ERGONOMICS AND DRIVING

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Overview

- Physical hazards
- Selecting a Vehicle
- Steps to Injury Prevention
- Working from your vehicle
- Human factors / cognitive hazards

Driving Statistics

- On average men drive 71 kms, women drive 55 kmseach day
- Studies have found **significant** associations **between driving and back problems.**
- One study analysis for the possible reasons related to reporting of low back pain found:
  - **Long-term vibration exposure** from driving among the HIGHEST risk factor for neck, back and low back problems.

Problems with Frequent Driving

- Neck, back and shoulder pain
- Cramps, pressure points & poor circulation in the legs & buttocks
- Immediately after driving – increased chance of low back injury from lifting
- Long-term potential for degeneration of spinal discs and disc herniation

What Activities Increase Risk?

ACTIVITY	RISK
Driving 30 km or more a day	Two to four times risk of back pain
Truck Driving	Four times risk of disc ruptures
Car Driving	Two times risk of disc ruptures
Increased Vibration	Increased tension, fatigue, pain
Driving a bus	Back pain risk increased

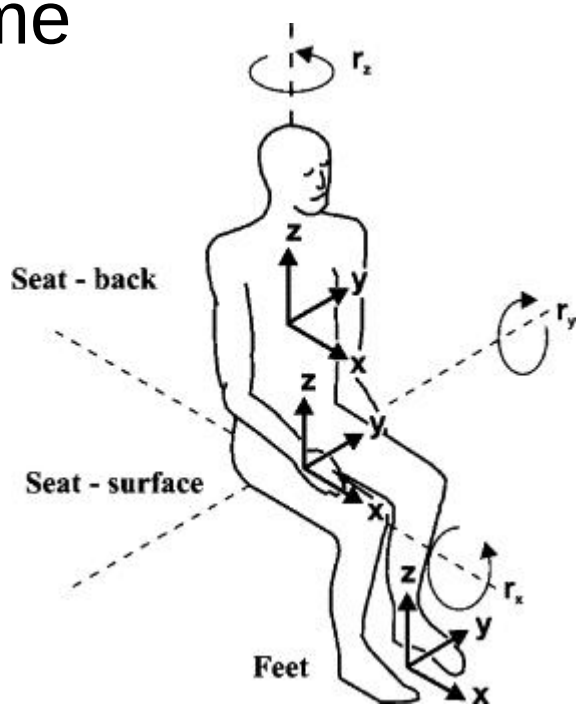
OHS Canada, Oct., 2000

Who is at Risk?

- Truck drivers / Ambulance Drivers
- Heavy equipment operators
- Bus drivers
- Forklift operators
- Farmers
- Delivery and courier service workers
- Taxi / Limousine Drivers
- Travelling sales workers

Back & Neck Injuries

- Two main hazards
  - Sitting for long periods of time
  - Whole-body vibration



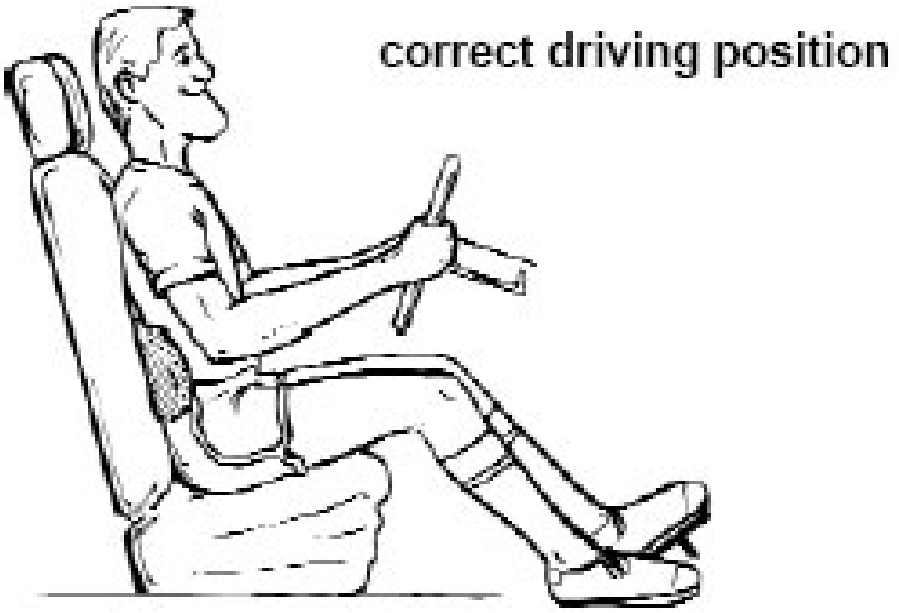
SITTING Hazards

- An **AKWARD** posture
- A **STATIC** posture
- A **WORKING** *position*
- Hard on **DISCS & LIGAMENTS** of the back
- Restricts **BLOOD CIRCULATION** through the muscles = fatigue

