UNDERSTANDING FACTORS THAT AFFECT THE ADOPTION OF ERGONOMIC INTERVENTIONS AMONG EMS WORKERS

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The primary goal of this study was to understand the adoption of specific voluntarily used ergonomic interventions aimed at the musculoskeletal needs of EMS workers. According to previous research in the areas of information technology, acceptance and diffusion of innovation, worker's perceptions and attitudes impact the adoption of an intervention. Prior research identified the lateral transfer of patients as a frequently performed strenuous task performed by EMS workers. The intervention introduced is a transfer-board, designed and biomechanically validated to assist with these lateral transfers. In the current study EMS workers were surveyed to determine which factors most closely correlated with their intention to use the transfer-board. The data suggest that the perception that it is easy to use, the patient is safer while using the transfer-board, the transfer-board is compatible with other pieces of equipment and the smoothness of the patient transfer when using the transfer-board are all factors that may predict adoption.

INTRODUCTION

Ergonomic interventions may include redesign of workplace layout, new work policy, health programs, and/or a piece of equipment. Whatever the form of the intervention, they are often put in place to specifically alleviate or reduce occupational injuries.

Emergency Medical Service (EMS) professionals, in particular are considered to be at high risk for occupational injuries. A previous study conducted by Schwartz, Benson, & Jacobs (1993) evaluated Emergency Medical Service (EMS) workers from six New England states using a survey questionnaire. They reported a back injury rate of 25.4 per 100 full-time EMS workers per year. A study by Hogya and Ellis (2007) reported low back strain as the most common injury and 31% of the personnel had recurrent back injuries. Several pieces of equipment have been designed and validated through laboratory testing to assist in the patient-handling activities performed by EMS workers (Lavender et al., 2007a-c). While these devices are biomechanically advantageous, unless these devices are produced and adopted by the targeted workers, they will fail to make the intended impact.

Several studies have considered factors that explain how attitudes and intentions are linked to workers' behaviors and health outcomes (Becker, 1974, Pender, 1987, Davis, 1989 and Dishaw and Strong, 1999). However, there is a paucity of literature regarding adoption models specific to the voluntary use of ergonomic interventions. No existing models have been applied to healthcare workers in the context of the use of ergonomic interventions. Furthermore, none specifically consider EMS work environments.

Conrad et al. (2008) reported a set of commonly held end user criteria for EMS patient handling devices that may aid in making the device more desirable and likely to be adopted. These criteria included operability, cleanability, durability, portability and affordability. There may be several factors that affect the decision of the worker to use or not use a certain intervention. These include technology factors, organizational factors, individual factors and task factors. The objective of the study was to identify factors that affect the intention to use/adopt an ergonomic intervention.

Figure 1: Transfer-board used for bed to cot transfer

Intervention:

The intervention introduced was a transfer-board (Fig 1) that aids in lateral transfer of patients from bed to cot or cot to bed. The transfer-board is a low friction surface that slides under the sheet that a patient may be lying on. The transfer-board reduces the friction between the bed and the sheet which in turn reduces the stress on the EMS worker's back. The tri-fold transfer-board was specifically designed for EMS environments for convenient storage under the mattress of the cot (Conrad et al., 2008). The biomechanical benefit of this equipment was validated in a study conducted by Lavender et al. (2007c).

We hypothesized that adoption of the transfer board intervention is a multifactorial problem that is affected by many of the factors shown in figure 2.

