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## RECOGNIZING WMSD SYMPTOMS AND CAUSES



**D**ental care is a rewarding profession that helps improve the lives of others. As providers of an essential health care service—caring for the present and future oral health needs of their patients—dental workers are challenged to a lifetime of learning. As a dental worker, an important part of your learning process is self-care. You must develop the proper mindset and work habits early in your career to prevent the occurrence of work-related musculo-skeletal disorders (WMSDs). Simply put, you must take care of yourself so you can take care of your patients.

WMSDs are traumas to the body that can be caused by daily overuse of certain muscle groups. This causes tissue fatigue and inflammation. Ignoring the symptoms of overuse only worsens your WMSD condition. WMSDs, if not checked, can result in permanent, lifelong physical disability and an inability to continue in the dental profession. Studies have reported:

- Dental workers who suffer a WMSD injury have a lost workday average of 93 days.
- A total of 62% of dental hygienists have complained of neck problems and 81% complained of shoulder pain in one or both shoulders.
- Between 6 and 7% of all dental hygienists in the states of California and Minnesota report being diagnosed with carpal tunnel syndrome (CTS).
- Musculoskeletal pain has been reported by 59% of dentists.
- A survey of a U.S. Army dental clinic reported that over 75% of all dental care providers complained of one or more CTS symptoms, over 50% complained of back and shoulder pain, and 11% were diagnosed as having CTS.

Allowing WMSDs to occur in the workplace is costly! It can cost *you* your livelihood, and *your employer* will suffer the costs of an injured workforce, the premature loss of trained professionals, and the training of new employees to replace those with WMSDs who can no longer work.

This brochure gives you the information you need to recognize the symptoms of the various WMSDs, their causes, and their consequences. You will learn how to prevent WMSDs from occurring and the steps to take if you develop the signs of a WMSD.



Research surveys of dental care providers reveal the following specific WMSDs are common to the dental profession:

**Neck pain** is caused by sitting in static postures for long periods of time and moving the head sideways, contorting the neck, or assuming other sustained awkward postures to look in a patient's mouth.

**Headaches** result from poor sitting posture and poor head posture with sustained neck flexion for long periods of time without change.

**Shoulder pain** is experienced from working in static sitting postures for long periods of time where the forearms are not supported. Shoulder fatigue can be made worse by poor seating that also offers inadequate trunk support. Dental work typically involves extensive periods where the shoulders and arms are held up, with inadequate support for the arms to rest on a surface. This causes the shoulder muscles and tendons to be strained and overused. Medical terms for the conditions associated with this pain include muscle strain, bursitis, and tendonitis.

**Elbow, forearm, wrist, and hand pain** are caused by prolonged static grip on dental tools during scaling and polishing activities. Retraction of the lips with the wrist flexed (bent downward) and ulnarly deviated (bent sideways towards the small finger) can also cause pain. Glove wear reduces hand sensitivity and can result in gripping a tool harder than necessary. Tools with thin and smooth handles require a tighter grip and also contribute to hand pain. Dull dental tools require more force and more repetition to perform scaling. High frequency vibration of dental drills can contribute to hand pain. Unbalanced dental tools, where the weight is at the top of the tool or curled cords tend to pull the tool out of the hand, force the use of a tighter grip to control the tool. This causes muscle strain and inflammation. Medical terms for these problems include tennis elbow, golfer's elbow, wrist sprain, intersection syndrome, tendonitis, tenosynovitis, and CTS.

**Finger numbness** results from constriction of the median and ulnar nerves as they progress from the neck, through the shoulder area, down the forearm, and through the wrist. Tendons and their muscles become inflamed from repetitive forceful movements of the wrist and fingers. These tendons and muscles swell and press on the nerves and the delicate nerve blood supply. An awkward wrist position, where the wrist is flexed or extended, also narrows the wrist space where these nerves pass. High frequency vibration from dental tools also causes nerve blood vessels to constrict which further reduces blood flow to the nerves, impairing their ability to function. The medical terms for the more common of these conditions are CTS, Guyon's canal syndrome, cubital tunnel syndrome, and thoracic outlet syndrome.

