Neck, Back & Beyond: Preventing Pain for Peak Productivity

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Presented by

Bethany Valachi, PT, MS, CEAS
Physical Therapist/Dental Ergonomic Consultant

Author, “Practice Dentistry Pain-free”

bvalachi@posturedontics.com
(503) 291-5121

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The Problem

- Brief history of dental ergonomics
- Impact of CTDs

Cumulative Trauma Disorder (CTD) Definition

Work-related pain or injury to the musculoskeletal system resulting from microtrauma which accumulates at a rate faster than the body can repair it.

Microtrauma resulting from Prolonged, Static Postures

1.

2.

3.

4.

Safe Postural Working Range (SPWR)

1) Head posture: 0 – 20 degrees
2) Forward arm reach: 0-25 degrees (≥ 15 degrees requires armrests)
3) Forearms parallel to floor, or angled upward 10 degrees
4) Hip angle 105 – 125 degrees

Positioning Sequence

1. Operator Stool Adjustment (dentist & hygienist)
   - Adjust backrest height so the convex portion aligns with low back curve
   - Move backrest away from the back
   - Sit all the way back on the seat (Place 3 fingerwidths behind the knee. If the closest finger touches the seat, the seatpan is too deep for you.)
   - Find neutral posture
   - Tilt seat slightly forward 5-10 degrees
   - Adjust height till thighs slope slightly downward
   - Adjust backrest forward to snugly nestle in low back curve

2A. Patient Positioning: (upper arch)
   - Recline the patient to supine position
   - Adjust the double-articulating headrest to angle up into the occiput. The occlusal plane of the upper jaw should be up to 25 degrees backward in relation to the vertical plane.
   - If using flat headrest, ask the patient to scoot to end of headrest and position with contoured dental cervical pillow (Crescent Dental)
   - Position the patient chair so forearms are level or sloping 10 degrees upward. May also be determined proprioceptively.
   - Rotate or side bend the head to view the treatment area.

Safe Postural Working Range

2B. Patient Positioning: (lower arch)
- Recline the patient to semi-supine position (20 degrees above horizontal)
- Adjust the double-articulating headrest forward so chin tilts downward. For anterior teeth, molars & pre-molars, the occlusal plane of the lower jaw should be angled backward about 30-40 degrees above horizontal. Flat headrest, raise backrest slightly.
- Adjust the height of the patient chair.
- Rotate or side bend the patient’s head to view treatment area.

3. Operator position.
- Move to the appropriate clock position to establish a line of sight perpendicular to the tooth surface
  This may be direct or indirect.
- Position delivery system within easy reach
- Identify finger fulcrums to enable relaxation of hand/arm
- Adjust light to prevent shadowing (within 15 degrees of operator’s line of sight).

LOW BACK PAIN
Primary Risk Factors for Low Back Pain in Dentistry

The impact of the pelvic position on the low back curve

Passive sitting  Active sitting  Balanced sitting

Strategies to prevent low back pain & maintain the low back curve
1. Hip angle and stool adjustment
2. Saddle stools
3. Move patient to end of headrest
4. Change positions frequently
5. Operator weight
6. Rheostat position
Periodic Stretches – Take frequent breaks & stretch

How to Stretch Safely

- Move into and out of a stretch slowly.
- Breathe in and exhale slowly as you increase the stretch to a point of mild tension or discomfort.
- Hold stretch for 2-4 breathing cycles.
- Try stretch toward both sides to determine tightest side. Stretch toward the tightest side during the workday. Perform stretches in both directions at home and on weekends.
- Do NOT stretch in a painful range. Discontinue stretching if pain increases following stretching.

Delivery Systems

- Rear Delivery ________________
- Side Delivery ________________
- Over-the-patient Delivery ________________
- Over-the-head Delivery ________________

Patient Chair Features

Small, thin headrest
Swivel feature
Adjust up/down
Narrow upper back
Base location/size
Low-profile armrest

Traditional Operator Stool Features

Cylinder height (short, med or tall)
Adjustable backrest – should not extend above the lower edge of shoulder blade. 8-10 “ high backrest is very adequate to provide lumbar support.
Textured seat material – place a square of rubber shelving material on seat if worn smooth
Tilting seat pan – tilted from 5-15 degrees forward
Lumbar support – should be contoured to fit the shape of the low back
Armrests (opt.)

Saddle Stool Features

Cylinder height (available in short, med or tall)
Places pelvis in the most neutral position to optimize posture, which minimizes the need for backrest support
Adjustable split seat design available for men
Seat tilt to accommodate different spinal anatomies
Improved circulation in legs
Allows closest positioning to the patient
TENSION NECK SYNDROME

Symptoms include pain and tenderness in the neck and trapezius muscles, between the shoulder blades, and often accompanied by painful muscle spasms or trigger points.

