Using Job Analysis Tools

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Session Agenda

- Compare “analysis” versus “evaluation"
- Job analysis strategies
- Building the “Toolbox”
- Training
- Using tools and getting results i.e. improving job safety
Analysis Vs Evaluation

- **Analysis:**
  "the method of proof to which a truth is sought…"

- **Evaluation:**
  "to examine and judge carefully…"

American Heritage Dictionary
Evaluation

- Decision or judgment
  - Acceptable or unacceptable
  - Good or “bad”

- Do we need tools to help us make decisions on risk?
Question…..

When is it a good time to use any ergo assessment tool?

- Energy Expenditure Data
- RULA
- Psychophysical Tables
- Biomechanical Models
- Strain Index
- Force Measurement
- ACGIH HAL
- LMM
- OCRA
- OWAS
- PATH
- NIOSH Lifting Guide
Have A Strategy

- I’ve done a “risk assessment”
- I have a “problem job”
- I need to make this job safer
- I need to demonstrate value from an ergonomic intervention
- What tools help me prove my case?
Strategy

- **Job Surveys**
  - Cursory or preliminary review of jobs
  - Facility walkthroughs
  - Employee/supervisor interviews
  - Risk factor checklists

- **Job Analysis**
  - More detailed study of work than job surveys
  - Identifies risk factors for task and entire job
Job Analysis Tools

- Provide an objective evaluation when needed
- Be supported in the literature
- Be flexible and easy to use after training
- Support ergonomic solutions
Strategy

1. Describe the job/collect data
2. Describe the work methods
3. Identify risk factors
4. Evaluate risk factors
   - By element
   - For the cycle
   - For the whole job
5. Identify physical and administrative controls
Building The Tool Box

Upper extremity tools

Force measurement

Manual handling tools

Anthropometry data
Basic Tools

- Tape measure
- Force measuring devices - gauges, spring scales
- Video camera/recorder
- Timing devices
- Work standards
Advanced Tools

- Goniometry
- EMG
- Motion/posture analysis
- Ergonomic computer models and software
Observational Tools

- Examples
  - RULA
  - Strain Index
  - Hand Activity Level (HAL)
  - Others
RULA
Rapid Upper Limb Assessment

To perform an assessment, use the RULA Score Sheet and Grand Score Table to determine relative risk. Scores of 1 or 2 are low risk tasks, while scores of 6 or 7 place the user at a much higher risk of CTD.

Find the scores for each element in Group A, and enter each in the appropriate box on the Score Sheet. Use Table A to determine Posture Score A, then add in Muscle and Force Scores to calculate Score C.

Repeat the process for each element in Group B, and enter them in the proper box on the Score Sheet. Use Table B to determine Posture Score B, then add in Muscle and Force Scores to calculate Score D.

Find the Grand Score using Score C and Score D on the Grand Score Table. This is the risk assessment.

Group A

**UPPER ARMS**
- **ADD 1.** If shoulder is raised.
- **ADD 1.** If upper arm is abducted.
- **SUBTRACT 1:** If leaning or supporting the weight of the arm.

**LOWER ARMS**
- **ADD 1.** If working across the midline of the body or out to the side.

**WRIST**
- **1.** Mainly in mid-range of twist
- **2.** At or near the end of twisting range

**WRIST TWIST**
- **1.** In ext’n
- **2.** 20°
- **3.** 45°
- **4.** 90°+

**TRUNK**
- **ADD 1.** If trunk is twisting.
- **ADD 1.** If trunk is side-bending.

**LEGS**
- **1.** If legs and feet are well supported and in an evenly balanced posture
- **2.** If not

**NECK**
- **ADD 1.** If the neck is twisting.
- **ADD 1.** If the neck is side-bending.

**Forces or Load Score**
- **1.** 2-10 Kg intermittent load or force
- **2.** 2-10 Kg static load
- **3.** 10 Kg or more static load

**Muscle Use Score**
- **Give a score of 1** if the posture is:
  - Mainly static, e.g., held for longer than 1 minute
  - Repeated more than 4 times/minute

**DEFINITION**

Rapid Upper Limb Assessment (RULA) is a commonly used tool to assess the risk of musculoskeletal disorders and injuries among workers. The assessment evaluates various postures and muscle usage to determine if an activity is potentially hazardous. A score is calculated based on the posture, muscle use, and forces or loads applied during an activity. Higher scores indicate a greater risk of developing musculoskeletal disorders, while lower scores indicate lower risk.
## Strain Index Ratings Key

