OCCUPATIONAL HEALTH & SAFETY

Roger R Hall
Safety Science
UNSW

H-CI and OH&S

- What is OH&S?
- Workstation design
- Keyboard design
- Mouse design
- Vision & lighting
- Screen factors & readability
- Job design
- Liability for design

What is OH&S?

- Hazards & risks in the workplace
  - things in the workplace that can cause harm (injury or ill health)
- Duty of care
- Personal health & safety using computers
- RSI & OOS

Sources of risk in the workplace

Duty of care

- Statutory compliance OH&S Act (1983)
Employers:
  - To ensure health, safety and welfare of people at work including contractors & visitors
  - Minimise and manage risks
  - Foreseeability of harm to workers
Workers:
  - To act with care –to property, themselves AND others

Risks of computer use

- “Improper or prolonged keyboard use may result in injury.”
- “Viewing the display or external monitor screen for extended periods of time may result in eye strain ”
  [from Dell laptop on-line guide]
- Back, shoulder & neck pain – poor posture
- Overuse of mouse, trackball or keyboard – thumb, index finger, wrist and possibly shoulder
- Visual problems, red eye, dry eye etc
Personal health & safety

- Duty of care to self
- Ergonomically sound workstation – good seating, good posture, layout of keyboard, monitor etc,
- Proper working environment – proper lighting, freedom from noise
- Ergonomically sound working habits – take rest breaks, vary posture & task

Working Comfortably?

“If people are feeling significant discomfort, and they continue doing the same activities, that discomfort will get worse and worse until it is disabling. Once it is disabling, it’s a real long road back … if you can ever get them back. The upside is if you get them early enough …. address what’s causing the pain you can stop it building up …. with no long term disability”

Straker L (2000). Curtin University of Technology, Perth

RSI & OOS risk factors

- Repetition Strain Injury or Occupational Overuse Injury – repetition or overuse!
- Static loading – hold one position too long
- Non-neutral postures of limbs & joints
- Localised pressure
- Use of force, esp with small muscles

Workstation design

- Heights of desk and chairs
  - good ergonomic chair: adjustable, stable
  - sufficient clearance underneath desk
  - use footrest if necessary
- Layout of workspace
  - depth to set screen at right distance
  - document holder at same depth as screen
  - equipment within easy reach
- Environment
  - lighting + task light if necessary
  - noise free

Heights of desk & seating

Workspace layout
Notebooks & posture

- Can cause excessive forward bending of the neck and screen may be “too” close
- Use external monitor, keyboard and mouse for prolonged usage – improves posture and visual conditions

Keyboard design – MS Natural

- Standard 101/104
- Split design - allows hands, wrists and forearms to be in a natural position for greater comfort while using MS Natural: hinged etc.

Mouse design

- "Standard" designs
  2 button, + wheel; whale, tilt ...  

Mouse design (continued)

Vertical design –
- Anir, or
  - 3M Renaissance  
  (no longer available)

Vision & lighting

- glare – direct and reflected
- the luminance (brightness) contrasts
- the amount of light available, task lighting
- the viewing distance of screen and documents
- the readability of the screen and documents
- the person’s vision and their corrective lenses

Screen factors & readability

- Good colour now standard
- High resolution now standard
- Screen flicker - refresh rates, 70 Hz or higher
- Set monitor at distance for comfortable reading – visual angle of letter ~20-22 min of arc (ISO 9241-3, 1992)
- Resolution & magnification – changing either does not seem to affect reading speed or editing per se, if visual angle optimum; subjective preference for larger letters (Long, 2000)
Job design

- A significant factor – context specific
- 1980s & the introduction of VDUs into offices
  - RSI epidemic
  - solution: “ergonomic” furniture:
    - 5 leg, gas strut adjustable chair
    - adjustable desks, etc
- “Ergonomic” furniture helped but “real” problem was excessive keystrokes, lack of
  breaks and no variation in tasks

Liability for design

  of manufacturers and importers of defective goods.
- Mainly for consumer products with safety
  implications but covers “defective” goods.
- Includes designers; & “programmers”?
- Software ergonomics now expected –
  EC directive
- Safety critical software?

References

- Aarås A and Ro O (1997). Workload when using
  mouse as input device. A comparison between a new
  developed mouse and a traditional mouse design.
  Preferred VDT workstation settings, body posture
  and physical impairments. Applied Ergonomics, 15,
  pp 99-104
- ISO 9241: Ergonomics requirements for office work
  with visual display terminals (VDTs) – 17 Parts:
  Part 3 - Visual display requirements
  Part 5 - Workstation layout and postural reqs.
  Part 11 - Guidance on usability
  Part 12 - Presentation of information

References (continued)

- Kroemer KHE & Grandjean E (1997). Fitting the
  task to the human – 5th ed. (London, Taylor &
  Francis).
- Long J (2000). The effect of magnification and
  screen resolution on the ability to edit text on a
  computer screen. Master of Safety Science Project
  Report, UNSW.
- Pheasant, S (1986). Bodyspace: Anthropometry,
  ergonomics and design. (London, Taylor &
  Francis).
  of postures assumed when using laptop computers
  and desktop computers. Applied Ergonomics
  28(4), pp 263-268

URLs

Workstation design
- www.office-ergo.com/a.htm

Anir (“joystick”) mouse
- www.animax.no

Anir (“joystick”) mouse
- www.animax.no

URLs (continued)

Split keyboard
- http://www.goldtouch.com/about_rsi/Workcover-
  AssessmentGoldsteinKB.pdf

MS Tilt mouse
- www.extremetech.com/article2/0,3973,1241298,00.asp