**Lower back pain** is caused by prolonged static sitting in poor postures without adequate lumbar or abdominal support.



## THE CONSEQUENCES OF WMSDs

Allowing WMSDs to go untreated can result in permanent disability.



- **Neck and back pain.** Severe neck and back pain can interfere with virtually every daily activity including reading a book, watching TV, looking at a computer, picking up an object from the floor, driving a car, and so on.
- **Shoulder pain.** The consequences of severe shoulder pain can result in limitations in reach. You might not be able to lift bags of groceries or a child without experiencing severe pain.
- **Elbow pain.** Complications from severe elbow pain can result in an inability to hold objects and use a forceful grip. You might not be able to use a hammer or screwdriver, hold a hair dryer, or pick up a golf club.
- **Carpal tunnel syndrome (CTS).**
  - You may have heard of CTS surgery. This surgery is often not successful if the individual does not make dramatic changes in the activity that is causing the CTS. It is important to change your potentially harmful work habits early before they lead to disability.
  - If CTS is allowed to progress, the median nerve that supplies sensation to the thumb, index, middle, and part of the ring finger may become permanently damaged.
  - Severe CTS will result in a loss of sensation to the fingers and a loss of use of the thumb for gripping. Without feeling in your hand, you will have difficulty picking up small objects and performing finger tasks such as using a dental mirror. You will also not feel when you cut or burn your fingers. This could result in severe burns to the fingers and hands. Without sensation and strength, you will frequently drop objects because you are not getting sensory feedback from your hands or you don't have the ability to sustain muscle contraction of the thumb.

### ALL OF THESE PROBLEMS CAN BECOME CHRONIC IF IGNORED.

Just imagine if you could no longer perform your job or participate in your favorite leisure activities. Most of these depend on the effective use of your arms and hands. WMSDs not only affect your ability to do your job and earn a living, they also dramatically affect the quality of your life away from work as well.



## YOU CAN PREVENT WMSDs

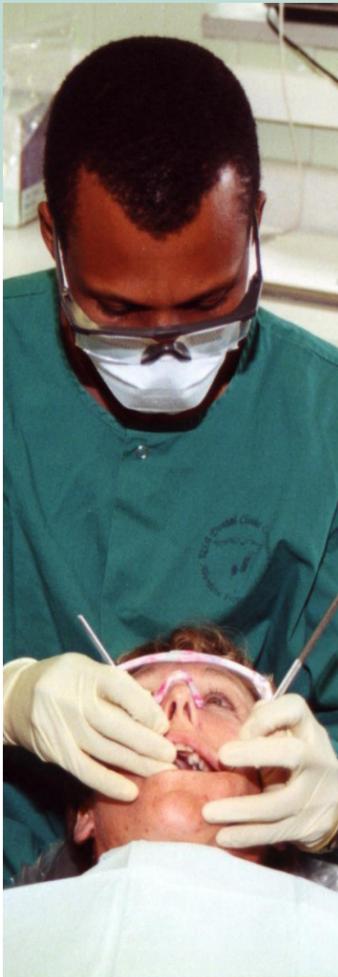
**Recognize the various WMSDs related to dental work and their causes.** This is an important first step in preventing WMSDs.

**Include ergonomics in your daily routine of delivering dental care.** Ergonomics is the science of making the workplace fit the worker. However, it is not a topic that is typically emphasized in dental training. In the long term, though, ergonomic practices are critical to your health and ability to continue with your dental career.

**Take action to incorporate ergonomics into your workplace.** Some of these are easily within your control; others will involve clinic-wide changes that need the support of your dental clinic leadership. You can influence those in leadership by taking action and practicing good ergonomic principles in your own daily routine, educating those you work with about the benefits of practicing good ergonomics, and being an active member of safety and other committees that encourage a healthier work environment.

