DRIVING ERGONOMICS

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APHIS ERGONOMICS
Work Healthy

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Ergonomics

- Definition: Fitting the job to the worker.

- Goals:
  - Fit you to your car so you can drive in a way that maximizes the natural ability of your body to move and respond to physical stress.
  - Decrease risk of injury/illness.
  - Enhance worker productivity.

Understand

- There is no such thing as the average person.
- It is not normal to be in pain.
- Different people respond differently to their work environments, particularly after an injury, due to:
  - Hereditary.
  - Age.
  - Gender.
  - Lifestyles.

Work-related Musculoskeletal Disorders (WMSDs)

- Disorders of the muscles, joints, nerves, tendons, ligaments, cartilage, or spinal discs.
- Mainly occur in the neck, back, arms, and wrists.
- Reflect gradual or chronic development.

Causes of WMSDs

- **Awkward/Deviated Postures**
  - Twisting the body (e.g., to use a laptop or do paperwork in the passenger seat from the driver's seat).
- **Highly Repetitive Work**
  - Lifting.
- **Excessive Force**
  - Gripping (e.g., holding the car steering wheel too tightly).
- **Vibration**
  - Sitting, standing, or lying on a vibrating surface.

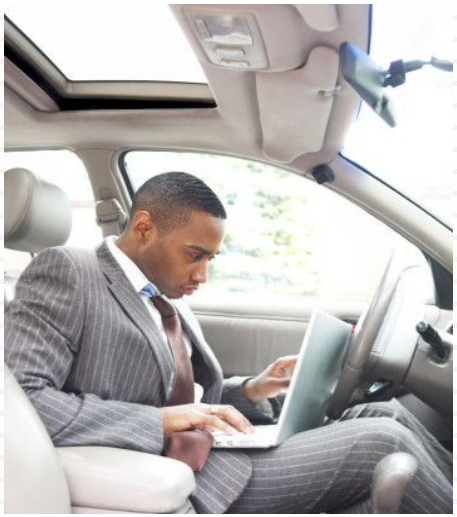
Most Common WMSDs

- **Lower Back Pain**
  - Back injuries cost - $125K per incident.
- **Carpal Tunnel Syndrome (CTS)**
  - CTS injuries cost - $30K per incident.

What You Will Learn

- Work-related musculoskeletal discomforts and their causes associated with driving.
- Recommended postures to minimize your risk for musculoskeletal injuries while driving.
- How to identify if you are an at risk driver.
- Exercises and stretches to relieve tension.

Reported Driving Discomforts and Their Associated Causes



Driving Statistics

- Research has linked long hours behind the wheel to:
  - Back pain.
  - Greater risk for low back trouble than sitting and standing jobs/activities.
  - Increased frequency of discomforts with the number of miles driven annually.

Drivers' Health

- Those who drive for 20 hours per week or more are at an increased risk for WMSDs.
- Driving forces the driver to sit in a constrained posture.
- Less discomfort reported in drivers of cars with more adjustable features:
  - Lumbar support.
  - Seatpan angle.
  - Steering wheel.

Check the Types of Discomfort Experienced

- ☐ Lower back pain
- ☐ Foot cramps
- ☐ Stiff neck
- ☐ Sore shoulders
- ☐ Finger cramps
- ☐ Other

Commonly Reported Discomforts

- Recent research has revealed that within a group of business drivers, the following was reported:
  - 65% low back trouble.
  - 43% neck trouble.
  - 40% shoulder trouble.

Causes of Discomfort

- Poor posture(s):
  - Personal habits.
  - Improperly adjusted or fitted seat.
- Stress/Tension.
- Static and extended posture(s)/position(s).
- Wrong-sized vehicle:
  - Individual.
  - Job.

