SEDATION VOYAGE
ANATOMICAL & PHYSIOLOGICAL CONSIDERATIONS

A basic understanding of the anatomical structures and associated physiology as it relates to the use of pharmacological agents is necessary for the safe and effective administration of sedation dentistry. This section follows the voyage of sublingually delivered benzodiazepine as it journeys through various organ system. It is an overview of the most critical organ systems associated with conscious sedation in the dental office with an emphasis on normal anatomy and physiology in the healthy adult patient.

The organ systems that will be discussed are:

- Sublingual absorption
- Gastrointestinal
- Cardiovascular and Circulatory
- Central Nervous System
- Respiratory
- Hepatic
- Renal Systems

I. ORAL CAVITY: SUBLINGUAL ABSORPTION

Sedation drugs should be administered sublingually with medications crushed by a pill crusher.

Orally administered medications enter the body through the oral cavity and are either swallowed to pass into subsequent portions of the gastrointestinal tract where they are primarily absorbed in the small intestine, or pass through the sublingual mucosal membranes into the general circulation.

The sublingual plexus of blood vessels approximate the mucosal surface, allowing for soluble medications to pass through the mucosa, into the interstitial space, and into blood vessels, namely, the deep lingual vessels and their associated branches.

The sublingual space is exceedingly vascularized and, for medications that can dissolve in that space, provides an extremely efficient mode of delivery of drug. Sublingual administration permits very rapid absorption via the highly vascularized buccal mucosa. The active ingredients are absorbed directly into the blood stream. This then passes into the jugular vein and the superior vena cava.
This allows for bypassing the gastrointestinal tract and the liver and therefore avoids the first pass phenomenon of drugs normally absorbed through the gastrointestinal tract.

Many drugs that need rapid mode of action are designed to be absorbed sublingually, the most prominent of which is nitroglycerin. Onset of action of drugs that can be absorbed sublingually is often within a minute with rapid peaking of action.
II. GASTROINTESTINAL SYSTEM

The function of the gastrointestinal system is to transfer food and water from the external environment to the internal environment, where they can be distributed to the cells of the body by the circulatory system.

THE STOMACH

Very little absorption takes place in the stomach. The most important function of the stomach is to regulate the rate at which substances enters the small intestine, where most of the process of digestion and absorption takes place. In the absence of the stomach, a normal-sized meal moves so rapidly
through the small intestine that only a fraction of the food has time to be digested and absorbed.

The activity of the stomach is controlled by the autonomic nervous system. The most important factor controlling gastric emptying is the chemical composition and amount of partially digested food in the upper part of the small intestine (duodenum). When the duodenum contains fat, acid, or hypertonic solutions, or when it is distended, gastric motility is reflexly inhibited. Of these factors, fat in the duodenum is the most potent stimulus for the inhibition of gastric motility. The high fat content of eggs and milk may inhibit gastric emptying to the point where some of the meal may be found in the stomach after 6 hr. In contrast, a meal of meat and potatoes (protein and carbohydrate) may empty in 3 hr. It is therefore important to make the patient NPO after midnight to facilitate the transfer of the stomach content into the small intestines.

From a practical standpoint, asking the patient to be NPO after midnight would optimize the absorption of drugs administered.

THE SMALL INTESTINE

The small intestine is approximately 9 feet in length and can be divided into three segments: an initial short 8 inch segment, the duodenum, two much longer segments, the jejunum (3 ft.) and the terminal segment, the ileum. It is in the small intestine that most digestion and absorption occur.
The blood flow to the small intestine of a normal man at rest averages about 1 liter/min. or one-fifth the resting cardiac output. Much of what is absorbed from the small intestine enters the portal circulation for transport to the liver and its actions.

LIVER

Drugs absorbed throughout the gastrointestinal tract enters the portal circulation and is delivered to the liver via the portal system. Here, benzodiazepines are partially metabolized ("First pass " phenomenon). The remainder of the drugs enters the central circulation to be distributed throughout the body.

Liver is the major site of metabolism of all benzodiazepines. Detailed discussion of the metabolism of all of the drugs used in sedation protocols will be undertaken on Day 3 under the section of Pharmacology II.

III. CARDIOVASCULAR & CIRCULATORY SYSTEM

The cardiovascular system’s critical role in the maintenance of life lies in its ability to adequately perfuse vital organs and tissues with oxygenated blood, nutritive substances, as well as route blood to organs for purification and waste removal. Sedative drugs can affect the functioning of the primary organ of the cardiovascular system, the heart, through their effects on the respiratory and central nervous systems.
PERIPHERAL CIRCULATION

The peripheral circulatory system consists of a system of tubes called the arteries and veins and further subdivide into smaller vessels called arterioles and veinules and finally into fine vessels called capillaries.

