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Factors Associated with Return to Work Following Work-Related Injuries to the Lower Extremities

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Abstract

Purpose: To identify factors associated with return-to-work (RTW) following work-related foot and ankle injuries.

Methods: 86 patients with work-related foot and ankle injuries were asked to complete questionnaires during a comprehensive assessment at entry to a treatment program, at discharge, and at three months' post-treatment (P-T) follow-up. The primary study outcome was RTW status at 3 months P-T follow-up. The relationship between RTW status at 3 months PT follow-up was modelled against the independent variables of age, time since injury, as well as Lower Extremity Functional Scale score (LEFS) at initial presentation, using logistic regression. The secondary study outcome was RTW status and predictors of RTW at discharge.

Results: The overall RTW rate at 3 months P-T follow-up in the patients with work-related foot and ankle injuries was 33.7%. There were no significant demographic differences between the patients who were able to RTW at 3 months P-T follow-up and those that did not. In a logistic regression model, a greater time since injury was a significant predictor of being less likely to RTW at 3 months P-T follow-up (OR= 0.527, 95%CI [0.295, 0.940]). Similar results were obtained for patients able to RTW at discharge.

Conclusion: Time since injury is the strongest predictor of RTW at 3 months P-T in patients suffering from work-related foot and ankle injuries. Placing emphasis on early referrals to treatment may improve the RTW rates for these injured workers.

Keywords: Early Intervention; Lower Extremities; Return-To-Work; Work-Related Injury

List of Abbreviations:

RTW	:	Return-To-Work
P-T	:	Post-Treatment
LEFS	:	Lower Extremity Functional Scale Score
WSIB	:	Workplace Safety and Insurance Board
CA	:	Comprehensive Assessment
PCS	:	Pain Catastrophizing Scale
PHQ-9	:	Patient Health Questionnaire

Introduction

It is estimated that in 2012 there were 245,365 accepted Time-Loss injuries in Canada [1]. Whilst work-related injuries have been decreasing, these occurrences have significant and wide-ranging impacts for the worker, the employer, the worker's family, and compensation systems [2, 3]. Prolonged absence from work is detrimental to individuals in terms of house-hold finances and emotional well-being, as well as to society as a whole; it has

been stated that the health of the working-age population is critical to economic growth and social justice [4]. Given the far-reaching consequences, and the prevalence of injuries disrupting work, significant effort has been put into identifying factors affecting the Return-To-Work (RTW) rate for different conditions, and in developing systems with a view to improving outcomes. There is extensive literature reviewing factors associated with RTW outcomes from general injuries; however, factors associated with RTW following foot and ankle injuries have not been well-studied. It has been reported that age is a significant factor in predicting RTW following foot and ankle injuries. In a prospective cohort study of patients with lower extremity fractures, patients 18-24 years of age were three times more likely to have a successful outcome than those older than 45 [5]. In another report, motivation appeared to have the greatest influence on RTW than other known predictors in a group of patients who had been disabled as a result of upper or lower limb injuries [6].

The few studies investigating RTW following lower limb injuries are limited by power and few variables. It is likely that social, economic and employment-related factors are important predictors of RTW in patients with lower limb injuries as the correlation between physical impairment and RTW is weak [5, 6]. The primary objective of this study was to identify the factors associated with a successful RTW in patients with work-related foot and ankle injuries attending an injured worker's clinic. The primary study outcome was RTW status at 3 months PT follow-up. The secondary study outcome was RTW status at discharge.

Methods

Study sample

The current study was a retrospective review of data collected from 86 patients with work-related foot and ankle injuries seeking treatment at a single, injured worker's clinic in Toronto, Ontario, between October 2010 and July 2013. Inclusion criteria were 1) 18-75 years of age; 2) work-related foot and ankle injuries; 3) not currently working; 4) discharged from the Foot and Ankle program at University Health Network Altum Health; and 5) intake assessment, discharge and follow-up questionnaires completed between January 1, 2010 and August 20, 2013. Patients were excluded if they suffered from any other debilitating condition. All patients included in the study had been receiving compensation benefits from the Workplace Safety and Insurance Board (WSIB) for their injury. A research coordinator and an independent assessor not involved in the medial care of the patients approached the patients to participate in the study and collected the data. The study protocol was approved by the local hospital Research Ethics Board. All patients provided written informed consent to participate in the study.

