



METHOD DENTAL

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Method Dental
401 9 Ave SW #222
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For Dr. Rempel:

Following is my formal report conducted to assess the feasibility of incorporating postural awareness techniques into daily practice within the Method Dental Clinic. The preparation of this report was extensive, incorporating primary and secondary research to assess all options in determining the most feasible based on cost, sound methodology and ease of inclusion to practice.

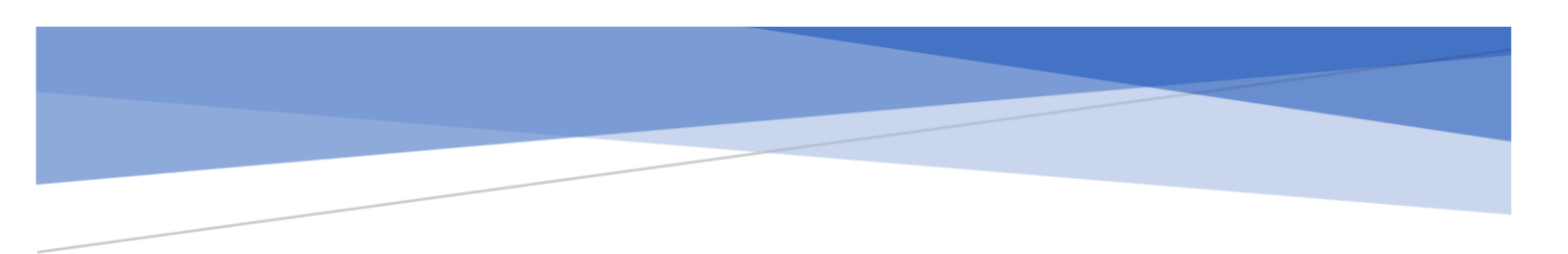
Thanks to the participation of the Method Dental staff, primary data of the dental clinic was obtained and used to assess willingness to change ergonomic practice and gather a history of injuries.

Many options are available to dental clinicians to aid in ergonomic practices with varying costs associated with change. Practitioner compliance is also most important for long-term changes to last.

I have learned so much about ergonomic practices, mitigation tools, and techniques that I would be happy to answer any questions. Please phone at (705) 606-1052 or email at samanthateeple1@gmail.com anytime.

Sincerely,

Samantha Teeple



ADOPTING POSTURAL AWARENESS TECHNIQUES TO MINIMIZE INJURIES AT A GENERAL DENTAL PRACTICE IN DOWNTOWN CALGARY

A Feasibility Report

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Abstract

The feasibility of incorporating postural awareness techniques into daily practice uses primary and secondary sources that positively highlight the adaptive strategies and positioning to reduce long-term musculoskeletal injuries.

An array of solutions to minimize long-term injuries were assessed and reviewed to determine the feasibility of incorporation based on cost, time, overall benefit, and clinician acceptance rate.

The research included assessing options such as:

- Ergonomic techniques such as postural awareness and ergonomic courses.
- Loupes usage.
- Speciality chairs with built-in support.
- Cavitron use to minimize repetitive strains.

Synthesized research addressed each of these items, and postural awareness techniques were voted by primary data sources as the most acceptable for long-term health and found to be the most cost-effective requiring no equipment. Training costs would be present but completed for a reasonable fee with personalized staff assessments for custom modification requirements to address the variability of MSDS.

Introduction

Definition, Description, Background

Dental office personnel are at increased risk for musculoskeletal disorders (MSDs) and pain. MSDs are a prevalent occupational hazard associated with dental office personnel that usually requires time off from work or an early exit from the profession (Lietz et al.). Yearly there is a 78% prevalence of MSDs in these workers, with some conditions being acute and others chronic, with a higher propensity for the latter (Lietz et al.).

These MSDs are common in the neck, shoulders, lower back, upper back, and hands/wrists (Ayatollahi et al.; Bedi et al.; Lietz et al.). These injuries are more prevalent due to the posturing of dental office staff throughout dental procedures, where they adopt awkward body positions, use repetitive movements, carry-out treatments for a long duration and use instruments that cause constant vibrations (Ayatollahi et al.; Bedi et al.; Lietz et al.).