<table>
<thead>
<tr>
<th>Rating</th>
<th>Intensity of Exertion</th>
<th>Duration of Exertion (% of cycle)</th>
<th>Efforts/Min.</th>
<th>Hand/Wrist Posture</th>
<th>Speed of Work</th>
<th>Duration Per Day (hrs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>light</td>
<td>&lt; 10</td>
<td>&lt; 4</td>
<td>very good</td>
<td>very slow</td>
<td>&lt; 1</td>
</tr>
<tr>
<td>2</td>
<td>somewhat hard</td>
<td>10-29</td>
<td>4-8</td>
<td>good</td>
<td>slow</td>
<td>1-2</td>
</tr>
<tr>
<td>3</td>
<td>hard</td>
<td>30-49</td>
<td>9-14</td>
<td>fair</td>
<td>fair</td>
<td>2-4</td>
</tr>
<tr>
<td>4</td>
<td>very hard</td>
<td>50-79</td>
<td>15-19</td>
<td>bad</td>
<td>fast</td>
<td>4-8</td>
</tr>
<tr>
<td>5</td>
<td>near maximal</td>
<td>&gt; 80</td>
<td>&gt; 20</td>
<td>very bad</td>
<td>very fast</td>
<td>&gt; 8</td>
</tr>
</tbody>
</table>
# Intensity of Exertion

<table>
<thead>
<tr>
<th>Rating Criterion</th>
<th>% of MSA</th>
<th>Borg Scale</th>
<th>Perceived Effort</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light</td>
<td>&lt;10%</td>
<td>2</td>
<td>barely noticeable or relaxed effort</td>
</tr>
<tr>
<td>Somewhat Hard</td>
<td>10 to 29%</td>
<td>3</td>
<td>noticeable or definite effort</td>
</tr>
<tr>
<td>Hard</td>
<td>30% to 49%</td>
<td>4-5</td>
<td>obvious effort; unchanged facial expression</td>
</tr>
<tr>
<td>Very Hard</td>
<td>50 to 79%</td>
<td>6-7</td>
<td>substantial effort; changes facial expression</td>
</tr>
<tr>
<td>Near Maximal</td>
<td>&gt;=80%</td>
<td>&gt;7</td>
<td>uses shoulder or trunk to generate force</td>
</tr>
<tr>
<td>Rating Criterion</td>
<td>Wrist Extension&lt;sup&gt;A&lt;/sup&gt;</td>
<td>Wrist Flexion&lt;sup&gt;A&lt;/sup&gt;</td>
<td>Ulnar Deviation&lt;sup&gt;A&lt;/sup&gt;</td>
</tr>
<tr>
<td>------------------</td>
<td>-----------------------------</td>
<td>---------------------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>Very Good</td>
<td>0 to 10°</td>
<td>0 to 5°</td>
<td>0 to 10°</td>
</tr>
<tr>
<td>Good</td>
<td>11 to 25°</td>
<td>6 to 15°</td>
<td>11 to 15°</td>
</tr>
<tr>
<td>Fair</td>
<td>26 to 40°</td>
<td>16 to 30°</td>
<td>16 to 20°</td>
</tr>
<tr>
<td>Bad</td>
<td>41 to 55°</td>
<td>31 to 50°</td>
<td>21 to 25°</td>
</tr>
<tr>
<td>Very Bad</td>
<td>&gt;60°</td>
<td>&gt;50°</td>
<td>&gt;25°</td>
</tr>
</tbody>
</table>
## Speed of Work

<table>
<thead>
<tr>
<th>Rating Criterion</th>
<th>Compared to MTM-1A</th>
<th>Perceived Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Slow</td>
<td>&gt;=80%</td>
<td>extremely relaxed pace</td>
</tr>
<tr>
<td>Slow</td>
<td>81 to 90%</td>
<td>&quot;taking one’s on time&quot;</td>
</tr>
<tr>
<td>Fair</td>
<td>91 to 100%</td>
<td>&quot;normal&quot; speed of motion</td>
</tr>
<tr>
<td>Fast</td>
<td>101 to 115%</td>
<td>rushed, but able to keep up</td>
</tr>
<tr>
<td>Very Fast</td>
<td>&gt;115%</td>
<td>rushed &amp; barely or unable to keep up</td>
</tr>
</tbody>
</table>
Hand Activity Level, HAL Rating

0  mostly idle
2  Brief bursts of activity
4  slow steady motion and frequent pauses
6  steady motion occasional breaks
8  rapid steady motion, infrequent pauses
10 rapid steady motion or continuous exertion; difficulty keeping up
Normalized Hand Force

None | Easy | Somewhat hard | Hard | Very hard | Greatest Imaginable

0 | 2 | 4 | 6 | 8 | 10
Training

- Use of tools and how they penalize:
  - Frequency (HAL, physiological models)
  - Force (HAL, Strain Index, psychophysical tables)
  - Posture (RULA, OWAS, LMM, biomechanical models etc.)
In Summary

- There is a big difference between “analysis” and “evaluation”
- Build a tool box with assessment tools that meet needs
- Have a strategy:
  - Select tools that “sell” your interventions
  - Train users on using the tools
- Goal: Improve the job – Ergonomics!