



Chapter 7: Pain Management for the Dental Professional

3 CE Hours

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Learning objectives

- Understanding pain and identify the difference between acute and chronic pain.
- Describe the most prevalent pain types that dentists see in their health care setting.
- Understand the difference between the treatment modalities of acute and chronic pain.
- Describe temporomandibular joint disorders (TMJ) and temporomandibular disorders (TMD) pain management and treatment.
- Explain different treatment methods used for pain management with trigeminal neuralgia facial pain.
- Learn the two most common causes of lingual nerve and/or alveolar nerve injuries.
- Review key points regarding treatment of patients seen before and after an organ transplant.
- Review dental treatment and pain management before and after organ transplants.
- List guidelines strategies for dental professionals.

Introduction

After years of neglect, issues of pain assessment and management have captured the attention of health care professionals and the public. Factors that prompted such attention include the high prevalence of pain, continuing evidence that pain is undertreated, and a growing awareness of the adverse consequences of inadequately managed pain.

Pain is common. About 9 in 10 Americans regularly suffer from pain, and pain is the most common reason individuals seek health care. Each year, an estimated 25 million Americans experience acute pain due to injury or surgery and another 50 million suffer chronic pain. Chronic pain is the most common cause of long-term disability, and almost one third of all Americans will experience severe chronic pain at some point in their lives.

Understanding pain

Let's begin by understanding the definition of pain. In 1968, McCaffery defined pain as "whatever the experiencing person says it is, existing whenever s/he says it does." In breaking down this definition, you find that it:

- Emphasizes that pain is a subjective experience with no objective measures.
- Stresses that the patient, not the clinician, is the authority on the pain and that his or her self-report is the most reliable indicator of the pain.

In 1973, the International Association for the Study of Pain (IASP) defined pain as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage." This definition says that:

- Individuals not only feel the pain, they place it into an emotional context.
- Pain may be associated with tissue damage, but damage is not necessary for individuals to perceive pain.

For the purpose of this course, we will define acute and chronic pain as follows:

- Acute pain is the normal, predicted physiological response to an adverse chemical, thermal or mechanical stimulus and

is associated with surgery, trauma and acute illness. It is generally time-limited and is responsive to opioid therapy, among other therapies.

- Chronic pain is a state that is persistent and in which the cause of the pain cannot be removed or otherwise treated. Chronic pain may be associated with a long-term incurable or intractable medical condition or disease.

The following chart shows a comparison of the two types of pain.

Acute vs. chronic pain	
Acute	Chronic
Time element.	Persists more than six months.
Normal healing process.	Persists beyond the body's normal healing process.
Associated with physical trauma – break, strain, sprain.	Limited in physical pathology.
Clear explanation of pain.	No clear explanation of pain.

Acute vs. chronic pain	
Pain nerves send signals to spinal cord and pain is perceived.	Pain nerves and pain system are damaged.
Pain nerves send signals to spinal cord and person perceives pain.	Changes occur in the brain and spinal cord that control the pain message, increasing pain's volume and duration.

Acute vs. chronic pain	
Pain is described as physical: hurtful, stabbing.	Pain is placed in an emotional context, described as wrenching, grueling, frightening; the emotions then intensify the pain.
Pain is considered a warning signal telling the person to either act (pull hand away from stove) or rest (after sprain/strain/break).	Pain is a problem that doesn't respond well to normal treatments.

The complexity of pain

Chronic pain impacts:

- The economy, the provider, significant relationships, the person.
- The biological, social and psychological contributions to pain.
- The economy, the health care provider, significant relationships, the person.

Pain is the chief complaint of nearly 40 percent of patients seeking help from general practitioners, and an estimated 86 million Americans are affected by some form of chronic pain – more individuals than diabetes, heart disease and cancer combined. The costs associated with treatment of chronic pain are staggering with more than \$100 billion in treatment-related costs and lost work productivity. In addition to the financial strain, chronic pain is debilitating in several other ways, often contributing to decreases in quality of life through physical, relational, social and psychological losses. Back pain patients account for 75 percent of the above costs.

The impact on the health care profession is noteworthy. Health care providers often report frustration due to the 80/20 rule, which is that 80 percent of provider's time is taken up by 20 percent of his/her patient population, the difficult, chronic pain patient.

Significant relationships are often considerably affected. Family members sometimes feel they have lost their partner as an equal contributor – both financially and physically – to the home, and have lost their “best friend” because individuals in pain often resist recreational activities. Pain impacts children when they actually become caretakers – which they later resent.

Most importantly, pain affects the patient, and it affects him/her in a multitude of ways. Individuals frequently have decreases in functioning, significant relational problems, substance abuse, kinesiophobia, memory and cognitive impairments, mood disorders, and also may have suicidal ideation, intent or attempts.

Frequently, pharmacologic management is the treatment of choice in managing chronic pain; however it may not be sufficient for patients with physical and psychological losses. An increasing body of literature demonstrates that opioids may fail to provide efficacy and decrease functioning in many chronic pain patients; nonetheless, opioids continue to be among the most commonly prescribed medications, accounting for more than 235 million prescriptions.

Biological, social and psychological contributions to chronic pain

Biologically, pain is a signal that the body has been harmed. However, when pain progresses to chronic pain, the amount of pain a person feels is generally not well correlated with the extent of the injury.

Social contributions generally contribute to the biological involvement. For instance, we must consider incentives for staying in a sick role, including disability and secondary gain issues. We also must consider the U.S. culture – fast paced, lacking patience and holding expectations of immediate results. The fast-paced U.S. society is also highly encouraged by both the media and drug companies.

Psychologically, an individual's beliefs about pain or pain treatment contributes to management:

“Fear of pain and what we do about it is more disabling than pain itself.”

Patients who are more fearful are more hypervigilant to symptoms and may misinterpret symptoms. The fear increases physiologic arousal, which obviously increases the pain experience. Therefore, many variables go into determining how much pain a person perceives, including what the pain means to them and the context in which the injury occurred. It is always important to consider secondary gain issues, exaggeration for a purpose, and minimization.

Types of pain chronic or acute pain

The most prevalent chronic or acute pain types that dentists see in their patients are from:

- Temporomandibular joint (TMJ) pain and temporomandibular disorders (TMD).
- Trigeminal neuralgia.

- Lingual nerve and/or alveolar nerve injury.
- Patients seen before or after organ transplants.
- Patients with cancer.
- Oral surgery patients.
- Migraine headaches.