Purpose of the Report

This report aims to identify why dental office personnel report high incidences of musculoskeletal disorders, examine the causal relationships of injuries and determine feasible prevention strategies for workers. With dental office personnel, dentists, dental hygienists, dental assistants, and managers to assess the feasibility of including postural awareness techniques to minimize daily pain and long-term injuries for a downtown Calgary, Alberta general dental practice.

Method of Inquiry

The primary data resource was a short 10-question survey distributed electronically to the staff of Method Dental in downtown Calgary Alberta. The Method Dental team completed the ergonomic survey, comprising fourteen participants: three dentists, five hygienists, three assistants, and three front staff. Data aimed to determine the participant's background, including clinical role and years within that role. Staff perception about dental workplace injuries, attitudes towards change, and prevention methods were assessed to gauge willingness to change behaviours. An analysis of options was performed to determine the cost and feasibility of incorporating various prevention techniques, tools, and strategies for MSD mitigation.

On-site observations were conducted of bodily positioning without photos due to client confidentiality, including pictures from texts to simulate and assess physical positioning in daily treatment and with clients with physical impairments as bodily positioning is compromised.

Secondary sources included three publications: one meta-analysis, one systematic review, and one article by the dental research journal on MSDs and prevention to include supporting literature in the incorporation of MSD prevention strategies.

Limitations of Studies

Primary Study limitations include a small sample pool selected to complete the survey. Data represents a downtown Calgary, Alberta, general dental practice but is limited to this practice with a proportionally middle to pre-retirement age bracket, and dental auxiliary staff are more proportional than dentist representation.

Secondary data sources included a systematic review, meta-analysis, and cross-sectional study. Within these papers, the limitations included a lack of longitudinal follow-up to ensure lasting ergonomic interventions to prevent long-term MSDs and operator biases in completing secondary survey data. Both studies lack consideration of the multifactorial nature of MSDs and that one intervention is only a piece of the complexity of dental injury prevention.

Scope of Inquiry

To assess the feasibility of incorporating postural awareness techniques to minimize workplace injuries. I investigated five areas of study:

- Why do dental personnel suffer much higher incidences of workplace musculoskeletal disorders and pains?
- What causes these MSDs?
- What are the most common MSD injuries?
- How can we prevent MSDs for dental personnel?
- Would the adoption of postural awareness techniques, help prevent MSDs?

Epidemiology of MSDs

From primary data sources, a survey was conducted at a dental office in downtown Calgary Alberta with the entire staff completing the survey totalling fourteen participants. As shown in Figure 1 below, the extracted data depicted that 85% of survey respondents regularly (monthly or daily) experience occupational-related bodily fatigue, which can cause long-term injuries over time.

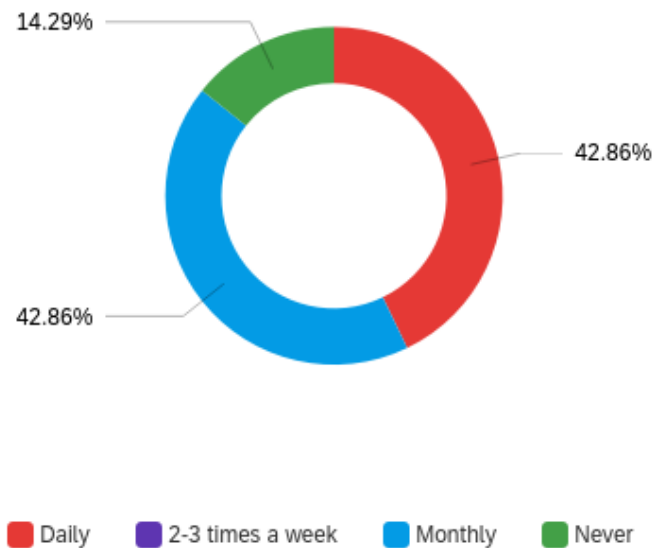


Figure 1 Percentage of Survey Respondents Experiencing Work Related Bodily Fatigue

Source: Qualtrics.