Capillaries absorbed the nutrients and gather into the tubular beginnings of a return system with the formation of the venules. Venules converge to form larger vessels, the veins, which run parallel to the arteries. Two or more veins of equivalent size approach each other to form a larger one. The same principle applies to the formation of the larger veins of the extremities, head, and trunk until two major venous vessels are formed. These are the venae cavae, which conduct the blood from the superior and inferior body regions into the heart.

From the heart, blood is pumped into the systemic circulation by way of the large vessels, arteries. The arteries gradually become smaller and simpler as they diverge and repeatedly branch within all parts of the body. They continue as microscopic vessels, the arterioles, which finally divide into a network of tiny vessels, the capillaries, within the tissues and in proximity with the intercellular substance.
THE HEART

The heart consists of four chambers, two atria, and two ventricles. Blood coming into the heart from the superior and inferior vena cava will go into the right atrium. Blood would then go into the right ventricle and is pumped out via the pulmonary artery into the lungs. Here the blood becomes oxygenated and returns back to the heart via the pulmonary veins.

Blood would now enter into the left atrium and then the left ventricle. Contraction of the left ventricle would lead to pumping of the blood out of the heart into the systemic circulation via the aorta.

A. THE ELECTRICAL SYSTEM

The contraction of the heart within a cardiac cycle must be carefully synchronized if function is to be normal. This responsibility is attributed to a specialized system of tissues that depolarizes spontaneously. These impulses spread directly onto myocardial cells, igniting them to depolarize.
and contract. Essential components of this specialized system, as well as the sequence of their conduction, commence with the sinoatrial node (SA node), spreading through the atrioventricular node (AV node), bundle of His, and Purkinje fibers.

Because its spontaneous firing rate is greater than that of the others, the SA node normally functions as the heart’s pacemaker. The intrinsic firing rates of all these tissues are influenced by autonomic innervations: sympathetic fibers increase the rates, and parasympathetic fibers decrease the rates. Diseases in the SA node can cause rhythm abnormalities such as atrial fibrillation.

Atrial fibrillation is a relatively common cardiac arrhythmia. It is usually related to ischemia to the SA node, with resultant chaotic rhythm because of multiple random firings from different parts of the atria. Patients with atrial fibrillation are often on anticoagulants such as Coumadin to decrease the likelihood of thrombus formation in the atrium and embolic strokes from these thrombi.

Atrial fibrillation is the most common reason for a patient to be on Coumadin. In these patients, concerns over hemostasis need to be addressed.
The electrical event has to go down the conduction system to reach the ventricle. Abnormalities in the conduction system can result in heart block. A very slow heart rate can obviously cause significant problems with perfusion of vital organ. The tracing below shows a patient with complete heart block and a heart rate of 14 beats per minute:

Heart rate is controlled by the autonomic nervous system with the sympathetic system responsible for increasing the heart rate and the parasympathetic nervous system responsible for decreasing the heart rate.

The key component dictating the integrity of cardiac function is the perfusion of the heart via the coronary arteries. Coronary artery disease causes angina, myocardial infarction, heart block and arrhythmia.
B. CORONARY PERFUSION

Coronary arteries are responsible for delivery of oxygen to the heart. Inadequate perfusion results in angina or myocardial infarction as well as arrhythmia, including lethal arrhythmias such as ventricular tachycardia or ventricular fibrillation.

The major determinants of adequacy of coronary perfusion include:
1. Patency of the coronary arteries
2. Oxygenation of the blood (pO2 and, indirectly, SO2)
3. Hemoglobin content: anemia would decrease the oxygen carrying capacity.

Progression of a plaque or rupture of the cap of a plaque can result in acute blockage of the artery, with resultant myocardial infarction.

Acute myocardial infarction is a life-threatening event and can be complicated by congestive heart failure, arrhythmia, heart blocks and cardiopulmonary arrest.

It is therefore critical to carefully assess patients with respect to risk factors associated with coronary artery disease.

If critical coronary artery disease can be detected before complete occlusion, coronary intervention such as coronary stents and coronary artery bypass graft can be undertaken.
C. CORONARY DEMAND: BLOOD PRESSURE AND PULSE

The energy requirement of the heart is dependent upon:

1. Heart rate: increased rate increases energy demand
2. Pre-load: filling pressure of the heart determines adequacy of the circulatory volume
3. Afterload: Blood pressure

Arterial blood pressure fluctuates according to specific events in each cardiac cycle. The pressure is greatest during ventricular systole (systolic blood pressure) and is attributed to ventricular ejection. At the completion of systole the ventricles enter a period of rest (diastole), and their pressure decreases to zero. However, arterial pressure does not decline this far because, on closure of the aortic valve, resistance within the arterial system maintains a diastolic pressure. Vessel diameter and elasticity are the principal factors that determine the degree of arterial resistance and therefore diastolic pressure.
Normal Blood Pressure Numbers

**JNC 7: New BP Classifications**

<table>
<thead>
<tr>
<th>BP Level (mm Hg)*</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systolic</td>
<td>Diastolic</td>
</tr>
<tr>
<td>&lt; 120</td>
<td>and &lt; 80</td>
</tr>
<tr>
<td>120-139</td>
<td>or 80-89</td>
</tr>
<tr>
<td>140-159</td>
<td>or 90-99</td>
</tr>
<tr>
<td>≥ 160</td>
<td>or ≥ 100</td>
</tr>
</tbody>
</table>

*Use higher value for classification.
Chobanian AV et al. JAMA 2003;289:2560-2572.

