

Yoganomics: Postural Health and Ergonomic Considerations for the Dental Professional

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Our Opportunities...

- ☪ Identify ergonomic issues relating to clinical practice and site resources to maximize postural health.
- ☪ Define the practice of yoga as it relates to the profession, postural health and ergonomics and site research relating to the health benefits associated with yoga.
- ☪ Identify precautions and considerations for yoga practice.

I. Defining Ergonomics: Mosby's Dental Dictionary

- ☪ The applied science of equipment design, as for the workplace, intended to maximize productivity by reducing operator fatigue and discomfort.
- ☪ "Laws" (nomo) of "Work" (ergon).
- ☪ The field of science including all aspects pertaining to a comparison of the mental and physical exhaustion produced to the quantity and quality of the deliverable *care*.

II. Defining Ergonomics: Center for Disease Control and Prevention (CDC)

Ergonomics is the scientific study of people at work. The goal of ergonomics is to reduce stress and eliminate injuries and disorders associated with the overuse of muscles, bad posture, and repeated tasks. This is accomplished by designing tasks, work spaces, controls, displays, tools, lighting, and equipment to fit the employee's physical capabilities and limitations.

III. Ergonomic Resources in Dentistry

- ☪ American Dental Association – <http://www.ada.org/en/publications/ada-professional-product-review-ppr/archives/2014/november/ergonomics-and-dental-practice-preventing-work-related-musculoskeletal-problems>
- ☪ OSHA - <https://www.osha.gov/SLTC/ergonomics/index.html>
- ☪ OSAP - http://www.osap.org/?page=Issues_Ergonomics&hhSearchTerms=%22ergonomics%22
- ☪ Ergonomics Facts - <http://www.ohcow.on.ca/uploads/Resource/Workbooks/ERGONOMICS%20AND%20DENTAL%20WORK.pdf>



Table 1. Symptoms of Cumulative Traumatic Disorders.⁷

Disorder	Symptoms
Carpal Tunnel Syndrome: a result of the compression of the median nerve within the wrist.	Pain, tingling, loss of feeling, or weakness in the thumb, index, and middle finger.
Ulnar or Radial Nerve Entrapment: produced by the compression of the ulnar or radial nerves that pass through the wrist.	Weakness, loss of feeling, and/or tingling in the lower arm or wrist.
Pronator Syndrome: brought on by the compression of the median nerve in the area between the pronator teres muscle that extends from the elbow forward.	Closely related to those noted for carpal tunnel syndrome.
Tendinitis: inflammation of the tendons as a result of strain. Tenosynovitis: inflammation of the tendons located on the lateral borders of the wrist and the lower end of the thumb.	Pain in the wrist, mainly on the periphery or the sides of the hand and thumb. These symptoms may also be expressed in the elbow, hand, and shoulder and may lead to severe pain and weakened function of the joints.
Extensor Wad Strain: a result of injury caused to the extensor muscles of the thumb and fingers.	Numbness, pain, and weakness in the fingers of the hand.
Thoracic Outlet Syndrome: caused by the compression of the brachial nerve plexus (located around the collar bone)	Loss of feeling, discomfort, and/or tingling in the fingers, hand, or wrist.

Preventive strategies can keep practice pain-free and ensure a long career in clinical dental hygiene.
 By Tabitha Tavoc, RDH, MEd, and Marylou E. Gutmann, RDH, MA
 Dimensions of Dental Hygiene, Web Site - <http://www.dimensionsofdentalhygiene.com/print.asp?id=417>

IV. Advancing the Art and Science of Dentistry through Yoga - Ergonomic Checklist

- Operatory/Clinician Chair & Patient Positioning
- Visual enhancing technologies – Magnification, Light & Indirect Vision
- Pre-procedure polishing for periodontal/recare appointments
- Powered instrumentation utilization
- Sharp instruments
- Varying size of instrument handles
- Use of cordless technologies
- Employ protective scaling techniques – *“Reinforced Periodontal Instrumentation & Ergonomics for the Dental Professional”* – www.dianemillar.com
 - avoid thumb hyperextension
 - avoid excessive finger movement
 - keep wrist in neutral during forearm rotation
- Proper fitting gloves
- Minimize patient stress through anxiety relieving technologies/techniques
- Frequent stretching and twists
 - Finger Yoga at: www.fingeryoga.com
- Colleague feedback
- Tune into signals from your body!



V. What is Yoga?!

VI. Impact of Yoga on the Body Systems

- ॐ Flexibility
- ॐ Strength
- ॐ Posture
- ॐ Joints
- ॐ Spinal Health
- ॐ Skeletal System
- ॐ Circulatory
- ॐ Lymphatic
- ॐ Heart
- ॐ Cortisol
- ॐ Mental Health
- ॐ Weight
- ॐ Cholesterol
- ॐ Brain Waves
- ॐ Nervous System
- ॐ Balance and Reflexes
- ॐ Immune System
- ॐ Respiratory System
- ॐ Waste Elimination
- ॐ Stress
- ॐ Pain
- ॐ Relations
- ॐ Healing
- ॐ Peace



VII. Just Breathe!

VIII. Equipment for Yoga Practice

- ॐ Non-PVC mats are now available
- ॐ Props: blocks, straps, blankets and bolsters
- ॐ Clothing: relaxed, comfortable and breathable
- ॐ Wrist ease: www.gripitz.com; www.getwags.com; www.yogastickysocks.com; www.threeminuteegg.com; www.forrestyogastore.com; www.wristwand.com
- ॐ Sweat reduction or travel mats – www.yogitoes.com
- ॐ Open mind!