The secondary data source of a systematic literature review documented that 78% of dental professionals reported at least one MSD injury annually (Lietz et al.). This huge percentage of congruently aligned primary and secondary sources indicates the severity of MSD injuries in the dental occupation and makes ergonomic intervention necessary.

Conclusion of Inquiry

MSDs are prevalent in dental occupations much higher than in other types of work. In this report, the assessment of dental clinicians having a higher occurrence of MSDs, common causes and types of MSDs, and three different ergonomic interventions were assessed for the feasibility of incorporation into a dental office in downtown Calgary. To prevent the early onset of MSDs in dental professionals' specialty dental chairs, loupes, and postural awareness techniques were assessed as ergonomic interventions based on available literature. The most feasible is to adopt the inclusion of postural awareness techniques. Postural techniques include:

- Varying sitting and standing
- Watching the alignment of the back to prevent curving,
- Adjusting the dental chair ergonomically
- Avoiding constant postures, proper client positioning in the dental chair, ensuring feet are parallel to the floor
- Preventing twisting of the torso (Bedi et al.).

Collected Data

Why do Dental Clinicians Suffer from Higher Incidences of Workplace MSDs?

Working Conditions

A dental clinician's work is not only precise but involves motions that are repetitive with awkward and strenuous bodily positioning held for long periods while working.

Conclusively in all secondary research, data attributed improper bodily positioning, physical straining, and repetitive movements as the primary source of both short and long-term MSDs (Ayatollahi et al.; Bedi et al.; Lietz et al.).

Dental clinicians are subject, as are other health care positions to a much higher prevalence of occupational injuries due to the extreme variances in working postures held for long periods and the repetitive movements from daily clinical work.

What Causes these MSDs?

Research data consistently contributes awkward and improper bodily positioning and repetitive movements as the most common sources of MSDs to dental clinicians, with recommendations on mitigation consistent throughout the literature (Ayatollahi et al.; Bedi et al.; Lietz et al.).

- Sitting for extended periods-unsupported lumbar region, feet not placed evenly on the floor, sitting flat, legs together or crossed
- Torso flexion-moving the body “trunk” or torso in a twisting motion, curved back, awkward positioning
- Unsupported posturing-arms up in the air, torso off backrest, major wrist flexion, legs together or crossed, head way out over shoulders

These widespread dental occupational scenarios illuminate the risk factors and describe the propensity for dental professionals to be at risk of injuries.

Physical Demands of Clinical Role

While each clinical dental role is similar, variances in occupation produce changes in the susceptibility to MSD locations. In secondary data collection, research data indicates parallels this susceptibility of MSDs based on the clinical role held:

Dentists:

Back pain is more predominantly lower back pain, and in those with back pain, an increased prevalence of shoulder and neck pain. Also noted are hand and wrist injuries, although lower back pain is leading for dentists (Ayatollahi et al.; Lietz et al.).

Dental Hygienists:

Hand and wrist injuries are the most predominant MSD for hygienists who use repetitive wrist motions to complete their work. More than 50% of hygienists display carpal tunnel symptoms as an MSD throughout their career (Ayatollahi et al.).

Dental Assistants:

No specific data was attributed to the profession of dental assisting. However, with similar poor adaptations while performing duties such as:

- Awkward bodily positioning.

- Holding positions for long periods.
- Repetitive movements would have similar susceptibility.

Improper Ergonomics

Ergonomics is the practice of proper physical alignment in a workplace setting to prevent long-term injuries. By definition, it is the designing and arranging of things people use to allow for efficient and safe interaction (Parker, 1). In Figure 2, it is easy to see that MSDs are very common in the dental field due to improper ergonomics with high prevalence due to clinical pressures to perform specialized skills.