Latest Classification of blood pressure for adults JCN VII guidelines

These guidelines have significant impact on dental interventions on hypertensive patients:

<table>
<thead>
<tr>
<th>BP Classification</th>
<th>Systolic mm Hg</th>
<th>Diastolic mm Hg</th>
<th>Lifestyle Modification</th>
<th>Dental Rx</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>&lt; 120</td>
<td>&lt; 80</td>
<td>Encourage</td>
<td>No Limitations</td>
</tr>
<tr>
<td>Pre-Hypertension</td>
<td>120-139</td>
<td>80-89</td>
<td>Yes</td>
<td>No Limitations</td>
</tr>
<tr>
<td>Stage I HTN</td>
<td>140-159</td>
<td>90-99</td>
<td>Yes</td>
<td>No Limitations inform patient</td>
</tr>
<tr>
<td>Stage II HTN</td>
<td>&gt;159</td>
<td>&gt;99</td>
<td>Yes</td>
<td>Selective non-stressful treatment only; Immediate MD Referral</td>
</tr>
</tbody>
</table>
D. IMBALANCE BETWEEN DEMAND AND SUPPLY

Coronary ischemia results when the cardiac demand outstrips supply. Angina is the result of reversible ischemia. Myocardial infarction is the result of irreversible ischemia.

Coronary ischemia promotes heart blocks and arrhythmias, including lethal arrhythmias that can result in cardiac arrest.

MONITORING OF CARDIAC FUNCTION

Blood pressure
Pulse rate
Rhythm
Should be recorded every 5 minutes during sedation

IV. NERVOUS SYSTEM: CENTRAL NERVOUS SYSTEM

THE BLOOD-BRAIN BARRIER

A complex group of blood-brain barrier mechanisms closely controls both the kinds of substances which enter the extra-cellular space of the brain and the rate at which they enter. The blood brain barrier is formed by fusion of foot processes from astrocytes of the brain. The barrier controls entry of substances into the central nervous system.
The barrier comprises both anatomical structures and physiological transport systems which handle different classes of substances in different ways. The blood-brain barrier mechanisms precisely regulate the chemical composition of the extra-cellular space of the brain and prevent harmful substances from reaching neural tissue.
THE BRAIN

The nervous system regulates the function of other systems of the body and provides for the awareness of changes which occur within the body or in its environment. It can be further divided into the central and peripheral nervous systems. The Central Nervous System is the site of action where sedative medications exert their pharmacologic effect, and consists of two main parts, the spinal cord and the brain. The brain is the portion of the central nervous system that concerns us most as sedation dentists. The primary divisions of the brain are the brainstem, cerebellum, and cerebrum. The brainstem is composed of the medulla, pons, and midbrain.

RETICULAR ACTIVATING SYSTEM

Running though the entire brainstem is a core of tissue called the reticular activating system. The reticular activating system is made up of the cerebral cortex, basal ganglia, limbic system, and other regions deep within the cerebrum. Some reticular activating system neurons are clustered together, forming “centers”. Reticular activating system is responsible for a variety of functions, including the state of consciousness. Within the reticular activating system are cardiovascular (blood pressure, heart rate, vascular tone), respiratory, and vomiting centers.

Sedation drugs exert its action by suppressing the reticular activating system. The goal is to decrease the state of consciousness.
However, since the RAS is also responsible for control of blood pressure, heart rate, vascular tone and respiratory function, these have to be carefully monitored during the sedation process.

**Gamma-aminobutyric acid (GABA)**

Most neurological transmission is mediated by neurotransmitters. These are chemical mediators that travel from the pre-synaptic neuron to the receiving cell (the post-synaptic neuron).
The transmission of signals by chemical neurotransmitters allows the body a means of fine regulation of nerve activation or inhibition.

The principal inhibitory neurotransmitter in the brain is gamma-aminobutyric acid (GABA).

The GABA receptor is located within a large protein complex that surrounds chloride ion channels (chloride ionophores) found in neuronal cell membranes. When GABA binds to this receptor, the channel opens, allowing greater numbers of chloride ions to enter the cell. This influx of negative ions hyperpolarizes the neuron, rendering it less responsive to excitatory signals. Some sedative agents can bind to the GABA-chloride ionophore complex and potentiate the influence of GABA-mediated opening of the chloride channels.