Data Collection

Each patient was enrolled in the study on initial presentation at the injured worker's clinic. Patients were asked to complete a questionnaire that constituted a Comprehensive Assessment (CA). Information gathered at the CA included the patients date of birth, age, gender, marital status, level of education, country of birth, date of immigration to Canada, languages spoken, their ability to speak English, the date of their accident, their working status at the time of injury, whether or not they were working at the time of the assessment and the status of that work, and their occupation at time of CA. Occupations were classified using the Canadian National Occupational Classification database 2011 [7]. In addition, 52 health factors regarding their physical and mental wellbeing were recorded, including the Lower Extremity Functional Scale (LEFS score), Pain Catastrophizing Scale (PCS), Patient Health Questionnaire (PHQ-9), smoking history, and pre-existing medical conditions.

The foot and ankle treatment program consisted of an acute/subacute program delivered by an interdisciplinary team of kinesiologists, and physical and occupational therapists, focusing on strengthening, function improvement, and worker education. Surgery was offered where deemed necessary. The treatment programs lasted typically about 6 weeks in duration. At the time of discharge from the treatment program, a discharge packet was provided to each patient to mail back to the treatment center. The package provided the patient with complete physical and psychosocial questionnaires to complete at discharge, including LEFS, PHQ-9, PCS, and RTW status at the time of discharge. A final, follow-up package was mailed to each patient three months after their discharge. This package contained a questionnaire for the following information: follow-up date, satisfaction at follow-up, general health, PCS score, and RTW status at follow-up. To increase the response rate, each patient received a telephone reminder when the follow-up package was mailed three months after discharge.

Measures

RTW status at 3 months P-T follow-up was the primary outcome of this study. RTW status at discharge was the secondary outcome. RTW status was defined as not working, ready to RTW, or RTW at the specified time point. RTW was considered successful if subjects returned to any working job, part time or full time, even if it was not their pre-injury occupation, including if it was a less physically demanding job. The LEFS was developed to assess functional impairment associated with a disorder of one or both lower extremities, and monitor patients over time. In this study, patients with work-related foot and ankle injuries rated difficulties they were having with activities of daily living, hobbies and recreational activities, sporting activities, and performing heavy

activities on a 5-point scale, where 0 indicates 'extreme difficulty or unable to perform the activity' and 4 indicates 'no difficulty' [8]. The PCS was used to evaluate any catastrophic thinking related to pain in the study population. The PCS is a 13-item instrument. Patients reflected on past painful experiences and indicated the degree to which they experienced each of the 13 thoughts or feelings when experiencing pain on a 5 -point scale, where 0 indicates 'not at all' and 4 indicates 'all the time' [9]. The PHQ-9 was used to record depression. It consists of 9 questions that rates the frequency of symptoms of depression in the last 2 weeks on a 4-point scale, where 0 indicates the symptom was not experienced at all and 3 indicates the symptom is experienced every day [10].

Statistical Analysis

Statistical analyses were performed using SAS (9.3) and Microsoft Excel with the XLSTAT package. Bivariate analysis compared demographic data and functional scores between patients that returned to work at 3 months P-T follow-up and discharge and those that did not. After completing tests of normality, continuous data were compared with the Student's t-test and categorical data with the Chi Squared test. Logistic regression was used to assess the relationships between age, intake LEFS, time since injury, and RTW status at 3 months PT follow-up and discharge. Age, disability, and time since injury were chosen as variables that are most likely to affect ability to return to work based on a priori knowledge. The time since injury was log transformed prior to analysis due to the skewness of the data. Grouped analyses were performed using unpaired t-tests to compare mean values and the Mann-Whitney test to compare medians. Proportional comparisons were conducted using either the Fisher's exact test or the Chi-square analysis as indicated in the results.

Results

In our cohort of 86 patients, 70.9% of the enrolled patients were male (mean age: 46.3 ± 12.4 years, range: 21-68) and 29.1% were female (mean age: 47.9 ± 10.3 years; range: 26-65). The age difference between males and females was not significant ($p = 0.5939$). Overall, 29 of the 86 patients were working at 3 months P-T follow-up (RTW rate at 3 months P-T follow-up, 33.7%). There were no significant differences in demographics between the patients that were able to RTW at 3 months P-T follow-up and those that did not (Table 1).