IX. Suggested Readings and Resources

- ॐ Yoga Journal: www.yogajournal.com
- ॐ White Lotus Foundation: www.whitelotus.org
- ॐ Kripalu: www.kripalu.org
- ॐ Yoga as Medicine by McCall (text book)
- ॐ Anatomy for Yoga by Grilley (DVD)
- ॐ Light on Yoga by Iyengar (text book)
- ॐ Office Yoga – Simple Stretched for Busy People by Zeer
- ॐ Yoga Applications on iTunes
- ॐ Yoga for Neck & Shoulders & Yoga Remedies for Everyday Ailments booklets – email kmenageb@aol.com for electronic copies of these guides
- ॐ Various televised yoga practices on cable television, including on-demand programming



X. My Intentions and Future!

Ergonomic Preventive Strategies for Dental Hygienists ⁹		
Armamentarium	Preventive Strategy	Expected Outcome
Seating	Allows sufficient body support, provides adequate padding and has a stable seat, adjustable arm rests suggested to provide relaxed rest area	Greater comfort, improved posture, less fatigue
	Maintain neutral positions	Reduced fatigue and injury
Magnification Loupes	Provide better visual acuity	Improved posture; reduced neck, back, and shoulder fatigue; improved diagnostic skills
Instruments	Large diameter handles	Reduced pinch grip
	Textured handles	Better traction and less pinch grip
	Sharp blades	Reduced pressure during instrumentation
Slow-speed Handpiece	Lightweight	Reduced hand fatigue and discomfort
	Balanced weight	Easier to hold, less strain on hand and wrist
	Large diameter handle	Looser grip/more control
Air Hose and Hose Apparatuses	Smooth hoses, not tightly coiled; lightweight	Reduces overall drag and pull on wrist and hand; more flexibility, easy to manipulate
	Within easy reach	Less pull and stress on the body
Gloves	Wear properly fitting gloves	Reduces hand fatigue
Exercise Techniques	Stretching before work and throughout the day	Improved strength and flexibility
	Warm-ups	Reduced muscle and joint soreness, increases work longevity

Dimensions OF DENTAL HYGIENE APRIL 2008

A Beginner's Guide to Taking Care of Yourself in Yoga Class

Yoga is meant to meet each individual exactly where he or she is. If you are new to yoga, there are many things you can do to make every class enjoyable and appropriate for your body and your needs.

1. **Leave your ambition at the door.** Yoga is a practice that will keep you interested and challenged for a lifetime. There's no need to achieve – or even try - everything the first day, week, month, or year.
2. **Talk to the teacher before class.** Let the teacher know that you are new to yoga and to the teacher's class. Let the teacher know if you have any injuries or medical conditions, or any concerns about class. Any teacher of an all-levels class will warmly welcome you and try to accommodate you in the class.
3. **Give yourself permission.** Take care of your own needs in class, whether that's by taking a break, observing instead of doing, or modifying a pose to make it more comfortable. You can use child's pose, or another resting pose, to focus on your breath and rest the body.
4. **Stay mindful.** Every action in yoga is intentional. Take the time to understand and approach a pose or movement at your own pace. By paying close attention to alignment and action, even challenging poses will eventually become possible and comfortable.
5. **Ask for assistance.** If you're unsure whether a pose or movement is right for you, ask the teacher for help. If you have a recent injury or other special concerns, seek out a smaller, slower-paced class, so the teacher can provide more individual attention.
6. **Use your breath as a guide.** If you cannot breathe smoothly and deeply, you may be working too hard or at risk for injuring yourself. Safe, comfortable stretching usually deepens the breath. Appropriate effort also deepens the breath. In contrast, strain of any kind (including working too hard or pushing too hard in a stretch) is usually accompanied by shallow or forced breathing.
7. **Listen to the teacher's feedback.** Individual feedback is one of the most valuable benefits of attending yoga class. We are so used to our physical habits that it often takes an observer to point out how we create stress in the body.
8. **During hands-on adjustments, give the teacher feedback.** Let the teacher know whether you prefer gentle or strong adjustments. If you prefer not to be adjusted, let the teacher know before class.
9. **Take the best, and leave the rest.** In any given class, some poses will feel good and others will not; some movements will feel exhilarating, and others won't. Notice what feels right for your body. You can begin to include these practices in your everyday life, when you can't make it to class.
10. **Stay open.** As you explore different classes, keep an open mind. No class or style of yoga is universally best for every person. As you build a regular practice, you may find that poses, practices, and classes that you didn't enjoy at first will become your favorites. As your life changes, so will your practice. Always honor your needs.

