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KATHERINE KRATTENMAKER, RDH, BS; LIANA LU, RDH, BS; TZU-YU KO, RDH, BS; AND DIANNE L. SEFO, RDH, MEd

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NOVEMBER 2017
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Join Forces to Fight Diabetes

November is designated by the United States Department of Health and Human Services (HHS) as American Diabetes Month. Dental hygienists are familiar with the adverse effects of diabetes, including diseases of the eyes, kidneys, nerves, and much more. Of course, we are especially attuned to the oral effects of diabetes, most notably periodontal diseases. As oral health professionals, we are uniquely positioned to raise awareness about the risk factors for diabetes and to impact the incidence of this debilitating disease.

Diabetes is one of the leading causes of disability and death in the US. One in 10 Americans have diabetes—that's more than 30 million people.[1] And another 84 million US adults are at high risk of developing type 2 diabetes.[1] Dental hygienists typically provide professional care at least twice a year, so we can help change these statistics and improve the overall health of our patients.

A plethora of resources are available that provide information about diabetes and offer patient education materials. Here are a few of the nationally known and recognized organizations that provide current, evidence-based recommendations:

- HHS Office of Disease Prevention and Health Promotion
  healthfinder.gov/NHO/NovemberToolkit.aspx
- American Diabetes Association
  diabetes.org
- National Institute of Diabetes and Digestive and Kidney Diseases
  niddk.nih.gov/health-information/diabetes

The American Association of Diabetes Educators (AADE)—diabeteseducator.org—is another resource. The AADE is a multidisciplinary organization that strives to improve diabetes care through education, management, and support. With more than 14,000 members, the organization provides continuing education discounts, online courses and webinars, and reduced rates for its annual meeting. Beyond just membership in the AADE, oral health professionals can take the additional, but rather difficult, step to become a certified diabetes educator (CDE). Dental hygienists and dentists are not listed as health professionals who meet the qualification under discipline requirements. However, they can apply under the "unique qualifications pathway." This route involves more patient contact time and continuing education requirements than the traditional pathway. One dentist I know took nearly 3 years to meet the requisite number of hours to sit for the CDE certification exam. More information is available at the National Certification Board for Diabetes Educators: ncbde.org.

"As oral health professionals, we are uniquely positioned to raise awareness about the risk factors for diabetes and to impact the incidence of this debilitating disease."

As more patients are diagnosed with diabetes or prediabetes, it seems natural for dental hygienists and diabetes educators of all disciplines to join forces. We all want the same outcome: fewer individuals who experience the adverse effects caused by diabetes. Until such partnership takes place, we can continue to do our part to educate patients and keep them as healthy as possible.

Jill Rethman, RDH, BA
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REFERENCE
1. United States Department of Health and Human Services. American Diabetes Month. Available at: healthfinder.gov/NHO/novAnnounce.aspx. Accessed October 23, 2017.



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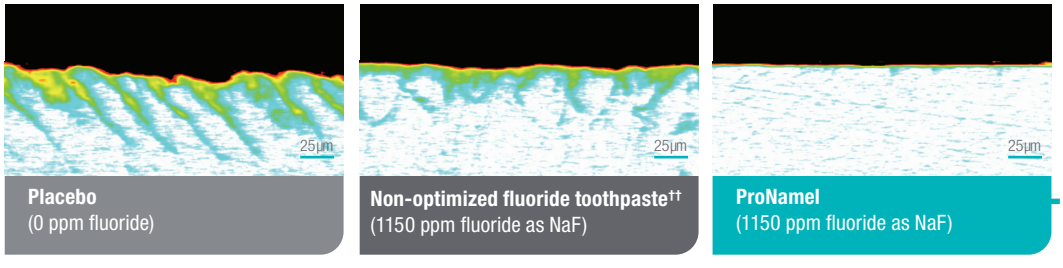
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From left to right: Marc Yale, International Pemphigus and Pemphigoid Foundation (IPPF) executive director; Nancy Burkhart, RDH, BS, MEd, EdD, recipient of the Dental Professional of the Year Award; and Kate Frantz, IPPF awareness program director.

Dental Hygienist Receives Award

Nancy W. Burkhart, RDH, BS, MEd, EdD, adjunct associate professor in the Department of Periodontics at Texas A&M University College of Dentistry, affiliate fellow, and *Dimensions of Dental Hygiene* Peer Review Panel member, received the Dental Professional of the Year Award from the International Pemphigus and Pemphigoid Foundation (IPPF) during the organization's 20th Annual Patient Conference held September 16, in Newport Beach, California.

Each year the IPPF—an organization focused on improving the quality of life for people affected by pemphigus and pemphigoid through early diagnosis and support—recognizes an oral health professional for going above and beyond to educate the dental community about these rare, autoimmune blistering diseases that affect the skin and mucous membranes.

Burkhart, who serves on the IPPF's Dental Advisory Committee, was surprised by the award. "I felt really honored to be recognized. The medical and dental professionals in the group are unbelievably talented, not only in their knowledge but also because of their caring personalities. There are so many people who contribute so much to this organization, and the patient support itself is beyond belief," Burkhart tells *Dimensions*.

Burkhart credits her work with the International Oral Lichen Planus Support Group, of which she is the founder and faculty co-host, as her largest contribution to the field. "Being part of the stomatology clinic at Texas A&M College of Dentistry has given me a wide perspective in the treatment of all patients with mucosal diseases, oral cancer, and rare types of pathology," she says.

Global Dental Hygiene Research Meeting Is a Success

More than 500 oral health professionals from around the globe convened in Ottawa, Canada, in October to discuss a range of oral health topics during the National Center for Dental Hygiene Research & Practice's fourth Global Dental Hygiene Research Conference. Together with the Canadian Dental Hygienists Association (CDHA), the conference, "Translating Knowledge to Action" gave dental hygienists throughout the world an opportunity to explore commonalities in research, education, and practice interests.



Jane L. Forrest, RDH, EdD

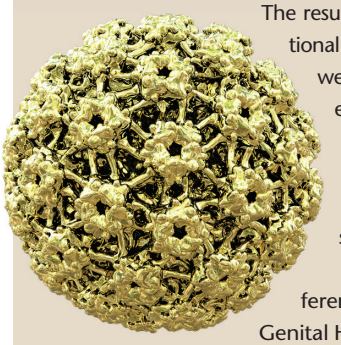
Each of the conference's 15 workshops focused on areas identified in the new CDHA and American Dental Hygienists' Association's (ADHA) research agendas: risk assessment and management, capacity building of the profession, access to care and unmet needs, alternative practice in the United States and Canada, and older adults and oral health.

Jane L. Forrest, RDH, EdD, director of the National Center for Dental Hygiene Research & Practice, professor of clinical dentistry at University of Southern California's Ostrow School of Dentistry, and *Dimensions of Dental Hygiene's* Editorial Advisory Board member, presented "Educators' Session: Engaging Students in Research at All Levels," with Joanna Asadoorian, RDH, PhD. This section discussed what faculty can do to integrate research throughout the curriculum. "Research supports evidence-based practice, which is integral to providing appropriate care to patients, so it is important that it be included at each level of education," Forrest explains.

In addition, she and members of the National Center for Dental Hygiene Research & Practice's Advisory Board hosted a workshop on "Jumpstarting Your Research Project," which featured a Q&A session to support participants in developing a successful project and provide networking opportunities with others who have similar interests.

Study Finds HPV Infection More Prevalent Among Men

A new study published in the *Annals of Internal Medicine* found that human papillomavirus (HPV) infection is much more prevalent among men than women.



The results are based on the 2011-2014 National Health and Nutritional Examination Survey in which oral, penile, and vaginal swabs were collected from participants, in addition to answers to a variety of health questions. The survey data revealed that one in nine men were infected with HPV and the overall prevalence of HPV was 11.5% in men compared with 4.2% in women. HPV 16, which is the strain most likely to cause cancer, was six times more common among men than women.

The study "Oral Human Papillomavirus Infection: Differences in Prevalence Between Sexes and Concordance With Genital Human Papillomavirus Infection, NHANES 2011 to 2014" was published in the October edition of the journal.

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Oraqix® is not for injection. Oraqix® should not be used in patients with congenital or idiopathic methemoglobinemia.

Please see Prescribing Information at dentsplysirona.com/oraqix.



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Local anesthetic for periodontal administration
Not for injection.

Oraqix®

(lidocaine and prilocaine periodontal gel) 2.5%/2.5%

INDICATIONS AND USAGE

Oraqix® is an amide local anesthetic indicated for adults who require localized anesthesia in periodontal pockets during scaling and/or root planing.

CONTRAINDICATIONS

Oraqix® is contraindicated in patients with a known history of hypersensitivity to local anesthetics of the amide type or to any other component of the product.

WARNINGS

Prilocaine can cause elevated methemoglobin levels particularly in conjunction with methemoglobin-inducing agents. Methemoglobinemia has also been reported in a few cases in association with lidocaine treatment. Patients with glucose-6-phosphate dehydrogenase deficiency or congenital or idiopathic methemoglobinemia are more susceptible to drug-induced methemoglobinemia. Oraqix® should not be used in those patients with congenital or idiopathic methemoglobinemia and in infants under the age of twelve months who are receiving treatment with methemoglobin-inducing agents. Signs and symptoms of methemoglobinemia may be delayed some hours after exposure. Initial signs and symptoms of methemoglobinemia are characterized by a slate grey cyanosis seen in, e.g., buccal mucous membranes, lips and nail beds. In severe cases symptoms may include central cyanosis, headache, lethargy, dizziness, fatigue, syncope, dyspnea, CNS depression, seizures, dysrhythmia and shock. Methemoglobinemia should be considered if central cyanosis unresponsive to oxygen therapy occurs, especially if metHb-inducing agents have been used. Calculated oxygen saturation and pulse oximetry are inaccurate in the setting of methemoglobinemia. The diagnosis can be confirmed by an elevated methemoglobin level measured with co-oximetry. Normally, metHb levels are <1%, and cyanosis may not be evident until a level of at least 10% is present. The development of methemoglobinemia is generally dose related. The individual maximum level of metHb in blood ranged from 0.8% to 1.7% following administration of the maximum dose of 8.5 g Oraqix®.

Management of Methemoglobinemia: Clinically significant symptoms of methemoglobinemia should be treated with a standard clinical regimen such as a slow intravenous infection of methylene blue at a dosage of 1-2 mg/kg given over a five minute period.

Patients taking drugs associated with drug-induced methemoglobinemia such as sulfonamides, acetaminophen, acetanilide, aniline dyes, benzocaine, chloroquine, dapsone, naphthalene, nitrates and nitrites, nitrofurantoin, nitroglycerin, nitroprusside, pamaquine, para-aminosalicylic acid, phenacetin, phenobarbital, phenytoin, primaquine, and quinine are also at greater risk for developing methemoglobinemia. Treatment with Oraqix® should be avoided in patients with any of the above conditions or with a previous history of problems in connection with prilocaine treatment.

PRECAUTIONS

General: **DO NOT INJECT** Oraqix® should not be used with standard dental syringes. Only use this product with the Oraqix® blunt-tipped applicator. Allergic and anaphylactic reactions associated with lidocaine or prilocaine in Oraqix® can occur. These reactions may be characterized by urticaria, angioedema, bronchospasm, and shock. If these reactions occur they should be managed by conventional means.

Oraqix® coming in contact with the eye should be avoided because animal studies have demonstrated severe eye irritation. A loss of protective reflexes may allow corneal irritation and potential abrasion. If eye contact occurs, immediately rinse the eye with water or saline and protect it until normal sensation returns. In addition, the patient should be evaluated by an ophthalmologist, as indicated.

However, Oraqix® should be used with caution in patients with a history of drug sensitivities, especially if the etiologic agent is uncertain. Patients with severe hepatic disease are at greater risk of developing toxic plasma concentrations of lidocaine and prilocaine.

Information for Patients: Patients should be cautioned to avoid injury to the treated area, or exposure to extreme hot or cold temperatures, until complete sensation has returned.

Drug Interactions: Oraqix® should be used with caution in combination with dental injection anesthesia, other local anesthetics, or agents structurally related to local anesthetics, e.g., Class 1 antiarrhythmics such as tocainide and mexiletine, as the toxic effects of these drugs are likely to be additive and potentially synergistic.

CARCINOGENESIS, MUTAGENESIS, IMPAIRMENT OF FERTILITY:

Carcinogenesis - Long-term studies in animals have not been performed to evaluate the carcinogenic potential of either lidocaine or prilocaine. Chronic oral toxicity studies of o-toluidine, a metabolite of prilocaine, have shown that this compound is a carcinogen in both mice and rats. The tumors associated with o-toluidine included hepatocarcinomas/ adenomas in female mice, multiple occurrences of hemangiosarcomas/hemangiomas in both sexes of mice, sarcomas of multiple organs, transitional-cell carcinomas/papillomas of urinary bladder in both sexes of rats, subcutaneous fibromas/fibrosarcomas and mesotheliomas in male rats, and mammary gland fibroadenomas/adenomas in female rats. These findings were observed at the lowest tested dose of 150 mg/kg/day or greater over two years (estimated daily exposures in mice and rats were approximately 6 and 12 times, respectively, the estimated exposure to o-toluidine at the maximum recommended human dose of 8.5g of Oraqix® gel on a mg/m2 basis). Complete conversion of prilocaine to its metabolite otoluidine on a molar basis is assumed. This gives a conversion on a weight basis of about 50% for prilocaine base (dependent on the molecular weights, i.e. 220 for prilocaine base and 107 for o-toluidine).

Mutagenesis - o-Toluidine, metabolite of prilocaine, was positive in Escherichia coli DNA repair and phage-induction assays. Urine concentrates from rats treated orally with 300 mg/kg otoluidine were mutagenic to Salmonella typhimurium in the presence of metabolic activation. Several other tests on o-toluidine, including reverse mutations in five different Salmonella typhimurium strains with or without metabolic activation, and single strand breaks in DNA of V79 Chinese hamster cells, were negative.

USE IN PREGNANCY:

Teratogenic Effects: Pregnancy Category B

There are no adequate and well-controlled studies in pregnant women. Because animal reproduction studies are not always predictive of human response, Oraqix® should be used during pregnancy only if the benefits outweigh the risks.

Nursing Mothers: Lidocaine and, possibly, prilocaine are excreted in breast milk. Caution should be exercised when Oraqix® is administered to nursing women.

Pediatric Use: Safety and effectiveness in pediatric patients have not been established. Very young children are more susceptible to methemoglobinemia. There have been reports of clinically significant methemoglobinemia in infants and children following excessive applications of lidocaine 2.5% topical cream (See WARNINGS).

Geriatric Use: In general, dose selection for an elderly patient should be cautious, usually starting at the low end of the dosing range, reflecting the greater frequency of decreased hepatic, renal, or cardiac function, and of concomitant disease or other drug therapy.

ADVERSE REACTIONS

A causal relationship between the reported adverse reactions and Oraqix® could neither be established nor ruled out.

Following SRP treatment with Oraqix® in 391 patients, the most frequent adverse events were local reactions in the oral cavity. These events, which occurred in approximately 15% of patients, included pain, soreness, irritation, numbness, vesicles, ulcerations, edema and/or redness in the treated area. Of the 391 patients treated with Oraqix®, five developed ulcerative lesions and two developed vesicles of mild to moderate severity near the site of SRP. In addition, ulcerative lesions in or near the treated area were also reported for three out of 168 patients who received placebo. Other symptoms reported in more than one patient were headache, taste perversion, nausea, fatigue, flu, respiratory infection, musculoskeletal pain and accident/injury.

OVERDOSAGE

Local anesthetic toxicity emergency: If other local anesthetics are administered at the same time as Oraqix, e.g. topically or by injection, the toxic effects are thought to be additive and could result in an overdose with systemic toxic reactions. There is generally an increase in severity of symptoms with increasing plasma concentrations of lidocaine and/or prilocaine. Systemic CNS toxicity may occur over a range of plasma concentrations of local anesthetics. CNS toxicity may typically be found around 5000 ng/mL of lidocaine, however a small number of patients reportedly may show signs of toxicity at approximately 1000 ng/mL. Pharmacological thresholds for prilocaine are poorly defined. Central nervous system (CNS) symptoms usually precede cardiovascular manifestations. The plasma level of lidocaine observed after the maximum recommended dose (5 cartridges) of Oraqix® in 11 patients exposed over 3 hours ranged from 157-552 ng/mL with a mean of 284 ng/mL 3 122 SD. The corresponding figure for prilocaine was 53-181 ng/mL with a mean of 106 3 45 SD.

Clinical symptoms of systemic toxicity include CNS excitation and/or depression (lightheadedness, hyperacusis, visual disturbances, muscular tremors, and general convulsions). Lidocaine and/or prilocaine may cause decreases in cardiac output, total peripheral resistance and mean arterial pressure. These changes may be attributable to direct depressant effects of these local anesthetic agents on the cardiovascular system. Cardiovascular manifestations may include hypotension, bradycardia, arrhythmia, and cardiovascular collapse.

Management of Local Anesthetic Emergencies: Should severe CNS or cardiovascular symptoms occur, these may be treated symptomatically by, for example, the administration of anticonvulsive drugs, respiratory support and/or cardiovascular resuscitation as necessary.

