

# 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

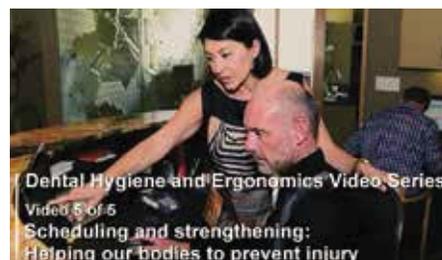
Pain in the hands, wrists, arms, shoulders, neck, and back are common among dental hygienists.<sup>1</sup> However, when ignored, these symptoms can become persistent and severe enough that they can end a career and make daily living miserable. No one should be required to do a job that causes pain. 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](http://www.cdph.ca.gov/programs/ohb/Pages/ErgonomicsDentalHygiene.aspx)



To evaluate this video series,  
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<https://www.surveymonkey.com/r/VYHKQXV>



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](http://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.

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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)

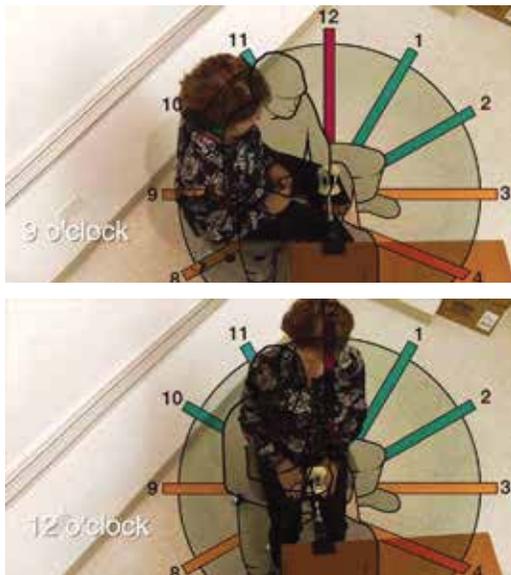


Figure 4. Hygienist demonstrating clock positions

## 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.<sup>2</sup>

## Basic steps for operator chair adjustment<sup>2</sup>

- 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.<sup>3</sup> Proper use of a finger rest or fulcrum during debridement also improves control and can decrease the pinch force applied to instruments.<sup>4,5</sup> 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.<sup>6</sup> 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.<sup>7</sup> 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

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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.

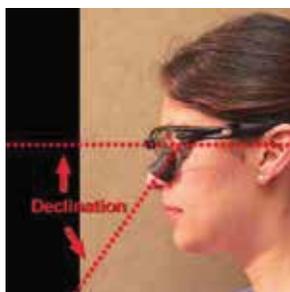


Figure 6.  
The viewing declination angle should be greater than 40 degrees while wearing loupes.

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.<sup>8</sup> 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.

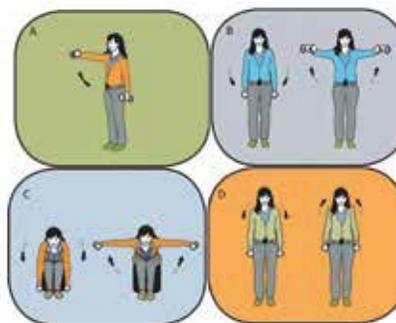


Figure 7.  
Examples of strengthening exercises that can relieve painful neck, shoulder, and upper back muscles.

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

## Pain is not in the job description

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.

References available on page 39.

## About the Authors



**David M. Rempel, MD, MPH**, is a Professor of Medicine at the University of California, San Francisco, and a Professor in Bioengineering at the University of California, Berkeley. He directs the University of California

Ergonomics Program at the University of California at Berkeley. Dr. Rempel conducts research on hand and arm disorders related to work and on engineering interventions for preventing disorders.

**Shelly Azevedo, BSRDH, MS**, is an assistant professor in the School of Dental Hygiene, Arthur A. Dugoni School of Dentistry, Stockton, CA. She received her Bachelor of Science in Dental Hygiene from Loma Linda University and holds a master's degree in health science with an emphasis in health education. Shelly is passionate about promoting awareness of ergonomics in the field of dentistry. She is a Certified Ergonomic Assessment Specialist and is a consultant for dental practices in assessing and improving office workspaces.



