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Ergonomics and four-handed dentistry

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How do you imagine yourself after 20-30
years of dental work?



Dental work specialities

- Physical work
- Big concentration, precise work
- Small repetitive movements
- Static work, posture
- Stressful

Awkward posture and repetitive movements

→ Work –related diseases: **musculoskeletal disorders** are the 1. among dentist's diseases

What are the Musculoskeletal disorders (MSDs)?

- MSDs are injuries and disorders that affect the human body's movement or musculoskeletal system (muscles, tendons, ligaments, nerves, discs, blood vessels,...)
- Reversible symptoms → Irreversible disease

What are the Musculoskeletal disorders (MSDs)?

- Neck, shoulder, upper and lower back, wrist, hand
- **Symptoms:** mild periodic pain to severe chronic pain and discomfort
- decreased range of motion, deformity, decreased grip strength and loss of muscle function
- Accompanying symptoms include pain, numbness, tingling, burning, cramping and stiffness.

Musculoskeletal disorders (MSDs) at dentistry



- Specialities of dental work contribute to MSDs.
- Awkward posture causes compression of nerves and blood vessels, leading to symptoms
- Repeated stress from over the years accumulates and slowly causes degeneration of the spine, muscles, joints resulting pain.
- Awkward postures are often adopted due to improper seating, improper patient positioning and/or poor work techniques.
- **Prevention!!! Ergonomics**

Ergonomics

- An applied science concern, designing products and procedures for maximum efficiency and safety.
- Modifies tools and tasks to meet dentist's needs, rather than forcing them to accommodate the task or tool.
- Includes: dentist-patient position, equipment utilization, dental office design, their impact on health



Standing work position

- Awkward postures
- Bad visual control

Sit down, please! 😊

- Comfortable
- Optimal working condition
- Better access and visual control in the mouth
- Assistant's work is more important

Sitting position- Four-handed dentistry

Assistant ~ 10cm higher for better visual control



Equipment layout- proper positioning of the dental equipment

- Frequently used items should be kept within a „comfortable distance” and not above shoulder height or below waist height
- To stay in a neutral working posture
- While working, clinician must be able to access to the patient’s mouth and the dental unit without bending, stretching, or holding elbows above waist level.

Dentist work position

- Feet resting flat on the floor
- Legs in fully supported position
- Angle between the spine and the thighs should be 90-110 degrees.
- Back is vertical
- Upper arms are close to your body
- Elbow/forearm angle is close to 90 degrees

Dentist work position



Patient position

- Patient's head, neck, body, legs are supported in a horizontal position, lying on his back
- Back of patient is parallel to the floor
- The chair back may be raised slightly for mandibular treatment areas.
- Patient's oral cavity is positioned at an equal height to the seated clinician's heart and elbow.

Patient position-lower arch

- Back-rest half tilted position
- Patient's head is higher than his feet
- Lower arch ~ 45 degree (closed mouth), horizontal if opened
- Direkt visual control + mirror

Patient position- upper arch

- Back-rest is horizontal, upper arch vertical
- Patient position also horizontal (head, feet same height)
- Patient's head is a little tilted back, neck supported!!!

Remember that the patient is only in the chair for a limited period of time while the clinician spends hours at chairside day after day.

The patient should be asked to adjust his or her head position to provide the clinician with the best view of the treatment area.

Wrong postures, positions



Positioning the patient too high in relation to the clinician

Above recommended level: increased the rate of shoulder fatigue



Wrong postures, positions

Positioning the patient too deep in relation to the clinician

Below the recommended
height:

non-neutral working postures

- over declination of the head
- forward and/or lateral bending of the torso

Wrong postures, positions



Avoid standing position!

Good, neutral working posture



Working area lightening



Operation lamp position (~1m, 5000 lux)

Upper arch

Lower arch

Magnification and lightening

- Provide clear vision
- Improve neck posture
- Dramatically increase image size while allowing you to work at a farther distance from the patient. The larger sized images reduce strain and stress on the eyes, while viewing an enhanced image

Dentist- patient-assistant position/
Clock positions



Dentist-assistant sitting position



7-9 o'clock position

- Lower incisors
- Lower right quadrant



9-10-11 o'clock position

- Upper right and left premolars and molars
- Lower left quadrant



11-12 o'clock position

- Upper incisors
- Lower incisors



How to prevent MSDs?

- Reduce physical effort
- Use ergonomic tools (seat, loupe, instruments)
- Ensure that you maintain an ideal operating posture
- Incorporate brief periods between patients > minimize fatigue and enhance productivity (stretching breaks)
- Avoiding prolonged work hours
- Simple chairside exercises
- Avoid static or awkward postures
- Increase treatment time for more difficult patients
- Vary procedures within the same appointment
- Provide sufficient recovery time (sports, massage)

Conservative dentistry- III. year

- Work in pairs /Dentist-assistant/
- Learn the assistant role
- Check the patient in the computer
- Prepare instruments for the dental treatment
- Help with the photo documentation
- Write the dental status
- Order x-rays
- Four handed dentistry!!! (use saliva ejector and suction!, dental curing light)

Help the „dentist“ work when you are an „assistant“, to get that help back if the roles change!