Risk Factors for Neck Pain in Dentistry

Strategies to prevent Neck Pain
- Magnification
- Armrests
- Target muscle imbalances with specific neck and shoulder girdle endurance exercises
- Use indirect vision

Magnification Systems
- Through-the-lens (TTL) loupes (pantoscopic tilt frame)

- Flip-up loupes (vertical slide adjustment)

Ergonomic criteria for selecting loupes
1) Working Distance
   Distance from eye to working surface.

2) Declination Angle
   The angle at which the scope is inclined downward toward the work area.

3) Frame Size
   Affects where scope is placed in relation to pupil.

- Microscopes

- Procedure Scope

Headmounted Lighting
Best way to prevent shadowing. Ultra-lightweight models now on the market, .4 grams.
REFERENCES


Callaghan J, McGill S. Low back joint loading and kinematics during standing and unsupported sitting. *Ergonomics* 2001; 44:280-294


Langford M. Poor posture subjects a worker’s body to muscle imbalance, nerve compression. *Occupational Health & Safety* 1994; September:38-42


RESOURCES

Posturedontics Newsletter Archives (www.posturedontics.com)
Find supplemental information to Bethany’s seminars: Articles on hand/wrist pain, trapezius myalgia, upper & middle back pain, recreational sports for dental professionals, neck pain, and much more.

**Articles**
Valachi B. Over 50 articles on dental ergonomics at [www.posturedontics.com](http://www.posteredontics.com).

**Books**
Finkbeiner, B. 4-Handed Dentistry: A handbook of clinical application and ergonomic concepts.

**Delivery System: Over-the-head**
Design Ergonomics: [www.ergonomic-products.com](http://www.ergonomic-products.com)

**DVDs /Continuing Dental Education at www.posturedontics.com**
Valachi, B. “Positioning for Success: Ergonomic Guidelines for the Entire Dental Team” DVD. Patient and operator positioning, stool adjustment, loupes exercise, wheelchair transfers. **Earn 2 CEUs**
Valachi, B. “Smart Moves in the Operatory: Chairside Stretching” DVD kit with laminated stretching wall charts. **Earn 2 CEUs**
Valachi, B. NEW! “Smart Moves for Dental Professionals on the Ball” Home Exercise DVD kit with elastic exercise bands/door anchor and ball. **Earn 2 CEUs**

**Operator Positioning Aids**
ErgoRest articulating arm support. Multiple vendors online
Wedge-shaped ergonomic seat cushion: [www.crescentproducts.com](http://www.crescentproducts.com)

**Patient Positioning Cushions**
Crescent Dental Products: [www.crescentproducts.com](http://www.crescentproducts.com) (neck, lumbar, knee cushions)

**Ergonomic Dental Loupes (flip-ups with vertical adjustability)**
Surgitel flip-up (front-lens-mounted) loupes with Oakley frame: [www.surgitel.com](http://www.surgitel.com)
Q-Optics flip-up loupes with Eclipse frame: [www.q-optics.com](http://www.q-optics.com)

**Hot/Cold Packs**
MediBeads Moist Heat Wraps [www.painreliever.com](http://www.painreliever.com)
Apollo Paks (hot or cold) [www.painreliever.com](http://www.painreliever.com)

**Trigger Point Tools**
Backknobber self-massage tool [www.posturedontics.com](http://www.posteredontics.com)
Davies, C. The Trigger Point Therapy Workbook. [www.posturedontics.com](http://www.posteredontics.com)
About the Speaker

Bethany Valachi, PT, MS, CEAS is a physical therapist, dental ergonomic consultant and author of the book, “Practice Dentistry Pain-Free: Evidence-based Strategies to Prevent Pain and Extend your Career”. She is CEO of Posturedontics®, a company that provides research-based dental ergonomic education and is clinical instructor of ergonomics at OHSU School of Dentistry in Portland, Oregon. A member of the National Speaker’s Association, she lectures internationally and was invited to speak at the International Dental Ergonomics Congress in Krakow, Poland and the Asia Pacific World Dental Conference in Dubai. She has also provided expertise on dental ergonomics to faculty and students at numerous dental universities.

Bethany has published over 50 articles in peer-reviewed dental journals and has developed patient positioning and exercise DVDs specifically for dental professionals. She lives in Portland, Oregon with her husband, Dr. Keith Valachi, who operates a private dental practice in St. Helens, Oregon. She offers free newsletters, articles and product reviews on her website at www.posturedontics.com.