**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. A professional communicator with many years' experience in the areas of worker health, workers' rights, and environmental health, Faith works to build a broader awareness of the Occupational Health Branch and its prevention campaigns on a statewide and national level. She also plans and executes communications across all media platforms in addition to conducting education and outreach.

## Producing 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.

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 the 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 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 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 videographers 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 appearing in the series, including narrator Michael Laflamme, is a dental hygienist from northern California. The early scripts, 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 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 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>

**Home Study Correspondence Course**

**“Dental Hygiene Work: Pain is NOT in the Job Description”**

2 CE Units – ADHA/CDHA Member \$25, Non-member \$35

Circle the correct answer for questions 1-10

1. The clinician should seek medical advice when: \_\_\_\_\_ .
  - a. Persistent or recurrent numbness in the fingers
  - b. Sudden shooting pain in the arm that lasts for seconds
  - c. Arm weakness that lasts for several hours
  - d. Pain in the neck at the end of the workday
  - e. a and c
2. The appropriate adjustment of the patient’s chair includes all the following EXCEPT which one of the following?
  - a. Adjust patient chair so that their feet are higher than their heart
  - b. Deep recline of the patient for better access to the patient’s mouth
  - c. Adjust patient chair height so clinician knees fit under the patient’s chair
  - d. Adjust patient chair so that clinician upper arms are at her side
3. Appropriate adjustment of the operator chair includes all the following except?
  - a. Adjust my chair height so my feet are on the floor and it is easy to move my chair
  - b. Pick a clock location around the patient’s head that provides good access
  - c. Adjust my chair back support so I can recline to 40 degrees or more
  - d. Adjust arm supports (if present) to provide good forearm and upper body support
4. Factors that increase the risk for hand or arm pain include all the following EXCEPT one?
  - a. High levels of pinch force applied to instruments during dental scaling
  - b. Use of sharp instrument tips
  - c. Long duration of pinch force during dental scaling
  - d. Awkward wrist posture during scaling
5. Periodontal instruments that are used daily should be sharpened \_\_\_\_\_.
  - a. daily
  - b. weekly
  - c. monthly
  - d. never – replace them when they wear out
6. Instrument handle designs that can reduce pinch force include all the following except?
  - a. Narrow diameter (7 mm) instrument handles
  - b. Light-weight instrument handles
  - c. Large diameter (11 mm) instrument handles
  - d. Textured instrument surface to increase friction
7. Which of the following is NOT a reason why loupes help with dental hygiene work?
  - a. Help maintain a more upright torso and head posture
  - b. Magnify the teeth and gums to increase the precision of work
  - c. Make the clinician look more professional
  - d. With a lamp on the loupes, the lighting in the mouth is improved
8. Well designed and properly fitted loupes include all the following features EXCEPT one. Which one is the exception?
  - a. A viewing declination angle of less than 40 degrees
  - b. A focal distance based on optimal positioning of my head and hands
  - c. A magnification of 2.5x
  - d. Lightweight frame and lenses
9. Which one of the following strategies applies to patients needing heavy root planing or scaling?
  - a. Schedule all these patients for the same day
  - b. Schedule just one of these patients per day
  - c. Use of dull instrument tips will make the work easier
  - d. Don’t bother using ultrasound for cleaning
10. Which of the following exercise strategies have been demonstrated to reduce chronic muscle pain in the upper back and neck?
  - a. Stretching exercises of the painful muscles every day
  - b. Yoga
  - c. Stretching exercises of the painful muscles 3 times per week
  - d. Exercises designed to strengthen the painful muscles

The following information is needed to process your CE certificate. Please allow 4 - 6 weeks to receive your certificate.

Please print clearly:

ADHA Membership ID#: \_\_\_\_\_ Expiration: \_\_\_\_\_  I am not a member  
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