Posture and Lumbar Load

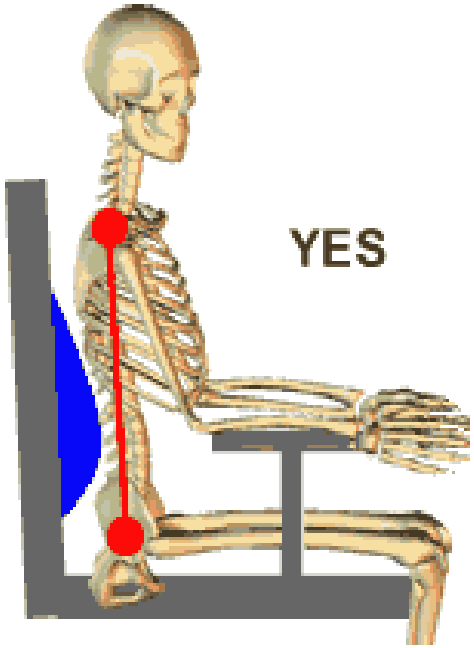
Long Term Sitting

- Sitting is a **static posture – <u>BUT not void of muscle contraction</u>**
- BUT, only some muscles NOT all – therefore, some muscles work constantly, while others do nothing!!



Backrests (Lumbar Supports)

- Sitting flattens lumbar curve
  - Changes biomechanics of spine
  - Increased forces on discs
  - Increased length of ligaments
  - Increased muscle tension
- Need support for curvature



Whole-Body Vibration

- Transmitted through the back & buttocks when sitting
- Every object has a ‘resonant frequency’ (RF) 3-5 Hz – vibration from the road is often in the body’s RF range; this increases the risk of injury
- Long-Term exposure:
  - Disc displacement
  - Degenerative spinal changes
  - Lumbar scoliosis
  - Intervertebral disc disease
  - Herniated discs
  - Disorders of gastrointestinal system