DO NOT FREEZE. Some components of Oraqix® may precipitate if cartridges are frozen. Cartridges should not be used if they contain a precipitate. Do not use dental cartridge warmers with Oraqix®. The heat will cause the product to gel.

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New CE Focuses on Cultural Competency

The continuing education article "Providing Ethical, Culturally Competent Care"—supported through an unrestricted educational grant from Philips—discusses the need for all patients to receive quality oral health care while being treated respectfully. As patients bring their own needs, expectations, and assumptions about their oral health to the appointment, oral health professionals can use the ethical principles of autonomy, nonmaleficence, beneficence and justice to help guide all facets of professional care. The piece is authored by Pamela Zarkowski, BSDH, MPH, JD, who serves as provost and vice president for academic affairs at University of Detroit Mercy, where she is also a professor in the School of Dentistry, Department of Patient Management. She is also a *Dimensions of Dental Hygiene* Editorial Advisory Board member.



The article provides two continuing education units with successful completion of the test and appears on page 37.

10th Annual 'Six Dental Hygienists You Want to Know' Unveiled In December

This year marks the 10th anniversary of *Dimensions of Dental Hygiene's* highly anticipated "Six Dental Hygienists You Want to Know" feature. Sponsored by Hu-Friedy, this unique look into different facets of the profession—academia, clinical practice, industry, "mover and shaker," public health, and research—from the perspectives of six noteworthy dental hygienists is a must read. The 2017 honorees will be announced in the December issue.

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*Survey of 1168 dentists, March 2016 *Clinicians Report*®, an independent, non-profit, dental education and product testing foundation.* Citation available at oracoat.com
†These statements have not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure or prevent any disease.
‡In people with diagnosed dry mouth who use 6 discs per day.

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Musculoskeletal Health: When to Seek PROFESSIONAL HELP

ORAL HEALTH PROFESSIONALS SHOULD UNDERSTAND THE COMMON SIGNS AND SYMPTOMS OF MUSCULOSKELETAL HEALTH PROBLEMS AND WHEN INTERVENTION IS NEEDED.

By Howell Tapley, PT, MSPT, PhD; Stasia Tapley, PT, DPT; and Tiffany Idlewine, PT, DPT, OCS

According to the National Institute for Occupational Safety and Health, work-related musculoskeletal disorders are common and may result in pain, limited motion, and weakness in the spine and extremities.[1] Dental hygienists are susceptible to musculoskeletal pain, especially in the neck, shoulder, and hand/wrist regions.[2,3] It is believed that awkward, prolonged working posture—such as bending, reaching, and standing—contribute to these conditions.[4,5] Like other health care professionals, dental hygienists experience psychological stress and anxiety at work.[6,7] Studies suggest that the psychological stress experienced by dental hygienists is related to musculoskeletal symptoms.[6,8] Studies on oral health professionals found that 58% of dentists have experienced headaches and dental hygienists may also be susceptible to tension headaches due to the nature of their work.[9,10]

Though prevention of musculoskeletal pain is preferred, sometimes pain and dysfunction are unavoidable. Dental hygienists should learn to recognize the common signs and symptoms associated with these pathologies. Better awareness of musculoskeletal problems and their treatments may result in improved long-term outcomes. Research has demonstrated that individuals who seek early intervention for musculoskeletal pain are eight times less likely to develop chronic pain.[11]

COMMON MUSCULOSKELETAL PROBLEMS

Muscle pain, or myalgia, is a common condition that affects most people at some point. It can vary from mild aches to severe, incapacitating muscle spasms.[12] A muscle spasm is an involuntary contraction of one or more muscles. Muscle spasms are frequently referred to as "muscle cramps," which may be related to dehydration, poor circulation, or lack of minerals in the diet. However, muscle spasms are also the result of overuse and excessive strain of the muscle unit.[13] The prolonged standing and awkward reaching postures commonly performed by dental hygienists, for example, may result in muscle tension in the spine and neck areas.

Tendonitis occurs when there is inflammation of the muscle tendon, or the muscle's attachment to the bone. It often happens after excessive, repetitive motions such as gardening, painting, and playing tennis. It is common in the upper extremities, especially the base of the thumb, elbow, and shoulder; although it affects the lower extremities, as well.[14] Tendonitis is frequently included in descriptions of cumulative trauma disorders, also known as repetitive strain injuries, which are the largest cause of occupational disease in the United States.[15] Repetitive

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TABLE 1. Red/Yellow Flags That May Signify More Serious Pathology Than Musculoskeletal Injury

- Severe, unremitting pain
- Pain unaffected by medication or position
- Severe night pain
- Severe pain with no history of injury
- Severe muscle spasm
- Incontinence
- Prolonged fever
- Ringing in the ears
- Dizziness
- Blurred vision
- Sensitivity to light
- Abnormal sweating
- Generalized and unexplained weakness
- Elevated heart rate not associated with activity

upper extremity motions routinely performed by dental hygienists may predispose this group to inflammatory conditions.

Bursitis is inflammation of the bursae, or the fluid-filled sacks in the body designed to reduce friction. Trauma to the area or excessive motion can lead to increased amounts of fluid in the bursae, causing pain. Bursitis is common in the elbow, shoulder, and hips.[16] The inflamed bursae often can be palpated as a fluid-filled sack, thus distinguishing it from tendonitis. As the bursae is not directly in series with contractile tissue, the pain may not be reproduced with muscle contraction or stretching. However, the area is typically extremely sensitive to touch and these criteria help a trained clinician reach an accurate diagnosis.

According to the Arthritis Foundation, more than 50 million Americans experience some form of arthritis; it is the number one cause of disability in this country. Osteoarthritis or "wear and tear" arthritis is the most common form. Osteoarthritis results from an erosion of the normal cartilage within a joint, reducing the joint space available for normal motion. Common symptoms include morning stiffness or stiffness after prolonged rest, and pain and swelling in the joints after use. There is no specific cause of osteoarthritis; however, genetics, obesity, injury, and overuse may be contributing factors.[17] The repetitive movements involved with dental hygiene practice may make these professionals more susceptible.

Fibromyalgia is a condition that can result in widespread chronic pain that frequently presents as musculoskeletal symptoms. It is not a specific disease but rather a group of symptoms that also include memory problems, fatigue, and mood changes. Unlike osteoarthritis, it does not lead to joint or muscle damage. Fibromyalgia affects nearly 4 million Americans most of whom are women between the ages of 40 and 75. Fibromyalgia is diagnosed when a certain identifiable pattern of symptoms is present, when pain has lasted at least 3 months, and when no other medical diagnosis explains these symptoms.[17]

Tension-type headache is the most common type of headache and affects more women than men.[18,19] Research suggests that psychological stress in dental hygienists may be related to musculoskeletal pain.[20,21] In addition to headache, individuals may sense tension in the neck, upper shoulders, and back.

WHEN TO TAKE ACTION

First, some serious medical conditions present as musculoskeletal pain. It is vital that individuals identify certain "red and yellow flags" that may help distinguish between typical musculoskeletal pain syndromes and serious pathology. Some of these signs and symptoms are presented in Table 1.[22] Dental hygienists who experience these symptoms should seek immediate assistance from a physician or equivalent medical professional.

TABLE 2. PRICE Treatment for Acute Injury

P - Protection
R - Rest
I - Ice
C - Compression
E - Elevation

In many situations, musculoskeletal pain is self-limiting. An individual may find he/she experiences pain after excessive activity, then within a few days the symptoms have resolved. Self-treatment can be effective during this time. The "protection, rest, ice, compression, elevation" (PRICE) method is commonly employed for acute musculoskeletal injuries (Table 2).[23] The procedure can begin at home or the workplace immediately after perceived symptoms and frequently will be curative for minor injuries. However, should pain, stiffness, or inflammation persist for more than a week, formal intervention may be needed. In addition, if pain is severe in the early stages of injury, individuals should seek medical attention immediately. Other considerations include more atypical symptoms, such as numbness/tingling and muscle weakness, which could be indicative of a significant soft tissue sprain or neurological involvement.

HOW TO TAKE ACTION

When dental hygienists determine the threshold has been met to seek medical assistance for musculoskeletal pain, they have multiple options. For example, they may seek help from a family physician, occupational health physician, orthopedic surgeon, nurse practitioner, physician assistant, chiropractor, massage therapist, or physical therapist. These professionals have varying levels of training and areas of expertise. In rural areas, nurse practitioners and physician assistants may be more accessible.

When dental hygienists seek help through a physician or physician extender, they will typically receive an evaluation that may include X-rays or magnetic resonance imaging (MRI). X-rays are usually included if trauma was involved or if joint space narrowing from arthritis is suspected. MRI is typically ordered to diagnose potentially serious soft tissue injuries, such as herniated discs in the spine or ligament and



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[1] Croft L. Int J Periodontics Restorative Dent. 2003. [2] Compared to other Cavitron models.

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FIGURE 1. Physical therapy intervention.

tendon ruptures in the extremities. Physicians, nurse practitioners, and physician assistants will typically order anti-inflammatory, muscle relaxant, or pain medications as needed. They may refer the patient for physical therapy. Physical therapists are doctoral-trained health care providers who specialize in the evaluation and treatment of movement disorders that may be related to musculoskeletal pain. In addition, physical therapists now have more extensive practice acts in every state, thus allowing patients to directly access their services without a physician referral.

According to the American Physical Therapy Association's *Guide to Physical Therapist Practice 3.0*, physical therapists practice according to the Patient Client Management Model: examination, evaluation, prognosis, diagnosis, intervention, and outcomes.[24] Dental hygienists seeing a physical therapist for their musculoskeletal complaint should expect to be examined and have these findings evaluated by the therapist. They should receive some type of movement-related diagnosis and an associated prognosis, indicating the potential for improvement. Common physical therapy interventions include therapeutic exercise; manual therapy (Figure 1); neuromuscular reeducation; gait training; functional training; work/home reintegration; physical agents, such as therapeutic ultrasound and various forms of electrical stimulation; posture and positioning techniques; and patient education. Finally, the physical therapist should determine outcomes and whether the goals set for treatment were met. Outcomes will typically include short-term measures of pain and physical function, such as range of motion and strength. Long-term impact, such as return to functional activities and normal social roles, is considered vital as they may more closely assess quality of life.

SUMMARY

Dental hygienists are susceptible to musculoskeletal pain secondary to work-related positions and postures. Early detection and treatment may result in better long-term outcomes including decreased re-occurrence and less work absence, resulting in enhanced job satisfaction and improved work longevity. Dental hygienists should seek more knowledge of musculoskeletal pathologies in order to make informed decisions. Multiple treatment options are available to help oral health professionals improve their quality of life with daily and work-related activities if they take the initiative to seek professional help. D

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01 ☐ 0–2 02 ☐ 3–5 03 ☐ 6–9
04 ☐ 10–15 05 ☐ 16–20 06 ☐ 20+

3. On average, how many days per week do you practice?

01 ☐ 1 02 ☐ 2 03 ☐ 3
04 ☐ 4 05 ☐ 5 06 ☐ 6

4. What type(s) of setting do you practice in?

01 ☐ General 02 ☐ Educational Institution
03 ☐ Prosthodontic 04 ☐ Pediatric
05 ☐ Periodontic 06 ☐ Public Health

5. How many dental offices do you work in?

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A CLOSER Look at MOUTHRINSES

THIS ADJUNCT TO SELF-CARE REGIMENS CAN HELP PATIENTS IMPROVE THEIR ORAL HEALTH.



STOCKBYTE/GETTY IMAGES

By Marisa Gregoire, AAS, and Kaitlin Karalunas, RDH, PHDHP, BS

The use of mouthrinses can benefit patients' oral health in a variety of ways—from reducing caries risk to supporting periodontal health. Therapeutic mouthrinses are meant to inhibit oral disease, such as caries and gingivitis. They contain chemotherapeutic agents designed to reach hard or soft tissues and ingredients may be added to increase the longevity of therapeutic action.[1] Cosmetic mouthrinses are typically indicated to freshen breath, remove stain, and improve the appearance of teeth. They may include botanical ingredients to combat oral malodor. Depending on the intended outcome, each mouthrinse contains its own proprietary combination of ingredients.

Mouthrinsing is not a replacement for mechanical plaque removal, but it can serve as a helpful adjunct, especially among patients who struggle with effective self-care and prefer the ease of mouthrinse use.[2,3]

CETYLPYRIDINIUM CHLORIDE

A broad-spectrum antiseptic, cetylpyridinium chloride (CPC) has been traditionally used to combat oral malodor.[4] CPC, a quaternary ammonium compound, is approved by the United States Food and Drug Administration (FDA) as an antimicrobial agent for controlling plaque-induced gingivitis when used in the range of .045% and 0.1%.[5] CPC adheres to biofilm's surface, helping to reduce the buildup of plaque.[6] The substantivity of CPC is between 3 hours and 5 hours. CPC-containing mouthrinses have some side effects. Studies report staining of the teeth and tongue, gingival irritation, and increased risk of aphthous ulcers.[7,8]

HYDROGEN PEROXIDE

Hydrogen peroxide remains the most widely used whitening agent in cosmetic mouthrinses due to patient demand for whiter, brighter teeth. Hydrogen peroxide is effective in whitening teeth due to the ability to easily pass into the dentin and break down the molecules that cause tooth discoloration.[9] This process occurs when hydrogen peroxide reacts with the organic material in the tooth enamel.[10] Long-term use of mouthrinses containing hydrogen peroxide may cause adverse effects on soft tissues.[11]

ALCOHOL

All mouthrinses with the American Dental Association (ADA) Seal of Acceptance designated as antiplaque and antigingivitis medicaments contain alcohol.[12] Alcohol, or ethanol, is commonly added to mouthrinses and serves multiple purposes. Ethanol helps to dissolve the mouthrinse's active ingredients and it acts as a preservative to create a longer shelf life. Misinformation abounds about whether the



MARISA GREGOIRE, AAS, (left) is a recent graduate of the Fortis Institute Dental Hygiene Program in Scranton, Pennsylvania. She worked as a dental assistant in general practice for 6 years before enrolling in the dental hygiene program. Gregoire plans to begin a baccalaureate degree program and has a keen interest in research.

KAITLIN KARALUNAS, RDH, PHDHP, BS, (right) is an instructor of dental hygiene at the Fortis Institute. She is also a graduate student at St. Francis University in Loretto, Pennsylvania. Karalunas' research interests include public health, access to care, and ethics.



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alcohol in mouthrinses causes xerostomia. Research shows, however, that this is not the case.[12–14] Two studies found that rinsing with an alcohol-containing mouthrinse did not negatively impact salivary flow.[13,14] Patients who have or are recovering from alcohol addiction are contraindicated for alcohol-containing mouthrinses.[12]

FLUORIDE

Products containing fluoride reduce caries risk among adults and children when used as instructed. Fluoride mouthrinses primarily work by protecting the teeth from harmful acids. These mouthrinses reduce the numbers of caries-causing bacteria, including *Streptococcus mutans*, and help remineralize soft enamel.[15–17] Fluoride uptake is directly related to the mineralization of tooth structure. Hypomineralized areas of enamel absorb fluoride at a higher rate than healthy enamel. The hypomineralized areas incorporate into hydroxyapatite structures to become fluorapatite. The areas remineralized by fluoride are stronger than the original enamel.[18] Mouthrinses containing stannous fluoride also offer antimicrobial properties.

CHLORHEXIDINE GLUCONATE

Chlorhexidine gluconate (CHX) is effective in controlling plaque and inhibiting bacterial colonization.[15,19] It has a broad antibacterial effect by causing cell lysis. CHX mouthrinse is available by prescription and can reduce gingivitis and *S. mutans* in the oral cavity. An alcohol-free version is available.

DELMOPINOL HYDROCHLORIDE

Delmopinol hydrochloride is available in a mouthrinse. Delmopinol does not kill bacteria and is not considered an antibacterial agent, but rather it slows the formation of the pellicle layer, making it more difficult for plaque and bacteria to adhere to the tooth's surface. Delmopinol also interrupts the plaque matrix formation, which makes plaque removal easier for patients.[20,21]

SODIUM HEXAMETAPHOSPHATE

Sodium hexametaphosphate chemically removes existing stains, as well as helps to prevent new stain formation.[22] Originally added to fluoride dentifrices, sodium hexametaphosphate is now available in mouthrinses.

CHLORINE DIOXIDE

A nontoxic broad spectrum microbiocide, chlorine dioxide is a mouthrinse ingredient typically used to fight oral malodor. Its ability to inhibit plaque proliferation and reduce gingivitis is currently under investigation.[15,23,24]

ESSENTIAL OILS

Research demonstrates that the combination of essential oils thymol, eucalyptol, menthol, and methylsalicaylate inhibit enzyme activity and disrupt the cell wall.[25] For oral hygiene treatment, essential oil

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mouthrinses are safe and effective at killing a variety of bacteria quickly.[25] They also provide plaque and gingivitis benefits. While essential oil mouthrinses do not have the same substantivity as CHX, they do not cause staining.