**Specifically, you can prevent neck, back, shoulder, elbow, wrist, and hand pain.**





## YOU CAN PREVENT NECK AND BACK PAIN

### Practice a neutral sitting posture when doing dental work.

- A neutral or balanced posture is one where you don't have to move your neck to various angles to look in your patient's mouth. It is the most comfortable position you can put your body in.
- You can practice a system of dental care known as *dental logic* (developed by Colangelo and Belenky):
  - Keep a balanced sitting posture. This is a posture where no muscle of your body is working more than the others.
  - Change your patients' head and chair positions, instead of your own, as you provide treatment. The object is to maintain the balanced position as much as possible throughout treatment.
  - Adjust the dental chair so your patients are in a full supine position. This allows you to have the best view inside your patients' mouths. This fully reclined position also puts your patients in a comfortable position where they are not using their muscles.
  - As treatment progresses, maintain your balanced posture while changing your patients' posture. Change the chair angle and height, or have your patients turn their heads, to get a better view inside their mouths instead of you changing your position.
  - Keep your body in neutral so you use only your large muscles and don't strain the smaller muscles of your neck. It is the repeated straining of the small muscles of your neck, extreme neck flexion for extended periods, and movement out of the neutral posture that cause neck pain.

### Take brief stretch breaks every 3-5 minutes to stretch your neck and back (see p. 17).

- Stretch breaks help you recover from the effects of static postures.
- Static postures for long periods of time cause the muscles to store up toxins, which make them more susceptible to strain and injury.

### Use your dental mirror effectively.

- Use your mirror instead of moving your head to odd positions to see inside your patient's mouth.
- Proper use of your mirror will allow you to stay in the neutral position and avoid neck discomfort and pain.

### Ice sore muscles when they first begin to hurt.

- Use an ice pack on sore muscles, keeping it in place for up to 20 minutes at a time.
- After icing, rest your muscle.
- Before using your muscle again, warm your muscle to prepare it for work and stretch it.

### Use a neutral body position and keep your arms in close to your body so that you use the stronger muscles of your body.

Prolonged awkward back postures can result in serious life-long injuries. Back pain affects and restricts everyday work and leisure activities. Severe neck and back pain can interfere with virtually every daily activity including reading a book, watching TV, looking at a computer, picking up an object from the floor, driving a car, and so on.



## YOU CAN PREVENT SHOULDER PAIN

### Practice a neutral body posture.

### Take frequent breaks to relax and stretch your shoulders (see p. 17).

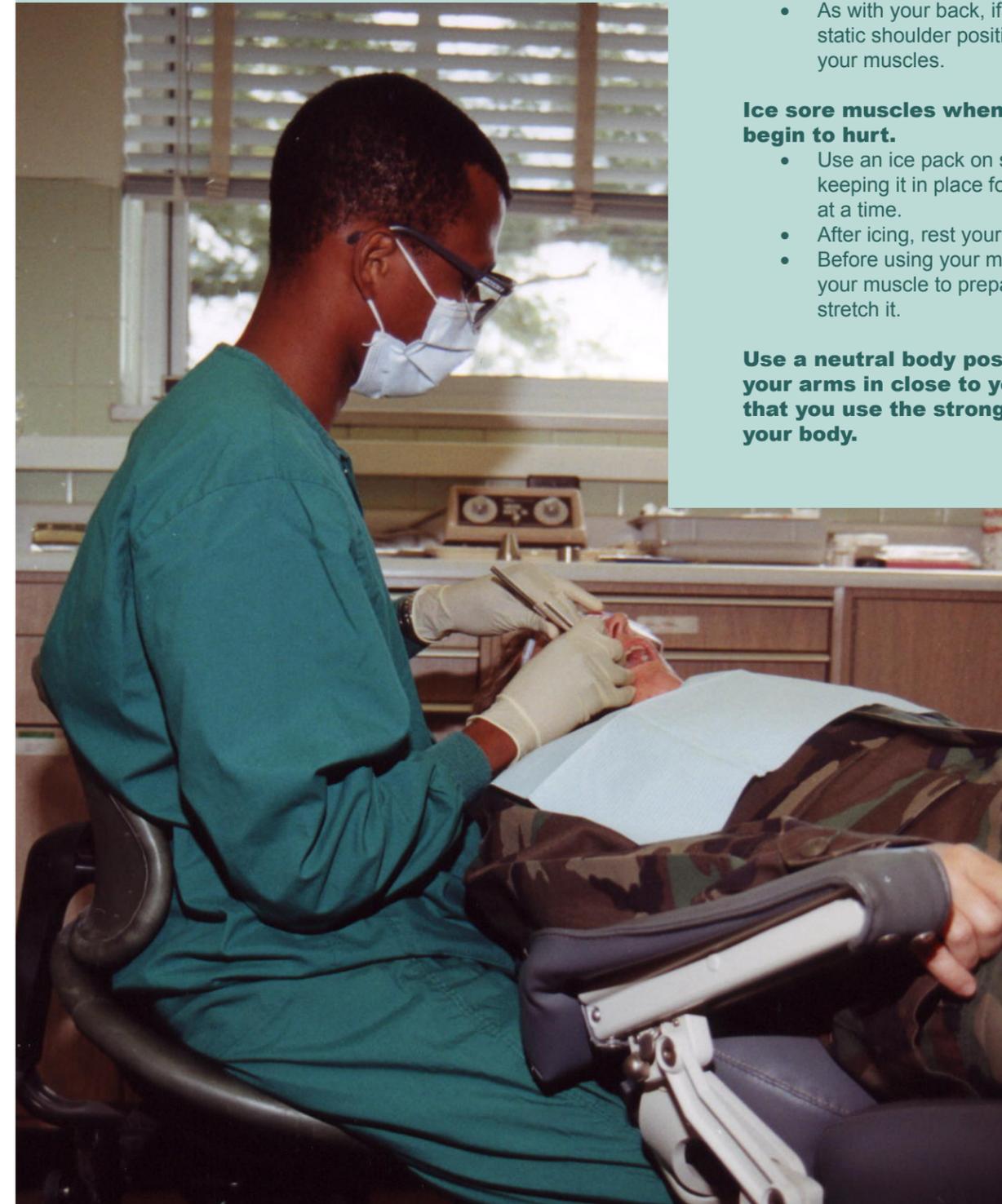
### Rest your forearms on the dental chair if at all possible.