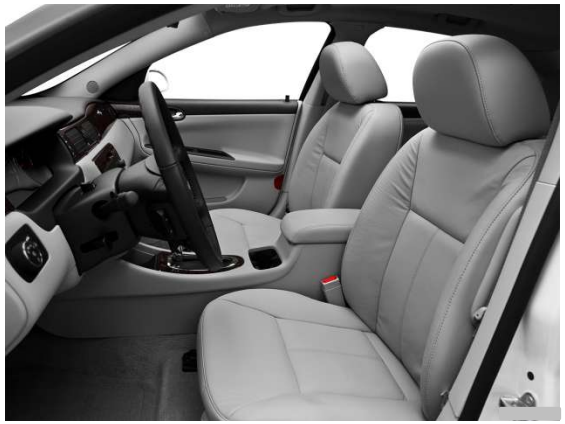
Causes of Discomfort: Driving Postures

- Postures vary:
  - Upright.
  - Leaning back.

- Interior design:
  - Forward tilting head-rest.
  - Low roof.

Causes of Discomfort: Seat Design

- The shape of the vehicle seat itself may put pressure on selected parts of the legs, back and buttocks:
  - Leading to pain or discomfort at pressure point.
  - Affecting blood flow to the legs and feet.



Causes of Discomfort: Road Conditions

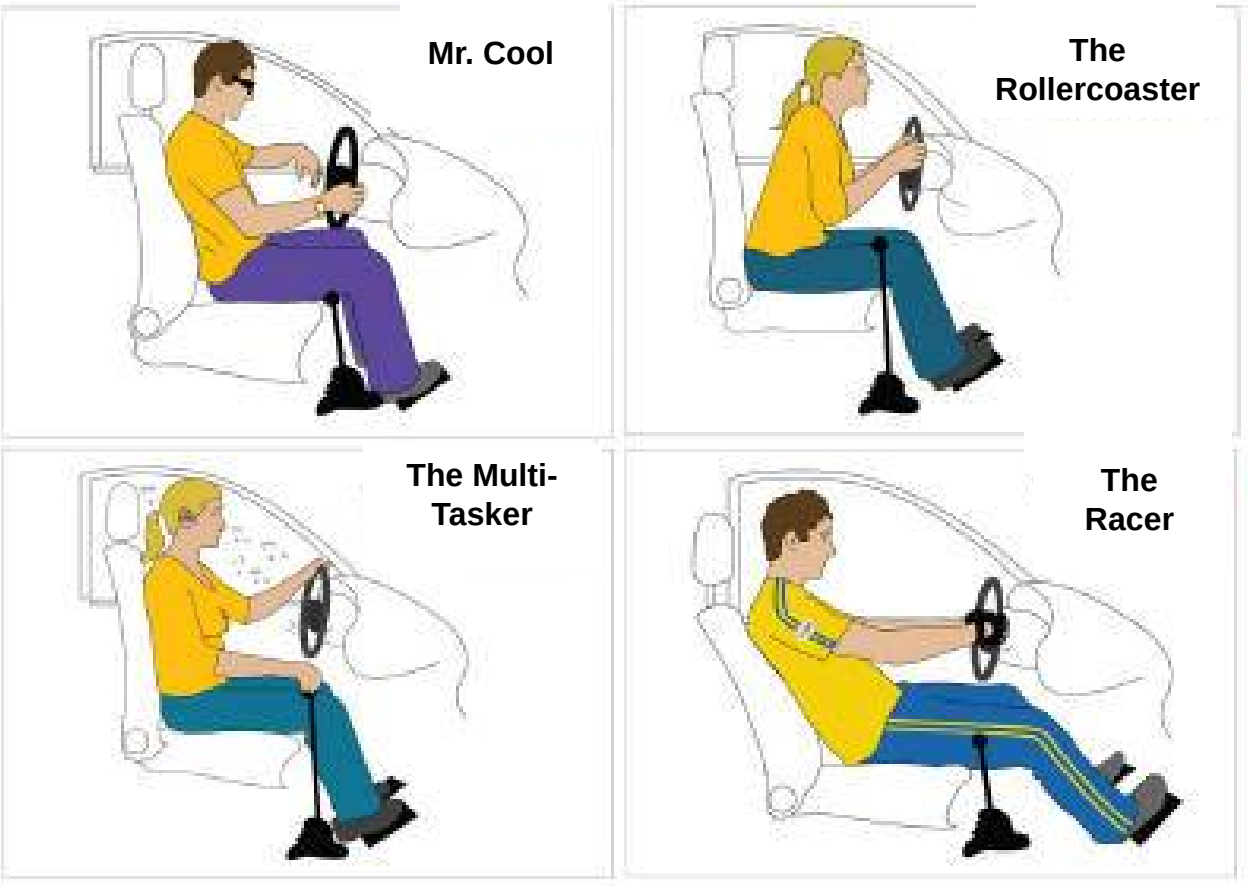
- The body moves sideways when you turn on corners.
- Depending on how fast you accelerate or decelerate, you will feel a force on your body.
- Your body experiences up-and-down vibrations from the car travelling on uneven or bumpy road surfaces.

