Improving Ergonomics in the Workplace

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A Great Workforce
A Great Workplace
What is Ergonomics?


Benefits of good Ergonomics practices

- Safer and healthier work
- More comfortable workplace
- Minimise human error
- Less injuries and illnesses
- Maximise efficiency
- Improve the quality of working life
Ergonomics has 3 domain areas:

- Physical Ergonomics
  - Musculoskeletal Disorders
    - Manual handling
    - Workstation design
    - Equipment design
  - Auditory and visual displays
    - Control design
    - Human Error
    - Vigilance
- Organisational Ergonomics
  - Shift work
  - Rest and work breaks
  - Work load
  - Job satisfaction
- Cognitive Ergonomics
Ergonomics-related workplace health problems cost $3.5b a year

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Workplace health problems cost $3.5b a year

Council launches guidelines to prevent ergonomic-linked woes like stiff necks

By JANICE HENG

THEY may not be as dramatic as falls from heights or collapsing scaffolding, but ergonomic-related workplace health problems such as stiff necks, strained backs and numb wrists cost Singapore a whopping $3.5 billion a year, said the Workplace Safety and Health (WSH) Council.

These "work-related musculoskeletal disorders" can result from bad practices such as poor posture, repetitive action or incorrect handling of heavy loads.

"In most developed countries, they are the most common type of occupational disease," noted Senior Parliamentary Secretary for Manpower Hazrin Zakaria.

"Being a developed country, we can expect Singapore to show and experience a similar trend," he added at yesterday's Workplace Ergonomics Forum, hosted at SIM University.

These problems are already the third most common source of occupational disease here, after deafness and skin disease.

To help firms, the council yesterday launched a set of guidelines on improving workplace ergonomics — that is, how workers interact with equipment and the environment.

These guidelines on improving workplace ergonomics include tips on how to lift heavy objects safely and good office workstation design.

From this year, back injuries due to ergonomic risks such as carrying heavy loads will be classified under "work-related musculoskeletal disorders" in the annual WSH statistics. Previously, they were classified as minor injuries.

The change "will give us a more complete picture of the injuries caused by poor ergonomic practices and increase awareness on the ground as well" said Mr. Hazrin.

The council's approach towards ergonomic safety is one of raising awareness and building capabilities, rather than punishment and enforcement, he added.

It is therefore developing an e-learning module on awareness of ergonomic problems.

Firms redesigning their workplaces for better ergonomics can apply for funding from the Government's WorkPro scheme, which supports firms in adopting good work-life practices. Workers can use the free ergo@WSH mobile application to snap photos and analyse their posture.

As an ergonomics specialist at manufacturer M4, Ms Noraini Mohd Nor has met many workers who are unaware of this area of workplace health.

"But when we explain to them that it's about back pain and headaches, then they understand. "Oh, that's ergonomics".

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Musculoskeletal Disorders (MSDs) are muscle, tendon or nerve disorders.

Musculoskeletal Disorders

- Low back pain
- Carpal Tunnel Syndrome
- Cubital Tunnel Syndrome
- De Quervain’s Tenosynovitis
- Trigger finger
- Epicondylitis
- Neck and shoulder pain

Symptoms

- Numbness
- Pain
- Aches
- Burning sensation
- Swelling
- Tingling sensation
- Weakness
- Cramping
- Loss of colour
Risk Factors of Musculoskeletal Disorders

Musculoskeletal disorders are associated with some risk factors. These factors may be found during work activities. Along with personal factors such as physical limitations or existing health conditions, these risk factors contribute to the development of MSDs.

**Workplace Risk Factors**

- Forceful exertion
- Repetitive movements
- Awkward posture
- Static posture
- Vibrations
At an outdoor catering event, a restaurant manager had to lift and carry about 20 carton boxes of food (22 kg each) and 80 cases of mineral water (8 kg each) for about 15 feet, over a 2-hour period.

That evening, he went to see the doctor complaining of acute back pain. He received 3 months of medical leave.
He was able to go back to work as restaurant manager but avoids heavy lifting.

**Recommendations**

1. Re-design of boxes to make them smaller in size.
2. Train all staff in manual handling methods.
3. Use height adjustable trolley to transport items.
Workspace and Workstation Design

Office Ergonomics

Workplace design and conditions, including the workstation, work postures and the physical environment, affect the well-being and comfort of an office employee.

Practice for Office Ergonomics

Poor office ergonomics can strain muscles, leading to aches, pains and musculoskeletal disorders. Prevent sprains and strains with proper workstation design and placement of equipment, and by adopting proper work postures.

- Place frequently used items within the primary zone (e.g., files).
- Place less frequently used items within the secondary zone (e.g., monitor).
- Items frequently used together should be grouped together at the workstation (e.g., keyboard and mouse).
Workstation Design and Posture

Sitting correctly?

Proper monitor position helps you avoid vision and neck problems. Position your monitor at least an arm's length away at the recommended viewing angle (10°-30°).

Feet should be flat on the floor or supported by a footrest to reduce pressure on your thighs.

Viewing Distance (45-70 cm)

Viewing Angle (10°-30°)

Sit with your hips as far back as they can go in your seat to ensure that your hips are fully supported.