- This will allow you to use your hands with support from the dental chair, enabling you to work while your shoulder muscles are relaxed.
- As with your back, if you maintain static shoulder positions you will injure your muscles.

### Ice sore muscles when they first begin to hurt.

- Use an ice pack on sore muscles, keeping it in place for up to 20 minutes at a time.
- After icing, rest your muscle.
- Before using your muscle again, warm your muscle to prepare it for work and stretch it.

### Use a neutral body position and keep your arms in close to your body so that you use the stronger muscles of your body.





## YOU CAN PREVENT ELBOW PAIN

**Rest your forearms and hands as much as possible.**

**Take mini stretch breaks as you work (see pp. 17-18).**

**Warm and stretch your muscles before you start working. Warm muscles are less prone to injury.**

- Exercise your wrist and fingers for 20 repetitions to warm your muscles.
- Wear long-sleeve shirts or sweaters when the room is cold to keep muscles warm.

**Ice sore muscles when they first begin to hurt.**

- Use an ice pack on sore muscles, keeping it in place for up to 20 minutes at a time.
- After icing, rest your muscle.
- Before using your muscle again, warm your muscle to prepare it for work and stretch it.

**Use a neutral body position and keep your arms in close to your body so that you use the stronger muscles of your body.**

# YOU CAN PREVENT WRIST AND HAND PAIN

**Practice using a neutral wrist posture when handling dental tools.** In the neutral posture, your wrist is not bent in any direction. Studies show that the neutral wrist places the least amount of pressure on the median and ulnar nerves.

- Keeping your wrist in neutral also allows your hand to have the greatest strength.
- Changing your angle of approach, and having curved dental tools, can also help maintain a neutral wrist posture while working.

**Alternate tough and easy patients.** Patients who require heavy scaling should be alternated with those needing light scaling so your hands have time to rest and recover.

**Take frequent mini stretch breaks (see p. 17).**

- Move your wrist and open and close your fingers between handling dental tools.
- Each time you open your hand for a dental tool, open it wider than normal to stretch the hand and fingers.

**Use dental tools with large textured handles (no smaller than number 4) and extra long shanks.**

- Dental tools with larger handles require less grip strength.
- Tools with textured handles provide sensory feedback to you as you work. With the added sensory feedback from a textured tool handle, you will not feel like you have to grasp the tool so hard.



- Maintaining a sustained tight grip on objects such as dental tools contributes to tendon inflammation. Inflamed tendons take up space in the carpal tunnel and compress the median nerve.