Causes of Discomfort: Vibration

- Low frequency whole-body vibration in moving cars and trucks can contribute to effects on the lower back and performance problems.

- Contact your agency Safety & Health Program for:
  - Blurred vision.
  - Decrease in manual coordination.
  - Drowsiness (even with proper rest).
  - Low back pain.
  - Insomnia.
  - Headaches or upset stomach.

Do You See Yourself Here?



Mr. Cool

- ***How to spot*:** Seat inclined, arm on window ledge/outside window, one hand on wheel.

- ***Most common WMSD symptoms*:** Arm and shoulder ache from resting on the window ledge.

- ***Solutions:***
  - Sit in a fairly upright position, with knees lower than hips.
  - You should be able to reach the accelerator and brake without stretching your legs.
  - Roll up the window and keep both arms on the steering wheel.

The Rollercoaster

- ***How to spot:*** Driver is leaned forward and sitting upright, seat forward, bent legs, bent arms.

- ***Most common WMSD symptoms:*** Shoulder pain, neck strain, leg cramp and side ache.

- ***Solutions:***
  - Relax! Tense/nervous drivers are more likely to adopt this position leading to tense shoulders; so try to avoid driving situations that stress you out.
  - Ensure the height of the back rest reaches the shoulders and does not obstruct "rearward vision."
  - Try and sit back more into the seat to get better back support.
  - Take regular breaks where you can get out of the car to stretch your legs.

The Multi-Tasker

- ***How to spot*:** Driver has straight back, arms bent.
- ***Most common WMSD symptoms*:** Headaches and eye strain, feet cramp, pain in coccyx.
- Twisting to access paperwork and the laptop can be more damaging to your back and neck than driving.
  - ***Solutions*:**
    - Regularly adjust your seat on long journeys to help your coccyx.
    - Use a 'hands-free' mobile phone kit.
    - Keep two hands on the wheel.

The Racer

- ***How to spot*:** Straight arms, seat reclined, straight legs, low driving position.

- ***Most common WMSD symptoms*:** Side aches and lumbar pain.

- ***Solutions:***
  - Be aware, low seat positions (and bucket seats) provide limited support for the lower back and sides. To counteract assume a fairly upright position.
  - Knees should not be higher than your hips - it reminds you to sit up!

Easing Driving Discomforts

- Distance Driving – alternate longer drives with shorter drives.
- Rest Breaks – implement at least once an hour or more if necessary.
- Work Days – consider moving office day to middle of week versus the end of the week.
  - Drive 2 days.
  - Work at office/home 1 day.
  - Drive 2 days.
  - Rest over 2 day weekend.

Minimizing Your Risks

Driver's Seat Adjustments

- Seat height
- Mirrors
- Lumbar support
- Back tilt
- Seatpan tilt
- Headrest
- Distance to pedals

Review the Vehicle Manual

Before You Start Your Drive

- Remove items from your pockets (e.g., wallet or keys).
  - May press on soft tissue as you sit down.
  - This compression can reduce circulation or press on nerves and other soft tissues.

- Position items that you may need during your drive (e.g., sunglasses, tissue, mints, etc.).
  - Place such as to minimize reaching while driving.
  - Take time to pull over if necessary to avoid awkward reaching.

