CAN NOVICE HEALTH PROFESSIONALS BE TRAINED TO UNDERTAKE A PEOPLE HANDLING RISK ASSESSMENT?

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People handling tasks are a source of musculoskeletal disorders in health care workers. Studies have shown that the use of ergonomic assessment tools can be effective in reducing the risk of musculoskeletal injuries. The Rapid Entire Body Assessment (REBA) is a quick observational tool to assess the level of risk associated with work in the healthcare industries. The aim of this study was to determine whether novices are as accurate as experienced health professionals in the use of the REBA to rate three common people handling activities and to report on the optimal mode of training required to ensure a consistent ergonomic risk assessment is undertaken. Thirty-one participants with variable levels of experience in completing ergonomic assessments were assessed in their ability to undertake a risk assessment of three common people handling tasks using the REBA. Ten experienced health professionals (Group A, mean age 32.8 years, equal gender mix) and twenty-one novices (students in health care sciences) participated. The novices were randomly assigned to a group face-to-face 30 minute training session (N = 11, Group B, mean age 22 years, seven females) or 30 minutes to read through written instructions (N = 10, Group C, mean age of 20 years and seven females) in use of the REBA. After viewing the videos of three people handling tasks, all participants independently scored the REBA. Data collected included: a) final score on the REBA for each task (range 1 -15); b) self-perceived difficulty in completing the REBA; and c) self-perceived confidence in the completing the REBA. The self-perceived level of difficulty and confidence were scored on an 11-point scale anchored at 0 = not difficult / confident, and 10 = extremely difficult / confident. Ethical approval was obtained from the institutional committee. Independent t-tests were used to compare self-perceived confidence and level of difficulty in scoring the REBA between novices and experienced health workers. One-way ANOVA was used to determine differences in REBA scores between Group A, B and C. To determine differences in variability of results between groups, the co-efficient of variation was calculated using a one-way ANOVA and Tukey post Hoc test. There was no significant difference in REBA score between novices and experienced professionals in any of the people handling tasks (p > 0.07). Novices rated the use of the REBA tool as significantly more difficult than the experienced health professionals (p = 0.03). However, the experienced health professionals were no more confident than novices in using the REBA tool (p = 0.07). Verbal instruction was no more beneficial than written instructions when educating novices in the use of the REBA (p = 0.07) although verbal training showed less variance than use of written instructions (p < 0.01).

Practitioner Summary: It is possible to train novices to conduct people handling risk assessments with the REBA to the same level of accuracy as experienced health professionals after 30 minutes of training. Delivering this training verbally is recommended as this method resulted in less variance than written instructions.

Keywords: Novice, REBA, people handling, training

1. Introduction

Health workers who perform frequent people handling tasks are at risk of musculoskeletal disorders (Campo et al. 2008, Darragh et al. 2012, Long et al. 2013). In addition to the personal pain and suffering, health care workers suffering an injury due to patient handling may experience lost time from work, change in work practices, early departure from the profession and/or a reduction in patient care hours (Cromie et al. 2000,

Prevention of injury in the workplace using a risk management framework is recommended by many jurisdictions including Australia (Standards Australia 2009, International Standards Organisation 2012). The initial step is to identify and assess the level of risk associated with performing these tasks. In the health care industry, the Rapid Entire Body Assessment (REBA) is recommended as one method to identify and evaluate the degree of risk associated with people handling (Hignett et al. 2000). It was designed as a quick, inexpensive and easy analysis tool for health practitioners who have limited time and resources (David 2005). Certified ergonomists in a study by Pascual et al (2008) rated the REBA as requiring some ergonomics knowledge to use. However, another author suggested that while some practice and training is recommended before using the REBA, no previous ergonomic skills are required (McAtamney 2002). As the environment in health care facilities is constantly changing with regard to the team members and patients’ condition, it is essential for staff to be able to make an appropriate and timely assessment of the risks for injury without relying on experts. It remains unclear, if novice health care professionals can be trained to effectively use the REBA to score patient handling tasks.