OTHER INGREDIENTS

A growing number of patients may be interested in a more holistic approach to oral health care. While there is no universal definition of what constitutes "natural," many mouthrinses are free of preservatives, colors, artificial sweeteners, and stabilizers.[15] A new ingredient, chitosan-argininamide, is being used in mouthrinses to remove oral contaminants and promote healthy gingiva. Research suggests that chitosan may have wound healing and antimicrobial properties.[26,27]

The addition of ingredients, such as peppermint oil, tea tree oil, lemon peel oil, and aloe vera, may provide benefits. For example, one study found that a natural mouthrinse containing aloe vera (plant known for its soothing qualities), calendula (anti-inflammatory agent), goldenseal (herb with antibacterial properties), and grapefruit seed (antimicrobial agent) was successful against the proliferation of these oral bacteria: *Eubacterium nodatum*, *Prevotella intermedia*, *Prevotella melaniogenica*, *Prevotella nigresecens*, *Tannerella forsythia*, and *S. mutans*.[28] On the other hand, the rinse had less efficacy than CHX in addressing gingivitis.



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More scientific study is needed to determine the efficacy of new ingredients. Clinicians should consider the scientific evidence in addition to their clinical experience and patient needs when recommending products.[29]

SAFETY

Only mouthrinses that make therapeutic claims are regulated by the FDA as drugs. Cosmetic mouthrinses are classified as cosmetics.[30] Mouthrinses with therapeutic claims must receive FDA approval through a rigorous process, including clinical testing. After completion of the testing, the manufacturer submits an application to the FDA that includes all drug test results, manufacturing information, and the product's proposed label, featuring uses, risks, and instructions for use. The FDA then reviews the information and determines whether the benefits outweigh the risks.

Over-the-counter oral care products can apply to receive the ADA Seal of Acceptance. Products submitted are assessed by members of the ADA's Council on Scientific Affairs and ADA-selected consultants with expertise in the particular product area. Manufacturers are required to provide high-level evidence—such as results from clinical and laboratory research—that demonstrates the product's safety and efficacy per guidelines established by the ADA Council on Scientific Affairs.[31,32] The seal is awarded for 5 years. At the 5-year mark, if the manufacturer has made any changes to the product, new data on the product's safety and efficacy must be submitted in order to renew the seal.[32] The ADA Seal of Acceptance program is designed to assist consumers and oral health professionals in choosing products that have met stringent safety standards as well as demonstrated effectiveness.[31,32]

CONCLUSION

Mouthrinses can serve as important adjuncts in patients' oral hygiene regimens to reduce plaque and gingivitis, prevent caries, and remove stain. With ongoing innovation occurring in mouthrinse formulations, including the introduction of different ingredients more research is needed to determine the effectiveness of these new products. D

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Sealant Selection

CHOOSING THE RIGHT SEALANT MATERIAL DEPENDS ON A VARIETY OF FACTORS, INCLUDING PATIENT NEEDS.

By Tracye A. Moore, RDH, MS, EdD

Dental sealants were developed in the 1960s by Michael Buonocore, DDS, and dental scientists at the Eastman Dental Center in Rochester, New York.[1–3] A thin plastic coating of an organic polymer (resin), a sealant is placed into the pits and fissures of newly erupted molar teeth that are susceptible to dental caries.[1–7] This placement acts as a physical barrier, sealing off the pit or fissure from caries-producing oral bacteria, thereby preventing decay.[1–7] Sealants can help shield grooved areas of the tooth where fluoride toothpaste is not as protective. They can reduce caries by approximately 80% in 2 years after initial placement and may remain effective for nearly 5 years.[1,3,6,7] Sealants cost one-third less than a restorative filling and can be placed after an initial assessment verifies no extensive decay is present.[6,7] Some research shows that sealant placement in areas of early decay can help to control and manage caries on occlusal and approximal surfaces.[1,3,6] There are two main types of sealants: resin and glass ionomer cements (GICs).

RESIN-BASED SEALANTS

Sealants are categorized by color, fluoride releasing or nonfluoride releasing, method of polymerization (hardening), and filler content (silica, glass, or quartz particles added to increase strength and resistance to occlusal wear).[1–4] The variety of colors ranges from clear to tinted and opaque, which aid in the sealant's application into pit and fissures and margin identification during retention checks.[1–4] Sealants containing fluoride increase resistance to caries formation and remineralize incipient carious lesions.[1,2,4] Many sealants are composed of dimethyacrylate monomers that may include bisphenol A-glycidyl methacrylate (Bis-GMA); they are classified as self-cured (autopolymerized) or light-cured (photopolymerized).[1–4] Unfilled sealants are clear (making placement difficult to see), may not require occlusal adjustment, and are less resistant to wear over time.[1,2,4] Filled sealants can be tinted, and may require occlusal adjustment after placement and light curing.[1,2,4]

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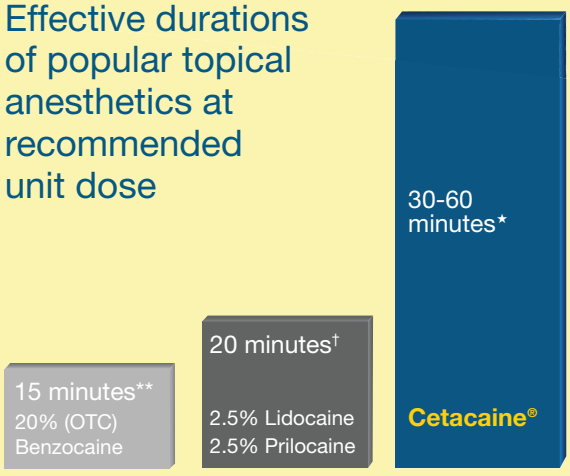
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CONTRAINDICATIONS: Do not inject or use in the eyes. Cetacaine is contraindicated in patients who are hypersensitive to any of its ingredients or are known to have cholinesterase deficiencies. To avoid excessive absorption, Cetacaine should not be applied to large areas of denuded or inflamed tissue, or administered to patients who are hypersensitive to any ingredients or are known to have cholinesterase deficiencies. Cetacaine should not be used under dentures or cotton rolls, as prolonged contact may cause an escharotic effect. Routine topical anesthetic precautions should be observed. Application of Cetacaine Liquid of more than 400 mg is contraindicated.

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PRECAUTIONS: On rare occasions, methemoglobinemia has been reported in connection with benzocaine-containing products. Do not exceed maximum dose. If a patient becomes cyanotic, treat appropriately to counteract, such as with methylene blue, if medically indicated.

ADVERSE REACTIONS: Adverse reactions, such as hypersensitivity, including anaphylaxis, are rare. Discontinue use if rash or allergic reactions develop. The most common adverse reaction caused by local anesthetics is contact dermatitis. Cetacaine should not be applied for prolonged periods except under continual supervision.

PEDIATRIC/PREGNANCY/GERIATRIC: Safe use of Cetacaine during pregnancy has not been established and should not be used during early pregnancy unless a doctor determines the benefits outweigh the risks. An appropriate pediatric dose has not been established. Reduced dosage is recommended among elderly, acutely ill, and very young patients.

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INDICATIONS

Evidence shows that 80% to 90% of caries lesions originate from pits and fissures in the occlusal surfaces of posterior teeth.[3–8] Patients should be assessed for caries and their risk for lesion progression determined. Then sealants can be placed on pit and fissure surfaces that are either at risk for caries or already exhibit incipient, noncavitated lesions in order to halt the progression.[1,2,4,7] Caries risk assessment includes determining oral, behavioral, medical, and environmental factors that raise the risk for caries.[1,2,4,7] Oral factors include frequency of brushing, prescribed orthodontic appliances, and a diet high in sugar and refined carbohydrates. Behavioral risk factors encompass illicit or recreational drug use that may cause xerostomia. Medical risk factors include conditions that increase risk of caries formation and medications that cause xerostomia. Environmental risk factors comprise nonfluoridated drinking water and low socioeconomic status.[1,2,4,7] Sealants are indicated for patients at any age who are at risk for caries. Sealants may be particularly helpful for patients age 3 and older who are at high caries risk with deep occlusal fissures.[1,2,4]

Safety glasses should be donned by all patients to provide a barrier to the acid etch solution and cure light.[1,2,4] The use of resin-based sealants that are photopolymerized shrink toward the source of the curing light, and therefore may be prone to marginal leakage.[4,9] The phosphoric acid (etch) solution used when placing resin sealants should not contact the patient's oral tissues.[1,2,4] Resin sealants may require self-etching bonding agents, which may not provide as good retention as acid-etch techniques.[1,2,4,7] Some sealant material retention is dependent on moisture control achieved by maintaining a dry field during etching and placement.[1,2,4,5,7,9] However, some resin materials can be placed in a moist field. Overmanipulation of sealant material by the clinician may result in air bubbles and voids, decreasing the sealant's effectiveness.[1,2,4]

CONTRAINDICATIONS

Sealants should not be placed if the following is present: radiographic assessment determines active occlusal or proximal decay into the dentin; insufficient eruption; primary tooth is near exfoliation; shallow coalesced and self-cleansing pits and fissures; or allergies to sealant materials.[1–4]

There has been some concern regarding allergic reactions to sealants and adverse effects of exposure to bisphenol-A (BPA), which is present in some resin sealant products.[1,3,4,7,8,10] Pure BPA is rarely used in dental materials; however, some resin-based sealants can contain its derivatives.[1,3,7,8,10] A transient amount of BPA has been detected in the saliva or bloodstream of some patients up to 3 hours after sealant application, but any residual sealant material can be rinsed away with water or blotted with a cotton roll.[1,3,4,7,10] Current evidence suggests patients are not at risk for estrogen-like effects when resin sealants are used; however, precautions should be taken (dental dam use) to minimize exposure to BPA.[1,3,4,7]



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GLASS IONOMER CEMENTS AND SEALANTS

GICs are composed of aluminosilicate glass (powder) and polymeric water-soluble acid (liquid) set through an acid-base reaction that is mixed to form a viscous paste.[9,11–13] GICs are less acidic compared to zinc phosphate, more compatible with dental pulp, set within 2 minutes to 3 minutes, and can be hand-mixed using a spatula.[12,13] The material can also be presented in a capsule separated by a membrane, which is broken prior to the capsule being vibrated in an amalgamator for a set time.[12] GICs have been used in dentistry to repair cervical lesions (both carious and non-carious), cavity liners/bases, fissure sealants, orthodontic band and bracket materials, and as a luting cement since the early 1970s.[3,7,11,12]

Type I cements are luting and bonding materials used for cementing crowns, bridges, inlays, onlays, and orthodontic appliances. They are fast-setting and water resistant.[8,11,12] Type II cements are restorative materials used for posterior restorations or repairs, fast setting, and have early resistance to water uptake.[8,11,12] Type III cements are lining cements applied beneath crowns, placed in fissures of molars, are fast-setting, and have low solubility in oral fluids.[8,11,12] In 1991, resin-modified glass ionomers (RMGIs) were introduced to improve the physical properties and decrease the water sensitivity of conventional materials.[11,12] RMGIs contain a polymerisable resin known as hydroxyethyl-methacrylate (HEMA) that may have the additional setting reaction of a resin, which may be self-curing and/or light curing.[11,12]

RMGIs can be used as interim therapeutic restorations (ITRs) and for application in the atraumatic restorative technique (ART).[6,7,11–13] ITRs are fillings placed without the use of anesthesia or drilling.[6,7] ART uses hand instruments to remove caries-affected dentin and enamel after which high-viscosity glass ionomer cement is placed to repair the tooth.[10–12] All glass ionomer dental materials release fluoride ions.[2–7,9,11,14] The difference between traditional glass ionomer and RMGI is that RMGIs offer enhanced esthetics, less solubility, and greater strength than regular glass ionomers, yet retain some of their fluoride-releasing characteristics.[11–13] Under oral acidic conditions, greater amounts of calcium are released from RMGIs, causing a buffering effect of the oral flora.[12]

Due to their fluoride-releasing properties that may last several years, GICs and RMGIs are indicated for restoration of root caries; Class V abrasion and erosion lesions; and Class I, Class II, and Class III caries on primary teeth.[7,9,11–13] RMGIs have increased strength, easy flow ability into pits and fissures, and improved wear and resistance compared with GIs.[4,7,9] All glass ionomers can be placed in less than ideal clinical situations and enable chemical bonding to both enamel and dentin; thermal expansion similar to that of tooth structure; and reduction in hypersensitivity.[4,7,9,12] Glass ionomers are also hydrophilic, meaning they have a tendency to absorb water and may be placed in the presence of moisture.[4,7,12,15,16] Lastly, glass ionomers can act as a fluoride reservoir, with absorption occurring from the use of mouthrinses, dentifrices, and topic fluoride applications. This may provide protection from secondary decay formation.[3,4,7,9,11,12,16]

CONTRAINDICATIONS

If high-quality resin sealant placement is desired and a modern clinic is accessible, then GICs are probably not the first choice.[7,8,10,12] Several studies demonstrate that glass ionomers have shorter retention rates than resin-based sealants, may be brittle, and show high rates of occlusal wear.[3,4,5,9,12,17–19,20] Due to their low retention rates, GICs may not be rec-

ommended for routine clinical use; however, they can protect pit and fissures against caries over 2 years due to their fluoride-releasing properties.[7,16–19,20] Because RMGIs contain properties similar to resin sealants, the HEMA emitted from the RMGIs may be a contact allergen for patients and dental personnel. However, no reports of allergies have been identified in the literature reviewed.[12]

CONCLUSIONS

Deciding on which type of sealant material to use depends on myriad factors. The benefits of both materials are based on retention and integrity in pit and fissures and fluoride release over time.[16–19,20] Resin sealants typically provide greater longevity than GICs. For instance, research shows that light-cured resin sealants were retained in pits and fissure of molar teeth longer than glass ionomers.[16–18,20] Other studies, however, suggest that neither material was superior to the other in caries prevention.[16,19,20,21] Glass ionomer sealants are recommended in ITR and ART.[6–8,10] In the final determination of material selection, oral health professionals should assess the clinical situation, as well as individual patient factors/needs to obtain the ultimate goal—caries prevention. D

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By Kathleen O. Hodges, RDH, MS



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The mechanical removal of deposits—from plaque biofilm to calculus—is key to effectively caring for patients with different oral health statuses, including those with a healthy periodontium, gingival inflammation, or impaired junctional epithelium and alveolar bone. However, the complex root anatomy of premolar teeth makes instrumentation challenging. The use of both ultrasonic and hand instrumentation is the typical course of action, as both are effective and complement each other.[1,2] In the final installment of this series, the focus will be on instrument selection for nonsurgical periodontal therapy and periodontal maintenance with an emphasis on premolar teeth.



TOO HARD

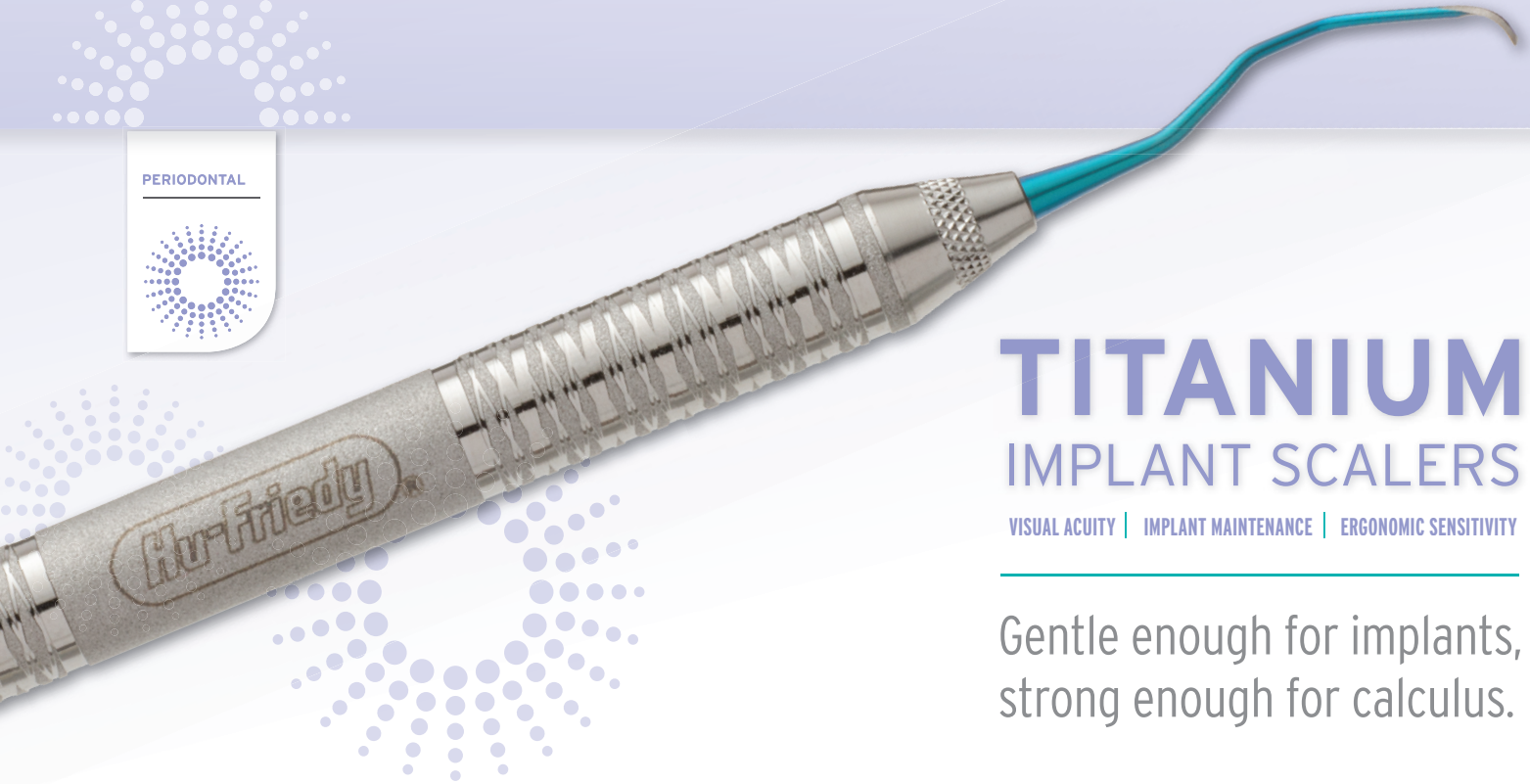


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TABLE 1. Hand-Activated Instruments for Mechanical Debridement of Premolars

Design	Number	Shank Length	Shank Strength
Universal	Columbia 13/14	Short	Standard and rigid
	Barnhardt 1/2 and 5/6	Long	Standard and rigid
	Columbia 4R/4L	Long	Heavy
	Mallery 1/2	Long	Standard
Area-Specific	5/6	Standard, extended, mini, micro mini	Standard, rigid, extra rigid
	7/8 for facial and lingual surfaces	Standard, extended, mini, micro mini	Standard, rigid, extra rigid
	11/12	Standard, extended, mini, micro mini	Standard, rigid, extra rigid
	13/14	Standard, extended, mini, micro mini	Standard, rigid, extra rigid
	11/14*	Standard, extended, mini	Standard, rigid
	12/13*	Standard, extended, mini	Standard, rigid
	15/16	Standard, extended, mini	Standard, rigid, extra rigid
	17/18	Standard	Standard, rigid
	15/18*	Standard	Standard
	16/17*	Standard	Standard

*Designed to complete an entire facial or lingual area without changing instruments—unlike the 11/12 and 13/14 or the 15/16 and 17/18 combinations—to enhance efficiency.

