



## Evaluation of the implementation fidelity of an ergonomic training program designed to prevent back pain

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### ABSTRACT

The aim of this study was to evaluate the implementation fidelity of a multidimensional ergonomic program designed to prevent back pain injuries among healthcare personnel. The program, provided by peer trainers included training intended to modify patient handling and transfer behaviour, trainee follow-up, prevention activities aimed at work environment improvements and follow-up monitors training. Two hundred twenty-one peer trainers at 139 Quebec healthcare institutions participated in our study. Only 61.5% were involved in training; most of them taught safe patient handling, positioning, transfer, and preparation techniques, which are the cornerstones of the program; 72.7% were involved in prevention activities, 46.1% in follow-up activities, and 10.7% in follow-up monitors training. The study results should help organizations anticipate and prevent potential discrepancies between prescribed and implemented programs.

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### 1. Introduction

All industrialized countries report a high prevalence of occupational back pain and related costs (Nachemson and Jonsson, 2000). In the province of Quebec, Canada, the latest statistics indicate that back pain accounted for 27.2% of all occupational injuries compensated between 2000 and 2002 (Duguay et al., 2008). The health and social services sector is particularly concerned about this type of problem, as the most common anatomic site of injury is the back (Duguay et al., 2003). Studies have found relationships between patient handling and transfer techniques and the incidence of back pain (Best, 1997; Jansen et al., 2004; Kjellberg et al., 2003; Kutash et al., 2009; Venning et al., 1987). The multidimensional ergonomic program under study, the Safe Patient-Transfer Program (SPTTP), focuses on these tasks.

The SPTTP has been implemented in Quebec healthcare institutions since 1985 and has the primary prevention of back pain among healthcare workers as its objective. This program was designed and developed by the Association for Health and Safety in the Workplace – Social Affairs Sector (ASSTSAS), one of 13 organizations created under Quebec's *Act Respecting Occupational Health and Safety*, to provide training, information and guidance to

organizations in its activity sector. Master-instructors from the ASSTSAS train healthcare personnel, who become peer trainers in their respective hospitals after earning accreditation. The objective of the present study was to evaluate the implementation fidelity of the program provided by peer trainers to their healthcare colleagues. In agreement with Hasson (2010), by implementation fidelity we mean the extent of the discrepancies between the SPTTP as implemented in hospitals and as prescribed by the organization that designed the training program.

SPTTP, provided by peer trainers included four interventions: 1) training of healthcare colleagues intended to modify their patient handling and transfer behaviour, 2) trainee follow-up in order to prevent problems that could hinder application of the principles learned, 3) prevention activities aimed at work environment improvements and 4) follow-up monitors training which should provide hospitals with competent human resources devoting a part of their working time to back pain prevention. Given that back pain related to patient handling and transfer techniques is multicausal, SPTTP is intended to address all the risk factors involved.

Primary back pain prevention programs that concentrate on worker training have been popular for several years (Best, 1997). With the exception of one study (Scopa, 1993), results indicate that such programs improve skills (Amosun and Falodun, 1991; Daltroy et al., 1993; Kindblom-Rising et al., 2011; Schenk et al., 1996; Walsh and Schwartz, 1990) and increase adoption of the principles of body mechanics or ergonomic work techniques in experimental

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situations (Amosun and Falodun, 1991; Fanello et al., 2002; Feldstein et al., 1993; Johnsson et al., 2002; Kindblom-Rising et al., 2011; Lagerström et al., 1998; McCauley, 1990; Nygard et al., 1998; Schenk et al., 1996; Trevelyan, 2002; Videman et al., 1989) and field intervention (Robertson et al., 2009). However, observational studies in the workplace indicate that certain work constraints, such as small work spaces or a shortage of personnel, hinder adoption of the ergonomic techniques recommended in prevention programs (Best, 1997; Fanello et al., 2002; Nygard et al., 1998; St-Vincent et al., 1989; Trevelyan, 2002). Epidemiological studies on the ultimate outcomes of such training programs do not provide evidence of their effectiveness. Whether in terms of the prevalence or incidence of back pain, either self-evaluated or diagnosed by a professional, most studies did not show statistically significant differences between experimental and control groups, or between pre-test and post-test data (Best, 1997; Bigos et al., 2009; Daltroy et al., 1997; Fanello et al., 2002; Johnsson et al., 2002; Lynch and Freund, 2000; Maher, 2000; Morken et al., 2002; Smedley et al., 2003; Van Poppel et al., 1998, 2004; Versloot et al., 1992; Videman et al., 1989; Warming et al., 2008; Yassi et al., 2001). One of the two exceptions is the case of sub-groups composed of individuals already suffering from back pain at pre-test time (Fanello et al., 2002). The other is a recent study (Kindblom-Rising et al., 2011) that showed a statistically significant decrease in the number of nurses reporting a physical disorder among a group exposed, for one year, to a two half-day patient transfer course. The authors did not observe such a reduction in their control group. In two systematic reviews, Martimo et al. concluded that there was limited to moderate evidence that training with or without assistive devices do not prevent back pain (Martimo et al., 2007) and that there was "...no evidence to support use of advice or training in working techniques with or without lifting equipment for preventing back pain..." (Martimo et al., 2008). Furthermore, in their systematic review, Bos et al. (2006) concluded that training and education combined with an ergonomic intervention were effective in preventing musculoskeletal symptoms, including back pain, in healthcare workers.