A. No GABA: chloride is on the outside of the neuron
A. GABA binds to receptor and causes influx of chloride ions
B. Benzodiazepine (BZ) enhances action of GABA
C. In the absence of GABA, BZ has no effect
Benzodiazepines act on GABA receptors in all parts of the brain and accentuate the inhibitory effects of GABA.

**MONITORING SEDATION**

- **Response to verbal commands**
  - Blood pressure
  - Pulse rate
  - Rhythm
  - Respiratory mechanics
  - Pulse oximetry

**V. RESPIRATORY SYSTEM**

The respiratory system is the most susceptible of all organ systems to adverse outcome associated with conscious sedation. Drugs used for these procedures can depress cardiovascular function directly, but adverse cardiovascular events are more likely caused by respiratory depression. Medications used for sedation can also cause loss of muscle tone in the posterior pharynx, resulting in upper airway obstruction by the tongue over the larynx.

**A. ANATOMY AND PHYSIOLOGY**

The airways are a system of tubes that connect the outside atmosphere and the gas exchanging surfaces of the lungs. The upper portion of the respiratory tree is the nasal and oral cavities, down through the larynx and trachea. The airway then divides into the right and the left main stem bronchi. From here, air would travel down to the smaller bronchioles and eventually to the alveoli, which are tiny air sacs within the lungs where gas exchange takes place.

At its most simple level, external respiration is the diffusing of gases between the alveoli and the pulmonary circulation, which is separated by the wall of each alveolus and each capillary. There are approximately 300,000,000 alveoli in the average adult human.

The diffusion of these gases (oxygen and carbon dioxide) is mediated by the partial pressures of the gases on either side of the membranes. In general, oxygen will diffuse from the external air through the membrane into the capillary blood of the alveoli. CO₂, on the other hand, will diffuse from the capillary blood into the air in the alveolar sac. These partial pressures of gases will lead to oxygenation of the blood in the pulmonary vessels and removal of CO₂ from the blood into the exhaled air.
Anatomy of upper and lower airways

Oxygen is transported from the lung capillaries to the systemic circulation, whereas the byproduct of cellular metabolism, carbon dioxide, is transported back to the lungs for expiration. Hemoglobin is a protein found in erythrocytes, the predominant cellular component of the blood, and is responsible for oxygen transportation throughout the body. High concentrations of oxygen in the lung capillaries favor the combination of oxygen and hemoglobin, conversely low oxygen tension in the peripheral tissues favors oxygen release. 85% of carbon dioxide is carried in the blood as sodium bicarbonate; the remainder is transported in the form of carboxyhemoglobin. Since venous circulation is characterized by a low O2 tension and a relatively high CO2 tension, the pressure gradient favors expiration of CO2 and diffusion of oxygen back into the lung capillaries.
The normal partial pressures of gases in the arterial system are:

- \[ pO_2 \] 100 mm of Hg
- \[ pCO_2 \] 40 mm of Hg
- pH 7.40

Intracellular respiration involves the exchange of gases between the blood and the tissue cells. Normal metabolic functions within the cells require oxygen for energy production and produce carbon dioxide as a byproduct. As intracellular oxygen levels decrease, and carbon dioxide levels rise, the pressure gradient is favorable for the diffusion of gases and the re-oxygenation of the cells. Energy production in the cell, utilizing oxygen and producing carbon dioxide, occurs in the mitochondria.
B. MECHANICS OF RESPIRATION

Normal in/outflow of gases into the respiratory system is mediated by differences in partial pressures and the rhythmic expansion of the chest cavity. During inspiration, the chest cavity expands through outward movement of the ribs and a downward movement of the diaphragm. This expansion of the lung creates a negative pressure gradient with the outside atmosphere and air enters the lungs and equilibrates the system. Upon expiration the opposite is true, the lung muscles relax and the diaphragm moves upward increasing intra-thoracic pressure and forcing air outward. Inspiration is characterized by muscular effort while expiration most commonly is passive, unless forced.

C. STIMULUS OF RESPIRATION

The respiratory center is located in the medulla and initiates neural impulses to respiratory muscles that generate inspiratory effort. The respiratory center is stimulated by two principal mechanisms, so-called hypercapnic and hypoxemic drives. Receptors for the hypercapnic drive are located within the respiratory center and are triggered by hydrogen ions produced by ionization of carbonic acid. In essence, the central receptors would drive respiration whenever the pCO2 level exceeds 45 mm Hg. This would result in CNS acidosis and would trigger respirations.
Sedation drugs would blunt the central hypercapneic drive to breathe. However, sedation drugs do not blunt the peripheral hypoxemic drive. This is mediated via receptors located peripherally, within the carotid and aortic bodies, and sense arterial oxygen tensions below 60 mm Hg (Oxygen saturation of <90%).