NONSURGICAL PERIODONTAL THERAPY

The instrumentation used in nonsurgical periodontal therapy (NSPT) is an extension of that used for prophylaxis and scaling, and a wide variety of instruments can be used for premolars (Table 1). During initial NSPT, large deposits will likely be present, accompanied by significant subgingival oral biofilm. Consequently, ultrasonic instrumentation with large edged tips/inserts and hand-activated working files are indicated.[3–7]

Traditional universal and area-specific hand instruments are used in scaling and root planing to reach difficult areas and remove calculus deposits (Figure 1). For heavier calculus removal, clinicians might consider shanks that are more rigid, such as the Columbia 4R/4L and the Gracey area-specific 7/8, 11/12, or 13/14 with rigid or extra-rigid shanks.

Extended shank designs for deep probing depths are also needed. These options have a 3 mm longer shank and a narrower working end than the standard designs. They are indicated for probing depths of 5 mm or greater. Another extended shank option is the mini-bladed instrument, whose blade length is 50% shorter than extended shank or standard instruments. It is ideal for the narrow facial and lingual surfaces of premolars, and the furcation on the first maxillary premolar.

Other choices for NSPT include the area-specific double Gracey design where the operator can move from mesial to distal without "flipping" the instrument for different ends. They are manufactured in anterior and posterior options with standard or mini designs. Also, the Langer series is made in extended shank and mini versions.

Diamond file hand instruments are indicated for finishing root surfaces, particularly in depressions and furcations. They are double ended and used with multidirectional strokes. Some designs have a 360° diamond coating while others have a 180° coating, so the noncoated, smooth surface is placed against the gingiva.



FIGURE 1. With universal curets the shank can cross the long axis of the surface, and with area-specific curets, the terminal shank will be parallel with the surface.

PERIODONTAL MAINTENANCE

Hand instruments used in periodontal maintenance are selected based on the data collected at the recare visit and root surface characteristics. For patients with good self-care and who adhere to 2-month to 4-month periodontal maintenance schedules, the root structure should be relatively smooth. As such, flexible shanks are an option. If deep periodontal pockets exist, extended shank instruments are excellent choices. Specifically, new periodontal maintenance curets designed for tight tissue are available. They have small blades and are honed at a 60° angle with a modified rigid shank to facilitate access.

During periodontal maintenance, a smooth premolar root in a deep pocket surrounded by healthy gingiva might warrant biofilm disruption with debridement curets, a mini- or micro-mini area-specific instrument with a flexible shank, or periodontal maintenance curets. However, a seemingly smooth root in a deep pocket with adjacent gingival inflammation clearly calls for different instrumentation in regard to extent and thoroughness to aid in reversing the inflammation. The micro designs and periodontal maintenance curets will be particularly useful in narrow deep pockets. As periodontal maintenance visits continue over time, the need for root surface instrumentation should remain static or decrease.

CONCLUSION

A combination of ultrasonic and hand instrumentation is the typical approach in root debridement, followed by root planing with hand instruments.[2] Premolar teeth are challenging to instrument due to their complex root anatomy. The use of extended shank, area-specific curets and mini- and micro-bladed instruments should be considered for concavities, grooves, and exposed furcations on premolars. The addition of diamond-coated files may also help clinicians achieve adequate root debridement. D



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The Treatment of Cleft Lip and/or Palate

WITH THE ADVENT OF PRESURGICAL INFANT ORTHOPEDICS, THE ROLE OF ORAL HEALTH PROFESSIONALS IN CARING FOR THIS POPULATION CONTINUES TO GROW.

By Matthew K. Geneser, DDS

EDUCATIONAL OBJECTIVES

After reading this course, the participant should be able to:

1. Explain the prevalence of babies born with cleft lip and/or palate, and factors that play a role in its development.
2. Discuss ways in which cleft lips and/or palates are detected, and the make-up of the interdisciplinary care team.
3. List the goals of presurgical infant orthopedics, the ways in which nasoalveolar molding therapy addresses this condition, and the growing popularity of this treatment approach.



FIGURE 1. Elastomeric taping of a child with a unilateral cleft lip and palate; note the thick, moisture-resistant bandage on the cheek to protect the skin from frequent tape placement.

Clefts of the lip and/or palate affect children of all socioeconomic and cultural backgrounds, with an overall worldwide prevalence of approximately one in 700 live births.[1] In the United States, it is estimated that nearly one in 1,000 babies is born with an orofacial cleft.[2] Interdisciplinary treatment is required, and this article will focus on developments in care, and the ever changing and expanding role of the dental provider. Clefts vary greatly in severity; one mild form, for example, is a submucous cleft, in which the soft palate is involved, but the oral tissues are intact. A submucous cleft may go undetected until toddler years, when abnormal speech may lead to a diagnosis. More severe clefts can involve the lip, hard palate, and, less frequently, facial structures. Clefts are classified as complete or incomplete, as well as unilateral or bilateral. Half of all orofacial clefts involve both the palate and lip, while clefts isolated to the palate are less common.[2] This condition can result from isolated genetic mutations, environmental factors, or teratogen exposures, including alcohol and tobacco. They are also associated with a number of syndromes (Table 1, page 34). While genetics may play a role in the development of orofacial clefts, both syndromic and nonsyndromic, genetics are not the sole determinant.

Caring for a child with cleft lip and/or palate (as well as caring for the family of the child) is an interdisciplinary task, one that starts even prior to birth. With advances in ultrasound technology, more orofacial clefts are being discovered in utero. While an exact percentage is difficult to determine, ultrasound detection rates of up to 75% have been reported,[3] with the highest rates noted when three-dimensional and four-dimensional technologies are used.[4] This is remarkable considering the first cleft deformity diagnosed by ultrasound technology was reported in 1981.[5]

INTERPROFESSIONAL CARE TEAM

As soon as a cleft lip or cleft palate is detected, the interdisciplinary cleft lip and palate team goes to work. The makeup of a cleft lip and palate team (sometimes referred to as a craniofacial team) differs depending on the institution, but typically consists of nursing, otolaryngology, plastic surgery, speech pathology, social work, audiology, orthodontics, oral surgery, and pediatric dentistry professionals.

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FIGURE 2. A bilateral nasoalveolar molding appliance in place; note the nasal stents designed to improve the cartilaginous architecture of the nose.



FIGURE 3. Unilateral cleft; note the lack of nasal convexity on the affected side.



FIGURE 4. Bilateral cleft; note the short columella.

This interprofessional collaborative care model is a necessity because children with cleft lip and/or palate will often present with numerous health challenges, sometimes due to other components of a larger syndrome or condition. These challenges include, but are not limited to, middle ear abnormalities, frequent ear infections, hearing loss, and difficulty feeding due to clefting of the palate. A complete cleft of the palate may prevent breastfeeding and complicate bottle feeding. The simple task of getting adequate nutrition can be a major challenge for infants with clefts.

Traditionally, the role of an oral health professional on an interdisciplinary cleft lip and palate team has been to address the preventive and restorative needs of the child—much as with any other patient. In recent years, however, the oral health professional's role has evolved with the rise of early orthopedic treatment of the predentate infant.

PRESURGICAL INFANT ORTHOPEDICS

The first member of the cleft lip and palate team to make contact with the family is often a nurse. This meeting will either take place during pregnancy, shortly after ultrasound reveals the cleft diagnosis, or at the time of birth, when a cleft is identified for the first time. The nurse will counsel the family on what to expect from their newborn and begin to lay the groundwork for future care. This can be an overwhelming time for parents and it takes a special individual to take on this counseling role. Nurses will discuss myriad issues with the family. One of these issues has dramatically altered the oral health professional's role on the team: presurgical molding of the alveolus, also known as presurgical infant orthopedics (PSIO).

The idea behind PSIO is to normalize the anatomy of a cleft as much as possible prior to surgical repair; the overarching goals are to give the surgeon a better starting point, and make the surgical closure of the cleft defect less difficult. These can be achieved by bringing the bony alveolar segments into better alignment by applying forces to the oral tissues. This is not a new concept. The PSIO idea was born in 1950 when McNeil[6] showed how orthodontic forces could be applied to a predentate infant to decrease the size of an alveolar cleft. This led to additional intraoral appliances that were based on this same concept. Subsequently, Latham et al[7] developed an acrylic plate that applied forces to the maxillary arch to close a bony cleft, but this plate was inserted surgically and retained by a pin screwed into the infant's hard palate. The "Latham appliance" is still used today, and movement is achieved by turning a screw—similar to one found on a rapid maxillary expansion device.

A simple version of PSIO is the use of elastomeric tape (Figure 1, page 33) across the maxillary lip[8] to place a constrictive force on the palate. The tape has the benefit of being inexpensive and easy to use, but does not allow the provider to control the forces applied to the palate, so it will indiscriminately bring the tissues together—often leading to a constricted palate.

The most recent advance in this area is known as nasoalveolar molding (NAM). The NAM appliance (Figure 2) was pioneered by Grayson,[9] and uses the same concept as McNeill's acrylic plate, in which sequential changes to the internal surface of the plate bring the bony alveolar segments together. The main difference is that NAM incorporates a nasal stent that improves the cartilaginous architecture of the nose.

The primary advantage of NAM over elastomeric taping is that it does not result in constriction of the palate because the transverse dimension is held static by the custom-made acrylic plate. Compared to a Latham appliance, NAM's primary advantage is that it does not require an additional surgery.

While the concept of molding the alveolus has been around for decades, the addition of the nasal stents separates NAM from other approaches. The idea for the stents came from research by Matsuo et al[10] on the molding of infant's ears to decrease deformity. The authors found that placing pressure on these deformed cartilaginous tissues resulted in visible and sustained improvement in the shape of the auricular tissues.

TABLE 1. Some Common Syndromes and Abnormalities Associated With Cleft Lip and/or Palate

Van der Woude syndrome	Pierre Robin sequence
Velocardiofacial syndrome	Treacher-Collins syndrome
CHARGE syndrome	Kabuki syndrome
Beckwith Wiedeman syndrome	Klippel Feil syndrome
Apert syndrome	Goldnhar syndrome
DiGeorge syndrome	Stickler syndrome

Infants with complete clefts of the lip and palate often have associated nasal deformities. For babies with unilateral complete clefts, the affected side of the nose will have a flatter and more stretched nostril (Figure 3). A child with a complete bilateral cleft will often have very short columella (Figure 4). Grayson and Maull[9] postulated that the same principles used on molding ear cartilage could improve the nasal shape of infants with clefts, thereby lessening the invasiveness of the surgical correction. Surgeons can use techniques to improve this nasal architecture, but any incision will result in scarring that has the potential to hinder future growth. Changes to these tissues that reduce the need for incisions and scarring are a major benefit of successful NAM treatment.



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The author has no commercial conflicts of interest to disclose.



FIGURE 5. Impression made in polyvinyl siloxane material for safety and dimensional stability.



FIGURE 6. Stone model used to fabricate the acrylic plate.

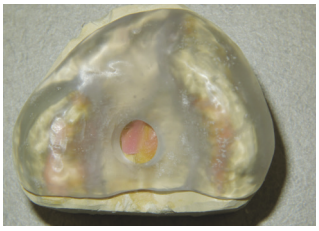


FIGURE 7. Acrylic plate that forms the base of the nasoalveolar molding appliance.

These advantages explain the popularity of PSIO. The dental provider—whether an orthodontist, pediatric dentist, or both working in concert—is on the front lines of caring for infants with a cleft lip and/or palate. The fabrication, adjustment, and maintenance of NAM appliances dovetail with the skill set of oral health professionals.

NASOALVEOLAR MOLDING

The first step in the NAM process is to make an impression of the infant's maxillary arch. This is done as soon as possible, as insertion of the NAM appliance at a very young age maximizes the malleability of the infant's soft tissues. This increased ability to mold the infant's tissues is thought to be due to an increase in maternal estrogen in the infant's body,[11] and is the same reason why auricular molding is more effective in young babies. The impression is made using a polyvinyl siloxane material that is not only dimensionally stable, but stays together well, thus reducing the risk for aspiration or swallowing. A member of the medical team is present chairside during the impression to provide support for any airway emergencies. Using this impression, a stone model of the palate is poured for the fabrication of an acrylic plate (Figure 5, Figure 6, and Figure 7) that fits the infant's palate. With sequential internal modifications, this plate will be used to change the shape of the infant's palate over the course of 3 months to 6 months.

The NAM approach is neither a simple process nor a quick fix, as adjustments have to be made on a regular basis to continue the movement of the tissues. These adjustments alter the internal shape and thickness of the acrylic plate by approximately 1 mm, so the plate no longer fits ideally on the palate (Figure 8). As the appliance is worn and as the baby feeds with a bottle, pressure will begin to move and mold the tissues into the new shape. These adjustments are repeated on a weekly or biweekly (at minimum) basis over 3 months to 6 months leading up to the initial surgical repair of the lip.

A chief goal of NAM is to decrease the size of the alveolar cleft as much as possible. Once the cleft is narrowed to 5 mm or less, the nasal stent can be added to the acrylic plate (Figure 9). A single nasal stent is used on the affected nostril for a child with a unilateral complete cleft, while two stents are used for a child with a bilateral complete cleft. The stent places pressure on the ala of the nose to create a more natural convexity of both the ala rim and nasal dome. As these nasal cartilages are reshaped, a more symmetric appearance results and the tissues of the columella are straightened and lengthened, lessening the need for more invasive surgical techniques.[12] The results of successful NAM treatment include closing of the bony alveolar cleft to within 5 mm, bringing the lip segments into closer proximity, elongating the columella, achieving convexity of the nasal cartilage, reducing the width of the nasal base, and achieving maximum symmetry of the nostrils.



FIGURE 8. Appliance with adjustments; note the pink "soft" acrylic that is used to place pressure on the alveolus and cause tissues to mold into a new shape.



FIGURE 9. Nasoalveolar molding appliance with nasal stent attached.

Taking care of the NAM appliance and keeping it in place and functional can be challenging for families. The appliance is retained by tape attached to the child's cheeks. Tape is integral to successful treatment because it not only provides force to activate the appliance, it also provides the upward force that keeps the appliance in contact with the palate. Improper taping can lead to a nonretentive appliance and frustrated caregiver. While it certainly can be challenging for families to use the NAM appliance (particularly at first), there is evidence that NAM therapy has psychosocial benefits for caregivers. A recent study examined caregivers from multiple US cleft treatment centers;[13] the subjects were divided up into groups, one of which had used NAM, and the other of which used traditional means of presurgical cleft care. Compared to the traditional treatment group, the NAM families had lower anxiety scores and a greater sense of empowerment. It was postulated the NAM group benefited from the regular weekly visits and support that they were able to receive as a result of these frequent trips.

The clinical benefits of the NAM appliance are still controversial. Many cleft lip and palate teams have established protocols (with predicable outcomes) utilizing Latham appliances, elastomeric taping, or other methods, and may be reluctant to change. With NAM being a relatively new treatment modality, long-term data are minimal. While there may never be a consensus, a 2008 study found that more than 25% of cleft surgeons report using the NAM appliance more than 50% of the time.[14] Families often see the results of PSIO on social media and support-group websites, and may seek cleft teams that offer this treatment. Although it is not an ideal approach for all patients, NAM's rising popularity is giving new prominence to the dentist's role in the fabrication, adjustment and maintenance of these appliances.

