

CE Course: Musculoskeletal Disorder Prevention in Dental Hygiene

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Learning Outcomes:

- Define MSD and explain why dental hygienists are susceptible.
- Discuss common risk factors and anatomical areas associated with the occurrence of MSD.
- Describe strategies for preventing and managing MSD.

Abstract

“Although I am not totally sure my pain is clearly linked to dental hygiene practice, I have severe narrowing of the foramen at L4, L5 and S1 and a subluxation on L4, L5,” says Susan McLearn, a hygienist who practiced for more than 40 years. McLearn’s painful story is one that is all too common among experienced hygienists. Younger hygienists often take to Facebook groups querying why they are experiencing these symptoms and how to avoid them. “Musculoskeletal disorder” (MSD) is debilitating neck, shoulder, back, hip and carpal tunnel pain that results from static, awkward working positions and repetitive motions. Prevalent in dental hygiene practitioners, MSD has far-reaching physical, emotional, and economic consequences, including disability leave or career abandonment. MSD often manifests as a confluence of risk factors. Because studies indicate that protecting one’s body is the best way to avoid developing MSD, this continuing education course explores MSD prevention for dental hygienists. Prevention techniques include early intervention, movement, self-care, ergonomic equipment, and collaborating as a dental office.

Keywords: musculoskeletal disorder, MSD, ergonomics, prevention, dental hygiene

Introduction

Musculoskeletal disorder (MSD) is injury to the musculoskeletal system (muscles, tendons, ligaments, nerves, discs, vessels, etc.) affecting human movement and causing pain. These traumatic or chronic injuries are often the result of repetitive motions in non-ergonomic postures. As nerves, ligaments, and muscles deviate from neutral position and are held, certain musculoskeletal groups become stronger and shorter while others become weaker and elongated, leading to imbalances and undue strain in specific areas.¹ These muscular, neural, and skeletal imbalances eventually lead to ischemia, muscle necrosis, chronic pain, and fatigue. Dental hygienists frequently experience stress on the carpal tunnels, neck, shoulders, back, and hips, and the nature of their work makes them more prone to developing MSD than dentists and dental assistants.² The prevalence and implications of MSD in dental hygiene practitioners are alarming. Studies indicate up to 96% of hygienists report occupational-associated pain, and MSD pain is a leading cause of leaving the profession or reducing clinical hours worked.^{1,3} This literature review briefly examines the most commonly affected anatomy and risk factors for dental hygienists developing MSD, followed by a consummate examination of prevention approaches.

Risk Factors

Positioning: In a systematic review of 58 articles on MSD in dental practitioners, De Sio et al (2018) found that static, non-ergonomic postures are the primary risk

factor for developing problems. The awkward postures more frequently identified among dental professionals are: extreme forward-head and neck flexion; trunk inclination and rotation towards one side; lifting one or both shoulders; increased curvature of the thoracic vertebral column; incorrect positioning of the lower limbs with thigh-leg angle of less than 90 degrees.⁴ McLearan agrees. “I feel that the twisting that I performed while trying to work on someone in a wheel chair and having to hold myself up as I extended over a hospital bed to work on my supine patient could be contributory to my bulging disk and vertebral degeneration,” she says.

Exercise, Weight Control, and Gender: In addition to static, awkward positions, lack of exercise and weight control can significantly increase a hygienist’s MSD risk.^{4,5} A cross-sectional study of 124 Thai dental professionals found that those who do not exercise experience statistically significant higher incidences of pain in the shoulders (72.3%), neck (69.2%), lower back (43.0%), knees (43.1%), upper back (32.3%), and ankles/feet (7.7%).⁵ Like many other research articles, this study examines the confluent, multifactorial nature of MSD. The researchers also found that clock position, more years in practice, longer working hours, greater frequency working, and the male gender all correlated to greater incidences of MSD. Regarding gender, another study indicated women in dentistry are at higher risk for developing MSD, even when adjusting for the disproportionate ratio of women to men in dental hygiene.⁶ Although this study also identified the existing presence of chronic disease as a risk factor for MSD, similar to the Thai study, it cited older age, long working hours, and number of patients treated as prominent causes of MSD pain.⁶

Age and Time Worked: Working more (whether hours per day, days per week, or years in hygiene) is correlated with MSD. A survey of 95 hygienists found that age, Body Mass Index (BMI), and number of patients treated per day were significant risk factors in developing carpal tunnel syndrome (CTS).⁷ Another survey of 2,142 Ontario dental hygienists found that the number of heavy calculus

patients per day, clock position, and years in practice were significant predictors of carpal tunnel syndrome.⁸ For shoulder pain, risk factors included days worked per week (but not heavy calculus patients), time with the trunk rotated, and years of practice.⁸ CDHA Speaker of the House Susan Lopez sees the research findings in her personal experience: “I graduated a long time ago – almost 47 years. I did have back surgery 13 years ago and proceeded well.” She added, “I am always surprised with our young hygienists who are already complaining of pain in necks, backs, and wrists so early in their careers.”