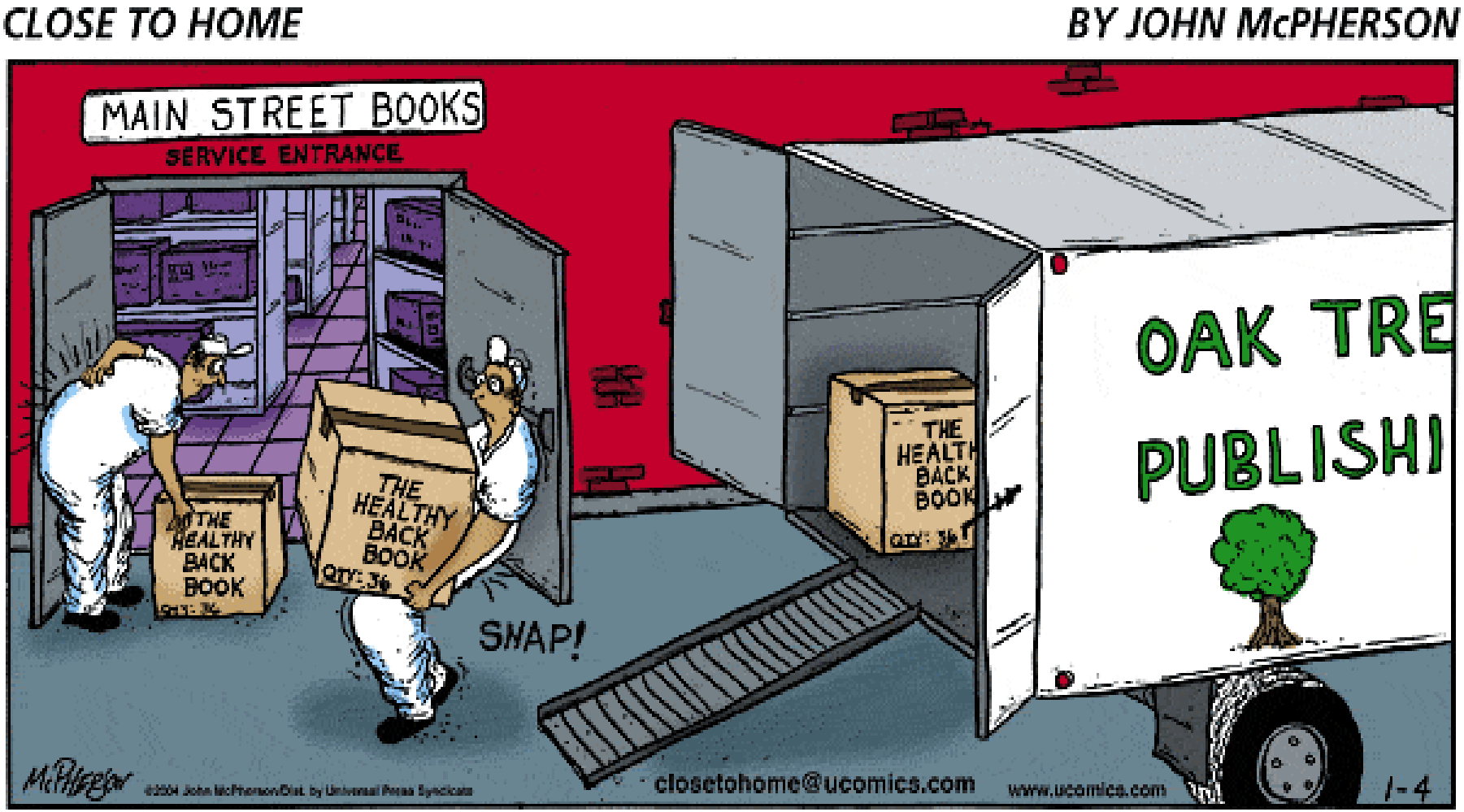
Reducing Effects of Vibration

- Reduce **transmission**
  - Improve vehicle suspension
  - Maintain equipment properly
  - Proper engineering of seating
  - Use of materials that generate LESS vibration
- Decrease **amount**
  - Reduce speed of travel
  - Increase rest/recovery time between exposure
  - Alternate tasks to minimize vibration exposure

Reduce – cont….

- **Modify the seat** and control positions
  - **Back rest support**
  - **Reduce forward/sideways leaning of trunk**
- **Eliminate awkward postures**
  - Difficulty seeing displays or reaching
- **Reduce or isolate** from the vibration source
  - Seated – spring or cushion (as an isolator)

Lifting after Prolonged Sitting



Manual Handling Tips

- Adopt good postures when MMH
- Get as close to the item as possible – therefore organize the trunk accordingly
- Try to park as close as possible to drop off point.
- Take care when MMH after a long drive – walk before handling
- Use wheeled bags
- Consider making 2-3 trips instead of one

Manual Handling

Selecting a Vehicle
(CCOHS)

- Does it match requirements for the body size of the driver(s) & any physical limitations
- Do the layout & ergonomic features of the vehicle meet your needs?
- How much time per day does the driver use the vehicle and what distance do they drive per year?
- Does it have features that assist in the kind of work the driver does – eg. Easy to load trunk (salesperson)

Ideal Car/Cab Design

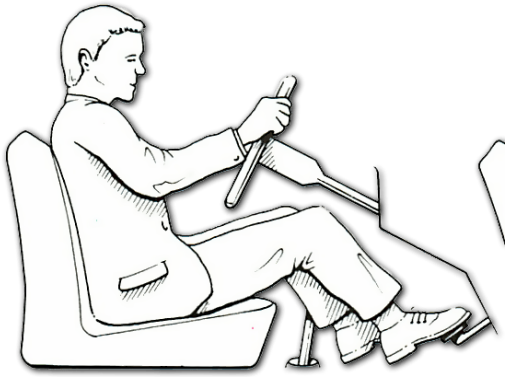
- Adjustable seat back incline (100º)
- Changeable seat bottom depth
- Adjustable seat height
- Adjustable seat bottom incline
- Seat cushion with firm (dense) foam
- Adjustable lumbar support (V & H)
- Adjustable bilateral arm rests
- Adjustable head restraint

Car Seat Design – cont…

- Seat shock adsorbers to dampen frequencies between 1 – 20 hz.
- Linear front-back seat travel to allow differently sized drivers to reach the pedals
- Seat back damped to reduce rebounding of the torso in rear-end impacts

