The Physical Impact of IT use on Children

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Outline

- Ergonomics approach
- Health risk and IT
- Risk nature and magnitude
  - Epidemiological studies
  - Laboratory studies
  - Planned studies

Ergonomics Approach

IT use associated with musculoskeletal disorders in adults

- 75% adult computer users report neck and upper limb pain
- Small % have severe disabling symptoms

Increasing IT use by children

- 95% Australian children use computers
- 74% use computers frequently
- Used for educational and leisure purposes
- Second highest participation as leisure activity
  - Watching TV 97%
  - Computer games 69%
Concerns raised for health of children

- International Ergonomics Association
  - Special session at triennial congress in 2000
  - Special interest group established in 2000
- Frequent requests for information from parents, teachers and education authorities
- Substantial media interest
  - BBC, ABC...
  - New York Times, The Times, The Australian...

Is working with computers a risk to health?

- Establishing causal link between risk factors and musculoskeletal disorders is difficult
- Epidemiological studies evaluate association between exposure to risk factors and health outcomes
- Laboratory studies explored how contributory factors alter risk factors

Is working with computers a risk to the health of children?

- Epidemiological evidence
  - Laptop schools study
  - Case-comparison classes study
  - RASCALS study
- Laboratory evidence
  - Upper quadrant posture
  - Neck and shoulder muscle activity

Laptop Schools Study

- 314 10-17 year old students at schools with mandatory laptop programs

Laptop Schools Study - exposures

- 3hrs/day use
- 17hrs/week use
- 66% non desk sitting use

Laptop Schools Study - outcomes

- 60% students reported discomfort
  - Neck and shoulders most common location
  - Max. time on task and discomfort relationship
Case-comparison Classes Study

- 40 12 year old students with 6 months laptop experience
- 34 11 year old students with 2hrs/week computer lab experience

Case-comparison Classes Study - exposures

Randomly Ascertained Sample Cohort Longitudinal Study

- 10% sample of children born in 1995 in Western Australia
- Followed annually with a questionnaire investigating range of health issues
- ~80% compliance
- 2 pages on IT exposure and outcomes
- Preliminary data from ~760 5year olds analysed

RASCALS - exposures

- TV/video
- Computer game on TV
- Hand held computer game
- Reading book
- Writing/painting
- Vigorous activity

RASCALS - outcomes

- Only 1% reporting sore/tired muscles with computer use
- Only 1.8% reporting sore/tired eyes with computer use

Discomfort commonly in head and neck
5-10% reporting high intensity discomfort

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Summary of Epidemiological Evidence

- Weak evidence suggests a real and significant problem which requires better understanding.
- High % of children report discomfort with computer use – increasing with age.
- Prevalence and intensity of discomfort may be greater with computer than paper.

Upper Quadrant Posture Study

- 33 4-17 year old children.
- Read from paper, laptop and desktop.
- Peak motion analysis.

Upper Quadrant Posture Study Results

- Increasing head tilt and neck flexion from desktop to laptop to paper.
- But laptop closest to resting head posture.

Neck and Shoulder Muscle Activity Study

- Same subjects and tasks.
- Physiometer normalised EMG.
- Cervical Erector Spinae and Upper Trapezius muscles.

Neck and Shoulder Muscle Activity Study Results

- CES higher for paper and laptop.
- Trap higher for laptop.

Summary of Laboratory Evidence

- Early evidence suggest different physical stresses.
- Not clear whether computer IT stresses worse than paper IT or not.
Planned Field Studies

• Development of valid measures of exposure and outcome
  - Questionnaires for children, teachers, parents
  - Observations at school and home
  - Physical measures of EMG, posture, heart rate

Planned Laboratory Studies

• 3D head and neck posture measurement
• Computer modelling of tissue stresses

Conclusion

• Computer use by children results in different physical stresses
• Experience of adults suggests if interaction not well managed negative outcomes likely
• Early evidence from children suggests similar problem
• Urgent need for quality research

Copies of papers available at URL ITkids.curtin.edu.au