Figure 2 Ergonomic Posture Compared to Typical (Harmful) Working Posture

Source: Pelton and Crane. <https://www.peltonandcrane.com/en-us/ergonomics>

Repetitive Strain

Repetitive movements over long periods increase dental providers' risk for carpal tunnel and associated pain. Dental hygienists work with their hands completing repetitive movements to



remove hard and soft deposits from the client's teeth. Therefore, dental hygienists have a higher propensity than dentists to have this type of MSD, with more than 50% of dental hygienists experiencing this occupational injury over their careers (Bedi et al.).

Figure 3 Cavitron Dental Hygiene Tool Used to Minimize Repetitive Strains

Source: Pelton and Crane.

To decrease repetitive movements for dental hygienists, selecting a combination of scaling with hand and powered scalers, as shown above in Figure 3, using ultrasonic scalers can minimize the time of manual scaling to aid in injury prevention (Parker).

Time Constraints/Scheduling Concerns

Scheduling is often very tight in a dental clinic, with no downtime between client care. This fast-paced scheduling can cause insufficient preparation time for clients who require more attention, such as those with physical disabilities, to ensure proper positioning for clinical care. Consider this factor in office acceptance of postural awareness techniques as, initially,

increased time requirements will be needed to adopt appropriate positioning of the client and operator.

Clients with Physical Impairments

These individuals may have accessibility issues that disallow transfer from their mobility device(s) to the dental chair. As seen in Figure 4, these cases can compromise practitioner ergonomics as the inability to sit

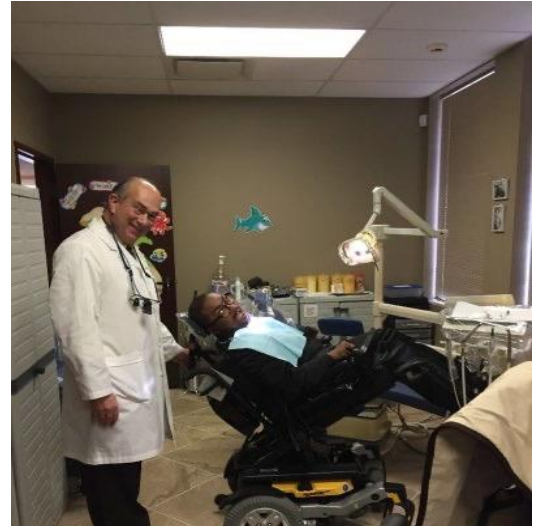


Figure 4 Ergonomic Considerations of Clients with Impairments *Source: Parker.*

ideally is impossible. With scheduling time constraints, a dental provider will likely compromise their positioning rather than taking the time to adjust proper seating or standing positions. In more challenging cases such as physical impairments that disallow transfer to the dental unit, ensuring comfortable positioning for clients and operators is crucial to maintaining proper ergonomic practice (Parker).

What is the most Common MSD?

As per primary data sources, the most common injury within a downtown Calgary, Alberta general dental practice is neck pain, as depicted in Figure 5. Secondary sources indicate lower back pain as the primary MSD for dentists and wrists as the primary MSD for dental hygienists. MSDs that are also mentioned upper back and shoulders as potential dental-related occupational MSDs.