As sedation dentists we administer medications that can create hypoxic situations. It is therefore critical to keep oxygen saturation above 90%. This would allow the more sensitive central hypercapneic drive to guide respiration and avoid using the less sensitive peripheral hypoxemic drive to dictate the safety margin.

Different drug classes can produce differing levels of respiratory depression, as well as upper airway compromise related to loss of muscle tone in the posterior pharynx. For this reason the maintenance of a patent airway must always be paramount.
UPPER AIRWAY CONCERNS

Upper airway obstruction can be accentuated by improper head position. This can be corrected by repositioning the patient, proper use of a chair pad and appropriate positioning of the chin.

Upper airway difficulty is more commonly seen in obese patients.

Patients with sleep apnea are particularly prone to upper airway difficulties. Sleep apnea patients are ASA III patients and are not candidates for sedation until the dentist has had extensive experience and training.

D. MONITORING OF RESPIRATION

1. Look: watch rise and fall of the thorax during the procedure
2. Hear: listen for signs of airway obstruction
3. Pulse oximeter: keep SaO2 above 90%, with the understanding that levels below 90% reflects pO2 below 60 mm of Hg.

PULSE OXIMETER is a critical piece of equipment for sedation since changes in SaO2 is an exceedingly sensitive indicator of respiratory compromises.

It is important to point out that pulse oximetry measures oxygen saturation (SaO2), which is related to PaO2 indirectly via the oxyhemoglobin dissociation curve.

Oxyhemoglobin Dissociation Curve

SaO2 = oxygen saturation of the blood as defined as % of heme sites occupied by an oxygen molecule. Expressed in %. Measured by the Pulse Oximeter

PaO2 = partial atmospheric pressure of oxygen that is dissolved in the blood. Measured in mmHg. Oxygen molecules pass from alveoli to blood and from
blood to other oxygen poor cells across a passive diffusion gradient. Measured in mm Hg.

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 (PaO₂) – Normal
Below 90% saturation = 60 mmHg (PaO₂) – Danger!
Below 80% saturation = 45 mmHg (PaO₂) – Severe Hypoxia!

When the SaO₂ drops below 90%, the PaO₂ drops steeply, resulting in a substantial drop in the pressure that drives oxygen from the blood into oxygen poor tissues.

VI. HEPATIC SYSTEM

THE LIVER

The liver is the largest gland of the body, made up of myriads of microscopic hepatic lobules. The hepatic lobule is a hexagonal structure made up of
anastomosing plates of hepatic cells which radiate outward from a central vein. At the angles of the hexagons are strands of connective tissue through which course branches of the portal vein and the hepatic artery. During its passage the blood nourishes the liver cells and the contained food substances are withdrawn or acted upon by the hepatic cells. Many metabolic actions are performed simultaneously within the cytoplasm of the hepatic cells.

Hepatic functions of concern to us as sedation dentists include:

1. Synthetic function
   - Proteins
   - Cholesterol
   - Hormones
   - Clotting factors
2. Biotransformation
   - Detoxification
   - Metabolism

VII. RENAL SYSTEM

THE KIDNEY

The typical human kidney is composed of approximately 1 million tiny units, nephrons, all similar in structure and function. Each nephron consists of a vascular component (the glomerulus), and a tubular component. The renal
glomeruli form a tremendous blood filtering mechanism. All of an individual’s blood passes through the kidneys about 15 times an hour.

Metabolic wastes in the form of compounds such as urea are removed from the blood by filtration into the glomerular fluid. Many drugs, as well as substances toxic to the body, are also removed from the blood by this route.

The appearance of large numbers of epithelial cells, blood cells, or cellular debris is an indication of disease of the urinary system. In microscopic and chemical examinations of the urine (urinalysis) these elements are watched for. The appearance of large molecular proteins, such as albumin, is an indication that damage to the renal filter by disease is permitting them to escape from the blood.
WHAT TO SAY & NOT TO SAY

The success of a sedation appointment requires more than just administering medication. It is creating an experience whereby the patient’s psychological needs are met as well. The sensitivity of the sedation team to the patient’s emotional state involves using words and phrases that communicate positive images. In the presence of a hypnotic medication, these images are likely to result in a self-fulfilling prophecy.

TO SAY (Only say those things in the presence of a sedated patient that you want them to remember. Patients will remember what you say, not what they say):

1. I am not going to start work in your mouth till you are completely comfortable.

Patients need to hear this. In the back of their minds still lurk painful memories of past emotional trauma suffered during a dental appointment. If they can be reassured that this is your primary concern – their comfort, then this will go a long way in ensuring a successful experience for them – and you! Due to a reduction in the patient’s level of anxiety, less medication is often required, so not only is there less anxiety, but safety is enhanced.