Characteristic (n)		RTW (n= 29)[a]	Did not RTW (n = 57)	P value
Age	<30	4	5	0.728[(CS)]
	30- 50	13	26	
	>50	10	23	
Gender	Male	20	41	0.8052[(FE)]
	Female	9	16	
Nationality	Canada	14	17	0.1533[(FE)c]
	Portugal	1	5	
	Ghana	0	3	
	Guyana	2	3	
	India	3	3	
	Hungary	0	2	
	Trinidad	0	2	
	Jamaica	0	2	
	Sri Lanka	0	2	
	Columbia	0	2	
	China	3	0	
	Other[b]	6	15	
English Speaking	Yes	22	45	0.7801[(FE)]
	No	7	11	

Marital Status	Married	19	35	0.834[(CS)]
	Widowed/ separated/divorced	9	20	
	Never married	6	9	
Education	Less than high school	2	11	0.144[(CS)]
	High school	11	26	
	Higher education	6	9	
Occupation	Management	0	1	0.4099[(CS)d]
	Business, Finance, and administration	2	1	
	Natural and Applied Sciences and related	0	1	
	Health	0	2	
	Education, Law, and social, community, and government services	2	1	
	Sales and Service	9	9	
	Trades, transport, equipment operators, and related	14	26	
	Natural resources, agriculture, and related	1	0	
	Manufacturing and Utilities	0	6	
Work Status at Time of Injury	Full-time	24	48	0.9418[(CS)]
	Part-time	3	6	
	Other	1	3	
Smoking Status	Current Smoker	8	18	0.9129[(CS)]
	Former Smoker	7	12	
	Never Smoked	10	20	
Alcohol/ Recreational Drug Use	Yes	13	13	0.0812[(FE)]
	No	16	41	

a- not all data was available for every patient, b- Nationality "Other" includes countries of origin that are represented by only a single patient, c- Fisher's Exact test comparing patients of Canadian nationality to all other nationalities combined because there were so few patients from each of the other countries, d- Chi-Square test comparing the percentage of patients in sales and service; trades, transport, equipment; and all other trades.

A Chi-square test for trend was also conducted using all the occupation categories as well to account for the zero values ($p = 0.3253$).

Table 1: Patient Demographics.

A comparison of the clinical characteristics at initial presentation of the patients that were able to RTW at 3 months P-T follow-up and those that did not is shown in Table 2.

Variable[a]	RTW	Did not RTW	P value
	(n=29)	(n= 57)	
Age (mean (SD))	44.26 (12.02)	48.06 (11.56)	0.173
Gender (% male)	68.97	71.93	0.805
Log Time since injury in days (median (IQR))	5.35 (4.55-5.73)	5.72 (5.18-6.52)	0.006
Intake LEFS (mean (SD))	19.55 (15.21)	24.49 (15.43)	0.165
Intake PCS (mean (SD))	33.90 (13.68)	27.12 (16.59)	0.062
Intake PHQ-9 (mean (SD))	15.62 (7.39)	11.18 (8.58)	0.021
[a] Unpaired t-tests were used to compare between means. The Mann-Whitney test was used to compare between medians. The exact p value is reported.			

Table 2: Clinical Characteristics at Initial Presentation of Patients Responding at Follow-up.

The PHQ-9 score at initial presentation was significantly lower in patients that did not RTW (11.18 ± 8.58) compared to patients who did successfully RTW (15.62 ± 7.39; p= 0.021). The median time since injury, defined as the logarithm of the time between injury and the patient's CA, was significantly longer in patients that did not RTW (5.72; IQR: 5.18-6.52) compared to patients that did RTW (5.35; IQR: 4.55- 5.73; p= 0.006). Logistic regression modeling indicated that intake LEFS (p=0.021) and time since injury (p=0.018) contributed significantly to the RTW status at follow-up (Table 3).

Variable	Odds Ratio	95% Confidence Interval		P value
		Lower	Upper	
Age	0.96	0.919	1.003	0.064
Log Time since injury (days)	0.527	0.295	0.94	0.018
Intake LEFS	0.957	0.919	0.996	0.021

Table 3: Effect of Clinical Variables at Initial Presentation on Return to Work Status Three Months after Injury.

To address the possibility of selection bias in the follow-up process, the relationship between clinical parameters and RTW status was assessed at discharge. RTW status at discharge was available for 78.2% (68/86) of enrolled patients. Of these, 17 patients had successfully returned to work at discharge and 51 patients had not (RTW rate at discharge, 25%). Patients unable to RTW at discharge had a significantly longer time since injury than patients able to RTW (p = 0.004; Table 4).