TMJ disorders

Temporomandibular joint and muscle disorders, commonly called “TMJ,” are a group of conditions that cause pain and dysfunction in the jaw joint and the muscles that control jaw movement. We don’t know for certain how many people have TMJ disorders, but some estimates suggest that over 10 million Americans are affected. The condition appears to be more common in women than men.

For most people, pain in the area of the jaw joint or muscles does not signal a serious problem. Generally, discomfort from

these conditions is occasional and temporary, often occurring in cycles. The pain eventually goes away with little or no treatment. Some people, however, develop significant, long-term symptoms.

Researchers are looking for answers to what causes these conditions and what are the best treatments. Until we have scientific evidence for safe and effective treatments, it’s important to avoid, when possible, procedures that can cause permanent changes in the bite or jaw.

The temporomandibular joint

The temporomandibular joint connects the lower jaw, called the mandible, to the bone at the side of the head – the temporal bone. If you place your fingers just in front of your ears and open your mouth, you can feel the joints. Because these joints are flexible, the jaw can move smoothly up and down and side to side, enabling us to talk, chew and yawn. Muscles attached to and surrounding the jaw joint control its position and movement.

When we open our mouths, the rounded ends of the lower jaw, called condyles, glide along the joint socket of the temporal bone. The condyles slide back to their original position when we close our mouths. To keep this motion smooth, a soft disc lies between

the condyle and the temporal bone. This disc absorbs shocks to the jaw joint from chewing and other movements.

The temporomandibular joint is different from the body’s other joints. The combination of hinge and sliding motions makes this joint among the most complicated in the body. The tissues that make up the temporomandibular joint also differ from other load-bearing joints, such as the knee or hip. Because of its complex movement and unique makeup, the jaw joint and its controlling muscles can pose a tremendous challenge to both patients and health care providers when problems arise.

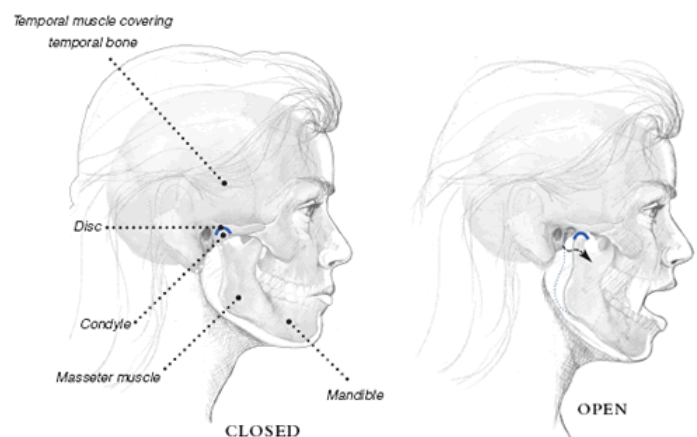
Disorders of the temporomandibular joint

Disorders of the jaw joint and chewing muscles – and how people respond to them – vary widely. Researchers generally agree that the conditions fall into three main categories:

1. Myofascial pain, the most common temporomandibular disorder, involves discomfort or pain in the muscles that control jaw function.
2. Internal derangement of the joint involves a displaced disc, dislocated jaw or injury to the condyle.
3. Arthritis refers to a group of degenerative/inflammatory joint disorders that can affect the temporomandibular joint.

A person may have one or more of these conditions at the same time. Some people have other health problems that co-exist with TMJ disorders, such as chronic fatigue syndrome, sleep disturbances or fibromyalgia, a painful condition that affects muscles and other soft tissues throughout the body. It is not known whether these disorders share a common cause.

People who have a rheumatic disease, such as rheumatoid arthritis, may develop TMJ disease as a secondary condition. Rheumatic diseases refer to a large group of disorders that cause pain, inflammation and stiffness in the joints, muscles and bone. Both rheumatoid arthritis and some TMJ disorders



involve inflammation of the tissues that line the joints. The exact relationship between these conditions is unknown.

How jaw joint and muscle disorders progress is not clear. Symptoms worsen and ease over time, but what causes these changes is unknown. Most people have relatively mild forms of the disorder. Their symptoms improve significantly or disappear spontaneously within weeks or months. For others, the condition causes long-term, persistent and debilitating pain.

Causes

Trauma to the jaw or temporomandibular joint plays a role in some TMJ disorders. But for most jaw joint and muscle problems, scientists don’t know the causes. For many people, symptoms seem to start without obvious reason. Research

disputes the popular belief that a bad bite or orthodontic braces can trigger TMJ disorders. Because the condition is more common in women than in men, scientists are exploring a possible link between female hormones and TMJ disorders.

There is no scientific proof that clicking sounds in the jaw joint lead to serious problems. In fact, jaw clicking is common in the general population. Jaw noises alone, without pain or limited jaw movement, do not indicate a TMJ disorder and do not warrant treatment.

The roles of stress and tooth grinding as major causes of TMJ disorders are also unclear. Many people with these disorders do

not grind their teeth, and many long-time tooth grinders do not have painful joint symptoms. Scientists note that people with sore, tender chewing muscles are less likely than others to grind their teeth because it causes pain. Researchers also found that stress seen in many persons with jaw joint and muscle disorders is more likely the result of dealing with chronic jaw pain or dysfunction than the cause of the condition.

Signs and symptoms

A variety of symptoms may be linked to TMJ disorders. Pain, particularly in the chewing muscles and jaw joint, is the most common symptom. Other likely symptoms include:

- Radiating pain in the face, jaw or neck.
- Jaw muscle stiffness.
- Limited movement or locking of the jaw.
- Painful clicking, popping or grating in the jaw joint when opening or closing the mouth.
- A change in the way the upper and lower teeth fit together.

There is no widely accepted, standard test now available to correctly diagnose TMJ disorders. Because the exact causes

and symptoms are not clear, identifying these disorders can be difficult and confusing. Currently, health care providers note the patient's description of symptoms, take a detailed medical and dental history and examine problem areas, including the head, neck, face and jaw. Imaging studies also may be recommended.

Facial pain can be a symptom of many other conditions, such as sinus or ear infections, various types of headaches and facial neuralgias (nerve-related facial pain). Ruling out these problems first helps to identify TMJ disorders.

Treatment or pain management

TMD treatment falls into two main categories: conservative/reversible and irreversible. Conservative treatments do not invade the tissues of the face, jaw or joint. These treatments are as simple as possible and are used most often because most patients do not have severe, degenerative TMD. Conservative approaches include self-care practices such as eating soft foods, applying heat or ice packs, and avoiding extreme jaw movements like wide yawning, singing and gum chewing. Learning special techniques for relaxing and reducing stress may also help patients deal with pain that often comes with TMD problems. Other conservative therapies may include education, pain control medication and physical therapy. Reversible treatments do not cause permanent changes in the structure or position of the jaw or teeth.