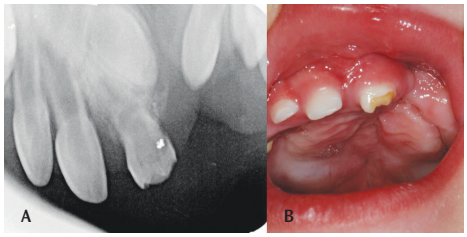


FIGURE 10A and FIGURE 10B. Radiographic and clinical appearance of a hypoplastic incisor located adjacent to a hard tissue cleft; note the primary left lateral incisor erupting within the cleft.

DENTAL CARE BEYOND INFANCY

The NAM appliance or other PSIO modality is used continuously from the time of fabrication until the first surgical intervention to close the soft tissues of the lip, which usually takes place

between 3 months and 6 months of age. Following the initial surgery, PSIO appliances are no longer needed, and the role of the oral health provider shifts to the more traditional tasks of providing anticipatory guidance and preventive care.

Children with cleft lip and/or palate often suffer from myriad dental anomalies in both primary and permanent dentitions.[15] Supernumerary teeth and missing teeth are more likely in this population. Eruption of teeth, both primary and permanent, may be abnormal in and around the area of the hard tissue cleft. Teeth adjacent to the cleft have a higher incidence of malformation and malposition, and frequently require restoration due to caries or esthetic concerns (Figures 10A and 10B, page 35).

These malformations and defects tend to be more severe in the permanent dentition. Tooth problems, such as hypoplastic enamel, coupled with malposition and rotations, make teeth difficult to clean, predisposing children to caries. If the cleft is part of a larger syndrome, it is also possible there may be issues with dexterity and the ability to brush effectively.[16,17] For these reasons, the role of the oral health professional is vital for maintaining the function and integrity of the dentition as the child transitions from predentate to primary dentition, and eventually into young adulthood.

Beyond the scope of this review—but certainly a major concern for children with cleft lip and/or palate—is the need for orthodontic care. Due to malposed teeth, constricted arches and missing teeth, children with clefts will almost certainly require orthodontic appliances and, depending on severity, may require orthognathic surgery to maximize form and function of the dentition. A pediatric or general dentist may play a role in this orthodontic care.

CONCLUSION

Under a collaborative approach to treating cleft lip and/or palate, the role of the dental team has become more prominent with the rise of PSIO—but the importance of the oral health professional remains integral over time. Monitoring teeth for proper eruption, making appropriate and timely referrals to orthodontic providers, and ensuring that families have established relationships with local cleft lip and palate teams are all vital functions. The American Academy of Pediatric Dentistry defines a dental home as "the ongoing relationship between the dentist and the patient, inclusive of all aspects of oral health care delivered in a comprehensive, continuously accessible, coordinated and family-centered way." Nowhere is this definition more apt or important than when treating a child with cleft lip and/or palate. D

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CE QUESTIONS

THE ANSWER SHEET AND FURTHER INSTRUCTIONS ARE LOCATED ON THE TEAR-OUT CARD THAT APPEARS ON PAGE 43, OR TAKE THE TEST ONLINE AT DIMENSIONSOFDENTALHYGIENE.COM.

1. In the United States, it is estimated that nearly one in how many babies is born with an orofacial cleft?
A. 500
B. 750
C. 1,000
D. 1,250

2. While genetics may play a role in the development of orofacial clefts, it is not the sole determinant.
True
False

3. More orofacial clefts are being discovered in utero. Detection rates of up to what percentage have been reported?
A. 83%
B. 75%
C. 67%
D. 58%

4. Which professionals are not typically part of a cleft lip and palate care team?
A. Nurses and otolaryngologists
B. Oncologists and physical therapists
C. Plastic surgeons and speech pathologists
D. Oral surgeons and pediatric dentists

5. What are the overarching goals of presurgical infant orthopedics?
A. To give the surgeon a better starting point
B. Make the surgical closure of the cleft defect less difficult
C. A and B
D. Provide emotional support for the child

6. The primary advantage of nasoalveolar molding (NAM) over elastomeric taping is that it does not result in what?
A. Constriction of the palate
B. Placing additional stress on the patient
C. Increased risk of ear infections
D. All of the above

7. Who postulated that the principles used in molding ear cartilage could improve the nasal shape of infants with clefts?
A. Grayson and Maull
B. James and Schlieder
C. Garfinkle et al
D. Pool and Farnworth

8. A chief goal of NAM is to decrease the size of the alveolar cleft. A nasal stent can be added to the acrylic plate once the cleft is narrowed to approximately what size?
A. ≥ 10 mm
B. 8 mm to 9 mm
C. 6 mm to 7 mm
D. ≤ 5 mm

9. There is no evidence that NAM therapy has psychosocial benefits for caregivers.
True
False

10. A 2008 study found that what percentage of cleft surgeons report using the NAM appliance more than 50% of the time?
A. < 10%
B. 16%
C. ≤ 21%
D. > 25%



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Dimensions CE

Providing Ethical, Culturally Competent Care

Oral health professionals are charged with encouraging open communication with patients, and understanding their perception of health and disease, as influenced by traditional beliefs.

By PAMELA ZARKOWSKI, BSDH, MPH, JD

INTRODUCTION

It is our responsibility as oral health professionals to treat every patient with ethical, culturally competent care. Philips is a health technology company that cares about people and delivers meaningful innovation. We believe there's always a way to make life better, and to achieve this positive impact we have teamed up with *Dimensions of Dental Hygiene* by providing an unrestricted educational grant supporting this excellent continuing education article by Pamela Zarkowski, BSDH, MPH, JD. An awareness and understanding of patients' values and beliefs, along with cultural differences, help practicing oral health professionals best accommodate patients' needs and concerns. We believe you will find this article helpful as you serve your diverse patient population and make their lives better.

—Cindy Sensabaugh, RDH, MS
Senior Manager, Professional Education and Academic Relations
Philips Oral Healthcare

About the Author



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Deliver Culturally Sensitive Care

EDUCATIONAL OBJECTIVES

After reading this course, the participant should be able to:

1. **Explain key tenets of ethical and culturally sensitive patient care.**
2. **Describe the factors that shape health beliefs, and patients' perceptions of oral disease and treatment.**
3. **Provide culturally competent therapy in clinical settings.**



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Every dental patient seeks and deserves a quality, evidence-based and respectful experience. Each patient brings to the appointment a unique set of oral health needs and expectations. At the same time, each arrives with an individual understanding of his or her oral condition, health beliefs and practices. Using the ethical principles of autonomy, nonmaleficence, beneficence, and justice as a framework for patient interactions will help guide all facets of professional care.

Well trained in the assessment, diagnosis, planning, treatment, and evaluation of outcomes essential to oral health care, dental hygienists strive to provide ethically based treatment. The American Dental Hygienists' Association (ADHA) Code of Ethics provides guidance to practitioners, and states that all individuals should have access to health care, including oral health care.[1] The ADHA code also provides guidance concerning interactions with patients, and offers directives to serve all patients without discrimination, communicate in a respectful manner, and provide patients with the information necessary to make informed decisions. A key statement in the code encourages clinicians to recognize that cultural beliefs influence patient decisions.

In addition, the ADHA Standards for Clinical Dental Hygiene Practice, revised in 2016, emphasize that "dental hygienists are expected to respect diverse values, beliefs, and cultures present in individuals and communities."[2] The standards underscore the importance of communication in assisting patients in making informed decisions, and suggest the possibility of using an interpreter to support positive communication. The standards outline professional responsibilities and state that dental hygienists should understand and adhere to the ADHA Code of Ethics and incorporate cultural competence in all professional interactions.[1,2] The standards also direct clinicians to consider patient diversity, cultural competence, cultural issues, and literacy when providing care. Recognizing the demographics of the patient populations served by the profession, both the ADHA Code of Ethics and Standards for Clinical Dental Hygiene Practice provide guidance for culturally sensitive care.[1,2]

Today's patient population is diverse, and each individual brings to the provider/patient experience not only specific oral health needs, but also an expectation that diversity will be respected and understood. Oral health professionals must develop awareness so as to recognize each individual's cultural diversity and health literacy. Culture influences a patient's communication style, beliefs, understanding of health and disease, and attitude toward health care.[3] Cultural competency is a set of skills, knowledge and attitudes that enhance a clinician's understanding of—and respect for—a patient's values, beliefs, and expectations.[3] Health literacy is the degree to which individuals have the capacity to obtain, process, and understand basic information concerning health and services that is necessary to make appropriate health decisions.[4]

Providers should take into consideration the culture of a patient, his or her ability to comprehend and synthesize information, and recognize the need to treat that individual in a professionally competent manner. Embracing the concepts of cultural competence, health literacy, and culture lays the foundation for cultural respect. The latter is defined as a combination of a body of knowledge, a body of belief, and a body of behavior.[5] It involves a number of elements, including personal identification, language, thoughts, communication, actions, customs, beliefs, values, and institutions that are often specific to ethnic, racial, religious, geographic, or social groups.[5] The provider of health information or health care must recognize these elements influence beliefs and belief systems surrounding health, healing, wellness, illness, and disease. The integration of cultural respect into daily practice has a positive effect on patient care by enabling providers to deliver services that are respectful of—and responsive to—the health beliefs, practices, cultural, and linguistic needs of diverse patients.[5] Recognizing and embracing the importance of cultural respect directly contributes to improved care.

ETHICALLY BASED CARE

Patient care involves treating a broad spectrum of individuals described in many ways, such as diverse patient family, demographically diverse, or representative of the culture or cultures living in a specific community. Diversity can be broadly defined to include all aspects of human differences; for example, physical dimensions, including race, ethnicity, and cultural background. Diversity can also be described using other influencing factors, such as socioeconomic status, religion, place of birth, or educational achievement. Additional characteristics that contribute to diversity include age, mobility, disability, gender, gender expression, height, weight, or marital status. All of these factors influence a patient's understanding and management of oral health.

In many situations, cultural background and experiences have a unique way of influencing oral and general health practices and beliefs. For example, many cultural groups are not prevention oriented, and only seek care when there is a serious problem. In this scenario, an individual will only seek care from an oral health professional after experiencing significant pain, with the expectation that the tooth will be extracted so the pain will be gone. In the United States and other Western cultures, suggesting a root canal and a restoration would be expected. However, the person experiencing the pain may view such treatment available only to the wealthy and not consider it as a viable option.[6]

A commitment to treating diverse patients and integrating their cultural beliefs and practices in assessment, treatment planning, and therapy is based on ethical principles. In turn, recognizing the emphasis on cultural respect in patient care heightens the need to practice in an ethical manner. The principles of autonomy, beneficence, justice, and veracity provide a foundation for managing patient interactions and care, and integrating cultural respect into all clinical care situations.

The principle of autonomy supports the patient's role in independent decision making. A patient must be able to make an informed decision about the care he or she is to receive in order to allow the individual to self-determine a course of action. Communication plays a critical role. Appropriate communication and information collection enhance patient rapport and compliance. Obtaining informed consent for treatment is a legal obligation that is based on the ethical principle of autonomy. To be informed, the patient must understand the reasons for a recommended treatment, as well as the risks and benefits. The provider also has an obligation to inform the individual in a manner that recognizes the patient has his or her own belief system. The patient makes decisions based on the information that was provided under the context of the individual's beliefs and practices.

By way of example, an oral health professional may observe the clinical signs of periodontal diseases, and collect and record clinical findings that support a diagnosis of advanced periodontitis.

Following data collection and analysis, the provider offers a treatment recommendation and presents a plan for therapy. As a result of his or her beliefs, however, the patient may view the same condition differently. For instance, some cultures believe that periodontal conditions are related to a hot and cold syndrome, and that mixing the wrong combination of hot and cold foods will lead to poor oral health.[6] A patient may attribute a particular condition to an imbalance in the individual's life, or a consequence of a particular action. Other cultures value the esthetic appearance of teeth, but do not value having both healthy teeth and gingiva;[6] in other words, red and bleeding gingiva is not perceived as a problem if the visible teeth look good.

As these examples demonstrate, beliefs impact a number of clinical issues, including when a patient seeks care, management of the condition, the treatment choices the individual elects, and, in some instances, how he or she follows or responds to specific recommendations or therapies. All of these considerations help shape the patient's assessment of the options presented and, ultimately, influence informed consent.

The principle of beneficence motivates the provider to take steps to benefit the patient's well being and oral health. An example of beneficence in clinical practice is assessing a patient's dietary habits to determine what may be contributing to an increase in caries. In this case, understanding that diet is influenced by culture is important. Food plays a significant role in many cultures, whether as a form of sustenance, custom, or celebration. A dental team member recommending a reduction in sugar intake may not recognize that sweets are an important part of a culture's regular diet, and that reducing or eliminating that food product is not an option due to cultural practices.

The principle of justice means treating patients fairly. Although a clinician might not consciously want to treat someone in an unfair manner, if the provider does not consider the cultural, religious, or ethnic background of the patient when planning care, or assumes that every patient follows the same health philosophy as the provider, there is a possibility the patient will be treated unfairly. Practitioners cannot assume that each patient has adopted the same health beliefs and practices, as culture, socioeconomic factors, generational practices, and religious requirements all contribute to different perspectives. Patients may be unfamiliar with oral health practices for preventing caries or periodontal diseases. Some cultures rely on folk remedies or family traditions to address oral health conditions, such as soaking a cotton ball in clove oil and dabbing it on the tooth. Other cultures believe that a painful tooth is a result of the body harboring excess heat, or from the flow of energy being inhibited. Acupuncture may be the treatment of choice to address the pain.

Providers must not make assumptions about patients, whether positive or negative, because of their values, practices, or beliefs.

The principle of veracity demands truthfulness. Oral health professionals cannot hesitate to be honest with patients and explain that an action they are taking to address an oral condition may be harmful. For example, if used to treat tooth pain, a culturally based practice, such as coin rubbing therapy, may appear as a bruise or abrasion on the face or neck. Coin rubbing is a global alternative medicine practice that uses special oil or ointment and rubbing the coin in a linear pattern until a skin abrasion occurs on the

(*Continued on overleaf*)

TABLE 1. D-I-V-E-R-S-E Mnemonic for Patient Encounters[9]

Use of this mnemonic tool will assist clinicians in developing a personalized care plan based on the patient's cultural/diversity aspects. It can be used when gathering the patient's history and placed in the chart.

	Assessment	Sample Questions	Assessment Information/ Recommendations
D	Demographics–Explore regional background, level of acculturation, age and sex as they influence health care behaviors.	• Where were you born? • Where was "home" before coming to the United States? • How long have you lived in the US? • What is the patient's age and sex?	
I	Ideas–Ask the patient to explain his/her ideas or concepts of health and illness.	• What do you think keeps you healthy? • What do you think makes you sick? • What do you think is the cause of your illness? • Why do you think the problem began?	
V	Views of health care treatments–Ask about treatment preference, use of home remedies, and treatment-avoidance practices.	• Are there any health care procedures that might not be acceptable? • Do you use any traditional or home health remedies to improve your health? • What have you used before? • Have you used alternative healers? If so, what types? • What kind of treatment do you think will work?	
E	Expectations–Ask what the patient expects from his/her oral health professional.	• What do you hope to achieve from today's visit? • What do you hope to achieve from treatment? • Do you find it easier to talk with a male/female? Someone younger/older?	
R	Religion–Ask about the patient's religious and spiritual traditions.	• Will religious or spiritual observances affect your ability to follow treatment? How? • Do you avoid particular foods? • During the year, do you change your diet in celebration of religious or other holidays?	
S	Speech–Identify the patient's language needs, including his/her health literacy level. Avoid using a family member as an interpreter.	• What language do you prefer to speak? • Do you need an interpreter? • What language do you prefer to read? • Are you satisfied with how well you read? • Would you prefer printed or spoken instructions?	
E	Environment–Identify the patient's home environment and the cultural/diversity aspects that are part of the environment. Home environment includes the patient's daily schedule, support system, and level of independence.	• Do you live alone? • How many people live in your home? • Do you have transportation? • Who offers you emotional support? • Who helps you when you are ill or need help? • Do you have the ability to shop/cook for yourself? • What times of day do you usually eat? • What is your largest meal of the day?	

(*Continued from inside flap*)
affected area. Ignoring a discolored or bruised portion of the face that may be near an area of the oral cavity in which there is caries or an infection is not being truthful with the patient.

Alternately, if the clinician does not ask about the source of the bruising, he or she may incorrectly assume the bruise is the result of an abusive situation. Ignoring or not seeking additional information about home remedies or alternative treatments the patient may have used prevents providers from demonstrating sincerity and trustworthiness, thus violating the ethical principle of veracity. Clinicians must also be truthful in educating the patient that home remedies or alternative therapies might negatively impact the professional treatment being rendered.

CULTURAL PERCEPTIONS

The ethical principles of autonomy, beneficence, justice, and veracity must be translated into action by the oral health professional. During interactions with a patient, when collecting health history, and when suggesting treatment or evaluating outcomes, the provider must be sensitive to the patient's health care beliefs. Patients may define and categorize health and illness in a variety of ways. The illness may be attributed to an evil force that is retaliating for moral or spiritual failings, and/or violations of social norms or religious taboos. Or it may be attributed simply to bad luck or karma.

