A Practical Guide to Workplace Ergonomics: Recognition, Evaluation & Control of Injury Risks

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Ergonomic Focus

The Tool

The Task

The Work Station and Environment

The User/Operator Interface
Ergonomic Statistics

- 90% of all office workers use computers
- More than 275,000 WMSD cases annually
- Carpal Tunnel Syndrome comprises 13% of all workplace injuries
- Women are 3 times more likely to sustain Carpal Tunnel Syndrome than men
- WMSD’s account annually for:
  - $20 billion in direct costs
  - $100 billion in indirect costs
What Are MSDs?

L5/S1
MSDs (a/k/a RSIs)

- Carpal Tunnel Syndrome
- Cubital Tunnel Syndrome
- Tendonitis and Tenosynovitis
- Trigger Finger
- Epicondylitis
- De Quervain’s Disease
- Ganglion Cyst
- Carpet layer’s knee
- Rotator cuff tendonitis
- Herniated disc
- Raynaud’s phenomenon
Carpal Tunnel, Inside of Wrist
Tendonitis
Double Crush Syndromes
5-Step Process for Identifying WMSD Hazards
Step 1. **Identify jobs that may have hazards**

Jobs with:

- Injuries
- Employee/supervisor concerns
- Bottlenecks
- Quality problems
- Unnecessary steps
Step 2. Educate and involve employees ("Participatory Ergonomics")

- Identify risk factors
- Use safety committees or ergonomics committees
- Provide employees with awareness training re: ergonomic principles
3. Evaluate jobs for hazards

Tools:
- Checklists
- Calculators for lifting tasks
- Employee interviews

Also helpful:
- Photos or videotape
- Symptom surveys
- Safety committee meeting minutes
- OSHA 300 or incident logs
- Claims history
Step 3A. Evaluate jobs for hazards - interviews
Step 3B. Evaluate jobs for hazards - checklists

Checklists are quick ways to check jobs to see if more review is needed
Step 3C. Evaluate jobs for hazards - Lifting Calculator (NIOSH & WISHA)

What you need to know:

- Weight of item
- Lifting location (hand zone)
- Frequency of lifts
- Duration of lifting
- Does the person twist?
Step 3D. Evaluate jobs for hazards – Common tools

- Symptom survey
- Walkthrough survey
- Ergonomics innovation assessment
- Photos/videos
Step 4. Identify and implement solutions

Solution Tools:

- Ergonomics Ideas Bank
- Industry Association
- Vendors
- Catalogs
- Create them in-house
Step 5. Re-evaluate to see if solutions are effective

- Use checklists and other tools to make sure you eliminated the hazards.
- Make sure you did not create new hazards.
- Ask workers if they feel better or notice positive differences.
- Review your ergonomics activities once a year.
Ergonomics Controls

Engineering
Administrative
Personal Protective Equipment
Principle #1: Keep Everything in Easy Reach

- Rearrange tools & equipment
- Reduce work surface dimensions
- Tilt work surface
- Provide cut-outs in work surface
Workstation Setup: Neutral Posture

Work within your normal range of motion

Other Office Items
- Telephones
- Staplers
- Staple removers
- Letter openers
- Hole punches
- Pens for writing tasks
Principle #2: Work at Proper Heights

- Ideal: Work at elbow height
- Account for type of work
- Account for size of product
- Maintain good height relationships
- Tilt the work surface
Awkward Posture Guideline

Recommended Limit
2 Hours Per Day
Principle #3: Reduce Excessive Forces

- Pinch vs. power grips
- Coupling factor
- Comfortable span of tool handles
- Use of 2-handled tools
- Minimize arm forces
- Keep loads close to body
- Reduce pushing/pulling forces
Forceful Gripping/Pinching Guideline

RECOMMENDED LIMIT

2 HOURS PER DAY
High Levels of Hand-Arm Vibration Guideline

RECOMMENDED LIMIT
30 MINUTES PER DAY
Moderate Levels of Hand-Arm Vibration Guideline

RECOMMENDED LIMIT
2 HOURS PER DAY
Principle #4: Work in Good Postures

- Maintain “neutral” postures
- Keep arms and elbows close to body
- Maintain natural curve of the back

Flexion

Extension

Radial Deviation  Ulnar Deviation  Pronation  Supination
Heavy Lifting Guideline #1