Irreversible treatments for TMD, which include surgical procedures, result in permanent alterations to the jaw joint or teeth. A research panel from the National Institute of Dental and Craniofacial Research (NIDCR) has emphasized that surgical treatments are indicated in only a small percentage of patients. When such treatment is necessary, however, it is essential the patient fully understand the reason for the treatment, the risks involved and other types of treatment that may be available. For patients who have already undergone surgery, additional operations should be considered only with great caution, as

the probability of success decreases with each additional intervention.

A form of occlusal adjustment irreversibly alters tooth structure by grinding down teeth to bring the bite into balance. The panel noted that there are no clinical trials demonstrating that this treatment is superior to noninvasive therapies. They recommended that more research be done to clarify the role of occlusal adjustment in the management of TMD.

TMD has been used to characterize individuals with a wide variety of symptoms and signs, such as pain in the face or jaw joint area; headaches, earaches, and dizziness; clicking sounds in the jaw joint; or locking of the jaw. The severity of these symptoms may range from painless clicking to serious debilitating pain and dysfunction.

Because more studies are needed on the safety and effectiveness of most treatments for jaw joint and muscle disorders, experts strongly recommend using the most conservative, reversible treatments possible. Conservative treatments do not invade the tissues of the face, jaw or joint, or involve surgery. Reversible treatments do not cause permanent changes in the structure or position of the jaw or teeth. Even when TMJ disorders have become persistent, most patients still do not need aggressive types of treatment.

Conservative treatments

Because the most common jaw joint and muscle problems are temporary and do not get worse, simple treatment is all that is usually needed to relieve discomfort.

Self-care practices

There are steps as a dental professional that you can recommend that may be helpful in easing symptoms, such as:

- Eating soft foods.
- Applying ice packs.
- Avoiding extreme jaw movements (such as wide yawning, loud singing and gum chewing).

- Learning techniques for relaxing and reducing stress.
- Practicing gentle jaw stretching and relaxing exercises that may help increase jaw movement. Recommend facial exercises appropriate for the particular condition.

Pain medications

For many people with TMJ disorders, short-term use of over-the-counter pain medicines or nonsteroidal anti-inflammatory drugs (NSAIDs), such as ibuprofen, may provide temporary

relief from jaw discomfort. Prescribe stronger pain or anti-inflammatory medications, muscle relaxants or anti-depressants to help ease symptoms.

Stabilization splints

If necessary, recommend an oral appliance, also called a stabilization splint or bite guard, which is a plastic guard that fits over the upper or lower teeth. Stabilization splints are the most widely used treatments for TMJ disorders. Studies of their effectiveness in providing pain relief, however, have been

inconclusive. A stabilization splint should be used only for a short time and should not cause permanent changes in the bite. The conservative, reversible treatments described are useful for temporary relief of pain – they are not cures for TMJ disorders.

Botox

Botox™ (botulinum toxin type A) is a drug made from the same bacterium that causes food poisoning. Used in small doses, Botox injections can actually help alleviate some health problems. The Food and Drug Administration (FDA) has approved Botox for the treatment of certain eye muscle disorders, cervical dystonia (neck muscle spasms), and severe

underarm sweating in addition to limited cosmetic use. Botox has not been approved by the FDA for use in TMJ disorders. Research is under way to learn how Botox specifically affects jaw muscles and their nerves. The findings will help determine whether this drug may be useful in treating TMJ disorders.

Irreversible treatments

Irreversible treatments that have not been proven to be effective – and may make the problem worse – include orthodontics to change the bite; crown and bridge work to balance the bite;

grinding down teeth to bring the bite into balance, called “occlusal adjustment”; and repositioning splints, also called orthotics, which permanently alter the bite.

Surgery

Other types of treatments, such as surgical procedures, invade the tissues. Surgical treatments are controversial, often irreversible, and should be avoided where possible. There have been no long-term clinical trials to study the safety and effectiveness of surgical treatments for TMJ disorders. Nor are there standards to identify people who would most

likely benefit from surgery. Failure to respond to conservative treatments, for example, does not automatically mean that surgery is necessary. If surgery is recommended, be sure the patient understands the reason for the treatment, the risks involved and other types of treatment that may be available.

Implants

Surgical replacement of jaw joints with artificial implants may cause severe pain and permanent jaw damage. Some of these

devices may fail to function properly or may break apart in the jaw over time.

Pain studies

Because pain is the major symptom of these conditions, NIH scientists are conducting a wide range of studies to better understand the pain process, including:

- Understanding the nature of facial pain in TMJ disorders and what it may hold in common with other pain conditions, such as headache and widespread muscle pain.

- Exploring differences between men and women in how they respond to pain and to pain medications,
- Pinpointing factors that lead to chronic or persistent jaw joint and muscle pain.
- Examining the effects of stressors, such as noise, cold and physical stress, on pain symptoms in patients with TMJ disorders to learn how lifestyle adjustments can decrease pain.
- Identifying medications or combinations of medications and conservative treatments that will provide effective chronic pain relief.
- Investigating possible links between osteoarthritis and a history of orofacial pain.

Trigeminal neuralgia

Trigeminal neuralgia (tic douloureux) is severe facial pain due to malfunction of the fifth cranial nerve (trigeminal nerve). This nerve carries sensory information from the face to the brain and controls the muscles involved in chewing. The condition is the most frequently occurring of all the nerve pain disorders. The pain, which comes and goes, feels like bursts of sharp, stabbing, electric shocks. This pain can last from a few seconds to a few minutes. It is an intermittent, severe pain that interferes with common daily activities such as eating and sleeping. People who have this pain live in fear of unpredictable, painful attacks that lead to sleep deprivation and undereating. This leads to irritability, severe anxiety, malnutrition, and suicidal depression is not uncommon.

There are three branches of the trigeminal nerve: the ophthalmic, maxillary and the mandibular. The pain of trigeminal neuralgia occurs almost exclusively in the maxillary

and mandibular branches. In most cases, the pain will be restricted to one side of the face and is most common in the maxillary nerve. The maxillary nerve runs along the cheekbone, most of the nose, upper lip and upper teeth. The mandibular nerve is the second most common affected; it runs along the lower cheek, lower lip and jaw.

