AN EVIDENCED BASED MODEL FOR WORK DISABILITY PREVENTION FOLLOWING WORK ACCIDENTS IN INDUSTRY: THE SHERBROOKE MODEL[1]

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Abstract
Work absenteeism due to musculoskeletal disorders is a costly health issue impacting workplace productivity in industrialized countries. This paper intend to present an innovative tested model of management that may be of help for industries in order to avoid prolonged absence from work and related costs and its negative consequences on workforce health and well-being. The Sherbrooke model was developed and tested through a randomized clinical trial in Canada among 31 workplaces hiring more than 175 employees. Its aim was to prevent prolonged disability through a progressive workplace and clinical intervention delivered at the subacute period of absence from work due to occupational back pain (1-3 months). This intervention was delivered by an interdisciplinary team working in collaboration with the industrial partners (employers and unions). Results have shown that the Sherbrooke model was effective, speeding up by 2.4 times the return to regular work and improving the workers' functional status. Also, the economical evaluation made with a six year follow-up demonstrated considerable savings for the workers' compensation board (entirely financed by employers). Results found a return on investment of more than $5 for each $1 invested. This model might be adapted to Brazilian workplaces and workers.
Key words: Work disability prevention; Work absenteeism; Musculoskeletal disorders.

UM MODELO BASEADO EM EVIDÊNCIAS PARA A PREVENÇÃO DA INCAPACIDADE DECORRENTE DOS ACIDENTES DE TRABALHO NA INDÚSTRIA: O MODELO DE SHERBROOKE

Resumo
O absenteísmo por doenças osteomusculares relacionadas ao trabalho representa alto custo para a saúde e impacta na produtividade dos centros de trabalho em países industrializados. Este estudo pretende apresentar um modelo testado e inovativo de gerenciamento, que pode ser uma ajuda para indústrias que desejam evitar prolongadas ausências no trabalho, custos a elas relacionados e suas negativas conseqüências para a saúde e bem-estar da força de trabalho. O modelo de Sherbrooke foi desenvolvido e testado por meio de um experimento clínico randomizado no Canadá, em 31 centros de trabalho que empregam mais de 175 trabalhadores. Seu objetivo foi prevenir a incapacidade prolongada através de mudanças nos locais de trabalho e intervenção clínica, oferecida em período subagudo das ausências no trabalho, devido à lombalgia ocupacional (1-3 meses). Esta intervenção foi oferecida por uma equipe de trabalho interdisciplinar, em colaboração com parceiros das indústrias (empregadores e associações). Os resultados têm mostrado que o modelo de Sherbrooke é eficaz, tornando 2,4 vezes mais rápido o retorno ao trabalho regular e melhorando o *status* funcional dos trabalhadores. Também, as avaliações econômicas, feitas em um período de seis anos, demonstraram economias consideráveis para o grupo previdenciário dos trabalhadores (totalmente financiada por empregadores). Os resultados encontrados mostram um retorno de mais de $5 para cada $1 investido. Este modelo pode ser adaptado aos centros de trabalho e aos trabalhadores brasileiros.
Palavras-Chaves: Prevenção da incapacidade do trabalho; Absenteísmo no trabalho; Distúrbios osteomusculares relacionados ao trabalho.

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1 BACKGROUND

Work absenteeism due to musculoskeletal disorders (MSDs) is a costly health issue impacting workplace productivity in industrialized countries. On a global basis, MSDs affect a large proportion of the general population, given that pain in the musculoskeletal system is the main symptom for seeking a consultation with a primary care physician.[1] MSDs often lead to disability and work absenteeism, and contribute considerable direct and indirect costs to businesses and society. In 1998, the estimated value of lost production due to long-term disability related to MSDs in Canada was $12.6 billion. MSDs were responsible for the highest morbidity costs due to long term disability, accounting for 39.2% of total morbidity costs, and for the third highest morbidity costs due to short term disability, accounting for 10.3% of total costs.[2] Although these disorders have been underreported in developing countries in comparison with developed nations, similar cost estimates regarding their financial impact are found in Brazil.[3] In 2005, MSDs represented nearly 60% of registered occupational diseases.[4] However, the total costs related to this morbidity are still unknown.

Besides its economic burden to society, pain-related disability, work limitation and absenteeism can have important individual and social implications on workers suffering from MSDs. Indeed, work is recognised to be an important source of financial independence, social status, time and space management, self-accomplishment, and self-realization.[5] Consequently, not being able to work may have important consequences for the lives of individuals suffering from MSDs who experience poor quality of life, a loss of social identity, and who may be definitely excluded from work.[6]

Work disability related to MSDs is a multidimensional problem influenced by the interaction among physical, psychological, social and environmental factors, which involve the worker, the workplace, the compensation and the healthcare systems.[7,8] When a health problem prevents an individual from working, the health status of that person should be considered not only a disease problem but also a disability issue.[8,9] Hence, return to work depends not only on the disease itself but also on all the psychosocial and environmental factors enhancing the pain and making return to work a difficult and frightening issue. As such, the procedure of assessing occupational disability should consider all the factors involved in work disability and be done according to the bio-psycho-social[10] or person-environment models.[7,11,12]