The optimal type of training required to ensure appropriate ergonomic interventions is still in question with no universally-accepted guidelines (Sedgwick et al. 1998). Jones et al (1999) found that non-ergonomists in a health care setting could be trained to identify hazards. Two types of training were delivered to the non-ergonomists: a book on practical ergonomics to safe handling of loads or the guidebook plus a 12 hour workshop with no significant differences in outcomes between training methods. Another study found that novices who received verbal ergonomic training were more able to eliminate risk factors than those using a risk assessment tool in the assessment materials handling. Thus, is unclear whether verbal or written instruction is superior.

The aim of this study was to determine whether novices have an equivalent level of proficiency as experienced health professionals in the use of the REBA in scoring three common people handling activities and to report on the optimal mode of training required to ensure a consistent ergonomic risk assessment is undertaken. It was hypothesised that novices, after a brief written or verbal training, would report significantly different results in three standard people handling tasks when compared with the scores of experienced health workers. It was further hypothesised that the novices given verbal training by an experienced health worker would perform significantly better in implementing the REBA than those given written training. A cohort of experienced health professionals was included to act as a positive control.

2. Method

2.1 Design

This study was a true experimental design with post-test only format. Group A comprised the experienced health professionals who received no training. Novice participants were randomly allocated to Group B or Group C by being handed alternating letters (B or C) as they entered the room prior to the experiment. Researchers were not blind to the group allocation. Novices in Group B and C received verbal and written training, respectively.

2.2 Ethics

The study was approved in accordance with the ethical review guidelines and processes of The University of Queensland. All subjects provided signed, informed consent and were given the opportunity to withdraw from the study at any time with no penalty. No incentives were offered for participation in this research.

2.2 Participants

Ten experienced health professionals and 21 novices were recruited to participate in this research. Eligible health professionals (Group A) were those who had experience in postural analysis and ergonomic assessments. The mean age of these health professionals (all physiotherapists) was 32.8 years (SD =10.3) with equal gender mix. The average years of experience working as a clinician or in a workplace setting was 9.9 years. To be included as a novice, participants were to be over the age of 18 years with no experience in
conducting workplace ergonomic assessments. Novices were recruited from the first year cohort of the undergraduate Physiotherapy and Occupational Therapy programs at The University of Queensland. The mean age was 20.9 years (SD = 5.1) of which seven were male.

2.3 Procedure
All participants observed three standardised pre-recorded people handling tasks. Each video was shown on repeat for seven minutes during which time participants completed the REBA assessment tool. On completion of the three tasks, participants completed a post-assessment survey to rate the level of difficulty experienced in using and scoring the REBA tool and their confidence in undertaking an ergonomic assessment in general.

The three tasks were:
1. A standing transfer from wheelchair to plinth with one carer assisting,
2. Transferring a patient from sit to stand and walking the patient using a walk belt with one carer assisting, and
3. An on-bed task using a slide-sheet to transfer the patient across the bed with one carer assisting.

2.3.1 Training
Group A - Experienced health professionals
These participants attended only one testing session. After an explanation of the tasks to be completed, participants were given an opportunity to revise the REBA and ask questions before the videos were shown. The REBA was scored independently and no discussion permitted. Demographic information including age, gender, previous educational history, occupation, previous experience in risk assessments and using the REBA was obtained after the testing condition.

Group B – Verbal Training Condition
Eleven novice participants attended only one 30 minute verbal training session at The University of Queensland. Training consisted of a power-point presentation on the use and scoring of the REBA. The training session was scripted to ensure standard information was provided. An example of a simple manual handling task and step-by-step scoring of the REBA was demonstrated. There was an opportunity to ask questions before commencing the testing session which was completed independently. Once testing commenced, no further questions or discussion were permitted.

Group C – Written Training Condition
Ten novice participants attended only one 30 minute written training session at The University of Queensland. After an explanation of the testing procedure, participants were given a written instruction package detailing how to conduct and score the REBA using pictures describing the anatomical planes of movement. The three videos were then demonstrated and participants asked to score them. During the training and testing session, no questions or discussion were permitted.

Novice participants also completed questions on demographics, program enrolled in, previous studies and work experience, manual handling or work safety training and previous risk assessment exposure.