In most cases, the cause is unknown, and doctors can rarely identify any disease of the trigeminal nerve or the central nervous system. Trigeminal neuralgia most frequently affects women older than 50 and occurs rarely in those younger than 30 years of age. These cases are usually linked to damage from diseases of the central nervous system, for example, multiple sclerosis, when an abnormally positioned artery compresses the trigeminal nerve near where it exits the brain. Rarely, trigeminal neuralgia results from damage due to herpes zoster (a viral infection) or compression by a tumor or from nerve damage or injury.

Symptoms

A defining feature of trigeminal neuralgia is the trigger zone – a small area in the central part of the face, usually on a cheek, nose or lip, that when stimulate, triggers a typical burst of pain. This can be caused by something as simple as the

wind hitting the face, eating and chewing, brushing the teeth, shaving or talking. The pain can cause severe malnutrition and dehydration; side effects of medications for it may cause drowsiness, sedation, nausea or vomiting.

Diagnosis

Although no specific test exists for identifying trigeminal neuralgia, its characteristic pain usually makes it easy to diagnosis. Physical examination of the head will help define other possible causes of this painful syndrome. An initial neurological examination to determine the presence of other conditions should be completed and may include CT scans or

an MRI of the head to determine other associated conditions, such as a skull or brain tumor, infection or neurological condition. Trigeminal neuropathy can be distinguished because it causes loss of sensation and often weakness in parts of the face. Trigeminal neuralgia does not.

Treatment

Specialist referral is recommended. People frequently require hospitalization for rapid pain control when their trigeminal neuralgia becomes unmanageable at home.

Between attacks, many people remain relatively pain-free, but others will experience a dull ache, suggesting physical compression of the affected nerve by either a blood vessel or some other structure.

Managing the pain often becomes very difficult, and it is especially important to work with the patient because with appropriate drug therapy, trigeminal neuralgia can almost always be controlled.

Typical analgesics are not usually helpful, but other drugs, especially certain anticonvulsants (which stabilize nerve membranes), may help. The anticonvulsant carbamazepine is usually tried first. Gabapentin or phenytoin, also anticonvulsants, may be prescribed if this is ineffective or has intolerable side effects. Baclofen (a drug used to reduce muscle spasms) or a tricyclic antidepressant such as amitriptyline – caution: may cause depression – may be used instead. A local anesthetic may be injected into or around the nerve (a nerve block) to provide temporary pain relief.

If the pain continues to be severe, surgery may be done. If the cause is an abnormally positioned artery, a surgeon separates

the artery from the nerve and places a small sponge between them. This procedure is called vascular decompression and usually relieves the pain for many years. If the cause is a tumor, the tumor can be surgically removed.

Often these treatments provide only temporary relief, and the patient continues to have even more severe pain. It is a

Lingual nerve and/or alveolar nerve injury

Lingual nerve injury or alveolar nerve damage can result in anesthesia (numb tongue), paresthesia (tingling) or dysesthesia (pain and burning) in the tongue and inner mucosa of the mouth or lips. This can be due to complication of tooth extraction of the wisdom teeth (third molar) or dental anesthetic injection (nerve block) for fillings or crowns. The result is chronic pain syndrome or neuropathy, and if the inferior alveolar nerve is involved, numbness of the lip.

Damage to the lingual nerve is a rare complication and it results in pain within the tongue and along the mucosa on the tongue side of the teeth (inner buccal mucosa). The pain can be burning, dull or achy or a combination of these, or it can be just numbness or a combination of numbness and pain. There is no regularity in the symptoms in this type of pain.

One of the reasons for this type of injury is from an anesthetic injection. The most common mechanism of injury is not known for sure. It includes trauma from the needle itself. One study documented by the Department of Oral and Maxillofacial Surgery at the University of California-San Francisco notes that during the procedure, the needle tip might have contacted bone and become bent. If this needle had pierced the lingual nerve on the way through, it could cause significant physical trauma when it was withdrawn. Many suspect that the injury is due to an intraneural injection of the local anesthetic, that is, an injection directly into the nerve itself. While the local anesthetic deposited just outside the nerve is relatively harmless, it may be neurotoxic if injected into the substance of the nerve itself. It may disrupt the nerve fibers and cause intraneural fibrosis. This is a rare injury, and there is no effective treatment at this

continuous cycle of trying to determine what to do next. As a last resort, the nerve may be cut surgically or by using a radiofrequency probe (heat) or gamma knife (radiation), or it may be destroyed by injecting a drug such as glycerol into it. Pain management in these situations is a difficult task; in most cases, the patient will continue to seek relief.

point. The incidence and exact mechanism of involvement still are unknown. Another study found that the nerve block can result in permanent involvement of the inferior alveolar nerve, lingual nerve or both. The 34 percent incidence of dysesthesia in the patients in this study is of concern. Of the local anesthetic agents used, prilocaine was found to be more frequently linked to cases of nerve involvement in this study. Permanent nerve damage can very occasionally occur as a result of an inferior alveolar nerve block. Knowledge of the risks and complications of local anesthesia is essential.

Another procedure that causes injury to the inferior lingual and/or alveolar nerves is during surgical tooth extraction for removal of impacted third molars (symptomatic and asymptomatic). This is the most common procedure performed by oral and maxillofacial surgeons. Impacted wisdom teeth occur because of a lack of space, obstruction or abnormal growth position. They can cause pain, swelling and infection and may destroy adjacent teeth and bone.

While it is clear that symptomatic impacted wisdom teeth should be surgically removed, it seems that extracting asymptomatic, disease-free wisdom teeth is not advisable, owing to the risk of damage to the inferior lingual nerve and alveolar nerve.

An understanding of the possible mechanisms leading to the nerve injury should reduce any occurrence. Careful assessment and documentation should follow a nerve injury, and early specialist referral be considered. There is no proven effective therapy at this point.

Pain management

The pain with these two situations can be quite debilitating, and these injuries are difficult to live with and to treat. Here are a few recommended treatment methods listed on the Facial Neuralgia Resources website, a patient-to-patient resource that is hosted by the Neurosurgical Service at Massachusetts General Hospital but is not associated with the hospital or Harvard Medical School.