More ideas for your yoga practice: www.openmindbody.com - **About the author:** Kelly McGonigal, Ph.D. teaches yoga, meditation, and health psychology at Stanford University. She is the Editor-in-Chief of the *International Journal of Yoga Therapy* and *Yoga Therapy in Practice*.



75 Health Conditions Benefited by Yoga, as Demonstrated in Scientific Studies
 From *Yoga as Medicine* by Timothy McCall, MD (updated February 2013)

- | | |
|---|--|
| Alcoholism and Other Drug Abuse | Menopausal (and Perimenopausal) Symptoms |
| Anxiety | Menstrual Disorders |
| Asthma | Metabolic Syndrome |
| Atrial Fibrillation | Migraine and Tension Headaches |
| Attention Deficit/Hyperactivity Disorder
(ADD/ADHD) | Multiple Sclerosis |
| Autism | Muscular Dystrophy |
| Back Pain | Neck Pain |
| Balance Problems | Neuroses (e.g. Phobias) |
| Breast Cancer | Obesity/Overweight |
| Cancer (General) | Obsessive Compulsive Disorder (OCD) |
| Carpal Tunnel Syndrome | Organ Transplant |
| Chronic Fatigue Syndrome | Osteoporosis |
| Chronic Obstructive Pulmonary Disease
(COPD) e.g. Emphysema) | Osteoarthritis (Degenerative Arthritis) |
| Congestive Heart Failure | Ovarian Cancer |
| Depression | Pain (Chronic) |
| Diabetes | Performance Anxiety |
| Drug Withdrawal | Pleural Effusion (Fluid in Lung Lining) |
| Eating Disorders | Polycystic Ovarian Syndrome |
| Epilepsy | Post-Heart Attack Rehabilitation |
| Fatigue | Post-Joint Replacement |
| Fibromyalgia | Post-Polio Syndrome |
| Gait (Walking) Problems | Post-Operative Recovery |
| Guillain-Barré Syndrome | Post-Stroke Rehabilitation |
| Heart Disease | Post-Traumatic Stress Disorder (PTSD) |
| Hemorrhoids | Pregnancy (both normal and complicated) |
| High Blood Pressure | Psoriasis |
| HIV/AIDS | Restless Leg Syndrome |
| Hypothyroidism | Rheumatoid Arthritis |
| Infertility | Rhinitis (Inflammation of the Nose) |
| Inguinal Hernia | Schizophrenia |
| Insomnia | Scoliosis (Lateral Curvature of the Spine) |
| Irritable Bowel Syndrome | Sexual Function |
| Kidney Failure | Sinusitis |
| Lymphoma | Smoking Cessation |
| Mental Developmental Impairment | Stroke |
| | Total Knee Arthroplasty |
| | Traumatic Brain Injury |
| | Tuberculosis |
| | Urinary Bladder Dysfunction |
| | Urinary Stress Incontinence |

Dental Hygiene Work: Pain is NOT in the Job Description

Learning Objectives

Upon completion of this course, the dental professional will be able to:

- Identify common upper body musculoskeletal disorders (MSDs)
- Identify dental hygiene working techniques associated with pain and MSDs
- Describe the upper body signs and symptoms that require a medical consultation
- Discuss how the following can reduce risk for MSDs:
 - o operator and patient positioning
 - o instrument selection and maintenance
 - o selection of appropriately sized gloves
 - o utilization of well-fitting loupes
 - o appropriate patient scheduling
- Describe employee rights regarding safe and healthy workplaces

Musculoskeletal disorders can end careers ~ Prevention is key

Pain in the hands, wrists, arms, shoulders, neck, and back are common among dental hygienists.¹ However, when ignored, these symptoms can become persistent and severe enough that they can end a career and make daily living miserable. No one should be required to do a job that causes pain. Relatively simple changes to work practices can prevent and alleviate musculoskeletal disorders (MSDs). This course will focus on the following topics:

- Common MSDs and their causes
- How operator and patient positioning can prevent pain
- How to select and maintain instruments that will help alleviate pain
- How to select and fit loupes to help prevent neck and back pain
- The importance of working with the dental office to appropriately schedule patients with heavy disease

Figure 1. The Dental Hygiene and Ergonomics Video Series: Pain is NOT in the Job Description
www.cdph.ca.gov/programs/ohb/Pages/ErgonomicsDentalHygiene.aspx



Each topic is also covered in five short videos available through the California Department of Public Health (CDPH) web site, www.cdph.ca.gov/programs/ohb/Pages/ErgonomicsDentalHygiene.aspx (Figure 1). The videos were developed by dental hygienists for dental hygienists in collaboration with the California Dental Hygienists' Association, CDPH's Occupational Health Branch, the University of California, Berkeley, and the National Institute of Occupational Safety and Health of the Centers for Disease Control and Prevention.

Musculoskeletal symptoms: When is it time to seek medical attention?