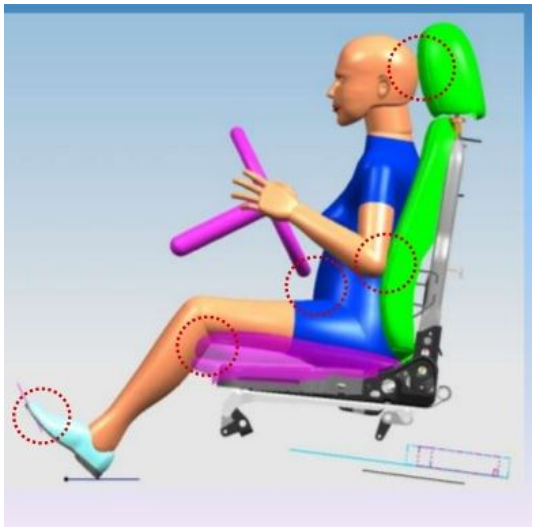
Car features: Seat Base

- Adequate leg length
  - Ensure thighs are adequately supported
    - Picture A – too short
    - Picture B – too long



A

- Adequate height adjustment
  - Feet can operate pedals without stretching
  - All controls are easily reached
  - All display instruments can be seen
  - Good all round vision



B

Car features: Back Rest

- Ensure the height of the back rest reaches the shoulders and does not obstruct ‘rearward vision’

- Ensure the back rest width is enough to support the shoulders

Car features: Steering Wheel

- Adjustable steering wheel – in/out, up/down and tilt
- Power steering
- Centrally positioned and not ‘off-set’ to prevent rotation of the spine
- Ensure steering wheel does not obstruct the display panel

Steps to Injury Prevention

- Learn how to get in and out of vehicle
- Use a good sitting posture – use lumbar support
- Tilt the backrest to 110 degrees from you legs to reduce disc pressure
- If possible, tilt the seat a notch or two back and forth every 20-30 minutes – alters the direction of vibration
- Adjust the steering wheel – ensure you can press the pedals without moving your low back off the back of seat
- Avoid slouching
- If possible, change positions while driving