Seat Belt Use

- Buckle up!
  - If seat belt strap is uncomfortable, take a short piece of large diameter soft pipe insulation or foam and place it on the part of the strap that is not comfortable against your body.
  - Purchase a shoulder strap cushion.

Seat Height

- Raise your seat as high as you can but still be comfortable.
  - This height will optimize your vision through the windows.
  - You should be able to see at least 76 mm (3 in.) over the top of the steering wheel.
  - Ensure that you have sufficient room between the roof and the top of your head.

Adjust Mirrors

- Adjust your mirrors after you have finished setting the seat height.
  - So that you don't have to crane your neck to see.
  - If you have a blind spot in your car you can attach a small mirror to your dashboard to improve your view.

Lumbar Support

- Adjust your lumbar support up-and-down and in-and-out until you feel an even pressure along your back from the hips to shoulder height.
  - The lower part of your back should feel supported, i.e., no gaps or pressure points in the back support area.
    - If not supported, roll up a small towel and place in the curve of your back.
    - Obtain a lumbar pillow if necessary.

Back Tilt

- Adjust your back tilt.
  - The least amount of pressure on the back occurs when your seat back is 100-110 degrees so that you are slightly reclined.
  - The back support should fully support your back.
  - If you are leaning too far back, you may end up bending your head and neck forward, which may cause muscle fatigue, neck or shoulder pain, tingling in the fingers, etc.
  - If you cannot recline your seat, take frequent breaks from your upright posture by shifting your weight side to side and using small upper body motions to relax the back.