**Alternate the size of your dental tools during a treatment and switch between tools frequently.** Studies show that the more frequently you switch tools throughout a treatment, the lower your incidence of CTS. This is because you are giving yourself mini stretch breaks as you take time to change tools.

**Make sure your dental tools are sharp.**

- Sharp tools require fewer strokes when scaling teeth and less grip strength to control them.
- Repetition of finger movements inflames tendons.

**Avoid wearing watches, bracelets, or items with tight restrictive cuffs that restrict blood flow to the fingers. It is critical that the muscles and nerves get the blood they need as you work.**

**Use a neutral body position and keep your arms in close to the body so that you use the stronger muscles of the body.**

**Instead of wearing ambidextrous gloves for either hand, wear gloves made specifically for the left and right hands.**

- Left and right gloves may cost a little more, but they are well worth it.
- Research shows the wearing of left and right gloves reduces strain on the fingers and thumbs. The fingers don't have to fight against the glove that doesn't properly fit.
- Unnecessary strain on the hands contributes to CTS and fatigues the hand quickly.

**Get in touch with your body.** Practice using the least amount of grip pressure on the dental tool as possible so that you don't overstress finger muscles.

**Be aware of the amount of time that you continually use vibrating instruments.**

- Research has shown that high frequency vibration, such as that produced by dental tools, causes blood vessels to constrict.
- Constricted blood vessels in the hand result in less blood flow to the nerves of the hand. Reduced blood flow to the nerves results in decreased nerve function and resulting finger numbness.
- Vibration exposure from powered hand tools also contributes to CTS.

**Have a piece of soft therapy putty available to gently work with before and after each patient treatment.**

This will warm your hands and prepare muscles to work.

**Check how you hold tools and their attached cords.**

- Try to rest the cord on your shoulder, or over your arm, so that it does not pull down on the end of the dental tool. The pulling of the cord on the dental tool causes you to have to maintain a tight grip on the tool, which dramatically contributes to CTS.
- Check the conditions of your tools to determine if replacement is needed. Older dental tools, where the hand

piece is not balanced because all of the weight of the tool is at the top of the tool, require you to maintain a tight static grasp on the tool. This fighting to control the tool fatigues muscles quickly and inflames tendons.

**Arrange your schedule to allow for breaks.** A break is not necessarily a stoppage in work activities. A break is when an activity that requires repetitive motions, forceful exertions, or other stressors is stopped and replaced with an activity that is not stressful. For example, a break from patient treatment may include prepping a room for the next patient, performing administrative tasks, or counseling patients on proper dental care. A break is meant to provide activities that do not involve strong finger grip or repeated finger and wrist movements.

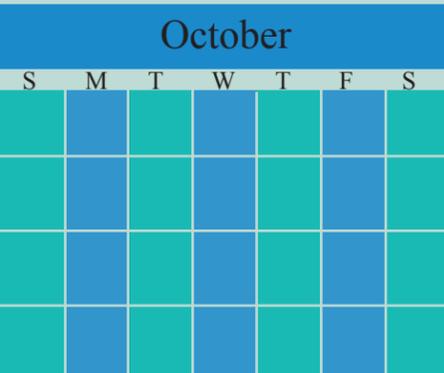
**Ensure that your leisure and other activities do not contribute to CTS symptoms.** Activities that involve hard, repeated gripping (such as pulling weeds, using a screwdriver, etc.), using vibrating tools (such as hand sanders and chainsaws), or sustained periods of wrist extension (such as typing on a keyboard) make your symptoms worse.

**Avoid home activities that aggravate your injured muscles.**

- If you must use a vibrating tool item, such as a lawn tool or sander, purchase a set of gel gloves to absorb the vibration.
- If you work on a computer, ensure that your keyboard is adjustable for height, that your chair has armrests to support your forearms, and that you have a wrist rest to place your wrists on during pauses in your typing. Consider purchasing an ergonomic keyboard that allows you to type without having to bend your wrists to the side. It is critical that your keyboard height is adjusted to allow you to have a neutral wrist position when you type.

