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ORIGINAL ARTICLE

Return to Work and Quality of Life in Workers With Traumatic Limb Injuries: A 2-Year Repeated-Measurements Study

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Abstract

Objectives: To assess the impact of return-to-work (RTW) status on health-related quality of life (HRQOL) over a 2-year period in workers with traumatic limb injuries and to elucidate factors that may contribute to the association of RTW with HRQOL.

Design: A 2-year repeated-measurements follow-up study using the generalized estimating equations approach for model fitting to account for within-subject correlations of HRQOL.

Setting: One teaching hospital.

Participants: Injured patients (N=966, 61% men) with a mean age of 44.7 years.

Interventions: Not applicable.

Main Outcome Measures: The RTW status, HRQOL (assessed by the EuroQol five-dimensional questionnaire), and activity/participation were repeatedly surveyed at 2 weeks and 1, 3, 6, 12, 18, and 24 months after injury. A series of regression models was used to examine the associations between HRQOL and RTW, with sequential adjustment for explanatory variables such as personal and environmental factors, body structure and function, activity/participation, and postinjury period.

Results: Over a 2-year study period, 81.2% of the study participants had 1 or more RTW episodes; 38.2% of them successfully maintained their RTW status until the end. A significant positive association was found between RTW status and HRQOL. The association could largely be explained by the domains of activity/participation. A higher HRQOL was associated with a shorter length of hospital stay, better coping ability, frequent participation in activities of daily living, and a longer postinjury period. A reduced HRQOL, however, was observed for participants with more depressive symptoms.

Conclusions: RTW showed a positive and independent influence on HRQOL in workers with limb injury. In addition, the activity/participation domains and the elapsed time since injury largely explained the association between RTW and HRQOL.

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Traumatic limb injury is one of the leading causes of work disability.[1-3] Upper and lower extremities are the most commonly injured sites in motor vehicle collisions and work-related injuries.[4-6] The resulting disability significantly reduces physical (eg, immobility), psychological (eg, depression), and socio-environmental well-being (eg, work and leisure activities) and can cause very severe health problems among workers.[7] After returning to work, however, persons with severe injuries achieve slightly poorer health-related quality of life (HRQOL) compared with that of the general population.[8] Given that early return to work (RTW) and good HRQOL are the 2 major goals of rehabilitation, it is, therefore, important to clarify the influence of RTW on HRQOL in traumatic limb injuries.

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Being able to work is associated with better health, increased self-esteem, financial reward, connections with others in the community, and HRQOL.[9] Previous studies reported that severely injured workers who were able to RTW attained significantly better HRQOL than did those who could not in 1 to 5 years after injury.[8] Despite that, it is not clear whether the above phenomenon is also true for workers with only limb injuries (ie, workers without cooccurring injuries to the brain or other internal organs). Workers with limb injuries are often characterized by frequent changes in their RTW status because they have either rehabilitated well or suffered from "secondary injury" or "work incapability" after their RTW.[10] A recent study that treated RTW as a time-stable status found that the first occurrence of RTW after an injury marked a return to stable employment for <40% of the workers who had returned to work.[10] Information on the impact of RTW on HRQOL in workers with traumatic limb injuries is scarce in the literature.

Because a traumatic limb injury causes not only bodily functional impairment but also limitations in daily activities and social participation, the *International Classification of Functioning, Disability and Health* (ICF) addresses a complex interaction between domains of personal factors, body function and structures, environmental factors, and activity/participation.[11] The ICF frequently serves as the framework for assessing postinjury functioning after multiple injuries.[12] Two other studies[13,14] confirmed that factors within the ICF framework reliably predict the RTW from 2 to 5 years postinjury. A recent systematic review[15] adopted the ICF framework to examine the prognostic factors of RTW after acute orthopedic injuries to limbs. However, it is an open question whether the RTW status among workers with traumatic limb injuries can predict the HRQOL within the ICF framework.