2.5 Data Collection
The primary outcome was the final REBA score and risk level for each people handling task. The REBA is an observational postural assessment tool for whole-body activities. The assessment is made by observing a people handling task and then assigning a score to each segment of the body individually, with reference to the planes of movement, load, repetition and coupling (Hignett et al. 2000). A numerical value is assigned to the different postures based on the level of risk that the posture poses and offers an action level indicating the degree of urgency required for ergonomic intervention (Hignett et al. 2000). The final REBA score ranges from 1-15 with one indicating negligible risk, a score of 2-3 indicates low risk; 4-7 indicates medium risk for injury; 8-10 indicates high risk and a score between 11-15 reflects a very high risk of injury and therefore
action should be taken immediately to minimise this risk. Inter-observer repeatability was moderate to good for leg and trunk postures but low for upper limbs (Janowitz et al. 2006).

On completion of the testing session, all participants rated their self-perceived level of confidence in performing a risk assessment using the REBA with one question scored on a 0-10 numerical rating scale where 0 = not confident at all, and 10 = extremely confident. Participants also rated the level of difficulty they experienced when performing the REBA assessment with one similar 0 – 10 numerical scale where 0 = found REBA not difficult at all, and 10 = found the REBA extremely difficult to use.

2.6 Statistical Analysis
A one-way ANOVA was used to determine differences in REBA scores between the three groups (A, B and C) and an independent t-test was used to determine differences between novices and experienced health workers. The co-efficient of variation (SD/mean) was then analysed using a one-way ANOVA and Tukey post Hoc test to determine any differences in variability of results between groups. An independent t-test was performed to compare self-perceived confidence and level of difficulty in scoring the REBA tool between novices and experienced health workers. Data were analyzed using SPSS v.18 (SPSS, Chicago, IL) with statistical significance set at P < 0.05.

3. Results
There was no significant difference in the mean age of Group B and C novice participants (p = 0.83). The mean age (SD) of Group B was 22 (6.4) and C was 20 (3.2) years, respectively which was non-significant. The participants in group A were significantly older than the cohort of novices (p=0.001).

3.1 Comparison of REBA scores between Groups
There was no significant difference in REBA scores between groups for each of the people handling tasks on either the left or the right sides of the body (p > 0.07) (Table 1). The results reveal that REBA scores are similar despite the type of training or experience.

Table 2 demonstrates the results of the independent t-test comparing the REBA scores of the Group A (n=10) with Groups B and C irrespective of their training (n=21). The results indicate there was no significant difference in how they rated the walk belt or the slide sheet task. There were, however, significantly different results for the Wheelchair Transfer for the left side of the body between novices and experienced health workers and for the right side of the body during the wheelchair transfer between novices and experienced health workers. The results show that novices scored the wheelchair task as a medium risk on the REBA scale, while the experienced health workers rated it as high risk.

3.2 Comparison of difficulty and confidence scores between experienced health workers and novices
The level of difficulty, rated on a scale of 1 to 10 was significantly different between the novices (5.7 ± 0.41) and the health workers (4.1 ± 0.64); t(29) = -2.223 p=0.034. The novices rated the task of using the REBA tool as significantly more difficult than the health workers. Conversely there was no significant difference in the rating of perceived confidence between the health workers (6.0 ±0.79) and the novices (4.3 ± 0.29); t(29) = 2.43 p=0.07.

3.3 Comparison of variability of results between groups
There was a significant difference in the variability in REBA the scores between groups (p=0.002). Closer examination of the data reveals that Group C (novices receiving written training) demonstrated greater variability in their REBA scores (4.8 ± 0.02) followed by the experienced health workers (0.38 ± 0.03) and Group B who received verbal training were least variable (0.28 ±0.04) (Table 3). Post Hoc analysis indicated that the Group C and Group A had a similar degree of variability in their scores, yet there was significant difference between Group A and Group B, and significant difference between Group B and C (Table 4).