2. You will have no pain or discomfort during the procedure.

While a properly sedated patient is less aware of uncomfortable stimuli, and they often require less local anesthesia, they are still capable of feeling discomfort. However, reassuring an anxious patient that they will not feel discomfort not only makes it more likely, it is what they need to hear when the decision to move forward hangs in the balance.

3. How are you feeling?

At least every five minutes the sedation team needs to elicit appropriate verbal responsiveness from the sedated patient. One way to do this is to simply ask them how they are doing. Their feedback not only establishes verbal responsiveness but gives the sedation team valuable information as to the comfort of the patient. If the sedation patient responds less than favorably, then the sedation team must not verbally recognize this discomfort, but reassure the patient while taking steps to correct the situation causing the discomfort.
4. Everything is going well.

A sedated phobic patient may have a tendency to “remember” where they are and act momentarily fearful. A soft and quick response reassures them how wonderful the process is going will wipe the anxiety away and allow them to once again relax. Do not give any details. The fear is in the details.

5. You are an excellent patient!

Unaccustomed to hearing compliments like this, the sedation patient tends to become what they are being praised for. Any behavior rewarded tends to be repeated.

6. Are you comfortable?

Even when a sedated patient asks you a question, especially one that you do not wish to answer, you can ask them a question in response that usually redirects any anxiety. “Are you comfortable?” or “Aren’t you glad that you are so relaxed and everything is going well?” are good re-directive questions. This can also be used every 5 minutes to check for an appropriate verbal response.

7. We finished the procedure as we had planned.

Sedated patients, not completely aware of the passage of time or the events of the appointment, need to be reassured that the appointment is going well and as planned. Although sometimes the plan must be altered due to unforeseen circumstances, and the patient has given you written permission to make such changes, they react much more favorably to being told that what they, as well as you, anticipated came to pass.

8. You just woke up. You have been sleeping for quite some time.

To a sedated patient, who has been totally comfortable any time during the appointment, but becomes startled by something, this statement helps them to recognize that they are safe and in good hands. A gentle reminder of their state of sedation helps to reinforce that the process is working. Please recognize that sleep is not appropriate for the visit, but since the depth of anterograde amnesia is profound, the patient will typically accept your statement as fact (although it is not) and relax once again.
9. Your teeth are looking very beautiful!

The sedated patient is hoping for the best possible outcome, and has placed their trust in you and your team. Letting them know during the appointment that their trust was justified increases their level of comfort, as well as making it more likely that they will also agree that their “teeth look beautiful” after their sedation wears off.

10. You are an excellent patient!

See #5 above.

WHAT NOT TO SAY:

1. You are a difficult patient.

Since, “THEY REMEMBER WHAT YOU SAY, NOT WHAT THEY SAY”, if you communicate they are uncooperative, you can bet that they will remain difficult for this appointment and most likely the next. Even if they are not cooperative you should say, “I am so impressed with how cooperative you are. You are an excellent patient.” This will most likely result in a better patient now and later.

2. It’s 11 o’clock.

Letting the sedated patient know what time it is often works against one of the greatest benefits of the sedation experience, that of not being aware of the passage of time. If they know they have been there for quite some time, they tend to look, act and feel fatigue and discomfort.

3. Your blood pressure seems abnormal.

“Doctor, come quick, the blood pressure alarm is going off!” These responses in front of the patient will result in more anxiety now and later. The entire dental team needs to be soft, gentle, easy and encouraging. As such, you will create patients just like you.
4. You look like you are going to get sick.

What you say might come to fruition, so only say something like this if you want them to vomit!

5. This is going to hurt.

Even when you are giving that painful palatal injection, don’t tell the patient it will hurt! They remember what you say, not what they say!

6. I’m sorry to hurt you like that.

The same thing applies as in #5 above. Remember, they will remember your words, not theirs. If they ask you why you hurt them? Answer: “You’re an excellent patient” and “Your teeth are looking beautiful”.

© DOCS Education 2009, All Rights Reserved
7. **At the next appointment we’ll pull out your teeth.**

*Even if this is your plan, using these words in this manner does not plant a positive image in the mind of your patient, especially one who is anxious and sedated. Instead, “spin” the anticipated treatment to the benefits – “At your next appointment, you’ll leave with that beautiful new smile you’ve always wanted”.*

8. **I am sorry, what was your name again?**

*What are the sweetest words in any language? Your name is. For some reason, dentists can remember every tooth in a patient’s mouth, but not their name. Please provide your patient with an environment that helps them through this difficult time by using their name often.*

9. **Hold your breath for as long as you can!**

*Again, be careful what you ask for! A patient under the influence of a sedative hypnotic medication can be surprisingly compliant with your requests. Obviously, normal and continuous breathing are in the best interests of the patient’s health.*

10. **Come on! Stay awake so I can do this bite check!**

*Always be encouraging. You can readily lighten a patient’s level of sedation to get temporary cooperation by stimulating them with a sweet drink of juice. Usually, 2 ounces provides 5 – 10 minutes of stimulation for an x-ray or a safe visit to the bathroom.*
Have you ever asked this question?