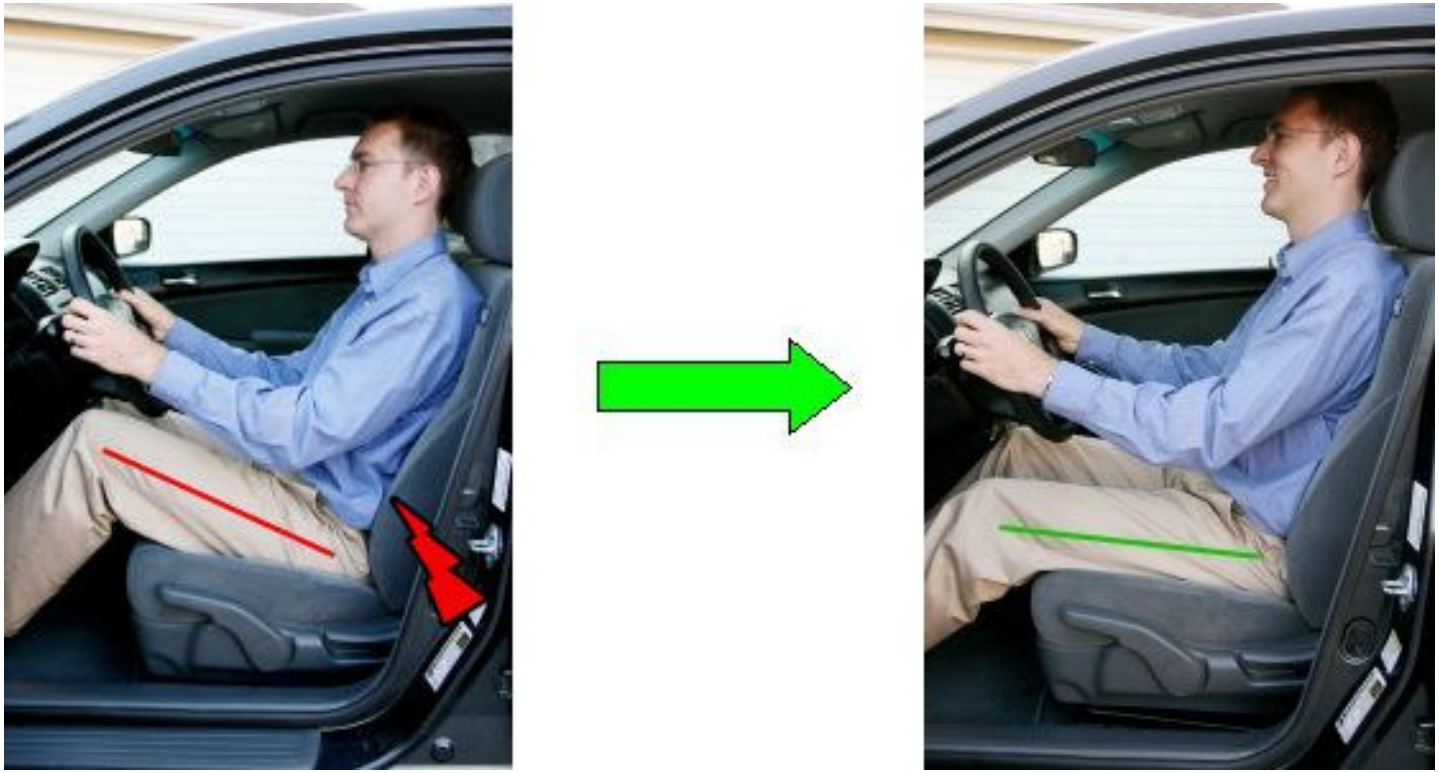
Seatpan Depth

- Check your seatpan/cushion length.
  - When seated, scoot your tail bone as far back to the seat back as possible.
  - Should be able to place 2-3 fingers between back of knee and front of seat.
  - If cannot perform, add a pillow or back cushion to car seat to move you forward.

Seatpan Tilt

- Adjust your seatpan tilt.
  - When seated, scoot your tail bone as far back to the seat back as possible.
  - Tilt the seatpan tilt until your thighs are supported along the full length of the cushion without there being pressure at the back of your knees.
  - The seat of your car should allow for your knees to be slightly lower than your hips:
    - Opens up your hip flexors.
    - Increases circulation to the back.
    - Decreases pressure on lower back.

Seatpan Tilt



Seatpan Tilt

Coccyx Cushion

Seat Cushion

Pedal Use

- Adjust the seat forward/back position.
  - Move the seat forward until you can easily push the pedals through their full range with your whole foot, not just your toes.
  - You may have to readjust the seat height to get better control of the pedals.

Head Restraint

- When seated Adjust the head restraint (head rest).
  - While sitting, raise the head rest until the top of it is level with top of your head.
  - Adjust the angle of the head rest until it is almost touching the back of your head when you are in your sitting posture.

Steering Wheel Postures

- Adjust the steering wheel for height or tilt and pull it back for easy reach.
  - The center of the steering wheel should be about 10 - 12 in from the driver's breast bone.
  - Your arms should be in a comfortable position (not too high or too low).

- Steering wheel grip – "The best posture is the next posture."
  - Keep two hands on your steering wheel except when shifting gears.
  - Change your hand postures frequently to improve circulation and reduce fatigue.

Steering Wheel Grips – Death Grip

- Common postures to avoid:
  - The death grip.
    - Results in decreased circulation and muscle tension.
    - Grip should be light.
    - If knuckles are white, you're gripping too hard.

Steering Wheel Grips – One Arm Cool Dude

- Common postures to avoid:
  - The one arm cool dude.
    - Wrist rests at 12 o'clock on the steering wheel and the fingers flop over the top.
      - Causes compression of soft tissue of the wrist.
      - Reduces circulation at the neck and shoulder.

Steering Wheel Grips – Arms Straight Out

- Common postures to avoid:
  - Arms straight out – in front to reach steering wheel.
    - Drive with shoulders relaxed and arms close to sides of your body.
    - If you have to reach too far forward, your steering wheel may be too far away.
    - Try tilting the steering wheel upwards and using a lighter grasp lower on the steering wheel.

Steering Wheel Grips – Arm Propped

- Common postures to avoid:
  - One arm propped – on the window.
    - Decreases circulation at the neck and shoulder.
    - May compress soft tissue on the arm/wrist.