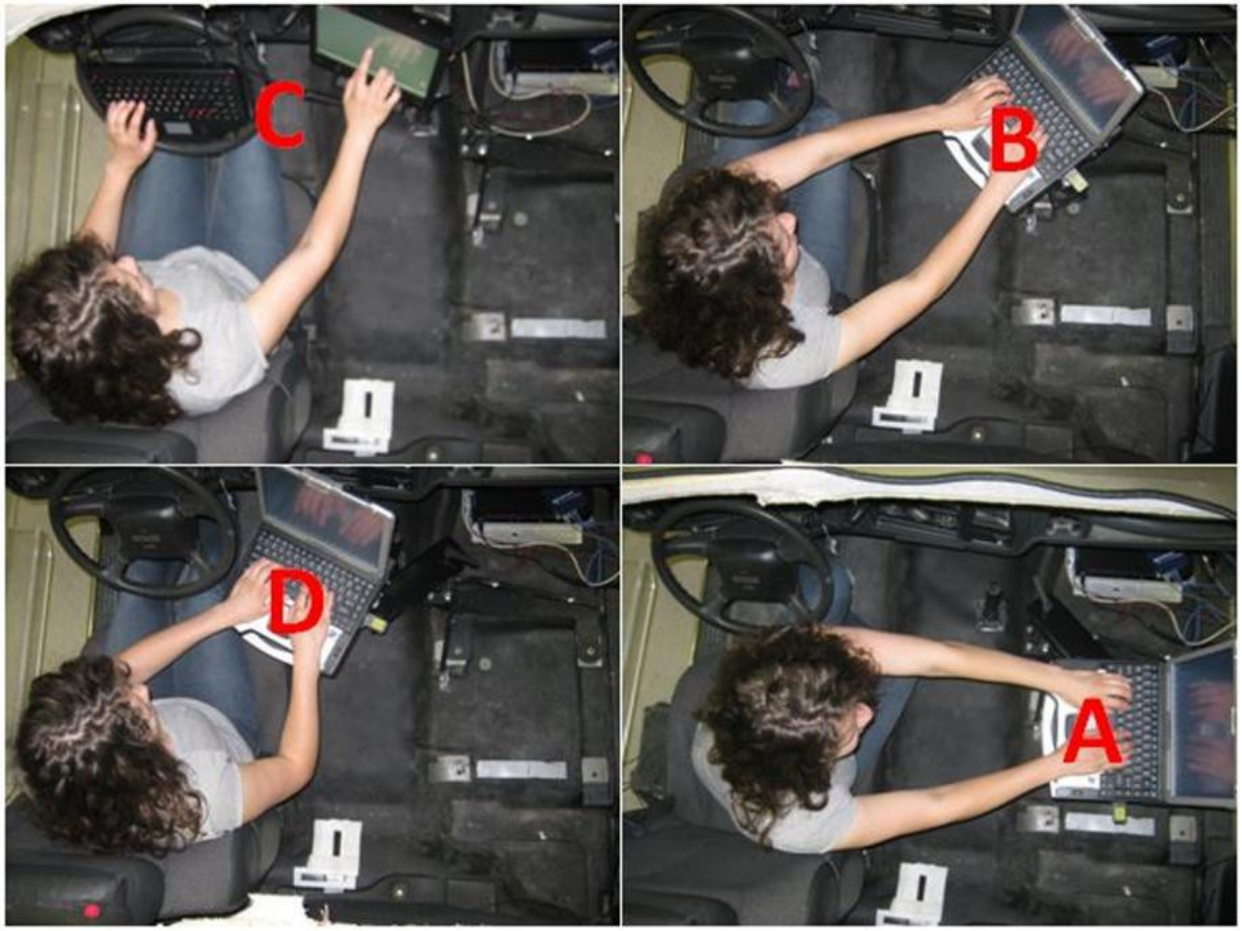
Steps to Injury Prevention

- Adjust your headrest
- Adjust your armrests
- Check your hand position on the steering wheel
- Try to take regular rest/stretch breaks. Only 5 minutes will suffice
- Avoid lifting immediately after driving – give yourself on or two minutes to stretch and rest before lifting

Working from your vehicle

- Working from a vehicle can entail use of a laptop, general paperwork, mobile use or manual handling. This could involve:
  - Static and awkward postures
  - Twisting and leaning to one side
  - Leaning forward
  - Slouching

Best location for a computer



- **A & B** – poor body postures & increased muscle strain
  - Increased muscle fatigue
  - Increased risk of low back pain
  - Increased risk of shoulder MSDs

Devices for laptop use

Human Factors & Driving

- Speeding
- Fatigue
- Distracted Driving

Speeding

- Safety features can be breached once drivers pass certain speed thresholds
  - Antilock braking systems (ABS)
  - Brake assist
  - Electronic brake-force distribution (EBFD)
  - Electronic stability control (ESC)

Fatigue

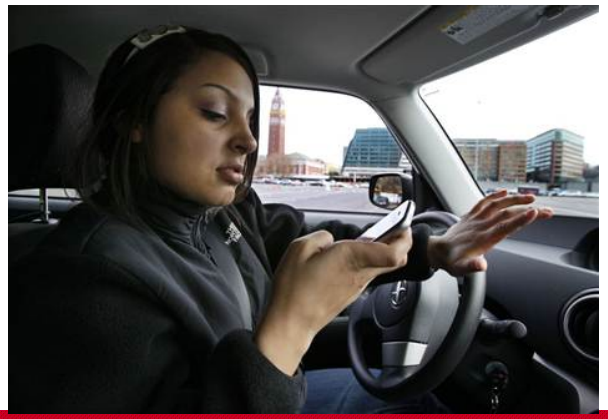
- Fatigue can be experienced for a variety of reasons:
  - Inadequate sleep
  - Alcohol / medications
  - Prolonged hours driving
  - Time of day

How does Fatigue affect Safety

- At risk for ‘nodding off’ at the wheel
- Slower reaction times
- Reduced overall attention
- Slower decision-making
- Delayed information processing
- Fatigued drivers not very good at gauging their own fatigue level
- Car safety features become ineffective (similar to speeding)

Distracted Driving

- Transport Canada
  - Fatal collisions where distraction is cited as cause have risen by 17% in Canada from 302 deaths to 352 from years 2006-2010
  - Studies estimate that distracted driving accounts for 30-80% of collisions – cellphone use



Distracted Driving (CAA)

- Cell phones are the most common distraction
- Texting – 23 times more likey to be involved in a crash or near crash event compared with non-distracted drivers
- 84% of distracting-driving-related fatalities in US were tied to the general classification of careless or inattentiveness
- 80% of collisions and 65% of near crashed have some form of driver inattention as contributing factors

Distracted Driving (CAA)

- Distracted drivers are 3 times more likey to be in a crash than attentive drivers
- Driver distraction is a factor in about 4 million MVA in North America
- Children are 4X more distracting than adults as passengers – infants are 8X

Cell Phone Use

- Bluetooth
- Hands-free car kit

Brain on Board:
Your brain is your vehicle's most important safety feature

http://brainonboard.ca/myths_and_misconceptions/

Safety Tips!!

- http://www2.worksafebc.com/Publications/Multimedia/Videos.asp?ReportID=37200

Thank You

If you have any questions about this presentation, please contact me at the email/number below

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