4. Discussion
The objectives of this study were to determine whether there is a difference between novices and experienced health workers in the analysis of risk for people handling tasks using the REBA; and to determine whether there is a superior training method for teaching the use of the REBA. There was no significant difference between REBA scores of novices when compared with experienced health workers for the ‘slide sheet’ and ‘sit to stand’ transfer tasks. Both groups rated these tasks as ‘medium risk’. There was, however, a significant difference between experienced and novice participants in their assessment of the wheelchair transfer task. The experienced health professionals rated the task as ‘high risk’ while the novices rated it as a ‘medium risk’ task. This disparity may be due to the complex nature of the wheelchair task that included a large number of movements at various joints that required analysis. These complexities included a phase of unilateral weight bearing, trunk flexion, knee flexion in addition to wrist and hand positioning throughout the wheelchair transfer. The task had more components to observe and therefore may have been more challenging for the novices who are less experienced in observation. Our hypothesis that the REBA scores would be significantly different between groups for all three manual handling tasks is therefore not supported.

There was no significant difference in REBA scores between experienced health professionals, novices receiving written training and novices receiving verbal training. Thus our second hypothesis that novices with verbal training would show more accurate results compared to novices with written training is not supported. In the current study a novel means of assessing the outcomes was to analyse the variance in participant responses, the underlying assumption being that less variance between participants reflects better uptake of the concept. Interestingly, this analysis proved informative with differences in the variability of results between groups identified. The novice group, who received verbal training showed less variability in REBA scores than both the novice group trained by written instruction only, and surprisingly the experienced cohort. This is an important finding and one that suggests further study into the training methods for risk assessment is warranted.

The experienced health professionals rated the REBA assessment task less difficult to undertake than the novices. This could be attributed to the greater amount of specific experience and skills in postural observation by the experienced health workers compared to the novices. Alternatively, it may simply reflect the general confidence of this cohort due to their age, maturity and general experience. Somewhat surprisingly the prediction that experienced health workers would be more confident in performing the REBA assessment tasks was not borne out in this trial, perhaps due to the fact that they were clinicians trained in manual handling yet the majority of them were unfamiliar with the REBA.

Palmiter, et al (1991) reported that verbal training with visual cues was the preferred method of training when learning a simple task. The present study found, however, that there was no difference in how difficult the verbally trained group found the task compared with those who had written training and no difference in their confidence in undertaking the task after their training. The study did not assess the preference of training types for the individual subjects.

It has been previously suggested that practice and training is recommended in the utilisation of the REBA yet previous ergonomic knowledge is not necessary (McAtamney 2002). The findings from the current study support these statements with the high level of difficulty reported by the novices. This may support the need for additional practice and training. There was no difference in how the novices scored the REBA for simple tasks (slide sheet transfer and sit to stand transfer) compared with experienced health workers indicating that no previous ergonomic knowledge is required. There was a difference between the novices and the experienced health workers for the more complex task, which may suggest that in the assessment of complex tasks, more training is required.

The lack of difference between experienced health professionals and novices may be due to the utilisation of a well-designed tool that indeed does not require prior experience. The training provided to the novices in either the written or the verbal format may be sufficient to allow them to achieve similar results to the experienced health workers. The results obtained may indicate a lack of significant difference between novices and health workers as the videos were viewed on a seven minute loop, allowing repetitive viewing of the task to the advantage of the novices. It is possible that the experienced health workers would be superior in their risk assessment if the task had occurred in real time and performed only once due to their experience in observation. It can be speculated that the lack of difference between groups may be due to the small sample size.
4.2 Limitations

Despite attempts to control confounding factors within the study, there are several limitations that may have contributed to the results of this study. Firstly, despite the health care professionals having an occupational background in postural analysis and ergonomic assessment, some of the experienced did not have any prior experience with using the REBA tool in particular. With only brief training prior to undertaking the task analysis; this may have impacted their results if they were unsure of exactly what was required of them to conduct a REBA. Secondly, assessing tasks from video which is subject to stereoscopic vision and corresponding loss of scenario detail the results may not transfer to the working environment. Finally, as this study has not been previously conducted, the standard power calculation to determine the number of participants required to detect a difference of two REBA points was merely estimated. The assumption that the variability of scores will be approximately 20% of the mean was not accurate as the scores varied by 38%, 28% and 45% for groups A, B and C respectively. Similarly, the assumption that the means would vary by at least two REBA points was also erroneous with the means closer than predicted. Post-hoc power analysis suggests that at least twice as many participants would be required to detect a significant difference with the degree of variance that was obtained in this experiment at a probability level of 5%.