- Specialist referral is recommended.
- Hypnosis and mind control, relaxation techniques.
- Pharmacologic drug options:
 - Antidepressant drugs:
 - Tricyclic antidepressants:
These drugs have been well studied. They are reported to reduce pain by 50 percent in about a third of patients. The side effects can be a problem for some people:

- Amitriptyline (Elavil®) – Member of the tricyclic antidepressant family.
- This is a commonly used first-line drug for chronic pain, including nerve pain. It may be the best drug available for chronic nerve pain, but it also has significant side effects. These include drowsiness and constipation among others. Typically, the dose used for nerve pain is less than that for treatment of depression. Many have reported excellent results with this medication. It may take weeks before the total effect is known.
- Nortriptyline (Pamelor®) – Also a member of the tricyclic antidepressant family.
- Some have found this choice to have fewer side effects than taking amitriptyline.

- Desipramine – Also a member of the tricyclic antidepressant family.
 - Selective serotonin-reuptake inhibitors.
- Other antidepressants:
 - Venlafaxine (Effexor®).
 - Another anti-depressant medication that has been used for chronic pain, with some success.
 - Bupropion SR.
 - This is a non-tricyclic antidepressant, which has recently been reported to be effective in treating neuropathic pain. The reference listed found that most patients reported a decrease in pain when on this medication. The most common side effects were dry mouth, insomnia and headaches. The long-term effectiveness was not studied, as the results were based on a six-week trial.
- Anticonvulsant drugs:
 - Carbamazepine – Thought to be effective for trigeminal neuralgia, but limited success for other painful sensory neuropathies. Oxcarbazepine is an analog that is better tolerated in some patients.
 - Neurontin is one of the newer anti-seizure medications that has been used with some success in treating chronic nerve pain. It is a very popular drug right now, although its mechanism of action is unknown. Optimal dosage is still being determined. It does have to be taken multiple times a day, because it does not last long (short half-life).
- Anti-arrhythmic drugs:
 - Mexiletine – Oral analogue of lidocaine (local anesthetic). Data is mixed as to whether it is at all helpful.
 - N-Methyl-D-aspartate glutamate antagonists.
 - Dextromethorphan – Beneficial in some, but causes significant sedation.
- Narcotic and non-narcotic analgesics:
 - Side effects and concern about addiction remain problems for the narcotics and treatment of chronic pain.
 - Oxycodone – Some data indicates it is somewhat effective, but with side effects.
 - Tramadol – May be as effective with fewer side effects.
 - Levodopa.
 - Topical agents.
- Others:
 - Lioresal (Baclofen®).
 - Usually used for muscle relaxation/spasticity, but has been used by some for chronic nerve pain. Mechanism of action is unknown.
 - Tramadol (Ultram®).
 - A pain reliever for moderate to severe pain.
 - Clonazepam (Klonopin®).
 - Clonazepam is a benzodiazepine, and is commonly used for seizures. It is used for chronic pain, but is generally not considered a first-line drug at this point.

Although spontaneous recovery of low-grade injuries is common, microneurosurgical techniques offer hope for more serious injuries.

Dental management of the organ transplant patient

Every year, more than 25,000 transplantation procedures are performed in the United States to replace solid organs, including the heart, intestine, kidney, liver, lung and pancreas. Patients with conditions including end-stage renal disease, severe diabetes, advanced heart disease and liver disease may undergo transplant procedures. Because advances in medical techniques and drug therapy have extended lives of organ

transplant recipients, you may treat some of these patients in your practice.

Organ transplant patients need specialized dental care. Their compromised health and immune systems place them at increased risk for systemic as well as oral infections. This must be considered when planning dental treatment before and after transplantation and requires consultation with the patient's physician.

Managing oral health before organ transplantation

Before treating a prospective transplant recipient, obtain and review the patient's medical and dental histories and perform a non-invasive initial oral examination (without periodontal probing). After the examination, discuss the current status of your patient's health and immune system and the degree of organ dysfunction with his or her physician. Decisions about the timing of treatment, the need for antibiotic prophylaxis,

precautions to prevent excessive bleeding and appropriate medication and dosage should be considered during your discussion. Whether a patient can tolerate dental treatment is another crucial concern. In some cases, it will be safer for patients to undergo extensive treatment after their transplant as the new organ improves their health.

Preparing for dental treatment

Several factors should be considered before starting treatment:

- **Antibiotic prophylaxis:** Decide with the patient's physician whether antibiotic prophylaxis is required to prevent systemic infection from invasive dental procedures. Unless

advised otherwise by the physician, the American Heart Association's standard regimen to prevent endocarditis (<http://www.americanheart.org/>) is an accepted option.

- **Infection:** If the patient presents with an active infection, such as a purulent periodontal infection or an abscessed tooth, antibiotics should be given to the patient before and after dental treatment to prevent systemic infection. Confirm the choice of antibiotic with the patient's physician.
- **Excessive bleeding:** Several factors can cause bleeding problems in organ transplant candidates, such as organ dysfunction or their medications. Many are anticoagulated, and some may have a decreased platelet count. Patients with end-stage liver disease may have excessive bleeding because the liver is no longer producing sufficient amounts of clotting factors. Before treatment, assess the patient's bleeding potential with the appropriate laboratory tests and take precautions to limit bleeding.
 - Consult with your patient's physician about whether anti-fibrinolytic drugs, vitamin K, fresh frozen plasma or other interventions are appropriate. The physician also may decide to temporarily decrease the patient's level of anticoagulation before extensive dental surgeries. Some patients are only suitable for surgery in a hospital setting or dental offices designed to handle emergency medical situations.
 - Use aggressive suctioning techniques when performing extractions or other invasive procedures to prevent your patient from swallowing blood. In a small number of patients with advanced liver disease, swallowed blood may increase risk for hepatic coma.
- Manage bleeding sites with careful packing and suturing techniques.
- **Medication considerations:** Patients preparing to undergo organ transplantation usually take multiple medications. These include anticoagulants, beta blockers, calcium channel blockers, diuretics and others. Be aware of the side effects of these medications, which range from xerostomia and gingival hyperplasia to orthostatic hypotension and hyperglycemia, and their interactions with drugs you might prescribe.

Likewise, use caution when prescribing medication to patients with end-stage kidney or liver disease. Many medications commonly used in dental practice, including NSAIDs, opiates, and some antimicrobials, are metabolized by these organs and are not removed from circulation as quickly in patients with markedly reduced kidney or liver function. Prior to dental treatment, consult the patient's physician on appropriate drug selection, dosage, and administration intervals.

- **Other medical problems:** Patients with end-stage organ failure may have other major medical conditions. A person with end-stage kidney disease, for example, may have diabetes and/or significant pulmonary or heart disease. Carefully review your patient's medical history to determine what additional treatment considerations your patient may have.