**Use large pens for writing. The larger size requires less grip strength and puts less strain on your muscles as you write treatment notes.**

## ASK YOUR LEADERSHIP FOR SUPPORT



### Schedule work to accommodate muscle rest.

- Schedule work so that your tasks are varied and you do not treat one patient after another who requires extensive dental work.
- If you are a dental technician, take x-rays or perform other duties so you don't overuse the same muscles.

### Limit work schedules.

- If you can't avoid high demand (e.g., as a result of mobilization), use other controls such as mini-breaks and administrative tasks.
- Good ergonomic practice recommends, if possible, to limit your work schedule to no more than nine patients a day with breaks in between.
- If you find yourself working in excess of 8 hours a day for a long period of time, staffing needs to be addressed.
- Research studies show that dental care providers who work more than 34 hours per week have a higher incidence of WMSDs.

### Replace/purchase ergonomic dental tools.

- When it is time to order replacement equipment in the clinic, purchase tools that incorporate ergonomics in their design.
- Tools with these design features are known to minimize WMSD risk factors and may significantly reduce the occurrence of a WMSD:
  - Larger handles that have a textured surface.
  - Longer shanks that are angled so that you can maintain a neutral wrist position as you work.

### Replace/purchase ergonomic dental chairs.

- Ergonomic dental chairs can significantly reduce neck, shoulder, and hand pain.
- When it is time to order replacement equipment in the clinic, purchase new dental chairs that are ergonomically friendly to both you and your patient.
- If necessary, you can make ergonomic changes to existing dental chairs. A U-shaped forearm rest can be attached near your patient's head. This will allow you to rest your forearms as you work.

## IF YOU ARE EXPERIENCING WMSD SYMPTOMS

### Seek medical attention.

- See your physician and ask to be seen by an occupational or physical therapist who can:
  - Give you more specific information on your condition.
  - Fabricate splints or other devices to help you perform your job.
  - Help reduce your WMSD-related pain.
  - Help assess your workplace and provide advice for workplace modification.

### Have someone help analyze your work posture and schedule.

- Have someone videotape you at work. This can be very helpful in figuring out what movements you may be doing wrong and are causing you strain.
- Have a co-worker who practices good ergonomic principles observe you as you work. Your co-worker can offer suggestions on how you can improve your posture and work habits.
- Consider the suggestions offered throughout this guide. Use the checklist on page 16 to help with your analysis.



### Take a rest and be kind to your body.

- When away from the job, do not perform movements or activities that cause you pain. If you continue in spite of the pain, you will cause more damage to injured tissues.
- Use ice compresses on sore muscles to decrease the pain.
- Once pain is reduced, slowly stretch muscles and warm them before doing any work that involves the use of the sore limb.

### Be conscious of ergonomics both at home and at work.

- Remember that your activities at home may contribute to your pain as well.
  - Are you performing activities with repeated forceful actions or awkward postures, or holding static postures for long periods of time?
  - Is your home computer set up ergonomically? If you are not sure, review the DoD publication "Creating the Ideal Computer Workstation: A Step-by-Step Guide" at [www.ergoworkinggroup.org](http://www.ergoworkinggroup.org).
  - Are you doing too much heavy yard work without a break?
  - Are you using vibrating tools for long periods of time?
- Remember that you are the first line of defense in preventing WMSDs. Be kind to your body and it will serve you well as you progress in the rewarding profession of a dental care provider.



# ARE YOU PRACTICING GOOD ERGONOMICS?

Ideally, you should answer NO to all of the questions below. If you answer YES to any of these questions, you should change your work habits or work environment.