Pain, numbness, tingling, and weakness are symptoms originating from the musculoskeletal system, usually due to injuries to muscles, tendons, nerves, joints, or ligaments (Figure 2). Some common examples include injuries to tendons at the wrist (DeQuervain's disease), elbow (Tennis elbow), or shoulder (supraspinatus tendonitis); injuries to nerves in the neck, shoulder, elbow, or wrist (carpal tunnel syndrome or ulnar neuropathy); injuries to joints (arthritis); or chronic muscle pain (myalgias).



Figure 2. Nine tendons pass through the carpal tunnel of the wrist. Carpal tunnel syndrome occurs when the synovium around the tendon becomes swollen and compresses the median nerve. Drawing of the carpal tunnel through which the median nerve and nine tendons pass. In carpal tunnel syndrome the synovium around the tendon (blue) is swollen and it compresses the nerve.

Symptoms that are brief and last only seconds are not usually worrisome. However, if a dental hygienist has symptoms that persist from day to day and interfere with work and home activities he or she should take action. Persistent numbness or weakness, which is suggestive of carpal tunnel syndrome or other nerve disorders, should prompt a visit to see a healthcare provider. Swelling, redness, or warmth in the upper extremities, suggestive of an infection, needs immediate attention from a healthcare professional.

Physicians who are experts in treating musculoskeletal pain are typically board certified in one of the following specialties: occupational medicine, sports medicine, rehabilitation medicine (physiatrists), chiropractic medicine, orthopedics, hand surgery, or neurology. Hand therapists and physical therapists also have important expertise in this area.

If the symptoms are mild and intermittent, a dental hygienist can try to manage them on his or her own by modifying work practices, as discussed below. However, if, after a few weeks, the pain is not reduced, he or she should see a physician.

Causes of work-related pain

Many dental hygienists are aware of the need to take care of their own body positioning in clinical practice in order to work comfortably and effectively. Some dental hygienists learned proper positioning in dental hygiene school. But in a busy dental practice proper positioning is easy to forget. High-risk postures to avoid include the following:

- Sustained neck and back flexion (forward bending) and twisting
- Sustained shoulder elevation (shrugging), abduction, or flexion
- Sustained forceful pinching of instruments during debridement

Ergonomics is the study of how to design work to be efficient and to prevent injuries. Ergonomics principles guide dental hygienists and other workers to avoid sustained awkward postures, sustained high muscle loads, or repeated forceful hand exertions. When performing dental hygiene work, a hygienist's body posture should be neutral and his or her muscles should feel relaxed. Examples of neutral and non-neutral postures during dental hygiene work are demonstrated in Figure 3.

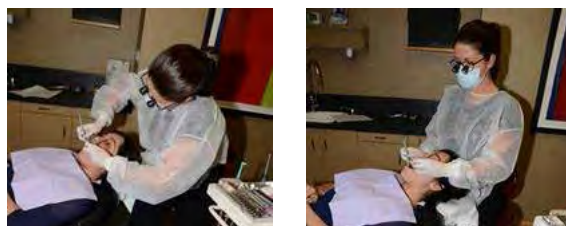


Figure 3: Left: non-neutral posture; Right: neutral posture

Operator positioning is often overlooked as the dental hygienist works through a busy day at the office and responds to patients' preferences and requirements. From elderly patients who must sit in a vertical position to the pediatric patient who cannot keep his chin up, hygienists often compromise their posture in order to meet the needs of the patients. Taking the time to adjust the operator chair and the patient is imperative to maintaining good musculoskeletal health.

The operator stool height should be adjusted so the operator's knees are slightly lower than the hips and the feet are flat on the floor. The angle between the thighs and torso should be 90 degrees or more and the operator should be able to easily move around the patient chair.

Next, the operator should recline the patient and adjust the chair height to have good access to the oral cavity in all the clock positions around the patient's head. The operator's knees should be able to slide under the patient's chair to avoid working with a twisted spine and torso. The operator should be able to work on the patient's mouth with shoulders relaxed and elbows next to the torso. The height of the patient's mouth should be close to elbow height.

Finally, the operator should move to the appropriate clock position around the patient's head, in order to achieve optimal access to the oral cavity. (Figure 4)

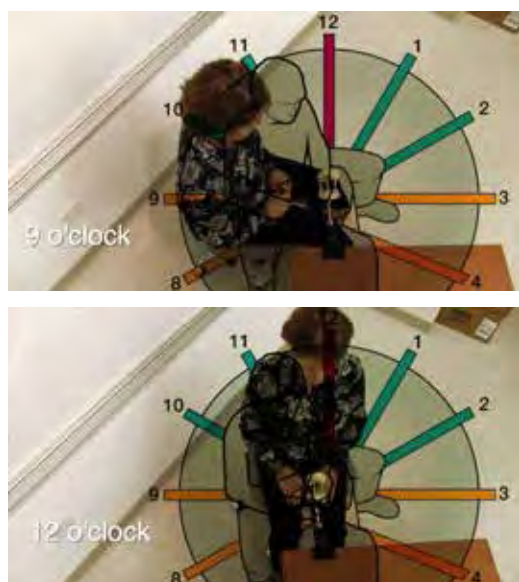


Figure 4. Hygienist demonstrating clock positions

Operator chair selection and adjustment

Neutral positioning begins with the operator chair. Correctly adjusted operator chairs enable a balanced working posture. The design and slope of the seat pan (e.g., the part of the chair one sits on) affects the sitting position. A seat pan that positions the pelvis in a neutral position will balance the spinal curves of the back, resulting in less fatigue in the back, neck, and shoulders. One chair does not fit all body types. Clinicians should be familiar with their chairs and know how to make the necessary adjustments for optimal seating.

