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Promote Ergonomic Health

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Promote Ergonomic Health

A wide array of interventions and therapies is available to help dental hygienists stay healthy and reduce pain.

By Amber W. Hunt, BSDH, M...

Impacting the muscles, bones, joints, tendons, and ligaments, musculoskeletal disorders (MSDs) are associated with pain and affect individuals' well-being by limiting mobility, dexterity, and functional ability.¹ The prevalence of musculoskeletal pain reported by dental hygienists ranges between 64% and 93%.² Musculoskeletal pain can negatively affect work life, requiring a leave of absence, fewer work hours, or a move to a different profession.³

Dental hygienists frequently report pain in the neck, shoulders, hands, wrists, upper back, and lower back.²⁻⁵ The repetitive nature of the job in addition to the need to hold static and awkward postures and use a pinch grip put dental hygienists at elevated risk for MSDs.² Appropriate positioning, ergonomic equipment, complementary and alternative medicine (CAM), and prevention techniques may help dental hygienists support career longevity.

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Maintain Appropriate Positioning

Appropriate ergonomics is important in preventing MSDs and repetitive motion injuries. Dental hygienists should sit in a neutral body position to prevent strain. This neutral position allows the spine's three natural curves to align with the ears, shoulders, and hips in a straight line. Neutral body positions include:⁶

- Head tilted at 0° to 20°
- Trunk flexed at 0° to 20°
- Torso in line with the long axis of the body
- Shoulders in a horizontal line with weight evenly distributed
- Elbows less than 20° from the body
- Angle between the forearm and upper arm between 60° and 100°
- Wrist aligned with the forearm with the pinky finger slightly lower than the thumb

Ergonomic Equipment

Reducing muscle strain is important to minimizing MSD risk. The use of equipment to support positive ergonomics can help reduce this risk.

Dental hygienists should tilt their clinician seats down about 5° to help maintain the natural lower curve of the spine, which reduces disc pressure.^{6,7} If the clinician chair cannot be tilted down, an ergonomic wedge cushion can be used to maintain appropriate posture. Another option is to use a saddle stool, which has a tilt to help meet the clinician's natural spinal curve. Saddle stools also allow dental hygienists to sit with the appropriate feet position—shoulder width apart.⁶

The use of loupes may help dental hygienists improve their working posture and reduce pain.⁸⁻¹¹ When comparing posture between clinicians who wore loupes and those who wore traditional eyewear, those wearing loupes demonstrated superior posture.^{8,9} Results of an analysis of the relationship between pain and loupes showed that wearing loupes improved arm, shoulder, and hand pain, while no significant difference was found in neck pain between the two groups.^{10,11} The effects of saddle stools used with and without loupes have been evaluated, and findings indicate that the loupes/saddle stool combination supported the best posture.¹² Coaxial illumination can be added to loupes, providing more intense light than overhead lighting. Due to its increased intensity and alignment with clinicians' field of vision, coaxial illumination may offer ergonomic benefits.

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The use of contra-angled handpieces may reduce muscle strain due to the decreased cord weight compared to straight handpieces. Straight handpieces tend to feel heavier from the extra weight of the attached cord. Conversely, contra-angled handpieces have cords that are angled away, resulting in a lighter feel. Additionally, cordless handpieces reduce overall muscle workload—but not muscle intensity—and increase polishing efficiency.¹³ In situations where corded air-driven handpieces do not reach far enough to access the patient's mouth, ergonomics may be impacted. In these cases, cordless handpieces may be a more ergonomic option.

The impact of ultrasonic inserts/tips on MSD risk has also been studied. When swivel ultrasonics were compared to standard ultrasonics, no difference was found in the range of wrist movement or scaling efficiency.¹⁴ When comparing ultrasonic scaling to manual instrumentation, higher muscular load has been found on the right forearm muscles during manual scaling due to the necessary forceful grip and repetitive motions.¹⁵ While power instrumentation offers ergonomic benefits, the high-frequency vibrations emitted by ultrasonics may cause neuropathy.^{16,17}

Instrument design—including diameter, weight, texturing, and padding—impacts muscle activity. Instruments and mirrors with a diameter of at least 10 mm, weight of 15 g or less, and padding have been found to decrease muscle activity.¹⁸ On the other hand, instrument length is not a factor in ergonomics.¹⁸ A recent study found instruments weighing 16 g to 21 g produced similar forearm muscle activity as heavier instruments, but significantly more muscle activity was generated when using an instrument weighing 23 g or more.¹⁹ Dental hygienists have also reported preferring lightweight instruments (16 g) with a large diameter (12.7 mm).¹⁹ Additionally, silicone instrument handles may improve hand comfort and reduce fatigue when compared to stainless steel handles.²⁰ Instrument handles with texturing and tapering at the end result in reduced pinch force. Therefore, dental hygienists should select instruments that are lightweight, large in diameter, include padding and texture, and are tapered to reduce muscle activity and pinch force.^{6,18,19}

Other ergonomic considerations are sharpness of instruments and proper glove fit. Sharp instruments result in more effective calculus removal without the need to exert as much force and implement repetitive movements. Sharpen-free instruments are also an option, offering durability and efficiency. Sharp instruments are important because they require less pressure to remove calculus deposits. Utilizing a soft "c"-shape modified pen grasp also reduces musculoskeletal stress during instrumentation.⁶ Lastly, wearing gloves that fit properly and loosely across the wrist and palm of the hand will prevent muscle strain. Wearing gloves that are too tight may cause MSD symptoms such as tingling, numbness, or pain in the wrist, hand, or fingers.⁶