Variable[a]	RTW	Did not RTW	P value
	(n=29)	(n= 57)	
Age (mean (SD))	48 (11.7)	40 (10.5)	0.5351
Gender (% male)	71	65	0.7635
Log Time since injury in days (median (IQR))	5.7 (1.0)	4.9 (1.1)	0.0043
Intake LEFS (mean (SD))	25 (16.4)	22 (14.1)	0.5273
Intake PCS (mean (SD))	28 (16.2)	30 (14.2)	0.7334
Intake PHQ-9 (mean (SD))	12 (8.3)	12 (7.0)	0.8358
a- Unpaired t-tests were used to compare between means. The Mann-Whitney test was used to compare between medians. The exact p value is reported.			

Table 4: Clinical Characteristics at Initial Presentation of Patients Responding at Discharge.

This was consistent with the logistic regression results indicating that time since injury (p= 0.045) contributed significantly to RTW status (Table 5). LEFS was not found to be significant at discharge.

Variable	Odds Ratio	95% Confidence Interval		P value
		Lower	Upper	
Age	0.97	0.92	1.03	0.285
Log Time since injury (days)	0.5	0.24	1.06	0.045
Intake LEFS	0.96	0.91	1.01	0.107

Table 5: Effect of Clinical Variables at Initial Presentation on Return to Work Status at Discharge.

Discussion

In this study, we examined the factors that predict RTW status following work-related foot and ankle injury. Only the time since injury was a significant predictor of RTW status at 3 months PT follow-up and at discharge. These data are in accordance with observations from previous studies. Time since injury was shown to predict RTW status in patients with chronic low back pain [11], and earlier treatment referrals improved the rate of RTW in injured workers suffering from chronic pain after total joint (knee/hip) arthroplasty [12]. Taken together, these observations suggest that early treatment programs and specific interventions may be

key for enabling a rapid RTW following work-related foot and ankle injuries. A recent systematic review of the literature showed that, regardless of the specific injury/target population, the most effective strategies to improve RTW rates are early intervention and multidisciplinary interventions in the process of RTW [13]. Multidisciplinary approaches that integrate work accommodation offers, contact between healthcare providers and employers, and the presence of a RTW coordinator have been shown to significantly accelerate RTW outcomes in patients with low back pain that had a long interval between injury and RTW [11]. Variables such as adequate support in terms of work place accommodations, advice from a healthcare provider about avoiding re-injury, and receiving an ergonomic workplace audit were significant contributors to an early RTW in workers who took part-time sick leave due to musculoskeletal disorders [14,15].

It is difficult to predict RTW following injury given the number of personal and injury related variables that influence the decision of an individual to RTW. A review of published studies identified over 100 determinants of RTW outcomes spanning factors at the individual level, such as age, gender and education, and at the injury level, such as severity (pain and loss of function) and rehabilitation interventions [16]. The physical demands of a job are known to affect the RTW rate after total joint (knee/hip) arthroplasty, few workers are able to return to physically demanding jobs but do RTW in less strenuous roles [12]. After traumatic limb injury, a rapid RTW is associated with a high degree of confidence that RTW is possible [17]. Similarly, in low back pain patients, low expectations of RTW are significantly associated with an unsuccessful RTW outcome one year after injury [18].

The current study is among the first to identify predictors of RTW in patients with work-related foot and ankle injury. However, this study had several limitations. First, defining RTW as a yes/no answer may not adequately account for the gradations in RTW that patients experience (part-time, reduced duties, horizontal job movement, etc.) and may overestimate the return to full employment comparable to pre-injury [19]. Second, previous studies have suggested that sustainable RTW can take up to 1.8 times longer than the first attempt to RTW [20]. The relatively short three-month follow-up in this study may not have allowed adequate time to gauge a sustained RTW profile after foot/ankle injuries. In conclusion, we identified a significant relationship between successful RTW at 3 months P-T follow-up and time since foot/ankle injury using logistic regression modeling. These findings suggest that the RTW rate of patients with work-related foot/ankle injuries may be improved by reducing the time between a work-related injury and entry into a treatment program. Earlier referrals to treatment programs after foot/ankle injuries should be encouraged.

Declarations

Ethics approval and consent to participate and consent for publication: Granted by the Research Ethics Board (REB) at the University Health Network (UHN) and all participants were consented into the study as per study protocol.