QUESTION	YES/NO	IF YOU ANSWERED "YES," TRY THIS:
<b>Scheduling/Repetitiveness</b>		
Do you perform two consecutive difficult scalings or cleanings?		Alternate in your schedule so they aren't consecutive.
Do you see more than eight patients a day for scalings/cleanings?		Consider ideas to allow breaks or reduce load. Intersperse other duties such as x-raying, filing, etc.
Do you use ultrasonic cleaners without a 30-minute break between uses?		Take stretch breaks. Try to reconfigure your schedule.
<b>Posture</b>		
Are your shoulders elevated, or one higher than the other, when working?		Keep your shoulders even. Use a neutral posture. Try armrests. Use frequent stretch breaks.
Is your lower back unsupported when you are sitting?		Adjust your chair to support your back. Stretch your back frequently, especially between patients.
Do you turn your head to the side to look in your patients' mouths?		Practice a neutral posture. Change your patients' chair height or ask your patients to turn their heads instead.
Are your wrists flexed, extended, or angled to the side when using tools?		Use a different tool approach angle to keep your wrists in neutral. Change your patients' chair height so you can keep a neutral posture. Use ergonomic tools.
When you type at your computer keyboard, are your wrists extended or unsupported?		Change your chair or keyboard height so your shoulders are relaxed with your elbows at 90° angles and your wrists in a neutral position. Invest in a soft wrist pad, ergonomic keyboard, and adjustable keyboard tray. Take frequent mini-breaks every 10-15 minutes to stretch your fingers.
<b>Force</b>		
Do you grip tools too hard or constantly without a break, causing your hands to hurt?		Practice using a minimal grip. Use ergonomic tools with large textured handles. Do hand stretching when reaching for tools. Change between tools every few seconds. Ensure tools are sharp. Use left-handed and right-handed gloves rather than ambidextrous gloves. Increase pressure only when deposits are engaged or in the early stages of root planting.
Do you grip polishing tools too tightly?		Try to put the cord over your shoulder or arm to help balance the tool. Initiate the purchase of more ergonomically friendly tools.
Is your treatment area cold or do your fingers get cold to the touch?		Wear a sweater or long-sleeve shirt to keep your muscles warm. Wash your hands in warm water to maintain a 77° finger temperature. Exercise your hand with therapy putty to warm muscles between patients.
Do you participate in leisure activities that require forceful gripping or repetitive gripping?		Be aware of your body and its limitations. Reduce exposure time, take more breaks, and purchase tools or equipment that place less stress on your body.

Adapted from Colangelo, G. & Belenky, M. (1990). Performance logic: A key to improving dental practice. *Journal of Dental Administration*, pp. 173-177.

## Dental Exercises

### Neck Stretch I

Tilt ear towards closest shoulder without turning head (eyes forward). Take a deep breath; slowly exhale while keeping shoulders level. Relax neck slowly as if falling asleep. Conduct stretch in opposite direction.



### Neck Stretch II

Slowly turn head so that chin is over shoulder. Take a deep breath; slowly exhale while keeping shoulders level. Hold position for at least 5 seconds. Conduct stretch in opposite direction.



### Neck & Shoulders I

Shrug shoulders up as far as possible & inhale. Slowly tilt head back, relax jaw (open mouth) & shoulders while exhaling. Close jaw without moving head forward & let shoulders drop.



### Neck & Shoulders II

Push shoulders down as far as possible; inhale deeply. Slowly tilt head forward pressing chin to chest; slowly exhale. Hold for 5 seconds, relax & slowly lift head.



### Upper Back & Arms

Place hands behind head; inhale deeply. Bring elbows back as far as possible and hold for 5 seconds. Try to bring elbows together; slowly exhale.

Interlock fingers, palms facing out. Straighten elbows & push shoulders forward.



### Forearms & Wrists

Raise arms until level. Place wrists back-to-back while in flexed position. Spread fingers; hold for 5 seconds & relax.



### Wrists

Bring one arm up as if holding a tray. Place palms together with opposite hand. Gently press down on "tray" hand; hold for 5 seconds. Repeat with opposite wrist.



### Lower Back

Sit with knees level or below hip height; take a deep breath. While slowly exhaling, lean as far forward as possible letting your head drop into your lap. Hold lower back stretch for at least 10 seconds. Place hands on knees and push upper body to start position.



### Eyes

Imagine a large clock face the size of your entire field of vision. Move eyes from 3:00-9:00 several times, then close eyes, then do 6:00-12:00. Start from 12:00 and move eyes to each number clockwise, close eyes to rest, then reverse order.



### Tendon Glides

Start with a relaxed hand, fingers straight, then make a fist. Slide your fingertips to the base of the palm; keep the thumb straight. Glide the fingers upward to make a "hook." Repeat 5 or 10 times.





Contact the USACHPPM Ergonomics Program at 410.436.3928 or visit our Web site at <http://usachppm.apgea.army.mil/ergopgm/>