Some cultures view health in relation to maintaining balance by regulating one's diet according to the seasons. For example, a patient may believe that a specific illness is the result of an imbalance in one's life, or that the condition may be the result of other factors, such as a test of character. Patients may not value Western medicine solutions to a particular condition, but, rather, seek alternative therapies based on their own cultural beliefs and practices. A provider can gather insight into a patient's beliefs by asking questions and making sure their assessment protocol includes questions about the specific condition, treatments used by the patient, and any healers that have been consulted.

TREATMENT STRATEGIES

For practitioners, the challenge is to balance ethical principles and the need to meet the standard of care within the context of a patient's cultural beliefs. Any clinicians practicing within a community that has a large population from a specific culture is advised to learn about that culture's health beliefs and practices. The provider must assign priority to each patient's autonomy and ability to determine care. Designating autonomy as a priority translates to valuing informed consent and taking steps to partner with the patient in the treatment planning process by recognizing the patient's beliefs, practices and values. This requires meaningful communication, shared decision making, and participation by both the provider and patient in the treatment planning and informed consent process. The emphasis should be on educating patients about their choices.[7]

To enhance shared decision making, providers must identify areas where cultural differences may be an issue; develop awareness of one's own values, biases, and understanding; and develop a nonbiased, nonjudgmental stance.[8] Clinicians must recognize that diverse patients have different communication needs—including the pace of speech, volume, and sensitivity to body language and eye contact. Another strategy that enhances communication is using a series of questions that will provide the clinician with information about the patient's culturally based health care beliefs and practices. The D-I-V-E-R-S-E Mnemonic for Patient Encounters (Table 1) provides a framework for seeking information that will assist in patient assessment and support culturally respectful care and the ethical principles that guide such care.[9]

Health literacy is also a factor that must be considered in patient communications. Practitioners should not assume that all culturally diverse patients have low health literacy; however, they should monitor behaviors that may indicate low health literacy, such as an inability to answer questions or complete health forms, noncompliance with specific recommendations, postponing decision making, or making excuses for delaying treatment. Oral health professionals can incorporate a number of strategies to assist patients with low health literacy. Speaking slowly, showing pictures, and utilizing the tell-show-do technique (to confirm that patients understand what they have been told) are all useful techniques.

A simple approach to evaluating health literacy is to ask the patient, "When you go home, tell me what you will tell your spouse about the directions I gave you concerning your premedication." Using plain language is also helpful, as this makes written and oral information easier to understand. An important tool for improving health literacy, plain language is communication that patients can understand the first time they read or hear it. It is sometimes referred to as "living room" language, and is a technique that clinicians use to explain oral conditions in simple, understandable language. This technique is very useful for patients from a wide variety of backgrounds. In terms of written materials, a plain language document is one in which people can find what they need, understand what they find, and act appropriately on that understanding.[10] Plain language documents can be developed to explain oral health conditions and their treatment, post-operative directions, or habits that are harmful to oral health.

CONCLUSION

While a practitioner may work in a practice, clinic, or community-based center with a patient population that represents a wide range of diversity, one cannot possibly understand all the cultural beliefs or practices due to sheer variety of patients. However, they can use models that serve as a framework for interacting with patients. For example, Ask Me 3 is an effective tool that suggests three simple, but essential, questions that patients should ask their providers.

1. What is my main problem?
2. What do I need to do?
3. Why is it important for me to do this?

Ask Me 3 is intended to help patients become more engaged with their oral health and medical providers. These questions improve communications between patients, families, and health care professionals. Resources are available for dental offices and include brochures, posters, and a website about health literacy.[11]

In order to provide ethical, culturally competent care, clinicians must recognize the diversity of the patients seeking treatment. Respecting cultural diversity means communicating with patients to determine their health beliefs, and understanding their perception of health and disease as influenced through their own cultural lens. Beyond the strategies explored in this article, further resources and tools exist to assist oral health professionals in providing culturally respectful care to all patients. CE

Dimensions CE

CE Questions—The answer sheet and further instructions are located on the tear-out card that appears on page 43, or take the test online at dimensionsofdentalhygiene.com

1. Which term is not among the ethical principles that can be used as a framework for patient interactions to help guide all facets of professional care?
A. Impartiality
B. Autonomy
C. Nonmaleficence
D. Beneficence

2. The American Dental Hygienists' Association Standards for Clinical Dental Hygiene Practice direct clinicians to consider which of the following when providing care?
A. Patient diversity
B. Cultural competence
C. Cultural issues
d. All of the above

3. What influences a patient's communication style, beliefs, understanding of health and disease, and attitude toward health care?
A. Assertiveness
B. Culture
C. Personal bias
D. Self-reliance

4. Embracing the concepts of cultural competence, health literacy, and culture lays the foundation for what?
A. Case acceptance
B. Successful outcomes
C. Cultural respect
D. Improved teamwork

5. Many cultural groups are not prevention oriented, and only seek care when there is a serious problem.
True
False

6. Practitioners cannot assume that each patient has adopted the same health beliefs and practices. Which of the following contributes to different perspectives?
A. Culture
B. Socioeconomic factors
C. Generational practices
D. All of the above

7. The principle of veracity demands what of practitioners?
A. Truthfulness
B. Speciousness
C. Compliance with best practices
D. Good communication skills

8. In general, patients define and categorize health and illness in similar ways.
True
False

9. To enhance shared decision making, providers must identify areas where cultural differences may be an issue, develop awareness of one's own values, biases, and understanding, and develop what else?
A. A sense of empathy
B. Clinical insight
C. A nonbiased, nonjudgmental stance
D. None of the above

10. What mnemonic provides a framework for seeking information that will assist in patient assessment while supporting culturally respectful care?
A. Developmental Stages Must Be Good
B. FLAGTOP
C. ALARM symptoms
D. D-I-V-E-R-S-E Mnemonic for Patient Encounters

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CE Article Begins on Page 33

1. (A) (B) (C) (D)
2. (T) (F)
3. (A) (B) (C) (D)
4. (A) (B) (C) (D)
5. (A) (B) (C) (D)
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7. (A) (B) (C) (D)
8. (A) (B) (C) (D)
9. (T) (F)
10. (A) (B) (C) (D)



Providing Ethical, Culturally Competent Care

Course 2 (2 units): $22

CE Article Begins on Page 37

1. (A) (B) (C) (D)
2. (A) (B) (C) (D)
3. (A) (B) (C) (D)
4. (A) (B) (C) (D)
5. (T) (F)
6. (A) (B) (C) (D)
7. (A) (B) (C) (D)
8. (T) (F)
9. (A) (B) (C) (D)
10. (A) (B) (C) (D)



The Therapeutic Use of Botox

Course 3 (2 units): $22

CE Article Begins on Page 46

1. (A) (B) (C) (D)
2. (T) (F)
3. (A) (B) (C) (D)
4. (A) (B) (C) (D)
5. (T) (F)
6. (A) (B) (C) (D)
7. (A) (B) (C) (D)
8. (A) (B) (C) (D)
9. (A) (B) (C) (D)
10. (A) (B) (C) (D)



The Leukocyte Platelet Rich Fibrin Technique

Course 4 (2 units): $22

CE Article Begins on Page 50

1. (A) (B) (C) (D)
2. (A) (B) (C) (D)
3. (A) (B) (C) (D)
4. (A) (B) (C) (D)
5. (A) (B) (C) (D)
6. (A) (B) (C) (D)
7. (T) (F)
8. (A) (B) (C) (D)
9. (T) (F)
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Please rate the course content. 5 4 3 2 1

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The cost of this activity is $22 for one course, $44 for two courses, $66 for three courses, or $88 for all four courses.

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The Therapeutic Use of BOTOX

BOTULINUM TOXIN TYPE A IS PART OF THE ORAL HEALTH ARMAMENTARIUM FOR PATIENTS WITH SPECIAL NEEDS.

By Katherine Krattenmaker, RDH, BS; Liana Lu, RDH, BS; Tzu-Yu Ko, RDH, BS; and Dianne L. Sefo, RDH, MEd

EDUCATIONAL OBJECTIVES

After reading this course, the participant should be able to:

1. Define botulinum toxin type A (BoNT-A).
2. Discuss BoNT-A's role in treating dental problems common among patient with special needs.
3. Identify its limitations and contraindications.
4. Explain the regulatory issues regarding its use in dental care.



FIGURE 1. Injection sites for masseteric hypertrophy.

While most commonly known for its cosmetic use as a wrinkle reducer, botulinum toxin type A (BoNT-A) is quickly growing in popularity as a therapeutic treatment option for many medical and dental issues related to muscle hyperactivity. In dentistry, a large number of muscle-generated issues require professional attention, such as hypersalivation, bruxism, masseteric hypertrophy, temporomandibular joint disorder (TMD), dysphagia, and oromandibular dystonia (OMD). Muscle-generated problems are often treated with intraoral appliances, occlusal adjustment, dental restorations, medications, and surgery, which can be invasive, expensive, and damaging to tooth structure. Many of these parafunctional habits can be overcome. The injection of BoNT-A is a growing treatment option for many dental issues due to its easy application, efficacy, and minimal side effects.

BoNT-A is a protein produced by the bacterium *Clostridium botulinum* and may be found naturally in expired or spoiled foods. In high doses, the toxin can result in muscle paralysis. BoNT-A inhibits the release of the neurotransmitter acetylcholine, which is responsible for muscle contractions.[1] Thus, depending on the concentration, injection of BoNT-A can temporarily reduce or eliminate the intensity of muscle contractions. Over about 3 months, the muscles slowly return to normal contractions and further injections are necessary to maintain the effects.[2]

BoNT-A is used for a variety of conditions in general medicine—both cosmetic and therapeutic. BoNT-A is approved by the United States Food and Drug Administration for a number of therapeutic uses, such as overactive bladder, chronic migraines, severe neck spasms, hyperhidrosis (excessive sweating), and strabismus.[3–7] It has also been prescribed for off-label uses, such as depression, atrial fibrillation, and cleft lip scars.[8–10] In dentistry, BoNT-A is used to treat hypersalivation, bruxism and masseteric hypertrophy, TMD, dysphagia, and OMD. These issues commonly appear in those with neuromuscular disorders. BoNT-A has some definite benefits. For one, the dosage for each application can be

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manipulated depending on the severity of the patient's condition. The therapeutic uses of BoNT-A in dentistry can be especially beneficial for patients with special needs. A wide variety of conditions, such as Parkinson's disease, autism, attention deficit hyperactivity disorder (ADHD), brain injury, and cerebral palsy, may cause maxillofacial issues that can be addressed with BoNT-A. For these patients, treatments like oral medications or intraoral appliances are often not ideal due to side effects and difficulty with compliance, especially among children.

HYPERSALIVATION

The inability to properly swallow or hold saliva in the mouth, as well as excessive saliva production, known as sialorrhea, are issues commonly seen in a variety of special needs conditions. This may result in excessive drooling, which can affect quality of life and exert both psychological and physical consequences, such as perioral dermatitis, dehydration, aspiration pneumonia, social embarrassment, and excessive clothing changes.[11,12] Traditional first-line treatment for sialorrhea is anticholinergic drugs, which may produce a number of adverse effects, such as blurry vision, drowsiness, and constipation. For more severe cases of sialorrhea or for patients who do not respond well to anticholinergic medication, surgery may be indicated to reposition the submandibular duct or removal of the gland.[12]

BoNT-A is another less invasive option to treat hypersalivation. Injection of BoNT-A into the submandibular gland and/or parotid gland is used to reduce drooling and salivary buildup in patients with neuromuscular diseases, such as Parkinson's disease and cerebral palsy.[13] Patients with these conditions typically cannot adequately swallow their saliva. If too much BoNT-A is injected or it is injected into the salivary glands of patients with normal or limited saliva flow, dry mouth may result, which can greatly increase caries risk. If BoNT-A is repeatedly applied to the salivary glands as a long-term treatment, atrophy and reduction in salivary gland size may occur, resulting in increased intervals between injections.[12] Ultrasound can help locate the salivary gland and guide the injection of BoNT-A, while also measuring gland size to track progress.

One study that evaluated the long-term safety and efficacy of BoNT-A for sialorrhea reported minor rates of complication, ranging from 0% to 11.1% in the submandibular gland.[14] Injection of BoNT-A should be considered for patients with sialorrhea or excessive drooling as the evidence suggests it is minimally invasive, effective, well tolerated, and has localized effects. However, the benefits should be weighed against the potential risk of xerostomia.

BRUXISM AND MASSETERIC HYPERTROPHY

Bruxism and clenching are conditions that affect many patients with special needs and may cause substantial wear of the dentition, headaches, damage to the temporomandibular joint (TMJ), masseteric hypertrophy, exacerbation of periodontal disease, and possibly avulsion of permanent teeth.[15] In patients with bruxism, occlusal guards, spasmolytic medications, and relaxation therapy are common treatments.[16]

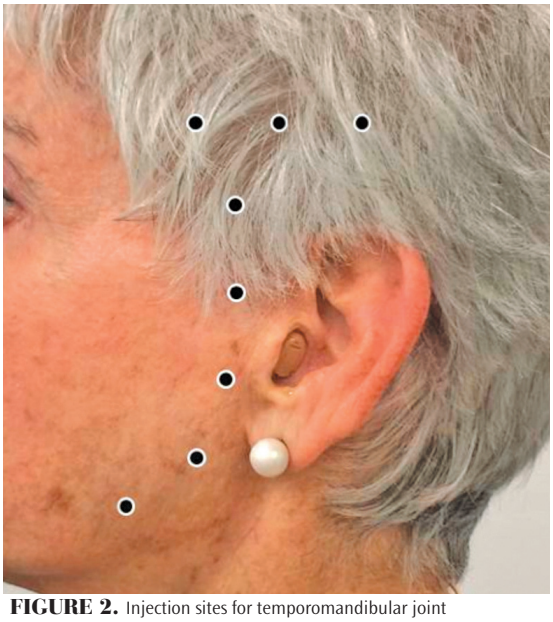


FIGURE 2. Injection sites for temporomandibular joint disorder.

Many patients with special needs cannot tolerate intraoral appliances and compliance can be difficult. Furthermore, an intraoral appliance may become an aspiration hazard for patients who have difficulty controlling facial muscles.[15]

Research suggests that injection of BoNT-A into the temporal and masseter muscles to treat severe bruxism may relieve pain and muscle tension in a variety of patients, including those with neurological disorders—such as Rett syndrome, intellectual disability, anoxic encephalopathy, cerebellar hemorrhage, autism, ADHD, and traumatic brain injuries— without significant negative side effects.[15–17]

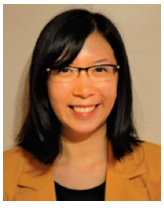
Masseteric hypertrophy may occur in patients who experience chronic jaw clenching or bruxism, resulting in the muscles around the jaw to appear enlarged or deformed. One treatment is surgical resection, which can cause permanent shortening of the muscle or joint. However, if a small amount of BoNT-A is injected (Figure 1), the contraction force of the masseter muscle may be reduced for a time, which can alleviate pain and reduce enlargement of the muscle.[1] As with all botulinum toxin treatments, injections must be repeated habitually to maintain desired effects.

TEMPOROMANDIBULAR JOINT DISORDERS

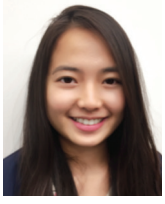
TMD is a broad term describing diseases that impact mastication. These issues frequently originate from either the TMJ or one or more



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The authors have no commercial conflicts of interest to disclose.

TABLE 1. Patient Populations for Which Botulinum Toxin Type A (BoNT-A) Injections Are Contraindicated[1,27]

- Pregnant or breastfeeding women
- Those with motor neuron diseases such as amyotrophic lateral sclerosis
- Those with urinary tract infections
- Known hypersensitivity to BoNT-A preparations or any of their components (human albumin, saline, lactose, sodium succinate)
- Use of medications that interfere with muscular function, such as muscle relaxants
- Use of medications that may increase the potency of BoNT-A (calcium channel blockers, quinine, aminoglycoside antibiotics)
- Those with active infection in the injection area
- Professionals, such as actors, who are highly reliant on the acuity of their facial muscles

of the masticatory muscles. Symptoms include headaches, neck and/or facial pain, decreased joint movement, joint sounds, and periauricular pain.[1] People with TMD may also experience greater damage to teeth, bones, joints, and gingiva.

One of the most frequent causes of TMD is bruxism. Treatment options for TMD are occlusal mouthguards, muscle relaxants, oral pharmacotherapy, and biofeedback. Studies suggest that the injection of BoNT-A (Figure 2) may be more successful, longstanding, less invasive, and produce fewer side effects compared with traditional treatments. The duration of efficacy for TMD is approximately 12 weeks, though this is affected by patient circumstances and severity of the condition.[18]

DYSPHAGIA

Patients with special needs, such as those with cerebral palsy, Parkinson's disease, and stroke, may also experience difficulty swallowing.[19] Patients with muscular mobility issues may not have proper function of their esophageal muscles, resulting in low dysphagia. This is often treated with swallowing therapy, endoscopic esophageal dilation, or oral medications to aid in relaxation of the esophagus, such as calcium channel blockers or proton pump inhibitors.