“Why is it, Mrs. Smith, that you are not committing to the dental treatment I recommended?”

And heard this response?

- “I’d rather not say”
- “It’s too much money”
- “I’m going to get a second opinion”
- “I’m not ready, I’ll call you”
- “I have a friend who knew somebody who had it done and they didn’t like it at all”

The best responses to these objections, as well as ways to prevent them from being raised are in the New Patient Packet.

WHAT THE PATIENT NEEDS TO HEAR BEFORE TREATMENT:
The Patient Information Program is an audio/video brochure that you can distribute to potential sedation patient candidates to prevent cancellations and no-shows, as well as set the stage for sedation treatment acceptance. These patient information tapes are professionally produced with audio and video patient interviews that can be viewed or listened to on any computer or listened to on any CD player. Ask your DOCS representative for availability.
Understanding *sedation psyche* will enable a practitioner to:
- Develop better diagnostic skills to assess fears
- Individualize treatment plans to reduce anxious behaviors that interfere with treatment
- Make better case presentations to avoid scaring off fearful patients
- Achieve more optimal pain and anxiety control
- Improve post-operative management
- Create a safe and welcoming environment that is non-threatening and non-judgmental

Patients who are fearful express themselves by describing their chief complaint:
- Pain or being hurt: 34%
- Lack of Control: 19%
- Embarrassment or being judged: 15%
- Noises like the drill or ultrasonic: 12%
- Panic attacks: 11%
- Others: 8%

Look for the signs of fear that manifest themselves in two categories:

**Behavioral Indicators:** These are the signs that are most prevalent in the reception room. Examples are: fidgeting with hands or objects; sitting on the edge of the chair leaning forward; pacing; changing sitting positions frequently; startled reactions to ordinary office noises and rapid head movement.

**Physiological Indicators:** These are the signs that are activated by the body due to the autonomic nervous system when the body is under stress. There are three indicators that are easy to observe and measure. The first is excessive perspiration seen on the palm of the hands, underarms, forehead and upper lip. Just shake the patient’s hand. The second indicator is the increased pulse and blood pressure – easily monitored with your pulse-oximeter. The last indicator is the respiratory depth and rate. Here you will observe rapid shallow breathing or a patient holding their breath.
EIGHT SEDATION PSYCHE LAWS:

1. Just because a patient seems to be cogent doesn’t mean they are. Many high fear patients will try to fight the effects of the sedative. They may appear to be free of the influence of our techniques, but are often putting on a show. They will forget most of what they say, and can be easily be relaxed with some simple relaxation techniques. Remember, they will remember what you say. A few of the techniques that can be used are “the placebo effect”, pacing and leading (slowly softening and slowing your voice) and providing a low concentration of nitrous oxide. Many times, just having a patient breath oxygen slowly and rhythmically through their nose is enough to break the fight.

2. Never give a fearful patients details of their upcoming or present appointment unless they specifically request it. If a patient requests more information, only give a small dose of it to test their tolerance to the information. Remember to observe their behavioral and physiological response to the information to determine if they are comfortable enough to understand more. **These patients require a level of trust in us, not an understanding of the procedures.** Many dentists and hygienists have to fight their natural tendencies to be a teacher and explain the details of a visit. Please, for the sake of the health of your new high fear patient, do not explain details unless asked. When asked during an initial appointment for information, recognize that the details maybe for a trusted love one to help them make a decision. Usually the high fear patient is too nervous to relay details to them anyway. So, we recommend that you ask how much detail the patient requires to make a decision and how much detail they need to convey to someone else if they are seeking counsel. Most of these patients will not review any written literature you give them, but it is helpful for there loved ones. Strong, encouraging descriptions like, “We are going to give you a new smile”, or “We will help you have a healthy mouth”, or “We are going to work on the top today” are the best type of responses when questioned for details during a sedation appointment.
3. **Remove all fearful stimuli from the operatory before escorting a fearful patient in.** The worst case scenario is when a patient is escorted into an operatory where all the instruments are laid out and a “helpful” dental professional explains what all the “tools” are for. These patients are programmed like computers to have reactions to certain words, sights, sounds, tastes and feels. In the psyche of the fearful patient, these “triggers” are followed by a series of events that are undesirable for the dental practitioner. The triggers elicit behavioral and physiological responses that are signals for the fearful patient to get out of there as fast as possible. Therefore, make the operatory a friendly and sparsely instrumented facility. Once the patient is sedated and their anxiety is relieved, bring out the “tools of the trade”.