The process of returning a disabled worker to work presents numerous challenges to the employees, employers, health care providers, and insurers. It is essential that all parties work together to achieve the common goal of safe and sustainable return to work. A large knowledge base is now available from numerous studies and reviews on disability and return to work predictors.[13-16] Also, clusters of interventions have been tested through randomized controlled trials.[17-21] Some key elements for healthy and quick return to work have been suggested and evidence has emerged from several quality studies suggesting shifting the rehabilitation process directly into the workplace. Evidence showed that graded and controlled return to regular work for back pain sufferers may contribute to workplaces and workers' health.[22-25] Extended careful implementation of effective return to work programs could allow vast savings to employers, insurers, and pension plan as well as improve the quality of life of the workers disabled from MSD.[8,26]

2 PURPOSE

This paper intend to present an innovative tested model of management, the Sherbrooke Model, that may be of help for industries in order to avoid prolonged absence from work and related costs and its negative consequences on workforce health and well-being. This model might be adapted for being applied to Brazilian workplaces and workers.

3 METHODS

The objective of the Sherbrooke Model development was to design a back pain management program based on evidence, available to a population of workers, compatible with provincial law, and linking clinical and occupational interventions. The Sherbrooke Model proposes an integrated approach, directed at both the worker and the workplace, using different evidence-based interventions to be implemented following a progressive and graded schedule. Its aim was to prevent prolonged disability through a progressive workplace and clinical intervention delivered at the subacute period of absence from work due to occupational back pain (1-3 months). This intervention was delivered by an interdisciplinary team working in collaboration with the industrial partners (employers and unions).

The Sherbrooke Model was made of three integrated steps: occupational intervention, clinical intervention and early rehabilitation.

Occupational interventions, initiated after six weeks of absence from work, included visits to an occupational medicine physician and a participatory ergonomics intervention. This latter intervention consisted in the workers' active involvement in ergonomic knowledge and procedures implementation with the support of their workplace, supported by their supervisors and managers, in order to improve their working conditions.[27] Participatory ergonomics involved several steps. It began by clarifying the nature of the worker's tasks with descriptions made separately by the employer and the worker. Then, the work tasks were observed by the ergonomist, generally in the presence of the injured worker. Data were collected on work process, characteristics of other jobs linked to the tasks involved, features of equipment and design of the workplace, loads handled, precision, quality, quantity handled, pace of the job, postural requirements, and environment characteristics of the job. After these observations, an "ergonomic diagnosis" was made with regards to the back, and recommendations for job modifications were discussed and proposed to the employer. The employer was at liberty to implement or not these ergonomic recommendations.

After eight weeks of absence from regular work parallel to the ergonomic intervention, the **clinical intervention** was introduced and consisted of a clinical examination by a back pain medical specialist to exclude a possible serious underlying condition (red flags). In absence of such serious condition, workers were directed to a back school. The back school was an activity that lasted one hour every week for four weeks including back education, coaching, practice of appropriate exercises and counseling for daily life activities.

When return to work did not occur after this relatively light clinical intervention, the **rehabilitation intervention** was initiated after 12 weeks of absence from work. This intervention included two successive activities: functional rehabilitation therapy and therapeutic return to work. Functional rehabilitation therapy was a modified Mayer's intervention and consisted of fitness development and work conditioning associated

with a cognitivo-behavioral approach. This intervention was carried out by a multidisciplinary team of health care providers. It allowed the development of the global condition of the worker, and improvement of specific skills and endurance required by the worker's tasks. More realistic expectations concerning the back condition and pain management skills were taught. The functional rehabilitation therapy was followed by the Therapeutic return to work. This innovative intervention progressively centralized the rehabilitation in the workplace, at the worker's regular job. Time opened in the clinical setting was progressively replaced by time on the job with reduced duties. For doing so, an agreement was made between the occupational therapist of the team and the worker's supervisor on the partial duties expected from the worker at his regular job, the worker being often placed in a supernumerary position and helping a coworker to do partial tasks of the job. Tasks were then progressively augmented until full job demands were fulfilled.[28]

The Sherbrooke model was tested through a randomized clinical trial in Canada among 31 workplaces hiring more than 175 employees. One hundred and thirty workers in the Sherbrooke area, who had been absent from work for more than four weeks for back pain, were randomized in one of four treatment arms:

Treatment arms	Description
1) usual care	
2) clinical/rehabilitation intervention	back school, functional rehabilitation therapy therapeutic return to work
3) occupational intervention	on-site ergonomic intervention occupational medicine
4) Sherbrooke model intervention	a combination of arm 2 and 3 (as described above)

Data were collected on outcomes of return to work, functional status, pain, cost-benefit and cost-effectiveness.

4 RESULTS

Results have shown that the Sherbrooke model was effective, speeding up by 2.4 times the return to regular work than the usual care arm (Figure 1).