Most dental offices have chairs with flat seat pans. This type of chair requires the thighs to be parallel to the floor with the hip angle at 90 degrees. The height of the chair is low enough for the heels of the feet to rest on the floor. This forward position causes the pelvis to roll back and flattens the natural curve in the low back. When the lumbar curve is flattened and the spine is in a

curved forward position for extended periods of time, the risk of low back, neck, and shoulder pain increases.

To address this problem, some newer ergonomic chairs have seat pans that tilt forward. The five to ten degree forward slope of the seat pan opens the hip angle to more than 90 degrees. Another type of seating is the saddle-style chair that positions the clinician in a more neutral sitting position. If there is no budget for a new chair, flat seat pan chairs can be retrofitted with a wedge-shaped cushion that will promote proper positioning and spinal alignment.²

Basic steps for operator chair adjustment²

- Adjust the lower rounded portion of the backrest to support the lower back.
- Sit all the way back on the seat pan.
- Tilt the seat pan forward (5 to 15 degrees). Do not tilt the seat more than 15 degrees as this can cause you to slip forward.
- Adjust the height of the chair so the feet are flat on the floor with thighs sloping slightly downward. Your weight should be evenly distributed across the thighs on the seat with some weight on the feet.
- Find your neutral pelvic position. This can be done by sitting up straight (the lower back will arch into the natural lumbar spinal curve).
- Adjust the backrest height and forward position to support the curve of the lower back.
- If the chair has armrests, they should support the arms fully in a relaxed position. Elbows should be parallel to the patient's occlusal plane.
- Chairs generally have two different heights of cylinders. If your thighs are parallel with the floor with your feet flat on the ground and you are not able to raise the height further to open the hip angle, consider ordering a taller cylinder for the chair. Conversely, if you are unable to sit all the way back on the seat pan with your feet flat on the floor at the lowest height, consider buying a shorter cylinder. Chair manufacturers can assist with this information.

Instruments: Choosing the best and keeping them sharp

Scaling and root planing require high levels of pinch force to instruments, applied over many hours per week, thus increasing

the risk for developing hand and arm pain and musculoskeletal disorders, such as carpal tunnel syndrome. There are a variety of ways to decrease the forces applied to the muscles in the hand and forearm during scaling including:

- using an ultrasonic scaler
- learning to reduce the muscle pinch force during debridement
- using lightweight instruments
- using instruments with a good grip surface and a larger handle diameter
- using sharp instruments

Research shows that experience matters! Studies have demonstrated that experienced dental hygienists and dentists apply less pinch force during scaling than students.³ Proper use of a finger rest or fulcrum during debridement also improves control and can decrease the pinch force applied to instruments.^{4,5} Clinicians must continue to consider alternative methods to perform periodontal debridement using comfortable hand motions and shoulder postures.

A recent study of dental hygienists in northern California demonstrated that by using larger diameter (11 millimeter), lightweight (14 gram) instruments clinicians reported decreased upper extremity pain compared to using traditional narrow diameter (8 millimeter), heavier (34 gram) instruments.⁶ After 4 months of use, study participants overwhelmingly preferred the lighter, larger diameter dental scaling instruments. Use of these new instrument designs also improved the sleep patterns of participants who had previously reported hand pain. These individuals found that they did not wake as frequently with hand pain symptoms and reported a reduction in the use of pain medications.

Clinicians can also reduce pinch forces by using instruments manufactured with a textured grip surface or with surfaces made from materials shown to increase friction between gloved fingers and the instrument.

Lastly, and perhaps most importantly, a sharp instrument requires less pinch force to use during debridement than a dull instrument. Instruments should be sharpened on a regular basis.

Gloves must fit well

Gloves play an important role in protecting the clinician and patients from transmissible diseases. Employers are required to supply their employees with properly fitted gloves. Most dental hygienists use nitrile gloves to reduce the risks of the allergic reactions associated with latex gloves. Gloves should fit comfortably across the palm and

through the length of the fingertips, without compressing the hand. Improperly fitted gloves can lead to increased hand and forearm muscle tension and reduced dexterity and tactile sensitivity.⁷ Tightly fitted gloves are a risk factor for MSDs.

Fortunately, gloves are now being made with new materials that allow them to be very thin, enabling improved dexterity, and good durability. Another recent improvement is the availability of low-cost right and left handed gloves instead of the usual ambidextrous gloves. Right and left handed gloves decrease the muscle forces required during high precision tasks, like root planing. Dental offices should have boxes of right and left handed gloves of different sizes to meet the needs of the staff.