Driving Ergonomics Tips: Entering/Exiting the Vehicle

- Stepping up/out of vehicle:
  - If you drive a large vehicle with a high step up/down, add an extra step or slowly step in and out of your vehicle versus jumping down.
    - Over time, jumping down can cause compression to your spine.
  - If the step height is high (e.g., SUVs and pick-up trucks), does it have or can you add a running board?
  - Straps and other hand assist devices for holding on to should be checked frequently for wear and tear.

- Are the door handles easy to grab and operate, to prevent slipping when if wet or snow-covered, including when you are wearing gloves?

- Does the open door provide enough space to get in and out easily (without stooping or banging your head on the door frame; and without bumping your knees on the bottom of the dashboard / instrument panel and steering column)?

Working in your Car

- Common Tasks:
  - Laptop use.
  - General paperwork.
  - Mobile phone use.

Ergonomic Risk Factors

- Static and awkward postures.
- Twisting and leaning to one side.
- Leaning forward.
- Slouching.

Laptop Use

- Move to passenger seat and place laptop on your lap.
- Never sit in the driver's seat while resting the laptop on the passenger seat and vice versa.
- Store laptop in car trunk.
  - Ensures you get out of the car and stretch your legs before using the laptop.
- Change position frequently and take breaks.
- Do not work on your laptop for prolonged periods (i.e., for more than 10-15 minutes at a time).

General Paperwork

- Try to achieve as good a range of postures as possible, avoiding:
  - Slouching.
  - Leaning forwards.
  - Twisting.
- Change position frequently and take breaks.
- Never sit in the driver's seat while reading the paperwork on the passenger seat and vice versa.

Mobile Use

- Never use your mobile phone while you are driving.
  - Stop vehicle.
  - If call will be lengthy to include note taking, work from passenger seat.

- If using a hands-free kit, ensure that the cradle, microphone and speaker are appropriately positioned to encourage good posture and do not obscure your vision.

Tips for Working in your Car

- Work from a location other than the vehicle when feasible.

- Work from the passenger or rear seats:
  - More available space.
  - The driver's/passenger's seat should be moved all the way forward if writing from the rear seat.

Tips for Working in your Car

- Incorporate the use of a writing desk/laptop buddy:
  - Creates a smooth surface for laptop use and an external mouse.
  - Promotes more neutral head/neck and wrist postures.

Tips for Equipment/Bag Placement

- Locate all items needed during the drive within an easy reach distance.
  - If necessary, place all items in the rear/trunk of the vehicle to eliminate ability to reach for items.
  - This may also encourage unplanned, but needed rest/stretch breaks.
- Reduce the weight of the equipment bag, file storage, and any other items carried in and out of the car.
- Only transport the items needed for the day's site visits.

Vehicle Accessory Resources

APHIS Ergonomics Program website:

- http://www.aphis.usda.gov/mrpbs/emssd/recommended_equipment.shtml
  - See Vehicle Accessories

Lumbar and Seat Supports

- McCarty's Sacro-Ease: http://www.mccartys.com
- Obus Forme Back Rest Supports:

http://www.obusforme.ca/obus_forme/sit/back-supports.html

Laptop Mounts

- Jotto Desk: www.jottodesk.us
- DeskSpaceAnyplace.com: www.deskspaceanyplace.com
- The Air Desk: www.airdesks.com

Lap Cushions

- Lap Desk Pillow: www.froogle.com

Risk Assessment

Are You an at Risk Driver?

- Perform an Initial Self-Risk Assessment.
  - **Driving at work**. Ask yourself about the time spent in the vehicle and typical daily/weekly mileage.
    - Use the Car Selection Check-List to help evaluate features of the car and seat design.
  - **Body discomfort.** Use the Body Part Discomfort Map to identify any discomfort experienced in a typical week.
  - **Working from the car**. Ask yourself about work activities undertaken in the car e.g., manual handling, laptop/PDA use, paperwork.
    - Use the Working From Your Car guide for a quick assessment.
  - **Lifestyle**. Consider your personal lifestyle factors, e.g., physical activity, smoking.