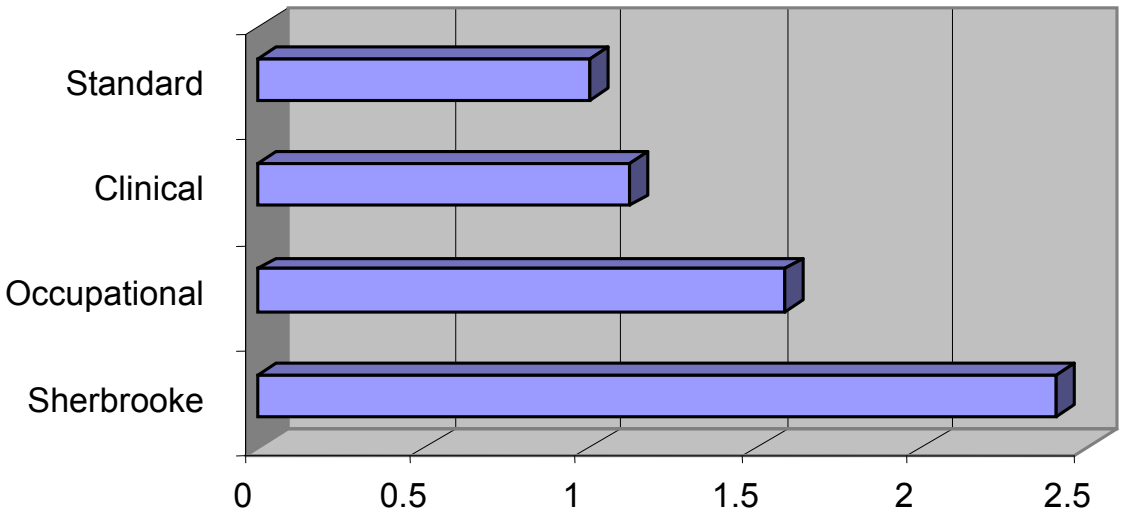

Figure 1: Rate ratio of return to regular work

In addition, the functional status was improved and the pain level was reduced in the Sherbrooke model arm compared with the usual care arm. One specific and innovative finding was that the greater part of the success on return to work was the result of the intervention done in the workplace.[25]

As for the economical evaluation, a six year follow-up demonstrated considerable savings for the workers' compensation board (entirely financed by employers). As shown in Table 2, consequences of disease costs at one year follow-up were higher in the standard care arm than in the experimental arms. However, during the first year, the clinical (-$2,250) and Sherbrooke model arms (-$2,348) were not cost-beneficial following the intervention compared to the standard care arm (negative cost) and the occupational arm was moderately cost-beneficial ($220).[29]

Table 2: Consequence of disease costs measure at follow-up

Follow-up	Usual care	Clinical intervention	Occupational intervention	Sherbrooke model
First year	$7,133	$6,458	$6,529	$6,515
6.4 years	$23,517	$10,045	$12,820	$7,060

The consequences of disease costs were much higher in the usual care arm at he follow-up and it resulted that the highest total consequence of disease costs at the mean 6.4 years follow-up were found in the usual care arm and the lowest in the Sherbrooke model arm.[29]

Over the course of the total follow-up period (mean 6.4 years), all experimental interventions were cost-beneficial with savings in the Sherbrooke model arm ($18,585) moderately higher than those in the clinical ($16,176) and the occupational ($16,827) arms. During the total follow-up period, the mean number of days on full benefits due to back pain was the highest in the standard care arm with a mean of 418.3 days, while it was the lowest in the Sherbrooke model arm with a mean of 125.6 days. The clinical and occupational arms had respectively a mean of 178.7 and 228.0 days on full benefits due to back pain.

These results indicate that the experimental interventions did not save costs in the first year (active management period) but saved major costs in long-term follow-up. The Sherbrooke model arm was the most cost-beneficial at the mean 6.4 years

follow-up with a mean savings of $18,585 per worker and 292.7 days were saved from disability (cost-effectiveness). Thus, experimental interventions were effective to prevent long-term disability and were cost-effective. Additional costs due to the Sherbrooke Model interventions ($3,291) can be considered as an investment since $16,457 of disease consequence costs was saved six years later compared to the usual care. In other words, each dollar invested in the Sherbrooke Model helped to save approximately five dollars six years later. In sum, this fully integrated disability prevention model for occupational back pain allowed a quicker return to work, savings to the compensation system, and improvement in quality of life.[29]

5 DISCUSSION

The Sherbrooke Model addressed directly the disability problem rather than the disease. Despite the availability of numerous different treatments from various therapists, no single approach has been proved more effective than the others. When back pain does not resolve, disability occurs, leading to prolonged absence from work. Knowing that 90% of back pain resolves spontaneously, the Sherbrooke model targeted the population at most risk of long term disability that is workers with subacute and chronic back pain. The early detection of these "at risk workers" allowed to prevent disability by initiating the right intervention at the right time. In doing so, unnecessary treatments and large amounts of money could be saved. The Sherbrooke Model was replicated in the Netherlands and similar results were obtained.[22] It is likely that an adaptation of this disability management model for MSDs in Brazilian industries would be as well effective and cost-effective.

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