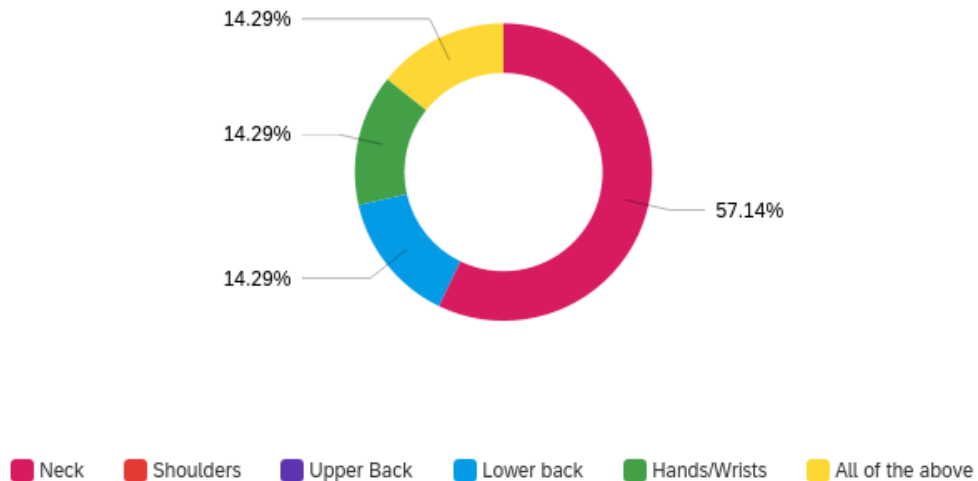


Figure 5 Survey Respondents List Their Most Common Sources of Pain from Work

Source: Qualtrics.

Occupational Hazards

Needle stick injuries are the top occupational injury to prevent in the dental workforce, with MSDs following closely behind (Ayatollahi et al.). Due to the nature of dental clinician's roles,

variances in sitting, standing, unsupported positions, excessive twisting of the torso, and unideal spine curvature comprise the occupational hazard of MSDs.

Holding Postures for Long Periods

Dental operators have a small area to work in and often use adaptative body positions to gain access or a better view of the oral cavity. These improper body holds can increase a rounding of the spine, cause unsupported positions like holding up arms for long periods and increase twisting of the body trunk into strange postures for an increased field of view (Ayatollahi et al.; Bedi et al.; Lietz et al.).

Improper use of Dental Equipment

Dental equipment and dental clinicians need to work together for safe interaction, which is the field of ergonomics. Selecting appropriate dental tools with supported holds, use of Cavitron (powered scaling tool), and proper alignment of both clinician and client chairs to facilitate the clinician in supported bodily positioning to decrease injuries. Appropriate adjustments to current equipment can increase ergonomic practice. Similarly, selecting lightweight instruments with varied textures and grips can reduce hand/wrist MSDs (Lietz et al.).

Causes of Premature Exit from the Profession

Long-term MSD injuries caused by repetitive strains and awkward or unsupported bodily positioning can result in early exit from the occupation. Due to the increased propensity of wear on clinicians, these injuries can “force” a clinician to leave the profession with an inability

to practice or making lateral shifts from clinician to an educator or other roles can be seen to maximize longevity.

Injuries Contributing to Long-Term Disability

- Repetitive strains
- Unsupported postures
- Awkward posturing held for more than 30 mins
- Improper ergonomic practices
- Client positioning

How can we Prevent MSDs for Dental Personnel?

Both primary and secondary sources identify the following as ideal methodologies for the depreciation of MSDs in dental practices.

Postural Awareness Techniques

One possibility to prevent the early onset of MSDs in dental staff is implementing ergonomic interventions into routine practice. The easiest to adopt is postural awareness and adaption of varied postural techniques, with the most significant hurdle being the clinician's perceived benefit. As seen in Figure 6, this has 57% of respondents' approval, with 29% thinking any form of ergonomics would help. These postural techniques include: varying sitting and standing, watching the alignment of the back to prevent curving, adjusting the dental chair

ergonomically, avoiding constant postures, proper client positioning in the dental chair, and ensuring feet are parallel to the floor, and preventing twisting of the torso.

Postural awareness techniques are a specific form of ergonomic practice with a low cost to initiate versus other ergonomic considerations, requiring operator training, constant awareness and modification of current habits (Ayatollahi et al.; Bedi et al.; Lietz et al.).