Ergonomics and Dental Students: Numerous studies note the role of early posture habits affecting a dental professional’s chances of developing MSD. In a survey of 336 Spanish dental students, it was found that “only 28.6% of the students were found to sit correctly in the dentist chair. Furthermore, in the opinion of the students, very few classes during their career afforded adequate teaching in relation to ergonomics and working posture.”⁹ Another study of 479 Egyptian dental students found 84.8% had positive attitudes toward studying ergonomics, 48.9% had fair knowledge of ergonomics, but only 4.6% of students practiced proper ergonomics.¹⁰ Ng et al noted that the pressure to complete clinical school requirements seemed to correlate with deteriorating ergonomics, therefore setting up young clinicians for increased likelihood of MSD development: “The final year dental students had the highest percentage with poor posture (68%).”¹¹

The old adage, “an ounce of prevention is worth a pound of cure” seems to bear true for developing healthy ergonomics in one’s dental hygiene career, which is why early intervention while in dental hygiene school is a crucial component of MSD prevention.

Prevention Techniques

Good Early Ergonomics – Photography: In 2017, Partido conducted two studies on MSD prevention in dental hygiene school that brought attention to early intervention. One study used a convenience sample of 32 dental hygiene students and used photography to

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bring awareness to poor ergonomics and model proper positioning. The students conducted self-assessments using the photographs, and the experiment resulted in improvements in their ergonomic scores and increased accuracy of their ergonomic self-assessments.¹¹ The other study Partido conducted was to address the ever-present problem of faculty calibration. Partido again used photography, but this time he used it to calibrate the faculty members' evaluations of student ergonomics. Over the course of a seven-week study, inter-rater reliability of evaluations on student ergonomics became more fair, accurate, and reconciled with one another.¹² The aim of this study was to demonstrate to faculty how reliable ergonomic instruction can be achieved while other studies concerning early ergonomic intervention recognize how important faculty is for reinforcing ergonomics while students are in school in order to increase the health and career longevity of dental hygienists.

Movement as a Preventive: Subsequent to correction of static and awkward postures during dental hygiene school, research shows that movement both inside and outside the operatory is essential to avoiding MSD. "I work out three or four times per week minimum in order to do my job and stay pain-free," says RDH Liz Grillo, who regularly does core-focused Pilates reformer exercises. One survey of 356 Serbian dentists found that massage and physical activity are the most effective methods of preventing musculoskeletal pain.⁶ The study listed ergonomically designed equipment, correct and dynamic working positions, and an adequate workflow organization as other helpful MSD prevention techniques. "Correct and dynamic working positions" include alternating between standing and sitting dental work, changing clock position, and not falling into the same routine for every patient and every appointment. Physical Therapist Dr. Howard Tapley recommends stretching between patients.¹³

As previously mentioned, physical fitness outside of the operatory has a positive effect on MSD prevention. In particular, yoga appears to protect the body from musculoskeletal pain. One 13-week study of 77 dental hygiene students found that bi-weekly, 60-minute yoga

sessions decreased musculoskeletal pain in the treatment group, while the control group had no such decrease in musculoskeletal pain.¹⁴ The study also found that yoga had no effect on BMI, which other research points to as a factor worth controlling to reduce MSD. Relatedly, a questionnaire of 220 dentists found that yoga was superior to other forms of exercise in preventing MSD symptoms.¹⁵ Overall, studies indicate taking care of one's health through movement is an important piece of preventing MSD. Next, the literature review explores two other forms of movement-related pain management: massage and chiropractic care.

Massage Therapy and Chiropractics: In a Journal of Physiotherapy systematic review, Bervoets et al, wrote, "Massage therapy, as a stand-alone treatment, reduces pain and improves function compared to no treatment in some musculoskeletal conditions. When massage is compared to another active treatment, no clear benefit was evident."¹⁶ Other "active treatment" includes acupuncture, joint mobilization, manipulation (such as chiropractic) or relaxation therapy.

Gross et al conducted a 2015 Cochrane Data Review on chiropractic manipulation, which warned heavily of publication bias. It also noted that the evidence supports thoracic manipulation for neck pain, function, and quality of life, but the results for cervical manipulation and mobilization efficacy are few and diverse. "Multiple cervical manipulation sessions may provide better pain relief and functional improvement than certain medications at immediate/intermediate/long-term follow-up," write the authors. This review also acknowledged the rare but serious risks of chiropractic care like stroke, disc herniation, and neurological effects.¹⁷

Saddle Chairs, Loupes, and Instruments: While some hygienists state they are unable to perform their job duties without certain workstation designs or setups, the research indicates that instruments and equipment have some impact on musculoskeletal health, but not as much so as a hygienist's own posture and movement. Plessas et al conducted a systematic review of eight studies on dental loupe magnification and ergonomic saddle seats. Though the

evidence is limited, it suggests that this equipment improves working postures. Loupes appear to relieve shoulder, arm, and hand pain. However, more longitudinal research is needed to determine if loupes reduce neck pain. None of the studies reported on the effect of the saddle seats on musculoskeletal pain, therefore more research is needed.¹⁸