4.3 Conclusion

This study is the first to examine the hypothesis that novices are less able to conduct a risk assessment using the REBA than experienced health workers. Within the constraints of the experiment it can be concluded that the REBA can be used as an assessment tool by either novices or experienced health professionals with the same degree of accuracy. In order to achieve the least variable scoring of the REBA a verbal seminar presented by a trained individual is recommended, yet there may be economic and time management benefits of using a written package for training in the use of the REBA if a larger degree of variability can be tolerated. The findings of the study are tempered by the fact that the number of subjects was less than that required to detect a significant difference between groups. Additional research is advised in order to further assess the effect of training and to expand the limited body of knowledge in this field.

Table 1. Comparison of the REBA scores between Experienced Health Workers and Novices who have had written or verbal training using a one way ANOVA.

<table>
<thead>
<tr>
<th>Variable</th>
<th>dF (between, within) F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walk belt (L)</td>
<td>2, 28 0.79</td>
<td>.47</td>
</tr>
<tr>
<td>Walk belt (R)</td>
<td>2.28 0.85</td>
<td>.44</td>
</tr>
<tr>
<td>Slide sheet (L)</td>
<td>2, 28 0.86</td>
<td>.44</td>
</tr>
<tr>
<td>Slide sheet (R)</td>
<td>2, 28 1.52</td>
<td>.24</td>
</tr>
<tr>
<td>Wheelchair (L)</td>
<td>2, 28 2.86</td>
<td>.07</td>
</tr>
<tr>
<td>Wheelchair (R)</td>
<td>2, 28 2.34</td>
<td>.12</td>
</tr>
</tbody>
</table>

Table 2. Comparison of REBA scores between Experienced Health Workers and Novices in completing the REBA for people handling tasks using an independent t-test.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Experienced health Mean (SE) (n=10)</th>
<th>Novices Mean (SE) (n=21) t-test</th>
<th>DF</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walk belt (L)</td>
<td>4.6 (0.64)</td>
<td>5.1 (0.51)</td>
<td>-0.628</td>
<td>29</td>
</tr>
<tr>
<td>Walk belt (R)</td>
<td>4.5 (0.65)</td>
<td>5.1 (0.51)</td>
<td>-0.738</td>
<td>29</td>
</tr>
<tr>
<td>Slide sheet (L)</td>
<td>8.1 (0.96)</td>
<td>8.6 (0.63)</td>
<td>-0.458</td>
<td>29</td>
</tr>
<tr>
<td>Slide sheet (R)</td>
<td>7.9 (0.97)</td>
<td>8.9 (0.60)</td>
<td>-0.874</td>
<td>29</td>
</tr>
<tr>
<td>Wheelchair (L) *</td>
<td>10.1 (1.05)</td>
<td>7.7 (0.56)</td>
<td>2.199</td>
<td>29</td>
</tr>
<tr>
<td>Wheelchair (R)*</td>
<td>10.3 (0.93)</td>
<td>8.1 (0.55)</td>
<td>2.113</td>
<td>29</td>
</tr>
</tbody>
</table>

* p < 0.05
Table 3. Coefficient of variation for Experienced health workers (Group A), Novices with Verbal Training (Group B) and Novices with Written Training (Group C).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group A Mean(SE) (n=10)</th>
<th>Group B Mean(SE) (n=11)</th>
<th>Group C Mean(SE) (n=10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CV</td>
<td>0.38 (0.03)</td>
<td>0.28 (0.04)</td>
<td>0.45 (0.02)</td>
</tr>
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</table>

SE = standard error

Table 4. Post Hoc Test for multiple comparisons, analysing the relationship between groups in the variability of REBA scores.

<table>
<thead>
<tr>
<th>Multiple Comparison</th>
<th>Mean Difference</th>
<th>Sig.</th>
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</thead>
<tbody>
<tr>
<td>Group A and Group B*</td>
<td>0.102</td>
<td>0.048</td>
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<tr>
<td>Group A and Group C</td>
<td>0.070</td>
<td>0.202</td>
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<tr>
<td>Group B and Group C**</td>
<td>0.172</td>
<td>0.001</td>
</tr>
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* p <0.05, ** p < 0.01

Acknowledgements

References