Using loupes to prevent neck and back pain

Loupes are magnifying lenses attached to special glasses designed to magnify the view of the oral cavity. Many dental hygiene schools currently require students to use loupes from the beginning of their clinical training. Well-designed and fitted loupes help clinicians to work in a more upright and neutral posture, which in turn, helps to prevent neck and back pain (Figure 5).

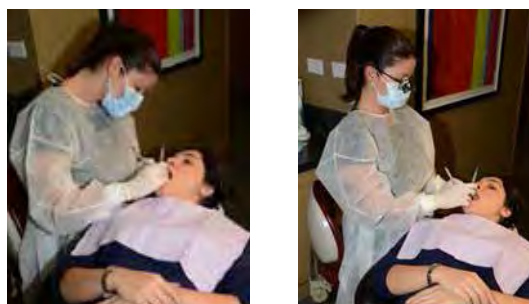


Figure 5

Left: Operator not using loupes demonstrates forward flexion of the neck and upper back.

Right: Operator using loupes demonstrates the head and torso in an upright, neutral posture.

Loupes are custom made to fit the individual; they should not be shared. There are many kinds of loupes. It is important for a clinician to consider the following factors when considering purchasing loupes:

- Weight
- Magnification, hygienists typically use 2.5x
- Viewing declination angle (should be greater than 40 degrees)
- Through the lens (TTL) vs. flip-up design
- Focal distance (custom fit)
- Additional loupe lighting

Clinicians should find an experienced fitter to help select and fit loupes. A fitter who is able to come to the clinician's workplace can more accurately measure the focal distance between an operator and a patient with the actual patient and operator chairs that will be used. In order to keep the head and back in a neutral upright posture while working, the hygienist's viewing declination angle should be greater than 40 degrees (Figure 6). The flip-up lens design can accommodate the larger declination angles better than the TTL design. However in the TTL design, the lens is closer to the eye, resulting in two advantages: a wider field of view and greater depth of field. The depth of field is the range that is in focus while wearing the loupes; the larger it is, the easier it is to work.



Figure 6.
The viewing declination angle should be greater than 40 degrees while wearing loupes.

The focal distance (or working distance) is the distance between the front of eyes to the patient's first molar, measured while maintain good working posture. It is critical to take this measurement correctly as it will determine the head and torso posture when working.

An light attached to loupes provides a better illumination source than ceiling mounted lights because it is directly aligned with the line-of-sight. The newer light-emitting diode (LED) lights provide a lightweight light source that does not overheat.

Clinicians over the age of 40 will have some degree of presbyopia; yellowing and stiffening of the lens in the eye. As the lens stiffens, the eyes lose their ability to change focus. Loupes may be especially helpful for individuals with presbyopia.

The employer's role in employee health and safety

Dentists and other employers are responsible for ensuring the health and safety of their employees on the job. Clinicians who are experiencing MSDs should notify their office manager, supervisor, or employer about their job-related pain. Employees injured on the job are eligible for workers' compensation benefits. For more about how to file a claim, see the California Department of Public Health web site: <http://www.cdph.ca.gov/HealthInfo/workplace/Pages/WorkerLinks.aspx#workerscomp>

Dentists are also at risk for developing job-related MSDs. Most dentists should want to help hygienists avoid job-related injuries

and should be willing to accommodate instrument, equipment, or scheduling changes to keep clinicians in the office injury-free.

Patient scheduling: Balancing the difficult cases

Patients requiring heavy root planing or scaling take extra time and the instrumentation will require higher pinch forces, putting clinicians at increased risk for developing hand and arm pain. Multiple patients requiring heavy root planing should not all be scheduled on the same day. Office managers or schedulers should be mindful of the need to balance the schedule so scaling and root planing appointments are spread throughout the week and not back to back. Clinicians should work with their dentist and scheduling staff so they understand the importance of a balanced schedule.

Can exercises reduce pain?

Scientific evidence demonstrates that strengthening exercises have been shown to reduce persistent pain in the muscles of the neck, shoulder, and upper back.⁸ These strenuous exercises are performed three times per week, using free weights, targeting the painful muscles (Figure 7). The exercise regimen may take several weeks before there is a noticeable decline in pain. Clinicians should get a medical clearance to make sure that the problem is based in the muscles and not the nerves, tendons, or joints, before starting the exercises program.

Regular stretching may feel good and relieve muscle tension, however, there is no strong evidence that stretching exercises alone will relieve or prevent pain.

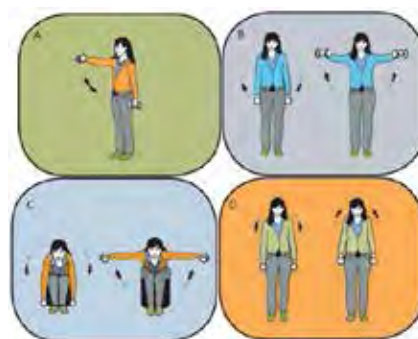


Figure 7.
Examples of strengthening exercises that can relieve painful neck, shoulder, and upper back muscles.