Availability of data and material: data and materials for this study are not available for the general public as they are still being used in the analysis for other studies.

Competing interests: None.

Funding: None.

Author Contributions

1. A. Veljkovic - Co-lead the study and helped recruit patients, write and edited the manuscript
2. R. Gandhi - helped recruit patients, allocate departmental resources for the study and edited the manuscript
3. P. Salat - helped write and edit the manuscript
4. KZ. Abbas - helped write and edit the manuscript
5. K. Syed - helped recruit patients and edited the manuscript
6. J. Lau - Co-lead the study, helped recruit patients and edited the manuscript

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References

1. Association of Workers'(2013) Compensation Boards of Canada.
2. Association of Workers' Compensation Boards of Canada (2012) and Statistics Canada. Labour Force Survey estimates (LFS), by sex and detailed age group, annual.
3. Boden LI, Biddle EA, Spieler EA (2001) Social and Economic Impacts of workplace illness. Am J Ind Med 40: 398-402.
4. Black C (2008) Working for a healthier tomorrow TSO.
5. Mac Kenzie EJ, Morris JA, Jurkovich GJ, Yasui Y, Cushing BM, et al. (1998) Return to work following injury: the role of economic, social, and job-related factors. Am J Public Health 88: 1630-1637.
6. Sheik K (1985) Return to work following limb injuries. Occup Med 35: 114-117.
7. National Occupational Classification Resources and Tools. (2013)
8. Binkley JM, Stratford PW, Lott SA, Riddle DL (1999) The Lower Extremity Functional Scale (LEFS): scale development, measurement properties and clinical applications. American Orthopaedic Rehabilitation Research network. Phys Ther 79: 371-383.
9. Sullivan MJ, Bishop SR, Pivik J (1995) The pain catastrophizing scale: Development and validation. Psychol Assess 7: 524-532.
10. Kroenke K, Spitzer RL, Williams JBW (2001) The PHQ-9: Validity of a brief depression severity measure. J Gen Med 16: 606-613.

11. Stapelfeldt CM, Christiansen DH, Jensen OK, Nielsen CV, Petersen KD, et al. (2011) Subgroup analyses on return to work in sick-listed employees with low back pain in a randomised controlled trial comparing brief and multidisciplinary intervention. BMC Musculoskeletal Disorders 12: 112.

12. Clyde CT, Goyal N, Matar WY, Witmer D, Restrepo C, et al. (2013) Workers' compensation patients after total joint arthroplasty do they return to work? J. Arthroplasty 28: 883-887.

13. Hoefsmit N, Houkes I, Nijhuis FJ (2012) Intervention characteristics that facilitate return to work after sickness absence: a systematic literature review. J Occup Rehabil 22: 462-477.

14. Franche RL, Severin CN, Hogg-Johnson S, Cote P, Vidmar M, et al. (2007) The Impact of early workplace-based return-to-work strategies on work absence duration: A 6-month longitudinal study following an occupational musculoskeletal injury. J Occup Environ Med 49: 960-974.

15. Viikari-Juntura E, Kausto J, Shiri R, Kaila-Kangas L, Takala E-P, et al. (2012) Return to work after early part-time sick leave due to musculoskeletal disorders: a randomised controlled trial. Scand. J Work Environ Health38: 134-143.

16. Krause N, Frank JW, Dasinger LK, Sullivan TJ, Sinclair SJ (2001) Determinants of duration of disability and return-to-work after work-related injury and illness: challenges for future research. Am J Ind Med 40: 464-84.

17. Hou W-H, Sheu C-F, Liang H-W, Hsieh C-L, Lee Y, et al. (2012) Trajectories and predictors of return to work after traumatic limb injury- a 2-year follow-up study. Scand J Work Environ Health 38: 456-466.

18. Jensen OK, Stengaard-Pedersen K, Jensen C, Nielsen CV (2013) Prediction model for unsuccessful return to work after hospital based intervention in low back pain patients. BMC Musculoskeletal Disorders 14:140.

19. Branton EM, Arnold KM, Appelt SR, Hodges MM, Battie MC, et al (2010) A Short-form functional capacity evaluation predicts time to recovery but not sustained return-to-work. J Occup Rehabil 20: 387-393.

20. Vogel AP, Barker SJ, Young AE, Ruseckaite R, Collie A (2011) What is return to work? An investigation into the quantification of return to work. Int Arch Occup Environ Health 84: 675-682.