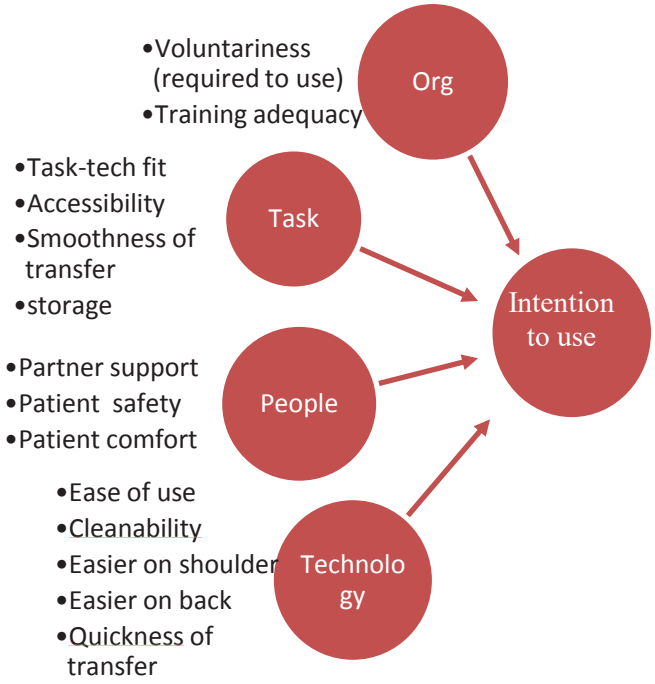

Figure 2: Factors included in the survey that were hypothesized to affect intention to use

METHOD

Approach. The study used a survey instrument to measure perceptions and attitude regarding the use of transfer-board. The 19-item survey was distributed to 116 EMS workers from two private ambulance companies, one suburban fire department and a city fire department. The survey instrument included questions from previously validated survey instruments designed to study technology adoption (TAM and TTF models) in other applications and some that were specifically developed to measure factors unique to the EMS work environment that were a result of several cognitive interviews. The survey instrument measured 16 variables, with three of the variables assessed by averaging two items. The response for the items were on a 6-point Likert scale (1. Strongly disagree; 2. Disagree; 3. Disagree somewhat; 4. Agree somewhat, 5. Agree; 6. Strongly agree), except for the partner support item that was on a 4-point scale (1. Not at all; 2. To some extent; 3. To a moderate extent; 4. To a great extent). Prior to the distribution of the intervention, the training manager provided a demonstration and the EMS workers had an opportunity for hands-on training. The survey was distributed and crossectional data were collected after the participants were exposed to the intervention for 1 month.

RESULTS

Of the 181 EMS Workers recruited, 116 participants completed the survey (response rate=64.08%). Figure 3 summarizes the means of the survey responses for each variable. The error bars indicate the 95% confidence interval for each measure. When asked if they were required to use the transfer-board, the responses were between "disagree" and "disagree somewhat". When asked whether the transfer-board was conveniently stored, whether the transfer was quicker, and whether the board was easily accessible the mean of responses fell between "agree somewhat" and "agree". The respondents indicated that they tended to agree that the transfers were perceived as smoother, safer and more comfortable for patient, the transfer board was easy to clean, easy to use, easier on the back and shoulder. All participants responded that they had adequate training (mean of 5.2 on the 6-point scale). The mean response for partner support was 2.6 which is between "to some extent" and "to a moderate extent" on a 4-point scale (not at all-to a great extent).

The relationships between each of the variables and intention to use are displayed in figure 4 along with the corresponding Spearman's correlation coefficient (with regression line and 95% confidence limits for the regression line). Twelve out of the fourteen items were significantly correlated with intention to use. The three most correlated factors were: 1) the transfer-board is easy to use (r=0.66); 2) the patient is safer when using the transfer-board (r=0.62); and 3) the transfer is smoother when using the transfer-board (r=0.61). The perceptions that the transfer-board helps make transfers quicker (r=0.53); more comfortable for patients (r=0.47); makes it easier on the EMS worker's shoulder (r=0.56); makes it easier on the EMS worker's back (r=0.59); and that the transfer-board was compatible with other pieces of equipment (r=0.57) were also significantly correlated with the intention to use.

DISCUSSION

Workers' health related behaviors and stresses have been modeled using, among others, the health belief model by Becker (1974), health promotion model by Pender (1987) and job-demands-control-support (DCS) model by Karasek and Thoerell (1990). However, none of these models were applied to ergonomic intervention use among healthcare workers. In additional, none of these models have explored the impact on intention to use. The results of the current study suggests that perceived ease of use, smoothness of transfer, patient safety, compatibility with other pieces of equipment and transfer-board making it easier on the back and shoulder were found to be critical factors that impacted the intention to use.

CONCLUSION

These results suggest that within the context of patient handling among EMS workers, factors such as ease of use, patient safety, compatibility of the intervention with other pieces of equipment, and smoothness in the transfer are important issues that affect intention to use and should therefore be addressed when implementing new ergonomic interventions for EMS workers. Further investigation is required to determine if these relationships persist for actual use of the equipment.