Chair Height (35-50 cm)
Workstation Design - Chair

Human Anthropometry and Workstation Design

Seat width = Hip dimension + 5 cm
(5 cm is for clothing & pocket contents allowance)

Female’s hip = 41cm (95% Singapore females)

Therefore width = 41 + 5 or 46 cm to accommodate 95% of female population
Hand tools Design

Hand tools

Ergonomically-design of powered and non-powered hand tools to avoid awkward postures of the hand and arm and prevent the user from experiencing excessive exertion or vibration.

**GOOD**
Hand and wrist in neutral, stress-free position

Soft grip ergonomic handle

**POOR**
Stretched tendons on upper wrist; compressed tissues on lower wrist; callouses on palm

Stress force
Displays and Controls

- Auditory display
- Visual display
- Hand control
- Foot control
Physical Environment

- Temperature
- Lighting
- Noise
Work Organization

To ensure employees can work safely and productively in the work environment, work arrangements such as work-rest regimes, shift work, and work pace should be carefully managed.

- **Shift work**
  - Disrupts circadian rhythm
  - Leads to sleep deprivation, digestive or heart problems

- **Work pace**
  - Differing physical and psychological capabilities
  - Substantial stress to keep up with work pace
WSH Guidelines: Improving Ergonomics in the Workplace

Workplace Safety and Health Guidelines

Improving Ergonomics in the Workplace
Content of Guidelines

1. Introduction
2. Musculoskeletal Disorders
3. Risk Factors of Musculoskeletal Disorders
4. Workplace and Workstation Design
5. Legislations and Standards
6. Ergonomics Programme
7. Conclusion
Ergonomics Programme

An ergonomics programme provides a systematic approach for the organisation to manage ergonomics-related hazards and issues at the workplace.

**Elements of Ergonomics Programme**

1. Management Commitment and Policy
2. Employee Involvement
3. Training and Education
4. Hazard Identification
5. Workplace Monitoring, Reporting and Medical Management
6. Implementation of Control Measures
7. Evaluation and Review
Hazard Identification

In hazard identification, work-related MSDs and their associated risk factors are identified and analysed. Job tasks are prioritised based on job hazard analysis. Control measures are then implemented to control the risks as far as is reasonably practicable.

1. Conduct a hazard identification exercise together with employees who are involved in the job.
2. Break down the job into its various work tasks. Observe employees performing the tasks.
3. Identify risk factors in each work task. Start with a qualitative identification.
4. Prioritise certain work tasks for more detailed analysis.
Ergonomic Risk Assessment tools

Observe the job being performed and break the job into individual tasks

For manual handling tasks

For pushing and pulling tasks
- Liberty Mutual Psychophysical tables

For carrying, lifting, lowering or stacking tasks
- ACGIH TLV for lifting
- Liberty Mutual Psychophysical Tables
- Quantitative risk assessment of manual lifting and carrying

For other repetitive tasks

Hand activity
- Moore Strain Index
- ACGIH hand activity level

Whole body activity
- REBA (Awkward whole body posture)
- RULA (Awkward upperbody posture)

For other repetitive tasks
Case study on manual lifting task

In a concrete testing laboratory, workers had to lift some 150 concrete cubes weighing 8kg each daily.

Improvement: The base of the tank was raised and an inverted L-shaped recess added.

Before

After
### Case study on manual lifting task

#### NIOSH Lifting Equation

- **Variables**
  - Horizontal distance
  - Vertical distance
  - Displacement
  - Frequency and duration of lifting
  - Coupling with load
  - Asymmetry

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<tr>
<th></th>
<th>Old</th>
<th>Improved</th>
<th>Lifting Index Reduction</th>
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| Lifting Index | 2.1  | 0.8      | 62%                     

Figures showing the old and improved lifting positions with relevant dimensions.

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Risk Control

Implementation of Control Measures

- **Engineering Control**
  - Automation
  - Mechanical aids or tools
  - User-adjustable work stations

- **Administrative Control**
  - Scheduling sufficient rest breaks
  - Job rotation to reduce repetitive movements
  - Training workers to raise awareness of ergonomics risk factors

- **PPE**
  - Vibration attenuation gloves
  - Vibration isolated seat
Case Study – Office environment

• A 28 year old female creative designer developed neck and shoulder pain after working 2 years in a software company. For the past 4 months, she covered for a colleague on maternity leave and worked 12 hours daily with tight deadlines.

• She had a history of migraine for 12 years, which was aggravated by computer work with no rest breaks.
Case Study – Office environment

She took 5 days of medical leave and was able to continue work with more frequent rest breaks, physiotherapy and medication

Recommendations

1. Re-distribute or re-schedule tasks.
2. Employ additional staff.
3. Schedule rest breaks and job rotation.
Summary

**Design for Ergonomics**
Incorporates **ergonomics principles** into design and selection process of tools, job methods, workstation layouts and materials.

**Ergonomics Programme**
- Hazard identification
- Risk analysis
- Implement control measures

Work-related musculoskeletal disorders (MSDs) can be prevented.

Ergonomics risks can be eliminated or minimised.
Thank you.