In 2010, Simmer-Beck et al compiled a literature review on instrument design and musculoskeletal impact. While they found no optimal length for dental instruments and mirrors, they did discover that an instrument with a larger diameter (10mm or more), lighter weight (15.0g or less), and more padding and patterning, decreases muscle activity.¹⁹ “Susan McLearan and I were both extremely fortunate way back then that UCSF utilized fat-handled instruments,” recounts Susan Lopez. “Many of our peers were learning on the thin-handled instruments, which led to pinching and pressures causing carpal tunnel issues.” It has also been found that cordless handpieces reduce muscle fatigue.¹³

Smart Scheduling: Gupta authored a 2011 review article that summarizes 20 strategies to prevent work-related musculoskeletal disorder in the dental field. While many techniques touch on topics explored above, other suggestions from the research are novel and logical approaches to working with the front desk to decrease repetitive bodily strain. For example, the hygienist can request that the front desk alternate scheduling heavy and light calculus patients, or alternate new patient exams that do not involve scaling with root debridement therapy.²⁰ The article also suggests allowing more time for difficult cases and a shorter recall frequency to reduce MSD risk. Such a strategy allows hygienists leeway if calculus is left behind (which is inevitable) while appeasing dentists who may be inclined to make shorter appointments for higher yield.²⁰

Conclusion

MSD is a prevalent problem in dental hygiene, and its importance is only underscored by its impact on many hygienists’ decisions to retire early. The greatest risk factor for developing chronic pain is static, awkward

postures, and even when following ergonomics, MSD risk increases with amount of time and intensity of hygiene. Research indicates prevention is the most effective means of protecting one’s body. Beginning with correct posture during dental hygiene school and ergonomic awareness using photography, hygienists can also prevent MSD by alternating their working positions. Movement, specifically yoga, is correlated with less MSD pain. Staying fit outside of the operatory and stretching between patients has been shown to increase flexibility and blood flow, both associated with musculoskeletal health.

Hygienists should also consider that loupes and lighter, larger diameter instruments have research that supports their ergonomic functionality, but more research is needed on saddle chairs. Finally, there is a benefit to having a collaborative dental office environment that works together to reduce occupational health hazards. If hygienists are able to work with the front desk to schedule patients in a manner that reduces MSD, the whole dental team benefits. Hygienists can have long, healthful careers if they adopt the self-care approaches outlined above and have the support of a like-minded dental team.

About the Author

Allison Yochim, RDH, is a recent graduate from the University of Pacific’s Bachelor’s degree program. She serves on CDHA Journal’s Editorial Board, CDHA’s Government Relations Council, and is a proud member of the San Francisco Dental Hygiene Society, where she acts as Student Liaison.

Allison is passionate about empowering and educating hygienists to protect their bodies so they can have healthy, sustainable careers. She works in a general practice and in a periodontal practice in San Francisco.



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Home Study Correspondence Course
“Musculoskeletal Disorder Prevention
in Dental Hygiene”

Circle the correct answer for questions 1-10

1. Dental hygienists are more prone to develop MSD than dentists and dental assistants.
 - a. True
 - b. False
2. The most likely areas for dental hygienists to develop MSD are:
 - a. Carpal tunnel, neck, shoulders, back and hips
 - b. Neck, shoulders, back, knees and ankles
 - c. Shoulders, elbows, neck, back and knees
3. A review of 58 articles on MSD found primary risk factors for developing MSD are:
 - a. Gender
 - b. Age
 - c. Static, non-ergonomic postures
 - d. Weight
4. Lack of exercise and weight control can significantly increase hygienists' MSD risk.
 - a. True
 - b. False
5. Studies correlating gender as a factor in increased MSD:
 - a. Are very definitive for males
 - b. Found no correlation for females
 - c. Are inconclusive: studies for each gender have been noted
6. Several studies confirm that age and working more (hours, days, years) correlate with MSD.
 - a. True
 - b. False
7. A survey of over 2,000 Ontario dental hygienists indicated the following were predictors of carpal tunnel syndrome:
 - a. Number of heavy calculus cases treated per day
 - b. Clock position
 - c. Years of practice
 - d. All of the above
8. Early awareness and intervention while in dental hygiene school is a critical component of MSD prevention.
 - a. True
 - b. False
9. Which of the following strategies has been shown to be effective in preventing MSD pain?
 - a. Photography, massage and physical activity
 - b. Team sports, massage and karaoke
 - c. Massage, music and physical activity
10. In several studies, which of the following physical activities has been a positive factor in managing MSD pain?
 - a. Swimming
 - b. Tennis
 - c. Running
 - d. Yoga

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