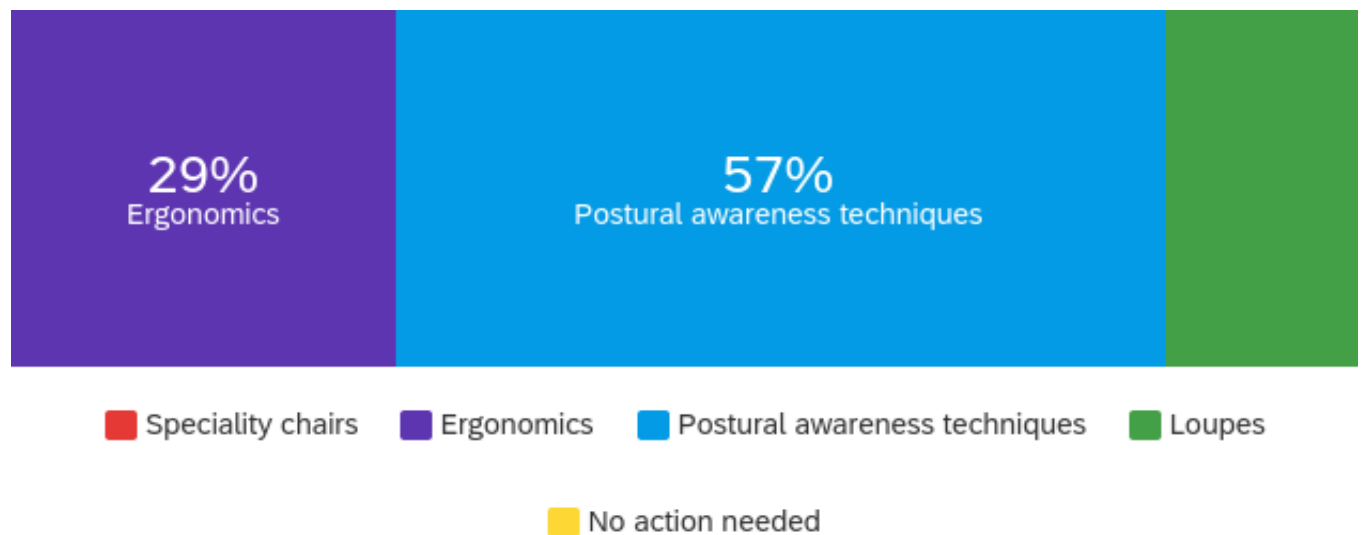


Figure 6 Survey Respondents Indicate their Ideal Prevention Method for MSD's

Source: Qualtrics

Loupes

These magnifications allow operators to carry a constant neutral body position while completing client care. Loupe providers are increasingly likely to maintain a proper working posture and less likely to hold awkward bodily positions. Their working distance is pre-established on magnification selection and, therefore, will not need to increase the range of view by holding unsupported postures. Loupes are a gold standard in personal ergonomic

practice but uncommon on a large scale as it carries a high cost per provider fee for a company to invest in (Lietz et al.).

Specialty Chairs

Are ergonomically designed chairs to promote an ideal working posture that is supportive in the lumbar to prevent bodily rotations and excessive torso twisting. These chairs usually are a waterfall design that encourages operators to sit on an angle versus flat to allow for ideal foot and hip placement under clients. Some of these ergonomic chairs also have armrests to stabilize and support the arms and decrease the amount of wrist flexion. However, in secondary studies, evidence of ergonomic chairs as interventions were only positive in conjunction with the use of magnification loupes (Lietz et al.).

Would Adoption of Postural Awareness Techniques Prevent MSD's?

Feasibility of Cost

There is some variance in the cost of onsite ergonomic training, with anywhere between \$200-\$550 being the average cost for a group setting. The higher price typically includes individual analysis and reports on ergonomic positioning.

Providers will not require additional time in their schedule to incorporate their bodily awareness techniques. Still, they may take time at the beginning of the day to ensure equipment is set up with the flexibility to accommodate variances in client positioning.

Employee Training Cost/Scheduling of Time

As the employee training costs require two things:

1. Time out of the schedule for training (no production or billing at that time)
2. Cost of group training

To complete the training accommodations to do so on a lunch break or after work paid for with continuing education (CE) credits to minimize costs during the work schedule. The regular group training costs \$200-\$550 for in-office training.

Other considerations include taking online ergonomic and postural awareness CE to incorporate within the office with a cost of \$20-\$40/person.