ACKNOWLEDGEMENT

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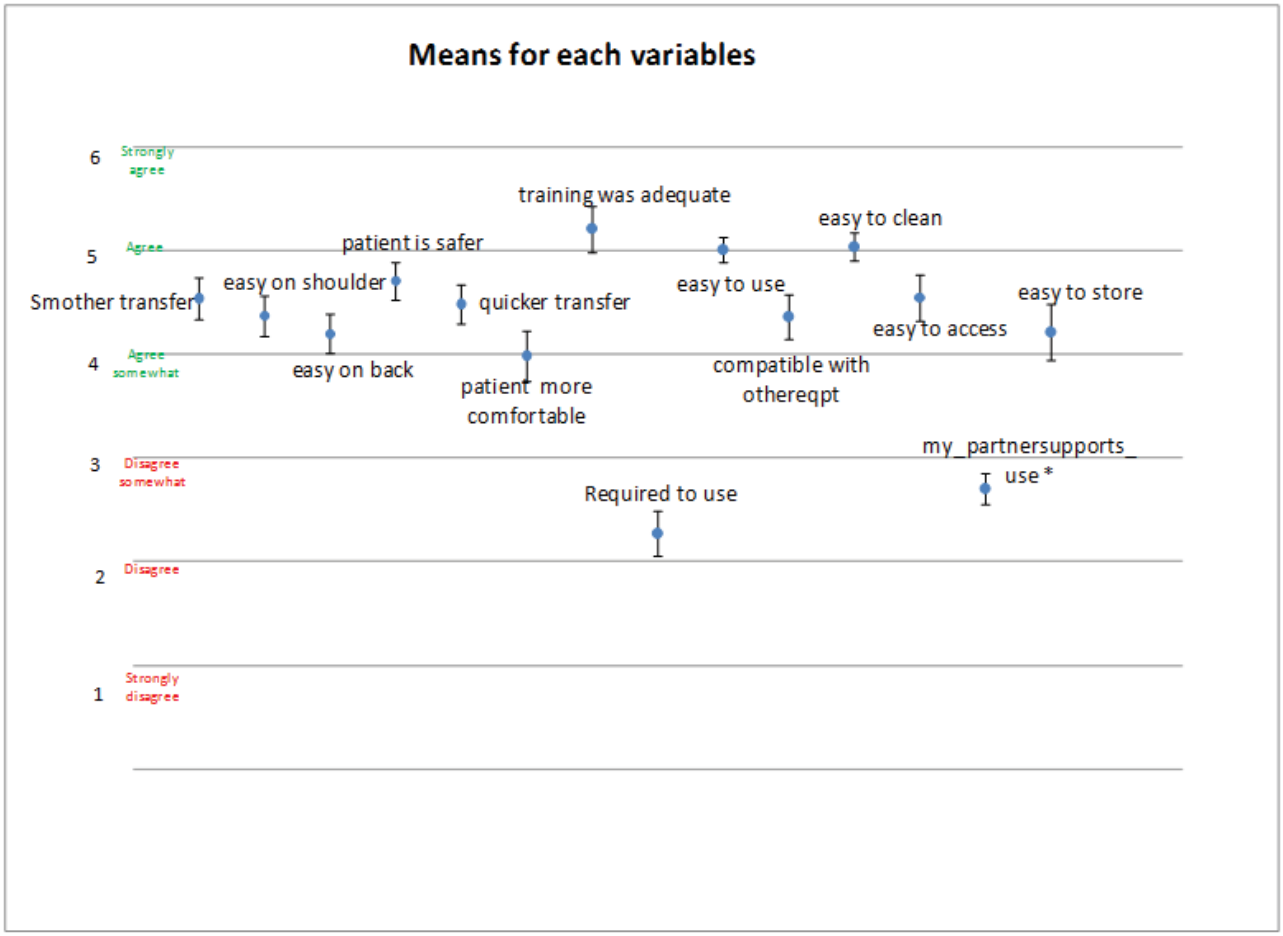

Figure 3: Survey variable means (n=116) and 95% confidence interval (easy to use, required to use and I intend to use were 2-item variables, the scores were averaged); * partner support was measured on a scale of 1(none)-4 (to a great extent).