Dental treatment

Whenever possible, all active dental disease should be aggressively treated before transplantation, because post-operative immunosuppression decreases a patient's ability to resist systemic infection.

- Eliminate or stabilize sites of oral infection. Patients with active dental disease who can tolerate treatment should receive indicated dental care. Depending on the patient's condition, temporary restoration may be appropriate until his or her health improves.
- Extract non-restorable teeth.
- Consider removing orthodontic bands or adjusting prostheses for patients expected to receive cyclosporine after transplant, as some patients taking this drug will develop gingival hyperplasia. The overgrowth can be minimized with good

plaque control, and removing orthodontic bands may make it easier to maintain good oral hygiene.

- Conduct dental procedures on days that your patient with end-stage renal disease does not undergo hemodialysis.
- Counsel your patients about their oral health. Explain that effective oral hygiene is crucial before and after transplantation and that more frequent dental appointments may be necessary if new dental disease develops.
- Pay special attention to anxiety and pain tolerance in organ transplant patients.
- Instruct patients to bring a current list of their medications, including over-the-counter drugs, to every appointment and note those that may be problematic.

Managing oral health after organ transplantation

Except for emergency dental care, patients should avoid dental treatment for at least three months following organ transplantation. Dosage of immunosuppressive medications is highest in the early post-transplant period, and patients are at

greatest risk for rejection of the transplanted organ and other serious complications during that time. Once the graft has stabilized, typically three to six months post-surgery, patients can be treated in the dental office with proper precautions.

Preparing for dental treatment

Treatment after transplantation requires consultation with your patient's physician. The medical consult can help you understand your patient's general health and ability to tolerate treatment. Post-transplant patients vary widely in their ability to endure dental treatment and heal following invasive procedures. Your discussion needs to address whether your patient requires

antibiotic prophylaxis and whether the physician will need to adjust other medications before treatment.

- **Infection:** Patients who have undergone organ transplant surgery are at increased risk for serious infection. Bacterial, viral and fungal infections are more common, especially immediately after surgery. The decision to

premedicate for invasive dental procedures and selection of the appropriate regimen should be done in consultation with the patient's physician.

- **Medication considerations:** Organ transplant recipients may be taking one or more medications that affect dental treatment. Immunosuppressive agents can cause gingival

hyperplasia, poor healing and infections and may interact with commonly prescribed medications. Anticoagulant medications may contribute to excessive bleeding problems, whereas a patient taking steroids is at risk for acute adrenal crisis. The patient's physician may want to adjust these medications several days before an invasive dental procedure.

Dental treatment

All new dental disease should be treated after the patient's transplant has stabilized.

- Check your patient's blood pressure before you begin treatment. Know baseline levels for each patient and call his or her physician immediately if blood pressure exceeds accepted thresholds. Do not treat a patient when this problem is present.
- Examine the patient's mouth thoroughly for dental infection, because immunosuppressive medication can hide signs of a problem. As a result, infections are often more advanced than they appear when detected. Treat all infections aggressively.
- Know your patient's bleeding potential and take appropriate steps to manage excessive bleeding.
- Watch for signs of adrenal insufficiency with surgical stress in patients taking steroids. These patients may require

increased doses of steroids at the time of extensive dental procedures to avoid adrenal insufficiency syndrome. A person experiencing this condition may become hypertensive, weak, feverish and nauseated and should be transported immediately to a hospital for treatment.

- Exercise care in prescribing medications to avoid potentiating the renal and hepatic toxicities of immunosuppressants. Consult the patient's physician to ensure proper drug selection and dosing.
- Prescribe an antimicrobial rinse when appropriate.
- Recommend saliva substitutes and fluoride rinses for your patients with dry mouth.
- Advise your patients to follow a conscientious oral hygiene routine and emphasize the importance of oral health before and after transplantation.

Oral complications

Side effects from immunosuppressive drugs to prevent organ rejection are among the most frequent oral health problems affecting transplant recipients. Common immunosuppressive agents and their side effects include:

- **Cyclosporine:** Changes in liver/kidney function, hypertension, bleeding problems and poor wound healing are among the adverse effects of this potent agent, which also interacts with a number of other drugs. Gingival hyperplasia occurs in some patients; incidence varies and is dependent on each patient and his or her drug regimen. Calcium channel blockers, for example, may exacerbate the problem. Children tend to be more susceptible to gingival overgrowth than adults. Emphasize conscientious daily oral hygiene to all patients.
- **Tacrolimus:** An immunosuppressive agent used increasingly in place of cyclosporine, tacrolimus causes less gingival overgrowth but is associated with oral ulcerations and numbness or tingling, especially around the mouth.
- **Azathioprine:** Bone marrow suppression and related complications such as stomatitis and opportunistic

infections are significant side effects of this drug. A decrease in white blood cell counts and excessive bleeding may occur.

- **Mycophenolate mofetil:** This immunosuppressant is commonly used as an alternative to azathioprine. Adverse effects include decreased white cell counts, opportunistic infections and gastrointestinal problems.
- **Corticosteroids:** Hypertension and high blood glucose (steroid-induced diabetes) are among the numerous side effects of these drugs, along with increased risk for infection, poor wound healing and depression. Adrenal suppression may occur, making invasive dental and medical procedures more difficult for your patient. Corticosteroids may also mask the early signs of oral infection. The trend toward using lower doses of corticosteroids in combination with other immunosuppressants for post-transplant maintenance therapy has helped mitigate these side effects.
- **Sirolimus:** Side effects of this anti-rejection drug can include hypertension, joint pain, low white cell count, hypercholesterolemia and oral ulceration.

Marked immunosuppression

Several complications associated with marked immunosuppression manifest in the mouth, including oral candidiasis, herpes simplex/herpes zoster, hairy leukoplakia, aphthous ulcers and uncommon viral and fungal infections. Progressive periodontal disease, delayed wound healing and excessive bleeding also may become problems for these patients.

Notify the patient's physician if you notice signs of marked immunosuppression. In some cases, the dosage of anti-rejection agents prescribed for patients may need to be reduced. This may help control the opportunistic infections and other oral complications. However, there will be patients who must be maintained on high-dose immunosuppression to prevent organ rejection. Treatment of oral opportunistic infection is necessary in any transplanted patient.

Oral malignancies

Screen patients for oral malignancies at every appointment. Kaposi's sarcoma, lymphoma and squamous cell carcinoma of the lip are among the oral malignancies that sometimes occur

in organ transplant patients. Malignancies can occur decades earlier in transplant recipients than in people who are not immunosuppressed.