Dental hygienists should not accept job-related pain as "just part of the job." When ignored, MSD symptoms can become persistent and severe enough that they can shorten a hygienist's career. Relatively simple changes to work practices can prevent and alleviate MSDs. Having the proper instruments and equipment; taking the time to correctly position the operator and the patient; and asking the dental office to help make positive changes to the work space and to the work schedule, will all help reduce the risk of MSDs.

Making of the dental hygiene and ergonomics video series



In 2013, the staff at the California Department of Public Health (CDPH) decided to create a video series on ergonomics and dental hygiene, based on the high number of workers' compensation cases filed by dental hygienists over time.

The interdisciplinary team, including physicians, data analysts, a health educator, and an ergonomist, decided that they needed a group of dental hygienists to act as an advisory board for the project. They recognized the need for hygienists who could help develop messaging and provide input and feedback into the videos.

After a few false starts, a CDPH staffer reached out to Michael Long, the Continuing Education Chair of the San Francisco Component of CDHA, just as Long himself was reaching out to the UC Berkeley Ergonomics Program to provide ergonomics education to his component.

The happy coincidence led to Long and a dozen Bay Area dental hygienists meeting with CDPH staff in October 2013 to discuss the project, job-related pain, dental hygiene and ergonomics. The discussion was lively and informed by many years of collective dental hygiene experience. The group was so articulate

that the CDPH video makers decided that the best way to make the videos was to use the words, concepts, and images of the dental hygienists themselves.

As a result, almost everyone who appears in the video series is a dental hygienist from northern California. The videos strive to allow hygienists to tell their own stories and provide compelling reasons for viewers to take simple ergonomic steps to prevent job-related pain.

The series is narrated by Michael Laflamme, a hygienist who had an earlier career in voice acting who is also a leader in the San Francisco Component. Video interviewee Shelly Azevedo is an instructor at the University of the Pacific in Stockton who was forced to stop practicing clinical dental hygiene when she sustained a work-related back injury. After several painful years on disability, Azevedo eventually underwent back surgery, and is now able to teach. She focuses on ensuring her students will have a long and pain-free career by teaching them proper ergonomics. She is also a Certified Ergonomic Assessment Specialist.

The early video scripts, subsequent storyboards, and the videos themselves were all vetted by dental hygienists, physicians, academics, and the California Dental Hygienists' Association, who agreed to endorse and help produce the video series.

The completed video series is a genuine collaboration between CDHA, the University of California, and the California Department of Public Health, and was truly made "by and for dental hygienists."

Watch the video series at <http://www.cdph.ca.gov/programs/ohb/pages/ErgonomicsDentalHygiene.aspx>

References

1. Hayes MJ, Smith DR, Taylor JA. Musculoskeletal disorders in a three year longitudinal cohort of dental hygiene students. *J Dent Hyg* 2014; 88(1):36-41.
2. Valachi, B. Practice dentistry pain-free. Portland: Posturedontics Press. 2008. 245p.
3. Dong H, Loomer P, Villanueva A, Rempel D. Pinch forces and instrument tip forces during periodontal scaling. *J Periodontology* 2007; 78(1):97-103.
4. Millar, Diane. Reinforced Periodontal Instrumentation and Ergonomics: The best practice to Ensure Optimal Performance & Career Longevity. *J CDHA*, Summer 2009; 24(3):8-16.
5. Dong H, Barr A, Loomer P, Rempel D. The effects of finger rest positions on hand muscle load and pinch force in simulated dental hygiene work. *J Dent Educ* 2005, 69(4):453-460.
6. Rempel D, Lee D, Dawson K, Loomer P. Effect of periodontal curette handle weight and diameter on dental practitioner arm pain: A 4-month randomized controlled trial. *J Am Dental Assoc* 2012; 143(10):1105-1113.
7. Dianat I, Haslegrave CM, Stedmon AW. Using pliers in assembly work: short and long task duration effects of gloves on hand performance capabilities and subjective assessments of discomfort and ease of tool manipulation. *Appl Ergon* 2012; 43(2):413-23.
8. Zebis MK, Andersen LL, Pedersen MT, et al. Implementation of neck/shoulder exercises for pain relief among industrial workers: A randomized controlled trial. *BMC Musculoskeletal Disorders* 2011; 12:205.

Michael Long: Job-related pain almost limited his career choice

Michael Long has wanted to be in the dental field ever since he was a child. He says, “I’ve always been attracted to dentistry...as far back as I can remember.” He began his career path as a dental assistant, but after two years, began to develop wrist pain. The pain caused him to switch to administrative work in the dental office instead.



The pain went away, but he missed working with patients. So he decided to go back to dental hygiene school with the promise that he would take care of his body while practicing dental hygiene.

In school he learned the proper positioning and techniques to lower the risk of getting a musculoskeletal injury. “Through the hygiene program, it was clear that dental hygienists’ bodies will fail over time without proper ergonomics,” he said. “What I learned was proper posture, instrumentation, general ergonomics, how to utilize my hand mirror, indirect vision.”

He supplemented his dental hygiene and ergonomics education with a personal strength training program to protect the health of his wrists and upper body. But after working for three years clinically, Long began to feel pain on his right side.

