Usability of six observational risk assessment methods

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1. Introduction

For the ergonomist of today, there are many different methods to choose from when assessing work related biomechanical risks (Neumann, 2007; Takala et al., 2010). Since different methods often place focus on different exposures, it may be worth to combine several methods in order to perform a more comprehensive risk assessment (Takala et al., 2010). The available methods also have different features which can make the method more or less applicable and versatile for the ergonomist.

An ergonomist within an occupational health service (OHS) company often acts as an external consultant with many different client companies, and the scope and length of the assignments varies greatly. This places many, sometimes conflicting, demands on the risk assessment methods. For a method to be useful for the ergonomist, not only does the method has to be valid and reliable but it also has to be communicable to the client. According to a survey with Swedish ergonomists (n=70) the most important aspect of an observational risk assessment method was related to the usability of the method in the feedback process of its results to the client company (Eliasson et al, manuscript).

The present study is part of the OBS project; an on-going project with the overall purpose to evaluate, with respect to validity, reliability and usability, six observational methods for assessment of biomechanical exposures. The aim of the present study was to evaluate aspects of usability of the six observational methods targeted in the OBS project. Increased knowledge about usability aspects provides support for ergonomists in the choice of method for an assignment and may be of importance for developers of observational methods.

2. Method

Twelve female OHS ergonomists with more than five years of experience of performing ergonomic risk assessments were trained in six different risk assessment methods. The six methods were: Assessment of Repetitive Tasks (ART) (Ferreira, Gray, Hunter, Birtles, & Riley, 2009), Hand Arm Risk Assessment Method (HARM) (Douwes & de Kraker, 2012), Model for assessment of repetitive work by the Swedish Work Environment Authority (SWEA), Occupational Repetitive Actions (OCRA) checklist (Occipinti & Colombini, 2006), Quick Exposure Check (QEC) (David, Woods, Li, & Buckle, 2008), and Strain Index (SI) (Moore & Garg, 1995).

The education was web-based. The ergonomists individually learned and trained on three methods at a time during a three-week period. The web-based model consisted of pre-recorded lectures and self-supported training using a video library of different work tasks. After three weeks the ergonomists made risk assessments of ten video-recorded (2-6 minutes) work tasks (supermarket work, meat cutting and packing, engine assembly, cleaning, post sorting and hairdressing) using the three observational methods. The duration for each risk assessment was noted by the ergonomist on the risk assessment protocol. The complete procedure was repeated for the remaining three methods.

For each of the methods, on completion of the ten risk assessments, the ergonomists were given an evaluation questionnaire where they were asked to grade different aspects of the specific method on a five-point scale. The seven aspects are shown in table 1.

Although the equidistant property of this five-step scale may be questioned, averages were chosen in order to present the results in a condensed form.
3. Results

The results of the questionnaire concerning the different aspects of the methods and the average time for assessments of ten work tasks are summarized in Table 1.

Table 1. Mean score of assessment on a 5-point scale (1-5) of which rating 1 corresponded to *not true at all* and rating 5 corresponded to *completely true*. The numbers in bold represents the highest values.

<table>
<thead>
<tr>
<th></th>
<th>SWEA</th>
<th>ART</th>
<th>HARM</th>
<th>OCRA</th>
<th>QEC</th>
<th>SI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Easy to use</td>
<td>3.8</td>
<td>4.2</td>
<td>3.6</td>
<td>2.4</td>
<td>4.0</td>
<td>4.5</td>
</tr>
<tr>
<td>Quick to use</td>
<td>4.1</td>
<td>3.8</td>
<td>3.6</td>
<td>2.2</td>
<td>4.0</td>
<td>4.7</td>
</tr>
<tr>
<td>Easy to interpret the results for me as a user</td>
<td>3.3</td>
<td>4.1</td>
<td>4.0</td>
<td>3.1</td>
<td>3.7</td>
<td>2.8</td>
</tr>
<tr>
<td>Easy to communicate to the client</td>
<td>3.3</td>
<td>4.1</td>
<td>3.7</td>
<td>3.2</td>
<td>3.6</td>
<td>2.6</td>
</tr>
<tr>
<td>Easy to learn</td>
<td>3.8</td>
<td>4.0</td>
<td>3.6</td>
<td>2.4</td>
<td>3.6</td>
<td>4.6</td>
</tr>
<tr>
<td>Easy to adapt to different lines of businesses/work-tasks</td>
<td>3.6</td>
<td>3.7</td>
<td>3.3</td>
<td>2.9</td>
<td>3.3</td>
<td>2.8</td>
</tr>
<tr>
<td>Provides a good basis for intervention proposals</td>
<td>2.9</td>
<td>3.8</td>
<td>3.9</td>
<td>3.1</td>
<td>3.7</td>
<td>2.4</td>
</tr>
<tr>
<td>Mean score</td>
<td>3.5</td>
<td>4.0</td>
<td>3.7</td>
<td>2.8</td>
<td>3.7</td>
<td>3.5</td>
</tr>
<tr>
<td>Average time for assessment (minutes)</td>
<td>9.0</td>
<td>13.0</td>
<td>12.0</td>
<td><strong>16.0</strong></td>
<td>12.0</td>
<td>8.0</td>
</tr>
</tbody>
</table>

4. Discussion

Different methods have various advantages. In the present study, ART was given the highest mean score, of the seven included aspects, by the ergonomists. The lowest rated method was the OCRA checklist. The OCRA checklist also required a relatively long time in average for assessment. One explanation for this may be that ART may be uncomplicated, while OCRA is probably the most complex method among the six methods in the study. Similar results were also found by Chiasson et al (Chiasson, Imbeau, Aubry, & Delisle, 2012). Methods that are too time consuming may be deselected by ergonomists, since they rate the time factor as important (Eliasson et al, manuscript).

References