Organ rejection

If a patient's body begins to reject a transplanted organ, only emergency dental care may be provided. Talk with the patient's

physician about antibiotic prophylaxis or other special needs before treatment.

Points to remember

- Organ transplant recipients are growing in number and living longer, increasing demand for specialized dental treatment.
- Effective dental treatment can play an important part in these patients' lives by preventing serious infection.
- Stay in close contact with your patient's physician and tailor your treatment to meet his or her special needs.
- Pain management must be monitored with the patient's physician to avoid additional complications.

Cancer pain

Cancer pain is in a class all by itself. This pain includes pain caused by the disease, tumor, inflammation or infection of organs; infection, invasion of tissue, swelling of nerves or blood vessels; or diagnostic procedures or treatments, such as biopsy, postoperative pain, chemotherapy and radiation. This pain is normally classified as acute or chronic, and any treatment must be discussed with the cancer specialist treating the cancer to avoid complications with the ongoing cancer treatment, medications, bleeding or other factors.

Oral cancer is part of a group of cancers called head and neck cancers. Oral cancer can develop in any part of the oral cavity or oropharynx. Most oral cancers begin in the tongue and in the floor of the mouth.

Almost all oral cancers begin in the flat cells (squamous cells) that cover the surfaces of the mouth, tongue and lips. These cancers are called squamous cell carcinomas. When oral cancer spreads (metastasizes), it usually travels through the lymphatic system. Cancer cells that enter the lymphatic system are carried along by lymph, a clear, watery fluid. The cancer cells often appear first in nearby lymph nodes in the neck.

Cancer cells can also spread to other parts of the neck, the lungs and other parts of the body. When this happens, the new tumor

has the same kind of abnormal cells as the primary tumor. For example, if oral cancer spreads to the lungs, the cancer cells in the lungs are actually oral cancer cells. The disease is metastatic oral cancer, not lung cancer. It is treated as oral cancer, not lung cancer. Doctors sometimes call the new tumor "distant" or metastatic disease.

Two conditions in the mouth – leukoplakia and erythroplakia – actually can be precursors to cancer. Often caused by smoking or chewing tobacco, these (initially) benign conditions can occur anywhere in the mouth. Only a biopsy can determine whether precancerous cells (dysplasia) or cancer cells are present in a leukoplakia or erythroplakia.

- **Leukoplakia** – a condition characterized by a whitish patch that develops inside the mouth or throat.
- **Erythroplakia** – a condition characterized by a red, raised patch that develops inside the mouth.

Treatment for leukoplakias or erythroplakias may include use of retinoids – medications which are related to vitamin A – to eliminate, reduce, and/or prevent dysplasia from forming.

Patients with oral and pharyngeal cancers are at an even greater risk for depression than other cancer patients because of surgeries that alter their appearance and persistent pain.

Methods of treatment

Oral cancer treatment may include surgery, radiation therapy or chemotherapy. Some patients have a combination of treatments. At any stage of disease, people with oral cancer may have treatment to control pain and other symptoms, to relieve the side effects of therapy and to ease emotional and practical problems. This kind of treatment is called supportive care, symptom management or palliative care.

Migraine headaches: From 10-20 percent of individuals are estimated to suffer from migraine headaches, which generally start in childhood or adolescent years. Headaches include migraine with

and without aura, tension-type and cluster headaches. Headache disorders may be acute, chronic, or both. The symptoms, triggers and treatment vary with the headache type.

Typical symptoms of a migraine include:

- Moderate to severe pain, often on one side of the face, but sometimes both.
- Pulsating or throbbing quality to the pain.
- Nausea, sometimes with vomiting.
- The pain interferes with daily activities and increases with physical activity.

- Often preceded by sensory warning signs, referred to as an aura.
- Pain accompanied by extreme sensitivity to light, sound and smell.

Without treatment, pain can last up to 72 hours. The frequency varies from person to person. Treatment of migraine includes medications; physical approaches such as cold and heat; psychological approaches such as relaxation and biofeedback; and in some cases, regional anesthesia.

Quality of life

Patients who suffer from these types of pain deal with major levels of stress, anxiety, depression and cognitive dysfunction. This can cause social and economic problems because of their limited ability of function if the pain is not treated adequately. Inadequate control of chronic or acute pain can often lead to long-term or permanent unemployment as well as drug abuse and addiction.

There are many barriers to the treatment and assessment of the management of pain. There are many misconceptions about pain, and often the patient does not communicate the pain well to the health care provider. The high cost of medical care is also a burden, and often the patient is discouraged and gives up before finding a successful treatment plan. Many times the

Signs and symptoms of a migraine will often cause people to seek the help of a dental professional. These symptoms will begin in the sinus areas around the eyes, nose and forehead. Other symptoms include fever, stuffy nose, feeling tired, swollen lymph nodes and a green or yellow discharge from the nose. Often there will be swelling of the gums around the teeth and pain high in the cheeks. The pain varies from mild to severe and is worse in the early morning. It is most likely this is a migraine headache instead of a sinus infection or a dental problem.

patient declines additional treatment or therapy because he or she fears addiction.

Many dentists and health care providers also have a fear of causing addiction. Most of these patients have been on many different drugs, particularly opioids, trying to find the right treatment for their pain. But medications, including opioids, play an important role in pain management.

Although opioid therapy is appropriate for acute pain and palliative care, evidence now suggests that it may be neither safe nor effective in the treatment of chronic pain. In fact, it has been found that chronic use of opioids will frequently enhance pain sensitivity, although each dose may momentarily help.

Treatment modalities of acute and chronic pain

Acute	Chronic
Rest/elevation.	Re-conditioning/PT/OT.
Ice/heat.	Ice/heat.
Pain medication. Opioid therapy.	Research suggests that opioids are neither safe nor efficacious in the treatment of chronic pain. Neuroleptic and SNRIs are usually 1st line.
Taken care of by family/significant others.	Avoid enabling by family members; patient needs to gain control of self back.
	Emotional control, often through counseling.

Opioid therapy

Examples (not an extensive list):

- Morphine – Avinza, MS Contin, Oramorph.
- Codeine.
- Oxycodone – Percodan, Percocet, Oxycontin.

- Hydrocodone – Vicodin, Lortab, Lorcet, Norco.
- Fentanyl.
- Methadone.

Concerns with opioids

- Tolerance, dependence and addiction.
- Side effects including constipation, sexual dysfunction, cognitive decline, decreased reaction time or respiratory distress when combined with benzodiazepines.