Employee Acceptance

As indicated in figure 5, the primary data source revealed that ergonomics and postural awareness techniques (a branch of ergonomic practice) as the best choice for preventing occupational MSDs. For this specific office in downtown Calgary, dental clinicians already propose this as an ideal strategy for mitigating injuries.

Longer Employee Retention

Engaging in employee longevity not only aids in the reduction of MSDs but increases provider morale and happiness to stay in the workplace free from injuries and displays a workplace that invests in employee health and stays current with occupational health and safety guidelines.

Conclusion

Summary of Findings

Both primary and secondary data sources indicate a high prevalence of MSDs in the dental clinical setting. Although dynamic in its etiology MSDs do have established interventions for prevention that includes:

1. Loupes
2. Speciality Dental Chairs
3. Postural Awareness Techniques

Loupes and postural awareness technique incorporation are the most researched and likely to create lasting change. Loupes are the most widely accepted option through research to make the most significant change but have a high cost associated with adoption. Primary data respondents selected postural awareness technique incorporation or ergonomics as the best way to minimize injuries in the workplace, indicating a better rate of acceptance of this prevention method.

Interpretation of Findings

Dental clinicians would benefit from preventing workplace injuries that can be severe and compromise occupational longevity. Clinicians must be on board with the selected prevention strategy to make successful changes. The inclusion of postural awareness techniques is low cost, with research data showing MSD minimization.

Recommendations

1. Hire an ergonomic specialist to assess each provider and teach postural awareness techniques specified to the provider's needs
2. Block time off the schedule at the end of the day for assessments and training of postural awareness techniques and ergonomic interventions
3. Follow-up on providers with assessments in six months and one year to determine long-term acceptance and incorporation

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Appendix A: Survey Questions

1. How long have you worked in the dental field?
 - 1-5 years
 - 6-15 years
 - 16-20 years
 - 21 years plus

2. What occupation do you currently hold within the dental field?
 - Dentist
 - Dental Assistant
 - Dental Hygienist
 - Dental Sterilization Technician
 - Receptionist
 - Office Manager

3. Did you have to change occupations within the dental field due to occupational injury?
 - Yes
 - No
 - Maybe

4. Do you feel long-term workplace injuries are common in the dental field?
 - Definitely not
 - Probably not
 - Might or might not
 - Probably yes
 - Definitely yes

5. Do you notice any muscle or bodily fatigue regularly related to your occupation?
 - Daily
 - 2-3 times a week
 - Monthly
 - Never

6. If you notice occupational body stressors, which areas are most commonly sore?
 - Neck
 - Shoulders
 - Upper Back
 - Lower back
 - Hands/Wrists
 - All of the above

7. On a scale from 1 being no pain to 5 being maximum pain how would you rate any areas that are sore?

Neck					5- Time Away From Work to Heal
4-Severe Pain	1- No Pain	2- Mild Pain	3- Moderate pain	4- Severe Pain	

Shoulders					5- Time Away From Work to Heal
	1- No Pain	2- Mild Pain	3- Moderate pain	4- Severe Pain	

Upper Back					5- Time Away From Work to Heal
	1- No Pain	2- Mild Pain	3- Moderate pain	4- Severe Pain	

Lower Back					5- Time Away From Work to Heal
	1- No Pain	2- Mild Pain	3- Moderate pain	4- Severe Pain	

Hands/Wrists					5- Time Away From Work to Heal
	1- No Pain	2- Mild Pain	3- Moderate pain	4- Severe Pain	

8. What systems do you personally use to prevent occupational injuries? Slide answers in order of most to least important.
- Ergonomics
 - Loupes
 - Postural Awareness Techniques
 - Speciality Chair
 - No Considerations
9. Have you ever had to take time off work due to occupational injury?
- Definitely not
 - Once
 - A few times
 - Reoccurring
 - Surgery
10. What is the most practical approach to protecting dental clinicians' from musculoskeletal disorders?
- Speciality chairs
 - Ergonomics
 - Postural awareness techniques
 - Loupes
 - No action needed