The aims of this study were (1) to assess the relation between RTW status and HRQOL in workers with traumatic limb injuries and (2) to illustrate whether the ICF domains may explain the relation between RTW and HRQOL. To the best of our knowledge, no studies have been reported using repeated measurements with generalized estimation equation (GEE) analysis to explore the influence of RTW on HRQOL, and consider the possible shift in RTW status and changes in workers' daily activity/social participation and HRQOL in workers with traumatic limb injuries.

Methods

Participants

We conducted a 2-year repeated-measurements study because most of the persons with limb injuries achieve their first RTW within 2 years postinjury.[16] Moreover, the RTW is not a permanent status because secondary injury or work incapability may occur after their RTW.[13] Inclusion criteria were patients older than 18 years diagnosed with limb injuries and hospitalized in a teaching hospital within 14 days postinjury. Those unable to read or answer the questionnaires, foreign workers, and those with coexisting injuries to the central nervous system (ie, traumatic brain injury or spinal cord injury) or internal organs were excluded. Participants were recruited from January to December 2009 and were then followed till December 2011. The Ethics Committee at the participating hospital approved the study. A total of 1010 patients met the inclusion criteria, and 966 (95.6%) of them gave their informed consents before taking part in the study (table 1).

List of abbreviations:

ADL	**activities of daily living**
BSRS-5	**5-item Brief Symptom Rating Scale**
EQ-5D	**EuroQol five-dimensional**
FAI	**Frenchay Activities Index**
GEE	**generalized estimation equation**
HRQOL	**health-related quality of life**
ICF	***International Classification of Functioning, Disability and Health***
LOS	**length of hospital stay**
PRO	**patients' self-reported outcomes**
PSS	**Perceived Stress Scale**
RTW	**return to work**
WC	**work compensation**

Procedure

During their hospital stay, patients completed a face-to-face interview (ie, baseline) concerning various ICF framework–based domains. These domains included personal factors (ie, age, sex, marital status, education, and occupation), body structure and function (ie, type of injury), environmental factors (ie, economic burden and work compensation [WC] coverage), and activity/participation domains (ie, patients' self-reported outcomes [PRO] measurements for performing activities of daily living [ADL], depressive symptoms, self-efficacy, and perceived level of stress). Medical charts were reviewed at baseline by the first author for the following information: diagnosis, injury dates, and dates of admission and discharge.

Two trained personnel also conducted the follow-up survey by telephone interviews for RTW status, assessments of HRQOL, and various PRO measures at 1, 3, 6, 12, 18, and 24 months after the injury. A total of 4643 episodes of follow-up data collections were successfully completed, representing a response rate of 80.11% (ie, 4643 completed/5796 expected).

Measures

The HRQOL was assessed by the EuroQol five-dimensional (EQ-5D) questionnaire, which is a generic HRQOL measure in which health status is divided into 5 dimensions (ie, mobility, self-care, usual activities, pain/discomfort, and anxiety/depression) within 3 severity levels (ie, no problems, moderate problems, and severe problems).[17,18] The EQ-5D questionnaire scores were elicited from time trade-off valuations for an identical set of health states.[19] The scores range from −.594 to 1, with 1 indicating "full health," 0 corresponding to "death," and negative scores implying "worse than death."[20] Scores derived from the EQ-5D questionnaire can be considered a health-related condition in the ICF framework.

The factors potentially influencing HRQOL and explaining the relation between RTW and HRQOL were derived from the ICF framework as follows:

1. Type of injury and length of hospital stay (LOS)

The types of injury were grouped according to the presence of musculoskeletal involvement. The LOS in days was retrieved from medical charts. We also summed up the periods of readmission if the patients were readmitted within 3 months of the index hospitalization because of a consequential illness after the previous injuries. Since 2007, up to 98.4% of the population in Taiwan is covered by the National Health Insurance program and the LOS was