RECOMMENDED LIMIT 75 POUNDS ONCE A DAY
Heavy Lifting Guideline #2

RECOMMENDED LIMIT
55 POUNDS
10 TIMES A DAY
Awkward Lifting Guideline

25 lbs, 25X daily, below knees or above shoulders or at arms length
Frequent Lifting Guideline

10 lbs, 2X/minute, 2 hrs. daily
Principle #5: Reduce Excessive Repetition Guideline

Repeating the same motion with the neck, shoulders, elbows, wrists or hands, every few seconds.
Intensive Keying/Hand Movements
Guideline

**RECOMMENDED LIMIT**
4 HOURS PER DAY
Principle #6: Minimize Fatigue

- Eliminate static load
- Minimize general fatigue
Monitor Accessories

- Screen height at eye level (exception: bifocals and trifocal lens wearers).
- Screen distance about arms length away.
- Room lighting - avoid backlight, shadows or reflective glare.
Principle #7: Minimize Direct Pressure

Soft tissue compression (muscles, nerves & blood vessels)
Principle #8: Provide Adjustability & Change of Posture

- Design for adjustability
- Allow for alternate postures
Principle #9: Provide Clearance & Access

- Insure adequate workspace
- Insure access to everything needed
- Visual access
Principle #10: Maintain Comfortable Environment

- Appropriate illumination
- Avoid temperature extremes
- Isolate vibration
Principle #11: Enhance Clarity & Understanding

- Use appropriate displays
- Design for expectations
Principle #12: Improve Work Organization (Admin. Controls)

- Enlarge jobs
- Rest/exercise pauses
- New employee conditioning
- Preventive maintenance
- Team approach
Personal Protective Equipment
Insufficient data that belts significantly reduce trunk loading

Insufficient data that wearing reduces risk of injury

May strain cardiovascular system

Insufficient data that discontinuation of use increases risk among healthy workers

NIOSH does *not* recommend as a tool for prevention
The “Business Case” for Ergonomics
Paradigm Shift

- Lagging (traditional safety metrics)
  - Injury frequency, severity, lost workdays, OSHA recordable injuries
  - Workers’ compensation costs
- Leading indicators
  - Safety training
  - Ergonomic opportunities identified & corrected
  - Reduction of MSD risk factors
  - Employee perception surveys
  - Safety program assessments
- Combined approach is needed
Think in Terms of “Competitive Edge”

- Reduced Workers’ Compensation costs
- Reduced turnover & absenteeism
- Improved employee morale
- Improved job satisfaction
- Improved product quality
- Innovation may be encouraged
- Increased productivity
Productivity Model

1. Calculate the productive hours worked & paid for by the employer
2. Calculate the wage (salary) costs
3. Calculate employee turnover & training costs
4. Calculate productivity short-fall (productivity losses due to absences)
5. Total costs for employment & productivity short-fall
6. Calculate estimated health & safety productivity benefits
7. Determine cost for improvements
8. Calculate pay-back period
Case Study

- Task
  - Rereeling/dereeling of continuous strip product
  - Entry level job

- Solution
  - Modest redesign

- Cost:
  - < $800, in-house fabrication

- Benefit:
  - $160,000 annually

- Payback:
  - *Immediate*
Selected References

- TLVs® and BEIs® Based on the Documentation of the Threshold Limit Values for Chemical Substances and Physical Agents. American Conference of Governmental Industrial Hygienists, Cincinnati, OH. (latest edition)
Selected Internet Resources

**Occupational Safety and Health Administration (OSHA)**
https://www.osha.gov/SLTC/ergonomics/

OSHA Guidelines on Videotaping Tasks:

**NIOSH**
Lifting Equation: http://www.cdc.gov/niosh/docs/94-110/
Easy Ergonomics: A guide to Selecting Non-Powered Hand Tools:

**Washington State Department of Labor & Industries**
Ideas to reduce hazardous exposures:
http://www.lni.wa.gov/Safety/Topics/ReduceHazards/ErgoBank/default.asp

WMSD hazardous exposures:
http://www.lni.wa.gov/Safety/Topics/Ergonomics/

Example Template of an Accident Prevention Program:
http://www.lni.wa.gov/Safety/Basics/Programs/Accident/

**Oregon OSHA**
Practical approaches for improving the workplace:
http://www.cbs.state.or.us/osha/pdf/pubs/3347.pdf
HAPPY WORK