TABLE 1. Stretches for Dental Hygienists²¹

| Part of Body | Type/Name of Stretch | Stretch Description | Time |
|--------------|--------------------------|---|--|
| Neck | Range of motion exercise | Rotate the head to the side | Hold for 5 seconds, repeating five times in each direction |
| Neck | Upper trapezius stretch | Move the ear toward the closest shoulder, while holding the opposite shoulder down with your hand | Hold for 30 seconds to 60 seconds on each side |
| Wrist | Wrist flexion | Hold one arm in front of you with wrist flexion (bend palm down toward the wrist) and apply pressure toward you with opposite hand | Hold for 30 seconds to 60 seconds on each wrist |
| Wrist | Wrist extension | Hold your arm in front of you with wrist extension (palm is facing away from you and wrist is facing up) and apply pressure toward you with opposite hand | Hold for 30 seconds to 60 seconds on each wrist |
| Chest | Shoulder retraction | Pull shoulders up toward ears then back down | Hold for 5 seconds, repeating five times |

| | | | |
|---|---------------------|---|-----------------------------------|
| Back, chest, abdomen, thighs, hip flexors | Camel | Start in a kneeling position, with hands on your waist then bend backward at the waist, keeping the neck in a comfortable position | Hold for 30 seconds to 60 seconds |
| Back, neck, abdomen, shoulders | Cobra | Lay on your stomach with your legs together and palms on the floor slightly outside your shoulders, then come up onto your elbows keeping your feet and pelvis on floor | Hold for 30 seconds to 60 seconds |
| Back, neck, hamstrings, calves | Seated forward fold | Start in a sitting position on the floor with your legs straight out in front of you, then stretch arms out in front of you toward the toes | Hold for 30 seconds to 60 seconds |

Prevention and Treatment

Preventing MSDs or improving symptoms associated with MSDs can be accomplished through a variety of modalities. A physician can be consulted or CAM therapies such as physical exercise, chiropractic therapy, yoga, acupuncture, and massage, can be implemented. Stretching or attending a training course on ergonomics may also be helpful.

Repetitive motions can shorten muscles, making them painful. Stretching can lengthen the muscle, increase range of motion, and boost blood flow, reducing pain.²¹ Stretches can be performed before work, during breaks, or after work. They should be performed for 30 seconds to 60 seconds unless specified otherwise. Table 1 provides descriptions on neck, wrist, chest, and back stretches dental hygienists can perform to support their musculoskeletal health.²¹

Learning more about ergonomics also offers benefits. For example, dental hygienists may take a course on ergonomic principles and ergonomic risk factors or a module that provides information on stretching or yoga. Dentists and dental students who participated in a training course in ergonomics either experienced lower rates of MSDs or saw an improvement in MSD symptoms compared to those who did not attend such a course.²²

Exercise also helps to improve MSD symptoms. Seeking the advice of a primary care provider is prudent to learn which type of exercise may be the most helpful.²³ Exercises that focus on strengthening the core can help develop deep trunk muscles, thus alleviating chronic low back pain.²⁴

Chiropractic care is another option in which chiropractors use spinal manipulation or adjustments to restore mobility to joints, particularly in the spine. To do this, they use their hands or a device to apply a specific amount of force to a joint. In particular, spinal manipulation can benefit sciatica, lower back pain, neck pain, and headaches.²⁵

Yoga combines controlled breathing, meditation, and body postures to promote relaxation and health. A study on dental hygiene students and yoga revealed that those who incorporated yoga in their routine for 1 hour twice a week were in significantly less musculoskeletal pain than those who did not do yoga.²⁶

Acupuncture, a technique derived from traditional Chinese therapy, uses thin needles that are inserted into specific points in the body to alleviate pain.²⁷ The mechanism of action involves the release of neuropeptides, such as opioid peptides, for managing pain.³ Acupuncture may help alleviate neck pain, knee pain, and headaches. While the benefits of acupuncture can be felt immediately, treatment usually consists of approximately 10 sessions.²⁸

Massage therapy positively affects pain.²⁹ It activates enkephalins and endorphins, which bind to opiate receptors, causing an analgesic effect. Swedish massage uses light strokes on the superficial layers of muscles to promote relaxation by releasing muscle tension. Another technique is deep tissue massage, which uses stronger pressure to target deeper layers of muscles and tissues.²⁹

Conclusion

Dental hygienists must be conscious of strategies to reduce the risk of MSDs in order to support a long and successful career. Appropriate positioning, ergonomic equipment, and traditional and CAM therapies can be considered to maintain musculoskeletal health.

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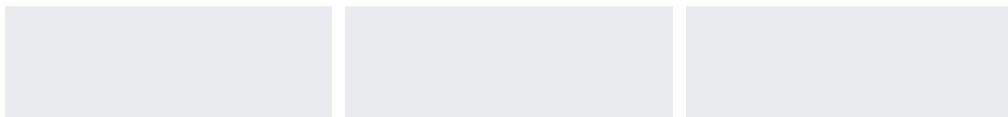
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