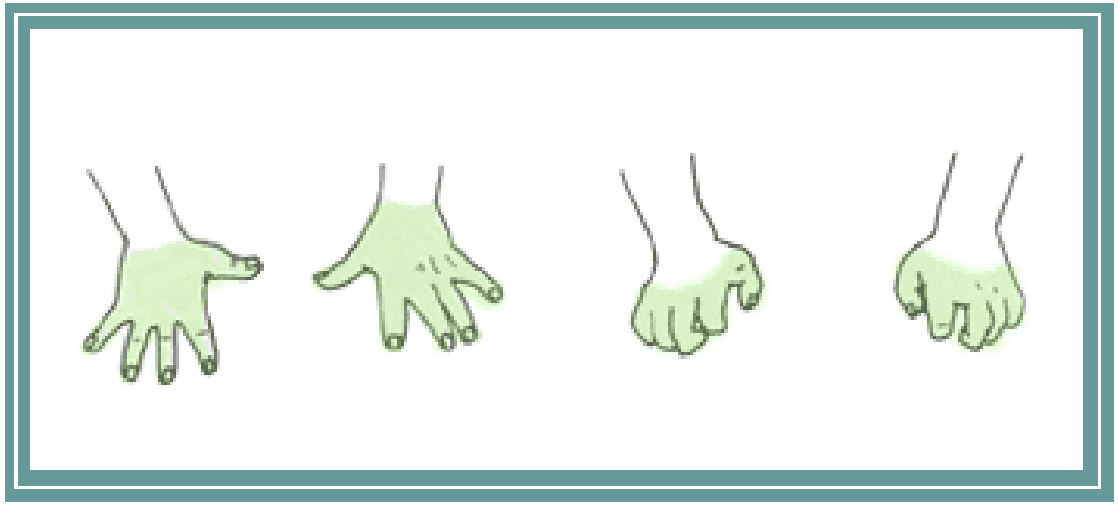
Identifying at Risk Drivers

- Upon the completion of your self-risk assessment:
  - Take urgent action to obtain continued support until your risk is deemed minimal, if you:
    - Present with severe pain or a medical history of low back injury.
    - Drive an inappropriate car.
    - Have high driving exposure.
    - Have other risk factors (e.g., as manual handling).
  - Contact your agency Safety and Health Specialist to:
    - Observe the work tasks performed which may increase risk.
    - Discuss options and solutions for improved driving support and comfort.

Exercises / Stretches

You can perform the following exercises and stretches at work throughout your day. These exercises can help energize your body and relieve muscle tension.

Hand Stretches



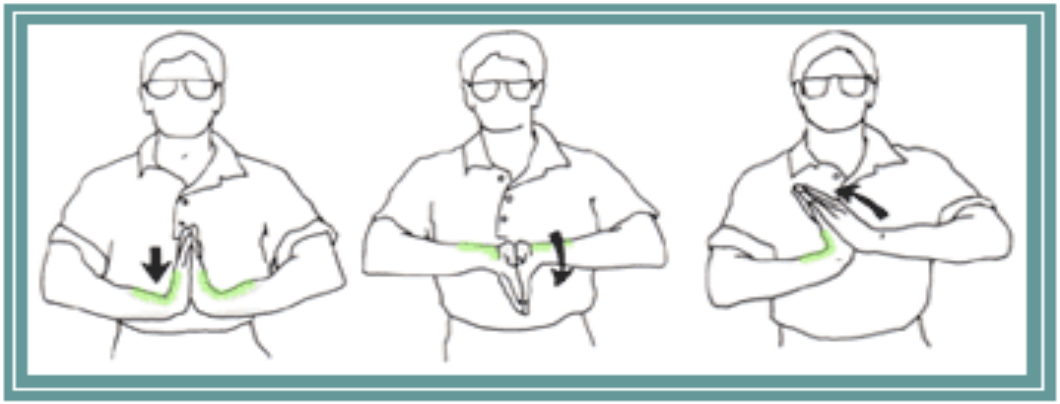
Separate and straighten your fingers until the tension of a stretch is felt.

Hold 10 seconds.

Relax, then bend fingers at the knuckles and hold 10 seconds.

Repeat the first stretch once more.

Wrist Stretches



Place your hands palm-to-palm in front of you.