The use of BoNT-A as a treatment option may increase a patient's independence in feeding, aid in the swallowing of saliva, and decrease drooling. BoNT-A injection into the cricopharyngeus muscle is effective in patients with underlying muscle spasm or hypertonicity to support swallowing.[20] The injection is administered endoscopically when the patient is under general anesthesia and is usually repeated every 3 months to 4 months.[20]

OROMANDIBULAR DYSTONIA

OMD describes involuntary and repetitive spasms of varying intensities that affect the masticatory, lingual, facial, lip, and pharyngeal muscles.[21,22] It may impact patients with Parkinson's disease, Meige's syndrome, and traumatic brain injuries.[22–24] Symptoms of OMD include bruxism, dysphagia, dysarthria, soft tissue trauma, mandibular deviation, and TMJ subluxation. OMD impacts oral function and the ability to chew, swallow, breathe, and communicate, which, in turn, may lead to shame, reduced quality of life, depression, malnutrition, and weight loss.

Currently, there is no cure for OMD, but patients may manage their conditions using oral medications, dental appliances, or deep brain stimulation surgery.[22,25] However, these treatment options have some drawbacks. Oral medications (cholinergics, benzodiazepines, anti-parkinsonism drugs, anti-convulsants) may exert negative side effects, such as seizures, muscle weakness, dizziness, low blood pressure, worsening of limb proprioception and motor fluctuations, confusion, and motor disturbances.[22,26] Meanwhile, dental appliances, such as splints or retainers, have limited longevity and may affect speech. Patient compliance is typically low, especially among patients with special needs.[25]

Intramuscular injections of BoNT-A (Figure 3), directed by electromyographic (EMG) guidance, is an effective treatment option for patients with OMD and is reported to have high success rates of 90% to 95%.[22] Using EMG guidance allows for accurate needle placement, lower doses of BoNT-A, and a more localized effect.[21,22] BoNT-A is safe, uncomplicated, and highly effective for OMD cases, as well as other conditions involving muscular spasms, but must be repeated every 3 months to 6 months.[22]

CONTRAINDICATIONS AND LIMITATIONS

BoNT-A's most significant limitation is that it wears off over time. Depending on the amount injected and the injection site, the effects of BoNT-A may last anywhere from 3 months to 5 months.[27] In addition, masticatory function may be inhibited for a short time immediately after the injection is administered.[1]

The use of BoNT-A may not be an appropriate treatment for all cases. Table 1 lists populations for who BoNT-A is contraindicated.[1,27]

REGULATORY REPORT

Each state has its own regulations regarding the use of BoNT-A in dentistry. Most states permit general dentists to inject BoNT-A and dermal fillers after completion of appropriate training.[27] Courses can be given either by a dental institution approved by the American Dental Association's Commission on Dental Accreditation or a continuing education provider.[27] The total hours of continuing education required vary by state. For instance, the Massachusetts Board of Registration in Dentistry states that dentists in Massachusetts may inject BoNT-A if they have completed a minimum of 8 hours of training.[27] Moreover, these injections can only be performed within the scope of dentistry. Other states, such as California, Michigan, New Hampshire, and North Dakota, also limit the use of BoNT-A to therapeutic treatments. States such as Arkansas, Florida, Louisiana, and Delaware allow both cosmetic and therapeutic uses in dentistry. In Oregon and West Virginia, BoNT-A is restricted to administration by qualified oral and maxillofacial surgeons only.

Could there be potential for the integration of BoNT-A into dental hygiene's arsenal of treatment options? Currently, only one state allows dental hygienists to administer BoNT-A: Nevada. On



FIGURE 3. Injection sites for oromandibular dystonia.

November 20, 2015, the Nevada State Board of Dental Examiners passed a motion stating Nevada dental hygienists can perform BoNT-A injections and dermal fillers as long as they hold a valid license to practice and have undergone BoNT-A injection training.[28] This procedure must be performed under the direct supervision of a dentist licensed to practice in Nevada, who has also undergone training to administer BoNT-A.[28]

In order to provide a meticulous curriculum, the American Academy of Facial Esthetics started its first live patient training course that included dental hygienists in January 2016.[29] This expanded function has the potential to expand career options for dental hygienists, generate higher profits for the practice, and provide patients with additional treatment options.

CONCLUSION

BoNT-A injection has many uses in the dental arena. It is not only effective, but safe, minimally invasive, and exerts few negative side effects. The advantages and disadvantages should be thoroughly considered for each patient. Additionally, regulations and insurance coverage vary state by state.

The integration of BoNT-A into dentistry as a frontline treatment option for dental problems is relevant for all oral health professionals. Dental hygienists play important roles in interprofessional health care and they should remain up to date regarding the use of BoNT-A, so they can effectively educate patients, particularly those with special needs. With this additional training and knowledge, dental professionals are able to create more individualized care plans to improve oral health and alleviate pain. D

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CE QUESTIONS

THE ANSWER SHEET AND FURTHER INSTRUCTIONS ARE LOCATED ON THE TEAR-OUT CARD THAT APPEARS ON PAGE 43, OR TAKE THE TEST ONLINE AT DIMENSIONSOFDENTALHYGIENE.COM.

1. Muscle-generated problems are often treated with which of the following?
A. Intraoral appliances
B. Occlusal adjustment
C. Dental restorations
D. All of the above

2. The injection of botulinum toxin type A (BoNT-A) is a growing treatment option for many dental issues due to its easy application, efficacy, and minimal side effects.
True
False

3. BoNT-A is a protein produced by which bacterium?
A. Porphyromonas gingivalis
B. *Clostridium botulinum*
C. *Streptococcus mutans*
D. *Tannerella forsythia*

4. For which uses does BoNT-A injection have approval from the United States Food and Drug Administration?
A. Overactive bladder
B. Chronic migraines
C. Severe neck spasms
D. All of the above

5. A wide variety of conditions, such as Parkinson's disease, autism, attention deficit hyperactivity disorder, brain injury, and cerebral palsy, may cause maxillofacial issues that can be addressed with BoNT-A.
True
False

6. Which is a first-line treatment for sialorrhea?
A. Anticholinergic drugs
B. Surgery
C. Intraoral appliances
D. None of the above

7. The injection of BoNT-A into which muscles is used to treat severe bruxism?
A. Intrinsic
B. Genioglossus
C. Temporal and masseter
D. None of the above

8. Patients with which disability may also experience difficulty swallowing?
A. Cerebral palsy
B. Parkinson's disease
C. Stroke
D. All of the above

9. Which of the following populations are contraindicated for BoNT-A injection?
A. Patients with Parkinson's disease
B. Patients with cerebral palsy
C. Pregnant or breastfeeding women
D. Patients with temporomandibular joint disorders

10. Which state allows dental hygienists to administer BoNT-A after completion of appropriate training?
A. Nevada
B. California
C. North Carolina
D. Colorado

The Leukocyte Platelet RICH FIBRIN Technique



CREATED WITH PATIENTS' OWN DONOR TISSUE, THE PLACEMENT OF L-PRF ENCOURAGES HEALING FOLLOWING A VARIETY OF DENTAL PROCEDURES.

By Joseph W. Evans, DDS, and Kyndall A. Hudson, RDH

EDUCATIONAL OBJECTIVES

After reading this course, the participant should be able to:

1. Define the Leukocyte Platelet Rich Fibrin (L-PRF) technique.
2. Identify the types of bone/tissue grafts.
3. Explain the procedure for L-PRF placement and its clinical applications.
4. Discuss the research conducted on the effectiveness of L-PRF.

New techniques in dental treatment are constantly being developed. Oral health professionals need to remain aware of these advances to promote the best possible patient outcomes.

Today, treatment modalities can assist with the stimulation of tissue formation after dental surgical procedures. The placement of Leukocyte Platelet Rich Fibrin (L-PRF), taken from the patient's own tissue, provides enhanced healing following specific dental procedures. Acting as a biologic modifier, L-PRF mimics and prolongs the effects of typical physiologic wound healing. By releasing the cytokines and platelets necessary for healing over an extended period, healing begins more rapidly and is accomplished at a faster rate. This is especially important in dentistry because many procedures require multiple steps before completion, with each step building and relying on the success of the previous one. For instance, in order for an implant to be placed, a patient must have an adequate amount of bone present for the implant to be stable and successful. If a tooth has been extracted or gingival tissue/bone has been lost, the patient must endure subsequent procedures to prepare the site before a dental implant can be placed. It can take as long as 6 months to 1 year before the patient completes treatment.

The L-PRF technique was first described by Choukroun in France in 2001.[1] It is an inexpensive technique using the patient's blood to create a leukocyte fibrin-rich substrate that can be placed in areas of the surgical site in conjunction with supplemental tissue to stimulate bone and soft tissue formation as a biological modifier.[2] The use of L-PRF can provide the patient with enhanced healing, possibly fewer appointments, and a faster end result. As the procedure poses minimal risk of infection and complications, it is a valuable approach that has a variety of applications.

BONE/TISSUE GRAFTS

There are many circumstances when a patient may require a bone/tissue graft or other treatment to induce new bone/tissue growth. Several types of bone grafting procedures are available to patients, each with its own

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limitations. These constraints encourage the continual development of new alternatives. Various disciplines have used L-PRF as a biological modifier in many types of surgery including periodontology, implantology, and maxillofacial surgery.[3]

Weinberg et al[3] define a graft as "any tissue or organ used for implantation or transplantation." Grafts can use human, animal, or synthetic substitutes to stimulate growth. They are divided into four categories based on the origin of the donor material: autografts, allografts, alloplasts, and xenografts.[3]

Autografts and allografts are associated with human donors. An autograft is tissue taken from and placed in the same individual. These have the highest potential for success because the tissue is obtained from the recipient. Unfortunately, this is not always an option for patients, leaving an allograft as the next option. Allografts are retrieved from one individual and placed in a different individual of the same species. They typically consist of tissue that is taken from a cadaver. Similar to the autograft, allograft studies have shown high success rates and enhanced tissue growth.[3]

Alloplasts are synthetic tissue substitutes, meaning they are made of nonvital materials. They offer more of a support system for surrounding structures and are present for tissue to grow around, but do not have the factors for cells to induce bone, unlike a tissue-derived graft. Alloplasts carry no risk of disease transmission and the patient does not have to undergo any additional procedures to collect donor tissue. Xenografts are tissue substitutes taken from a different species, such as bovine.[3]

Because these modalities are sometimes limited in their results, dentistry needs to continue evolving and discovering new treatment approaches. L-PRF is an autologous biologic modifier that is obtained from the patient's blood. This provides a condensed network of fibrin that is saturated with cytokines, growth factors, and platelets.[4] L-PRF speeds up the initial healing process of tissue repair. It is capable of generating both soft tissue and bone and is used in conjunction with a bone substitute or alone. There are many circumstances where tissue growth needs to be implemented for the success of a procedure.

PROCEDURE

The L-PRF procedure is relatively simple and begins with a blood draw. Approximately 9 ml to 10 ml of blood is drawn with a 24 gauge butterfly needle and then placed in a glass tube.[2] The glass tube is needed to achieve clot polymerization.[5] Correct handling of the blood is a significant factor in L-PRF treatment success. The blood must be immediately transferred to a centrifuge, which is activated for approximately 12 minutes, without the addition of an anticoagulant.[6,7] During the centrifuge process, the blood coagulates and separates into three distinct layers. The bottom layer is composed of red blood cells; it is discarded. The top layer is cell-free and is also discarded. The middle layer is a mesh network that contains the majority of the platelets and fibrin. Within this middle layer, platelets lead to synthesizing growth factors in response to clotting.[8] The fibrous middle layer also acts as a scaffold when placed for surgical dental treatment, leading to the initiation of tissue response.[9] This layer can be compressed into a membrane or shaped into a plug depending on what treatment is needed. This clot can be converted into a membrane by compression between two sterile gauzes or by using a specific tool for collection.[1] The fibrin is easily manipulated and placed, allowing it to be used with many dental treatment options.

Once placed, the L-PRF continues to release growth factors for up to 7 days, which speeds up healing time. The cost for this procedure is lower than other options for patients because fewer materials are needed because the patient is supplying his or her own tissue (blood) for the procedure. Additionally, because the tissue is taken from the patient, its use removes the risk of infection and disease transmission, which greatly diminishes the chance of rejection.

CLINICAL APPLICATIONS

L-PRF has many clinical applications, such as soft tissue and bone regeneration, extraction socket and alveolar ridge preservation,[6] horizontal and vertical ridge augmentation, improvement of three wall infrabony defects,[10] sinus lift procedures for implant placement,[2] periodontal tissue regeneration,[11] improvement of furcation defects,[12] assisting with repair of mandibular fracture sites,[8] and stimulation of enhanced repair when used in combination with bone substitute or autologous bone.[13–15]

RESEARCH

Timmerman et al[6] conducted a case study to determine the success of placing L-PRF in an extraction site to aid in alveolar ridge preservation. The study included 22 subjects who were monitored after extractions. It utilized a split-mouth randomized controlled clinical approach that compared a control group using no membrane in the extraction sites with sites undergoing the L-PRF membrane. Alveolar ridge levels of the extraction sites were compared using cone-beam computed tomography (CBCT). Each tooth was extracted and blood drawn to be centrifuged. The L-PRF membrane was isolated, compressed, and then placed in the extraction sites with subsequent suturing. Patients were prescribed a 0.12% chlorhexidine spray for use twice a day and seen 1 week later to monitor healing and remove sutures.[6]

At the follow-up appointment, patients reported discomfort following the procedure. The majority of extraction sites revealed a healing site that showed no signs of abnormality. CBCT images were taken immediately after the extraction and 3 months after treatment to track the progress. These images were then superimposed to analyze the measurement of alveolar ridge present immediately after the extraction and at the 3-month follow-up visit. Data showed that the sites where L-PRF was placed had a statistically higher success rate than those sites without. The researchers found a strong statistical correlation associated with the placement of L-PRF in extractions sites with improved healing when compared to those without.[6]



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El Kenawy et al[16] conducted a study with 15 patients that analyzed the placement of L-PRF in an extraction site while simultaneously placing an implant. Similar to other studies, each patient rinsed with chlorhexidine gluconate prior to the procedure. A flap was reflected and the tooth extracted. The socket was then irrigated and curetted thoroughly. Each site for implant insertion was continuously irrigated while being drilled to necessary dimensions based on implant size. Implants were inserted 2 mm to 3 mm beyond the original apex level to aid in stability. Following this, the space left between the socket wall and implant was packed with deproteinized bovine bone material and an L-PRF membrane positioned and sutured into place.[16]

Following treatment, each patient was prescribed 500 mg of amoxicillin for 5 days to 7 days. Oral hygiene instructions were demonstrated and a soft food diet was recommended for the next 1 week to 2 weeks. Sutures were removed 7 days post treatment and exams were scheduled every week for the following 3 weeks. At 4 months to 6 months, patients returned for healing cap placement, then 2 weeks later for abutment delivery. The implants were re-assessed every 3 months over a 1-year period. Implant success was evaluated based on stability, sulcular bleeding, peri-implant pocket depth, and radiographic findings. Results of this study revealed a 100% success rate with ideal osseointegration and a reduction in post-operative problems.[16] While implant therapy is highly successful with the conventional approach, L-PRF—when used as a biological modifier—can improve wound healing and decrease discomfort post-surgery.

Sharma and Pradeep[10] conducted a study on the effects of placing L-PRF in three walled bony defects in patients with chronic periodontitis. During the study, 56 defects were treated by adding L-PRF while conducting open flap debridement or performing open flap debridement with no addition of L-PRF. Both periodontal attachment levels and probing depths were documented with measurements at baseline and 9 months post-treatment. Periodontal dressing and sutures were removed after 2 weeks. A regimen of 0.12% chlorhexidine rinse was also implemented during this time. After 2 weeks, self-care was performed using a soft toothbrush and gentle brushing. No subgingival instrumentation occurred during the 9 months. Post-treatment values showed probing depths improved for the test group (approximately 4.55 mm vs 3.21 mm for the control group). Periodontal attachment levels also improved when L-PRF was added (value for the test group was 3.31 mm vs 2.77 mm in the control group). Additionally, test sites showed an approximate 48.26% greater bone production for filling the site vs 1.8% for those sites where L-PRF was not placed. When comparing the two methods of treatment, it was found that when L-PRF was used probing depths decreased, periodontal attachment level increased, and more bone was generated than when performing conventional open flap debridement.[10]

Sharma and Pradeep[12] evaluated the effects of placing L-PRF in Class II furcation defects when conducting open flap debridement in comparison to open flap debridement alone. Thirty-six defects were treated with one of these approaches. Plaque index, sulcus bleeding index, probing depth, clinical attachment level, gingival marginal level, and radiographic bone analysis were compared using baseline and 9 month post-operative measurements. Periodontal dressing and sutures were removed after 2 weeks while using 0.12% chlorhexidine rinse during this time. Self-care was also performed using a soft toothbrush and gentle brushing. No subgingival instrumentation occurred for 9 months. The data indicated a greater reduction of probing depth was found for the L-PRF clinical group with a difference of 2.17 mm as compared with the non L-PRF control group. The test group also showed a significantly greater vertical defect fill (50.8 +/- 6.24) when compared with the control sites (16.7 +/- 6.42) at the 9-month recare appointment. Upon evaluation, both clinical and radiographic parameters indicated drastic improvement observed at those areas treated with L-PRF and open flap debridement when compared with only open flap debridement.[12]

A study by Al-Khawlani et al[8] examined the benefits of L-PRF when placed at sites of mandibular fracture. When L-PRF was placed in close proximity to bone, enhanced bone development occurred. A group of patients ranging in age from 20 to 42 with mandibular fractures participated as subjects. The L-PRF was applied along the fracture line of the mandible, as plates were used to stabilize it. Patients were evaluated over 6 months post-surgery. The results indicated that L-PRF placement enhanced osteoblast and bone formation leading to improved healing. This autologous procedure led to a more stable bone regeneration.[8]

Sinus lifts are most commonly done so there is enough bone available to place an implant. A study by Mazor et al[1] determined the success of using L-PRF in a simultaneous sinus lift and implant placement procedure.[1] Sinus lifts are necessary when a natural tooth has been lost and the maxillary sinus, covered by the Schneiderian membrane, pneumatizes—preventing bone formation. A sinus lift is performed to lift this membrane to allow more space for bone. Additionally, bone or bone grafting material is placed to encourage bone growth in the area to stabilize the site for a future implant.[1] Typically, the graft must be placed 4 months to 6 months prior to implant placement; however, new methods are improving the success of completing both procedures at the same time.