4. **Always be encouraging.** The sedation patient psyche is not complicated regarding this issue. If we are encouraging and give praise often, the fearful patient remains relaxed and experiences a successful visit. This success is crucial to maintaining a lasting patient/doctor relationship. A fearful patient that continues to experience successful visits is most likely to complete their treatment plan and become a recare patient.

5. **To the sedation patient, the dental visit always goes as well as you and your team project that it went.** It is easy to project a successful visit to a patient when you complete 3 molar root canals (and fill to 1mm of the apex on all roots), extract (without breaking) a hopeless tooth with twisted roots and take (on the first try) a perfect full upper arch impress of 8 teeth. The question is… what if you weren’t so successful? Would you and your team be able to observe the 4th law of being encouraging? Would you be able to project the “feeling” of a successful visit, even if you overfilled 2 roots, underfilled 3 roots, broke the twisted hopeless tooth and pushed the root tip into the sinus and had to take the final impression 5 times and still had missed margins? Not that this has ever happened to you. But if it did, could you project a calm demeanor, treat your team with dignity and tell the patient that all is well? You must for the sake of your patient. You have the skill to come back another day and make it right. Your patient needs you to be confident, calm and project that all has gone as planned. You may have had to change the plan, but you can convey this detail to the patient the next day when both of you are better suited to handle the fact that an additional appointment or two is required.
6. **Raising your voice for cooperation is not yelling to the sedated patient.** Many of us grew up in households where a raised voice was a sign of anger and meant punishment was soon to come. Because of this, we as adults are less likely to raise our voices purposely, especially in a professional environment. There is a distinct difference between yelling and speaking loudly. The intent of yelling to express anger. The intent of raising one's voice when communicating with a sedated patient is to illicit cooperation from someone whose consciousness is slightly depressed. Can you hear the difference between a raised voice and a yelling one? To perform a needed task, such as taking a bite registration, it may be necessary to raise your voice to gain the appropriate amount of control with your patient to get him or her to bite completely and continuously for the time required. Remember to use additional stimulation, such as an ounce or two of Gatorade, to help bring the patient to a more cooperative level.

7. **Every visit must be a perceived success.** All high fear patients, no matter how many times they have been to your office, must perceive each experience as a pain-free, successfully completed appointment. This starts on the first appointment. Do not try to accomplish x-rays or an intraoral exam on the first appointment if you suspect that the patient may not tolerate this well. You are much better off waiting until they are sedated and will have little to no memory of the experience. Rules #5 and #6 apply here very well. If a sedation patient perceives an appointment as a failure, they are likely to regress to being a non-patient.

8. **Pain is subjective.** This is such a simple law, but is often overlooked. “You’re not feeling pain, that’s pressure,” or, “I haven’t done anything yet, how could you feel any pain?” Are good examples of how we sometimes miss the boat. **Pain is in the mind of the beholder.** High fear dental patients give us great examples of both of the extremes to this statement. These patients are so tuned into their own fear and pain that they often feel a needle before it touches the mucosa. Be respectful of this. Even if they are consciously sedated, please be slow, careful and use a topical anesthetic gel. On the other side of perception is when a high fear patient returns with a “very slight rubbing” of a new removable appliance and you observe that the flange of your appliance has created a
massive ulcer that has eroded the tissue thru to the bone. Pain is subjective. Respect this and your visits will go well.

Initial Visit:

Interviewing skills are paramount. Your ability to ask non-judgmental questions, use reflective listening skills and reply with non-critical responses is the key to the initial visit rapport. Here are a few good questions to ask a fearful patient on their first visit.

✔ What brought you in today?
✔ What was your last dental appointment like?
✔ If we work together to make your mouth/tooth feel better, what can I do to make you feel more comfortable?
✔ What is it like for you when you go to the medical doctor?
✔ Did you sleep OK last night?
✔ How do you feel this morning?
✔ When you went to the dentist before did you have nitrous oxide or a pill?

Steps to introduce x-rays:
1. Let the patient practice without pressure
2. Begin with easy positions and be flexible
3. Encourage breathing
4. Position head first
5. Count when placing film
6. Allow the patient to remove the film and holder after the x-ray has been taken (control)
7. Provide praise

When is a sedation patient ready to “do it” without the any sedative medication?

This is an important question that should be considered very carefully before proceeding. In order to ensure the best oral health of a sedation patient, what is more important: Getting the patient to come in for a prophylaxis or dental visit without the use of a sedative? Or preventing any possible set-back caused by painful or fearful stimuli? If a patient has avoid care for many years due to fear, and they are now comfortable receiving routine care while they are sedated, when is it appropriate to approach the possibility that they are ready to “do it” without a sedative? If you and the patient can answer the following questions in the affirmative, then they may be ready.

Do you and your patient think they can master the following required behavior?
- Radiographs without gagging
- Injections without jerking the head
- Rubber dam placement without choking
- Drilling without gripping the chair