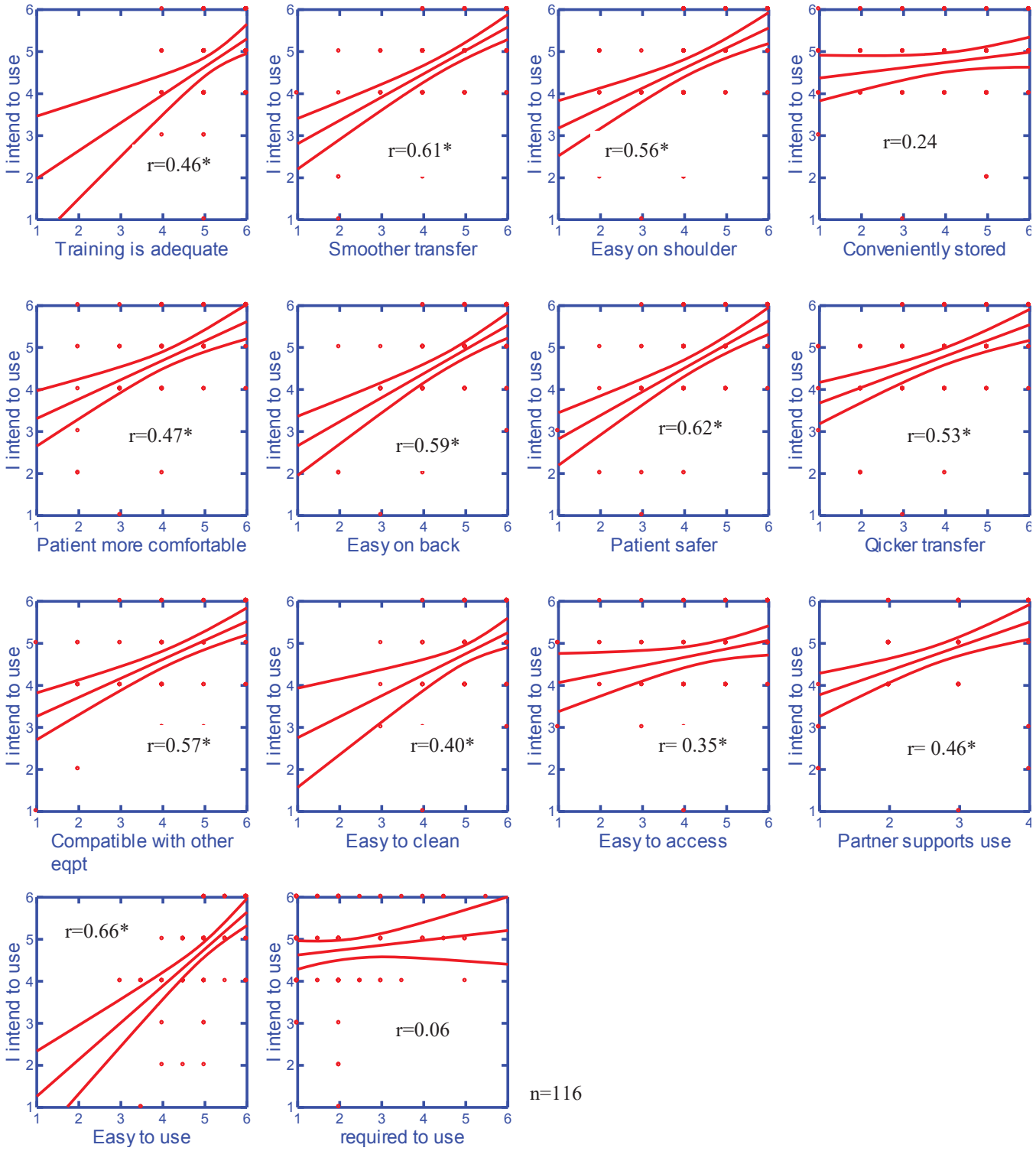

Figure 4: Scatter-plots and Spearman's correlation coefficients (r) between intention to use and variables with scales for each variable ranging from 1-6 except for partner support 1-4. Statistically significant correlation coefficients (r) are indicated by *.