L-PRF is useful during sinus lift procedures, especially when bone is needed for implant placement. Data were collected from 20 subjects via 25 sinus elevations and the placement of 14 implants.[1] There was no control group, but participants had to be in general good health and meet certain criteria. All implants were similar in length as well as width and there was approximately 2.9 mm of bone height remaining in each edentulous area. A full tissue flap was elevated and an ultrasonic lancet used to open a bony window. The Schneiderian membrane was delicately lifted and the bony window left attached to support the new sinus floor. This protects the sinus membrane and promotes space maintenance. Several vials of blood (72 ml) were taken from each subject and centrifuged. The PRF clots were removed and membranes compressed to be placed in each sinus. One to two PRF membranes were placed on the Schneiderian membrane in case there were any undetectable perforations created during the procedure. The implants were placed with the tips acting in a manner to hold the new sinus floor in place. One to two more PRF membranes were placed over the window before the flap was replaced to prevent invagination of the gingival mucosa. Patients were put on a 14-day chlorhexidine gluconate rinse

regimen, 6 days of amoxicillin, and instructed to take ibuprofen as needed.[1]

As expected, 8 days to 10 days following the procedure, a panoramic radiograph revealed no obvious change in bone density; however, 6 months later, the treated sites were filled with a dense bone-like tissue. Participants described minimal discomfort and all implants presented as stable. Six months after treatment, the procedure was deemed 100% successful by Mazor et al.[1] While some studies show that the use of implants to "tent up" the sinus membrane through elevation without L-PRF can be successful in stimulating resulting bone to fill the area, the authors concluded L-PRF was an optimal addition to this procedure to improve the natural bone regeneration around the implants.[1]

Clinical results demonstrate the efficacy of L-PRF in a variety of common dental procedures. The use of L-PRF as a biological modifier stimulates tissue and leads to the improvement of tooth support and maintenance. It is an added treatment modality to make the surgical and healing process easier on the patient. Using the patient's own tissue greatly aids in a quicker healing time and minimal-to-no risk of infection.

CONCLUSION

As a biologic modifier, L-PRF seems to have limitless possibilities when it comes to bone and soft tissue regeneration and overall healing. Studies with control and test groups show that implant placement, as well as various other dental treatments, can still be consistently successful without the use of L-PRF, but the improved results when L-PRF is used are statistically significant. Areas for future research should investigate its use in various other bone grafting procedures such as cleft palate repair, distraction osteogenesis, and treatment of osteonecrosis of the jaw. Additionally, further research may find that this technique could be used to stimulate gingival growth and aid in the repair and/or regeneration of attachment loss caused by periodontal diseases.

One of oral health professionals' primary objectives is to educate patients and discuss all treatment options. As such, clinicians should remain aware of viable treatment alternatives that could encourage improved outcomes. L-PRF is an advantageous technique that provides optimal results when used in conjunction with many dental procedures and is truly an asset to the dental profession. D

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CE QUESTIONS

THE ANSWER SHEET AND FURTHER INSTRUCTIONS ARE LOCATED ON THE TEAR-OUT CARD THAT APPEARS ON PAGE 43, OR TAKE THE TEST ONLINE AT DIMENSIONSOFDENTALHYGIENE.COM.

1. In what year was the Leukocyte Platelet Rich Fibrin (L-PRF) technique first described?
A. 2000
B. 2001
C. 2010
D. 2017

2. The use of L-PRF can provide which of the following?
A. Enhanced healing
B. Possibly fewer appointments
C. Faster end result
D. All of the above

3. Grafts can use which substitute to stimulate growth?
A. Human
B. Animal
C. Synthetic
D. All of the above

4. Which type of graft comes from nonvital materials?
A. Alloplast
B. Autograft
C. Allograft
D. Xenograft

5. Which type of graft comes from a different species?
A. Autograft
B. Allograft
C. Xenograft
D. Alloplast

6. How much blood is drawn in the initial step of the L-PRF procedure?
A. 7 ml to 9 ml
B. 9 ml to 10 ml
C. 10 ml to 13 ml
D. 20 ml

7. Correct handling of the blood is a significant factor in L-PRF treatment success.
True
False

8. Which of the following is a clinical application of the L-PRF technique?
A. Soft tissue and bone regeneration
B. Extraction socket and alveolar ridge preservation
C. Improvement of furcation defects
D. All of the above

9. L-PRF is useful during sinus lift procedures, especially when bone is needed for implant placement.
True
False

10. In which L-PRF study were the results, after 6-months post-procedure, deemed 100% successful?
A. Sharma and Pradeep
B. Al-Khawlani et al
C. Mazor et al
D. El Kenawy et al

Advancing Dental Performance And Smiles With a New Blog

Hu-Friedy Blog

Hu-Friedy, a global leader in dental manufacturing, has launched a company blog with the goal of enhanced digital engagement with the dental community and in support of the company's mission to improve lives by advancing dental performance—smile after smile.

The company believes that for dental professionals to perform at their best, they must have access to the best information. The Hu-Friedy Blog focuses on a broad array of topics, including instrumentation, infection prevention, implantology, and many more. Additionally, the blog addresses issues, such as social responsibility in dentistry, continuing education trends, and new ways for dental professionals to connect and collaborate via social media.



"At Hu-Friedy, we are aware of the tremendous amount of information that is delivered to us through all the various 'screens' we have at our disposal today," shares Ron Saslow, CEO and Chairman of the Board. "When considering the addition of another source of content to the digital ecosystem, we knew it had to be different in its purpose, significant in its relevance, and fearlessly truthful in its approach."

KEY OPINION LEADERS

A key component of Hu-Friedy's blog is the leveraging of its extensive network of Key Opinion Leaders (KOLs). The company features a point-of-view from one of its 600+ KOLs on every blog post and encourages comments and questions from blog readers and subscribers.

Sharing an additional thought on the blog, Patrick Bernardi, Hu-Friedy's Chief Marketing Officer states, "We are extremely proud of our 100+ year heritage in helping dental professionals perform at their best, as well as the amazing relationships we have built with the best and brightest KOL minds in dentistry. We feel we are uniquely positioned to deliver important information that will make a real difference in the lives of dental professionals."

Read the Hu-Friedy blog at: Hu-Friedy.com/blog.

ABOUT HU-FRIEDY

Founded in Chicago in 1908, Hu-Friedy Manufacturing Company, LLC helps dental professionals perform at their best by producing dental instruments and products designed to function as an extension of each practitioner's skill. Its products—hand-crafted by highly skilled artisans—are known for their precision, performance, longevity, reliability, and quality. Headquartered in Chicago, Hu-Friedy products are distributed in more than 80 countries and the company maintains offices in Germany, Italy, India, China, and Japan.

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- Dentist formulated
- Contains a unique blend of moisturizing enzymes
- Certified for use by individuals with diabetes, pregnant women, and nursing mothers
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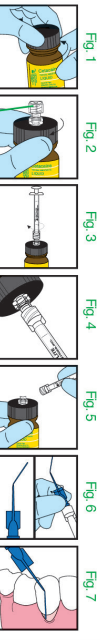
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3. Lock a Delivery Syringe into the port. (Fig. 3)
4. Invert the bottle and slowly draw liquid (0.4 mL maximum) into syringe. If air is drawn into syringe, push the liquid back into the bottle and slowly redraw liquid into the syringe. (Fig. 4)
   Application of Cetacaine Liquid in excess of 0.4 mL per dental visit is contraindicated.
5. Holding bottle upright, remove the syringe from the port and replace the small port cap. (Fig. 5)
6. Attach a Microcapillary Tip to the syringe. The tip may be bent to improve access. (Fig. 6)
7. Place tip subgingivally and apply Cetacaine liquid by slightly depressing the plunger while following the geography of the pocket. (Fig. 7)
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LM-Dental, St. Ignatius, Montana, has introduced new Sharp Diamond sharpen-free hygiene instruments. They feature innovative super-hard micro-coated tips that eliminate the need for sharpening. The instruments feature large-diameter handles with medical-grade silicone surfaces that are designed to reduce hand fatigue and strain. Instruments are color-coded for quick and easy identification. The Sharp Diamond instrument line features two scalers, a universal Gracey, and mini Gracey curets. 406-745-3746; lm-dental.com. Circle 51 on card

BATTERY-OPERATED SHARPENER



Easy Enterprises, Chico, California, offers a handheld, battery-operated EasyEx Dental Explorer Sharpener. Designed to make sharpening explorers quick and easy, this compact device restores explorers to needle-point sharpness with the push of a button to improve diagnostic results and caries detection. Just put a sterilized explorer tip inside the hole located on the nose cone with the tip perpendicular to the hole. With light fingers, slowly twist the EasyEx back and forth and the result is a resharpened explorer in 2 seconds to 3 seconds. 800-572-5560; easyexsharpener.com. Circle 52 on card

ANTICARIES TOOTHPASTE



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DIGITAL X-RAY SENSORS

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Kulzer, South Bend, Indiana, has become the exclusive marketer of Innovative Dental Technologies' ReLeaf and LinguaGuard product lines. ReLeaf is a high volume evacuation (HVE) system that connects easily to existing dental vacuum systems and provides efficient and comfortable hands-free suction during dental procedures. This system is said to allow patients to move their heads and communicate without affecting suction. LinguaGuard, a disposable add-on that allows clinicians to retract and protect the tongue during suction by attaching it to the vented end of the HVE straw, gives clinicians a free hand to help reduce chairside working time. 800-431-1785; releafdental.com. Circle 55 on card

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Black Hairy Tongue

By Olga A.C. Ibsen, RDH, MS, FAADH

Q Can you discuss treatment for black hairy tongue besides scraping?

A Black hairy tongue is a condition of the dorsal tongue, on which there is an overgrowth or elongation of the filiform papillae. The results are a mat-like surface that entraps bacteria, fungi, and food debris. It is an alteration of the microbial flora that is caused by broad spectrum antibiotics, hydrogen peroxide, carbamide peroxide, bismuth subsalicylates (for upset stomach), smoking, alcohol, radiation therapy of the head and neck, systemic corticosteroids, chemical rinses, and medications that cause xerostomia.[1–3]

Although the term black hairy tongue is more familiar, the patient may also have a heavily coated dorsal tongue with a white clinical appearance. Color changes are caused by chromogenic bacteria and the color can vary from white to yellow to tan to dark brown or almost black. It presents with elongated papillae, covered with a significant amount of keratin on the surface.[1,2] Black hairy tongue is usually asymptomatic, although the patient may complain of bad taste, oral malodor, or increased gag reflex. Concern regarding appearance is also common.

The diagnosis of black hairy tongue is made through clinical and historic diagnosis. Microscopic evaluation is not necessary. A white heavily coated tongue is sometimes mistaken for a form of candidiasis.[2]

TREATMENT

The first step in the treatment process is to remove the possible etiologic factors that may contribute. If the patient is taking prescription medication, a conversation with his or her physician is necessary before making any changes to the treatment protocol. The patient may need to complete a prescription, or the physician may elect to prescribe another drug.

Patients' at-home self-care regimens are in the purview of oral health professionals. Review patient history and identify the products that may be contributory that can be easily changed (eg, hydrogen peroxide is a component of many toothpastes and mouthrinses). If the patient has problems with an upset stomach, he or she may be using significant amounts of bismuth subsalicylates. Depending on his or her last medical appointment, it may be appropriate to refer the patient back to his or her physician.

If the patient smokes, this is the perfect opportunity to encourage him or her to begin a smoking cessation program. Black hairy tongue is the least important oral pathologic concern when a patient smokes. Oral cancer prevention is paramount! And sometimes, due to the esthetic component alone, the patient may be motivated to quit.



FIGURE 1. This patient has hairy tongue with tan and white papillae. The condition can also present with brown or black papillae.

For the best at-home oral hygiene regimen, the patient should brush the tongue with a soft toothbrush without any toothpaste. Toothpaste should be avoided due to the presence of chemicals or irritants. Brushing with water and sodium bicarbonate (baking soda) has also been effective.[3] Tongue scrapers can be used, but because the filiform papillae are elongated, gentle brush strokes may be more effective in cleansing and removing the excessive keratin coating these papillae. Some scrapers, based on design ("rake like") can be more irritating, or scrapers may be so flat, they only remove surface irritants. Remember, the dorsal surface of the tongue becomes matted in this condition, so brushing the surface should be more effective.

Black hairy tongue usually resolves rather quickly but can recur, depending on etiologic factors that can be removed or altered. Optimal oral hygiene in general can help to control the condition. D

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The Ask the Expert column features answers to your most pressing clinical questions provided by *Dimensions of Dental Hygiene's* online panel of key opinion leaders, including: Jacqueline J. Freudenthal, RDH, MHE, on anesthesia; Nancy K. Mann, RDH, MSEd, on cultural competency; Claudia Turcotte, CDA, RDH, MSDH, MSOSH, on ergonomics; Van B. Haywood, DMD, and Erin S. Boyleston, RDH, MS, on esthetic dentistry; Michele Carr, RDH, MA, and Rachel Kearney, RDH, MS, on ethics and risk management; Durinda Mattana, RDH, MS, on fluoride use; Kandis V. Garland, RDH, MS, on infection control; Mary Kaye Scaramucci, RDH, MS, on instrument sharpening; Stacy A. Matsuda, RDH, BS, MS, on instrumentation; Karen Davis, RDH, BSDH, on insurance coding; Cynthia Stegeman, EdD, RDH, RD, LD, CDE, on nutrition; Olga A.C. Ibsen, RDH, MS, on oral pathology; Jessica Y. Lee, DDS, MPH, PhD, on pediatric dentistry; Bryan J. Frantz, DMD, MS, and Timothy J. Hempton, DDS, on periodontal therapy; Ann Eshenaur Spolarich, RDH, PhD, on pharmacology; and Caren M. Barnes, RDH, MS, on polishing. Log on to dimensionsofdentalhygiene.com/asktheexpert to submit your question.



OLGA A.C. IBSEN, RDH, MS, FAADH, is a world-renowned authority on oral pathology and the co-author of *Oral Pathology for the Dental Hygienist*, now in its 7th edition. A trusted opinion leader on this subject, she also is an adjunct professor at several universities and a consultant member of the Commission on Dental Competency Assessments. Ibsen is a longtime member of *Dimensions of Dental Hygiene's* Editorial Advisory Board and the 2017 recipient of The Esther Wilkins Lifetime Achievement Award.

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[2] Jorgenson, G, Palenik CJ. Selection and use of personal protective equipment. *The Dental Assistant*. 2004; 73:16-19.

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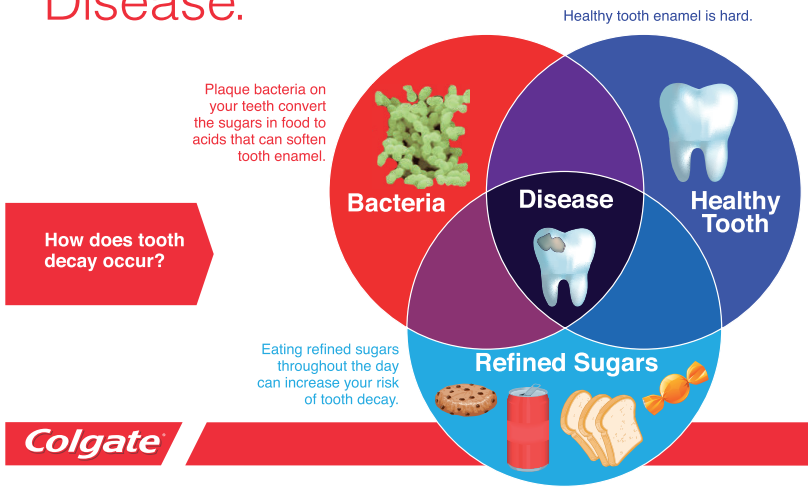
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