Assessment of patient for opiate therapy

- Overall treatment history/compliance.
- Overt psychopathology, significant mood disorder, anxiety disorder or personality disorder.

- Active substance abuse.
- Beliefs and expectations (i.e., Percocet will take away all of my pain).

Opioid perspective

- Though the U.S. constitutes only 5 percent of the world's population, Americans consume 80 percent of the world's opiates.
- Prescription drug abuse has moved ahead of street drugs in terms of abuse, according to NIDA.

Guideline strategies for dental professionals

In addressing the issue of pain management, a dental professional should always establish a treatment plan and a set of goals for each patient. For acute pain, this is very important because it is more difficult to manage if permitted to become severe. Maintaining accurate records and a detailed treatment history, including details of treatment success or failure, is critical. These details should be verified by reviewing internal records, obtaining outside documentation and contacting other medical providers as necessary. Always keep the patient's family involved with the treatment if possible because it is an efficient way to monitor treatment progress and to help the patient's emotional well-being.

Some key recordkeeping components are as follows:

- **Evaluation of the patient**

An appropriate medical history and dental examination must be conducted and documented in the dental/medical record. The dental/medical record should document the nature and intensity of the pain, current and past treatments for pain, underlying or coexisting diseases or conditions, the effect of the pain on physical and psychological function, and history of substance abuse. The dental/medical records also should document the presence of one or more recognized dental indications for the use of a controlled substance.

- **Treatment plan**

The written treatment plan should state objectives to determine treatment success, such as targeted pain relief and improved oral-facial, physical and psychosocial function, and should indicate whether any further diagnostic evaluation or other treatments are planned. After treatment begins, the dental care practitioner should adjust drug therapy to the individual patient needs. Other treatment modalities or a rehabilitation program may be necessary, depending on the etiology of the pain and the extent to which the pain is associated with physical and psychosocial impairment.

- **Informed consent**

The dental care practitioner should discuss the risks and benefits of the use of controlled substances with the patient, persons designated by the patient, or with the patients' surrogate or guardian if the patient is incompetent or a minor. The patient should receive prescriptions from one dental care practitioner and one pharmacy where possible. If the patient is determined to be at high risk for medication abuse or has a history of substance abuse, the dental care practitioner may employ the use of a written agreement

- Screeners: SOAPPSM (Screener and Opioid Assessment for Patients with Pain) and COMM (Current Opioid Misuse Measure).

- Retail sales of five major pain killers rose nearly 90 percent between 1997-2005 (codeine, morphine, oxycodone, hydrocodone and meperidine).

between prescriber and the patient outlining the patient's responsibilities, including:

- Number and frequency of all prescription refills.
- Acknowledging reasons for which drug therapy may be discontinued (i.e., violation of agreement).

- **Periodic review**

At reasonable intervals based on the individual circumstances of the patient, the dental care practitioner should review the course of treatment and any new information about the etiology of the pain. Continuation or modification of therapy should depend on the practitioner's evaluation of progress toward stated treatment objectives, such as improvement in the patient's pain intensity and improved physical and/or psychosocial function, i.e. ability to work, need of health care resources, activities of daily living and quality of social life. If treatment goals are not being achieved despite medication adjustments, the dental care practitioner should reevaluate the appropriateness of continued treatment. He or she also should monitor patient compliance in medication usage and related treatment plans.

- **Consultation**

The dental care practitioner should be willing to refer the patient for additional evaluation and treatment as necessary in order to achieve treatment goals. Special attention should be given to those pain patients who are at risk for misusing their medications and those whose living arrangement poses a risk for medication misuse or diversion. The management of pain in patients with a history of substance abuse or with a comorbid psychiatric disorder may require extra care, monitoring, documentation and consultation with or referral to an expert in the management of such patients.

- **Dental/medical records**

The dental care practitioner should keep accurate and complete records to include:

- The medical history and dental examination.
- Diagnostic, radiographic, therapeutic and laboratory results.
- Evaluations and consultations.
- Treatment objectives.
- Discussion of risks and benefits.
- Treatments.
- Medications (including date, type, dosage and quantity prescribed).
- Instructions and agreements.
- Periodic reviews.

- Records should remain current and be maintained in a recognized “SOAP” (subjective, objective, assessment plan) format and be accessible and readily available for review.
- Compliance with controlled substances laws and regulations:

To prescribe, dispense or administer controlled substances, dental care practitioners must be licensed in their state and comply with applicable federal and state regulations. Dental care practitioners are referred to *The Physicians Manual of the U.S. Drug Enforcement*

Administration (and any relevant documents that may be issued by the state dental board) for specific rules governing controlled substances as well as applicable state regulations.

- **Anesthesia**

When administering any type of sedation or general anesthesia to a dental patient, dental care practitioners should refer to the American Dental Association’s “Guidelines for the Use of Sedation and General Anesthesia by Dentists.”

Conclusion

Pain is often untreated, and often there is doubt about whether it is real or even that there is any pain. The diagnosis of suspicious addiction and the management of chronic pain are very controversial and very difficult to determine. Addiction is a serious disorder that has significant morbidity and is life-threatening. Chronic and acute pain is also very serious and can cause major dysfunctional loss to a patient’s lifestyle,

physically, mentally and financially. The most important function in diagnosis for chronic or acute pain is the assessment of functional disability attributed to the pain to help determine the treatment plan. The primary goal is to help the patient ease the pain, learn to live with what it is and be able to maintain an overall quality of life.

PAIN MANAGEMENT FOR THE DENTAL PROFESSIONAL

Final Examination Questions

Select the best answer for each question and mark your answers on the Final Examination Answer Sheet found on page 148, or for faster service complete your test online at **Dental.EliteCME.com**.

1. Chronic pain is a state that is persistent and in which the cause of the pain cannot be removed or otherwise treated.
 - ☐ True
 - ☐ False
2. Conservative treatments invade the tissues of the face, jaw or joint.
 - ☐ True
 - ☐ False
3. Before treating a prospective transplant recipient, decisions about the timing of treatment, the need for antibiotic prophylaxis, precautions to prevent excessive bleeding and appropriate medication and dosage should be discussed with his or her physician.
 - ☐ True
 - ☐ False
4. Research has found that the use of opioids for chronic pain is appropriate and safe.
 - ☐ True
 - ☐ False
5. The written treatment plan should state objectives that will be used to determine treatment success, such as targeted pain relief and improved oral-facial, physical and psychosocial function, and should indicate whether any further diagnostic evaluation or other treatments are planned.
 - ☐ True
 - ☐ False