He eventually realized that he had begun accommodating patients’ needs over his own. He had stopped paying as much

attention to his ergonomics. “Sometimes, I feel like I don’t want to inconvenience my patients to have them move into positions that would make it more comfortable for me,” he said.

“I jeopardized everything I learned about proper ergonomics in order to keep to the time schedule and accomplish everything I needed to do...In order to see more patients in the same amount of time, I took shortcuts...Over time, working with these shortcuts, now part of my standard practice, I developed shoulder ache, shoulder pain, wrist pain, to the point where I couldn’t sleep on my right side.”

Long asked his dentist for help, and she worked with him to find solutions. Since then, Long has rid himself of pain by focusing on the ergonomics he learned in school. Now he brings his shoulders down, his arms in, moves his patient’s head properly, and uses his mirror with indirect vision more often. And he wears loupes with an overhead light.

He continues to practice yoga and strength training outside of the office. He is planning to have a long career in the profession that fulfills his childhood dream. “I will continue to practice free of pain, and I do love being with my patients,” he said.

Michael Long practices dental hygiene in San Francisco and is active in the San Francisco Component and the California Dental Hygienists’ Association.

Resources Ergonomics

- California Department of Public Health
www.cdph.ca.gov/programs/ohb/Pages/ErgonomicsDentalHygiene.aspx
- University of California, Berkeley, Ergonomics Program
<http://ergo.berkeley.edu/>
- University of British Columbia, Dentistry Department, Dental Clinical Ergonomics
<http://www.dentistry.ubc.ca/ergo/>
- “Take your gloves seriously,” RDH Magazine
<http://www.rdhmag.com/articles/print/volume-33/issue-5/columns/take-your-gloves-seriously.html>

Workers’ rights

- California Department of Public Health
<http://www.cdph.ca.gov/HealthInfo/workplace/Pages/WorkerLinks.aspx>

Loupes

- “Magnification Magic,” RDH Magazine
<http://www.rdhmag.com/articles/print/volume-30/issue-7/features/magnification-magic.html>
- “Magnification in Dentistry: How Ergonomic Features Impact Your Health,” Dentistry Today
<http://www.dentistrytoday.com/ergonomics/1110>
- University of British Columbia, Dentistry Department, Dental Clinical Ergonomics
<http://www.dentistry.ubc.ca/ergo/>

Ursula Tumath: A new clinician with job-related pain



Ursula Tumath decided to become a dental hygienist because her dad was a dentist, and she loved the idea of forming strong bonds with patients.

“I’ve really built a relationship with people. . .you learn about their families, their vacations, their lives. . .it may have

been six months since you’ve last seen them, but you remember everything about them and they remember everything about you, it is really fascinating,” Tumath said in her video interview.

Practicing dental hygiene and helping patients improve their oral health has exceeded her expectations. The only downside to her career choice, Tumath said, was the unexpected appearance of a musculoskeletal disorder. She remembered when she started feeling wrist pain after practicing dental hygiene for two years. She knew it was connected to her work.

“When I first experienced the pain, I didn’t really turn to anybody because I thought I was the only one, and I didn’t want to think that – oh my gosh, I have pain, I’m not going to be able to work as a dental hygienist anymore – that to me was scariest part,” Tumath said. “I really thought I was the lone wolf on this one, but after doing some research, I realized I am not the only one, and there are people who have worse pain than I do.”

Tumath took matters into her own hands. She remembered that she had learned correct ergonomic posture and positioning in school but at work had stopped paying as close attention to her instrument grasp and to her body and patient positioning.

“I think in school I was listening in terms of ergonomics, I just didn’t think that I really was going to be one of those people who could possibly be injured,” she said. Tumath started watching and correcting her own positioning and checking her instrument grasp. In a few months, her wrist pain was gone.

“I think we get into bad habits really quickly sometimes just because it’s what’s easier or it might feel ok at that point and there is no one really hovering over you,” she said. Her observation that it can be hard for hygienists to practice ergonomics amidst the pressures of a day-to-day dental practice helped the video makers develop this theme in the video series.

“I tell myself that it feels so much better when I practice the right way, especially sitting correctly. I think just having caught myself so many times, now, I do make a point during an appointment to check my grip on my instrument, make sure everything’s correct,” she says.

Ursula Tumath, practices dental hygiene in the San Francisco bay area.

About the Authors



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Shelly Azevedo, BSRDH, MS, is an assistant professor in the School of Dental Hygiene, Arthur A. Dugoni School of Dentistry, Stockton, CA. She has written several articles in *Dimensions of Dental Hygiene* and *The Journal of Dental Hygiene* on Caries Management by Risk Assessment and Radiology. Ms. Azevedo teaches Oral Radiology, Oral Health Education and is a

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Faith Raider, MA, is a Program Communications Specialist with the Public Health Institute, working in the Occupational Health Branch of the California Department of Public Health. She is a professional communicator with many years’ experience in the areas of worker health, workers’ rights, and environmental health. She builds broader awareness of the Occupational Health Branch

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