In general, studies evaluate simple programs that focus on training only or on training combined with making patient lifting equipment available in the workplace, whereas in theory, to be effective, a primary back pain prevention program must address all the risk factors for back pain present in the work environment, namely, the physical and biomechanical characteristics of work (Daltroy et al., 1993; Engholm and Holmström, 2005; Lagerström et al., 1998; Lynch and Freund, 2000), the management of work environments (Lynch and Freund, 2000) and equipment (Feldstein et al., 1993; Miller et al., 2006; Smedley et al., 2003) and the psychosocial aspects of work (Chokar et al., 2004; Koehoorn et al., 2006; Smedley et al., 2003; Truchon and Fillion, 2000; Westgaard and Winkel, 1997; Yassi et al., 2005). Moreover, in accordance with the Ottawa Charter for Health Promotion (World Health Organization, 1986), the programs implemented in hospitals should target workers, care units and the organizations themselves. The likelihood of simple training programs that target only behavioural changes reducing the incidence of back pain is therefore low. More research is therefore needed on multidimensional programs because back pain is multicausal.

Our study was part of a broader evaluative research project on SPTTP effectiveness in its natural environment. This type of evaluation is rare (Chen, 2004). However, it is necessary if application limitations and the ethical problems often characterizing the randomized controlled trials used to evaluate public health interventions (Victoria et al., 2004) are to be mitigated. The present evaluation sought to identify discrepancies between the SPTTP as implemented in hospitals and as prescribed by the ASSTSAS in order to prevent the occurrence of a Type III error in the second phase of our project, i.e., a bias consisting in erroneously concluding

that a program is inefficient when the absence of effect is actually due to incomplete or inadequate program implementation (Dobson and Cook, 1980).

## 2. Methods

An advisory committee was created at the outset of the project. It consisted of the general manager of the ASSTSAS, his assistant, the SPTTP coordinator and the two principal investigators. The committee's goals were to interface between universities, the organization responsible for the program (ASSTSAS) and the general, specialized or long-term care hospitals in which the program was implemented, and to optimize the validity of the study results. An interactive approach of this type increases the probability of research results being used by decision makers (Landry et al., 2001).

In order to identify the key aspects of the SPTTP whose implementation in hospitals was to be evaluated, the theory underlying the SPTTP was described first, i.e., the characteristics of both the process and the human and physical resources prescribed by the ASSTSAS as a means of achieving the program's intermediate and final objectives. The following three conceptual frameworks were used. First, the educational objectives were organized hierarchically using Bloom's taxonomy (1969), according to whether they referred to knowledge, comprehension, application, analysis, synthesis or evaluation. Second, Weston and Cranton's conceptual framework (Weston and Cranton, 1986) was used to classify the pedagogical methods recommended: instructor-centred (lecture, questions or demonstrations), interactive (discussions, group projects or peer teaching), individualized (individual work with feedback) or experiential (learning in a natural context or through simulations). Finally, the Ottawa Charter for Health Promotion (World Health Organization, 1986) was used to identify at which of the following levels the SPTTP recommended action be taken in order to improve work situations: worker, care unit or the organization itself.

In order to describe the SPTTP underlying theory, theoretical sampling (Patton, 2003) was used to select, for purposes of direct observation, three SPTTP training sessions given by different master-instructors in the two cities where training took place: Montreal and Quebec City. The third case was selected after the ASSTSAS had introduced some changes into the SPTTP. The training sessions were audio-taped and transcribed. The transcripts and content of the master-instructors' and trainers' pedagogical materials were analyzed using our conceptual frameworks, and the results validated with the program designers and master-instructors (Leduc et al., 2008). Then, a self-administered questionnaire was developed for the purpose of collecting data to be used to determine the degree of SPTTP implementation in the hospitals. The questionnaire was designed in such a way as to describe the SPTTP as prescribed in 2000 and 2003, when the ASSTSAS made changes to the program. It is conceivable that these recent changes were not implemented by all trainers. An initial version of the questionnaire was submitted to two members of the ASSTSAS advisory committee for validation. After introducing a first set of changes to improve question formulation, data accuracy and completeness, the revised questionnaire was sent to the 14 ASSTSAS master-instructors. They were asked to complete it and add any comments they deemed useful. Eight master-instructors answered the questionnaire. The time taken to complete the questionnaire varied from 60 to 90 min. Their suggestions aimed at clarifying questions, facilitating completion and optimizing the completeness of the data collected were taken into consideration. Multiple-choice questions were used, except for questions referring to dates or numbers, which were open-ended. TELEform software was used to format the final version of the questionnaire, perform the automatic coding of the data obtained

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