Move hands downward, keeping your palms together, until you feel a mild stretch.

Keep elbows up and even.

Hold 5-8 seconds.

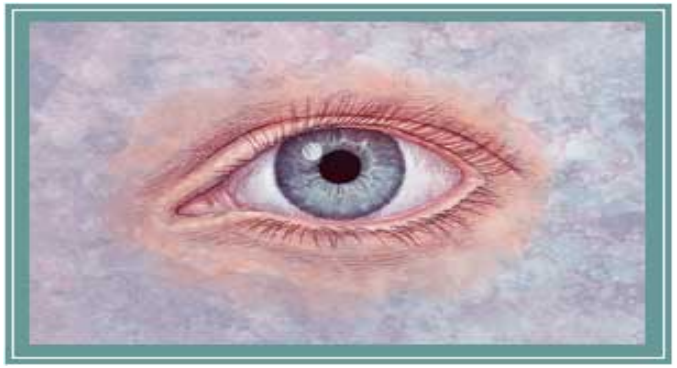
Back Stretches

- Lean forward to stretch.
- Keep your head down and your neck relaxed.
- Hold 10 - 20 seconds.
- Use your hands to push yourself upright.

Back Stretches

- Stand with hands on your hips.
- Gently turn your torso at the waist and look over your shoulder until you feel the stretch.
- Hold 8 - 10 seconds.
- Repeat other side.
- Keep your knees slightly flexed.
- Do not hold your breath.

Eye Stretches



Palming

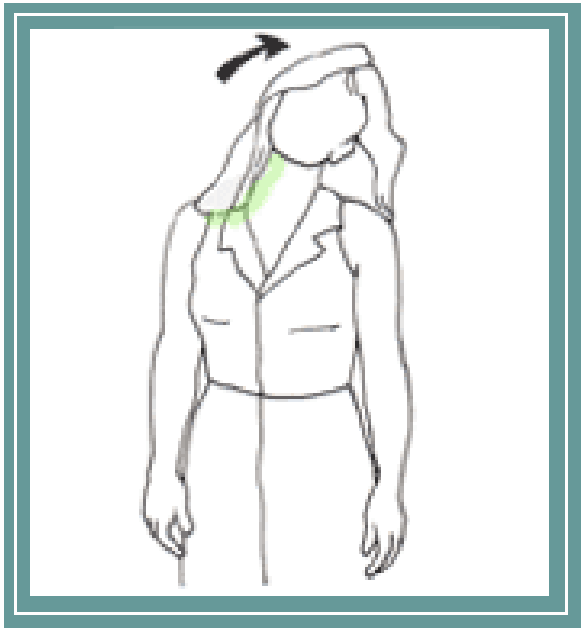
Cover your closed eyes with your hands, so that the palms are over (but not touching) your eyelids. Your fingers should overlap above your nose on your forehead.

Take several deep breaths and take in the complete darkness (or visualize a relaxing setting).

After 20 seconds or so, uncover your eyes and allow them to refocus.

Neck Stretches

- Slowly lower your neck to one shoulder, keeping that shoulder down.
- Hold 5-10 seconds.
- Do both sides.



Educational/Evaluation Resources

Available Resources/Tools

- Posters
- Individual, Group, or Worksite Ergonomic Evaluations
- Phone Consultations
- Correspondence via Email

*Contact your Safety and Health Program for more information.

Summary - Driving Postures

- Poor seated postures are generally considered to contribute to WMSDs.
- Good posture is a key feature in the prevention of back pain.
  - However, even good postures can result in discomfort.
  - It is important to note that no single posture is ideal if maintained for long periods of time.
- Adopting a range of comfortable postures, and frequent changes of posture, may help to delay the onset of discomfort in driving.
- Any seating position should account for the need to vary posture.

Summary

- **Understand:** causes of WMSDs & ways you can prevent them when driving.
- **Respect:** potential hazards caused by poor postures.
- **Communicate:** ways to eliminate stress factors & report symptoms early.
- **Commitment:** eliminate WMSDs in your driving environment.

Questions

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