J Rehabil Med 2009; 41: 1074–1079

ORIGINAL REPORT

PREDICTION OF EMPLOYMENT STATUS ONE YEAR POST-DISCHARGE FROM REHABILITATION FOLLOWING TRAUMATIC SPINAL CORD INJURY: AN EXPLORATORY ANALYSIS OF PARTICIPATION AND ENVIRONMENTAL VARIABLES

Gregory Murphy, PhD[1], James Middleton, MBBS, PhD[2], Ruth Quirk, B App Sci (Phys)[2], Annelies De Wolf, DPT, MPH[2] and Ian D. Cameron, MBBS, PhD[2]

From the [1]School of Public Health, La Trobe University, Bundoora and [2]Rehabilitation Studies Unit, Faculty of Medicine, University of Sydney, Ryde, Australia

Objective: **To identify the extent to which early participation and environmental variables, when assessed at discharge from hospital, add to injury and demographic variables in the prediction of employment following traumatic spinal cord injury.**

Design: **Prospective study in which participants were assessed on a range of injury, demographic, participation and environmental measures at discharge from inpatient rehabilitation and then followed up 12 months later to assess their employment status.**

Subjects: **A cohort of 72 eligible patients discharged from hospitals' rehabilitation units.**

Results: **Using injury, demographic and contextual variables as predictors, 94% of not employed and 65% of employed cases (87% overall) could be correctly classified. The contextual variables made a significant contribution to improving predictive power, beyond that achieved by use of the more restricted set of injury and demographic variables. Three variables made significant, independent contributions at the third and final step of a sequential logistic regression: Functional Independence Measure™ score at discharge, high-skill pre-injury occupation, and perceived community integration (CIM score, at discharge).**

Conclusion: **To assist in raising employment achievements post-injury, attention should be given during rehabilitation to factors beyond the traditional patient injury and demographic variables, as well as considering community integration support services when developing vocational rehabilitation service plans.**

Key words: employment, spinal cord injury, community participation.

J Rehabil Med 2009; 41: 1074–1079

Correspondence address: Gregory C. Murphy, School of Public Health, La Trobe University, 3083 Australia. E-mail: g.murphy@latrobe.edu.au

Submitted February 2, 2009; accepted August 25, 2009

INTRODUCTION

Within the field of traumatic spinal cord injury (SCI) rehabilitation, employment outcomes have long been considered the gold standard by which to judge the success of the rehabilitation effort (1–3). Some rehabilitation psychologists (for example, Trieschmann, 4) have argued for vocational rehabilitation services to be less focused on employment *per se* and for more attention to be given to other forms of community participation. However, many researchers and practitioners working in the field of SCI rehabilitation view gaining and maintaining paid employment post-injury as the best indicator of successful longer-term outcome following traumatic injury (5). Employment is also regarded by many as the most valid form of participation, as conceptualized in the World Health Organization's International Classification of Functioning, Disability and Health (ICF) framework (6). The validity of using post-injury employment achievements as an index of successful rehabilitation is based on reliable associations existing between holding a position of paid employment and important personal and social outcomes, such as increased quality of life (7) and reduced use of health services (8). Recent results from applied psychology (9) have supported improvements to health that flow from gaining employment.

Early research into vocational achievement following traumatic SCI had 2 clear objectives: (*i*) to establish the actual extent of post-injury employment; and (*ii*) to identify demographic and injury factors that were reliably associated with higher or lower rates of post-injury employment in particular sub-groups of patients. For SCI populations living in North America, the programmes of research led by DeVivo & Richards (10) and by Krause et al. (11) have produced the most detailed findings about the extent of post-injury employment along with identified demographic and injury moderators of that employment. For European SCI populations, prominent contemporary researchers of employment rates following traumatic spinal cord injury have included Kreuter et al. (12) in Sweden, and Schonherr et al. (13) in the Netherlands.

With respect to post-injury employment rates, while differences have been noted between various studies in terms of the methodology, definitions of "employment" adopted and time elapsed from rehabilitation discharge from hospital to follow-up, post-injury employment rates have generally been reported at around one-third when followed up more than one year post-injury. Furthermore, an additional 10–20% had

gained some post-injury employment, but were not actually employed at the time of survey follow-up (14). European rates of post-injury employment tend to be higher than those reported in the USA, with approximately 50% of people with SCI in European nations reporting being employed when followed up at various time-points post-discharge (15).

With respect to predictors of post-injury employment, the most replicated predictors are: level of pre-injury education (16), age (3), sex (17), injury level (18), time since injury (11), functional independence (10), and pre-injury employment (19).

One characteristic of multivariate research to date into post-injury employment has been a relative neglect of early participation variables and environmental factors as influences on post-discharge employment achievements. Study of the essentially static demographic and injury variables has been most useful in improving our understanding of employment potential following traumatic SCI. However, in addition, the study of community reintegration (early participation) and environmental variables (if these are found to be reliably associated with subsequent employment), may open up the possibility of targeting rehabilitation interventions more specifically to enhance such attributes and positively impact on post-injury employment achievement.

The aim of the present study therefore was to identify the nature and extent of the contribution to subsequent employment of participation and environmental factors assessed early following discharge from rehabilitation. Within the ICF (6), environmental factors act as barriers to, or facilitators of, various levels of participation. As further defined in the ICF, "environmental factors" make up the physical, social and attitudinal environment in which people live and conduct their lives, while "participation" is involvement in a life situation. It was expected that a higher degree of participation and greater environmental support early following discharge would enhance chances of return to work at one year following community resettlement. It was anticipated that improvement in the accuracy of employment prediction would be achieved when participation and environmental variables were added to traditional injury and demographic factors as predictors.

METHODS

Participants

All people with SCI who were admitted to the Spinal Cord Injury Units of the Prince of Wales, the Royal Rehabilitation Centre Sydney, or the Royal North Shore hospitals in Sydney, Australia, between mid-2003 and March 2005, were invited to participate in a prospective cohort study aimed at improving community reintegration after SCI. Participants who met the inclusion and exclusion criteria were approached by the research assistant approximately one month prior to expected discharge from any of the Spinal Units to the community. These 3 units serve the whole of the state of New South Wales (population approximately 7.0 million) and together admit approximately 100 patients with a traumatic SCI annually.

Study inclusion criteria were: (*i*) age 16–65 years; (*ii*) having sustained a spinal cord injury of traumatic origin; (*iii*) being medically stable post SCI; (*iv*) having persisting neurological loss; and (*v*) having Australian citizenship or permanent resident status. Study exclusion criteria were person with SCI: (*i*) requiring 24-h ventilator support; (*ii*) having significant brain impairment; (*iii*) possessing a severe psychiatric co-morbidity, significant adverse health status, and/or non-compliance due to drug use. The majority of people with acute traumatic SCI who were eligible for involvement agreed to participate in the project and evaluation. Of the 89 persons who met the inclusion and exclusion criteria, 8 declined either because of an expressed lack of interest or feeling that it was too great a commitment under the circumstances. In addition, 3 people were excluded due to inability to speak English, 2 were discharged or transferred outside Sydney within 48 h of referral and not able to consent in time, one person on a witness protection programme was non-compliant and discharged self from hospital. All 14 people were male, with SCI impairments ranging between C4 to L2 levels (9 paraplegia, and 5 tetraplegia); half having complete lesions. Seventy-five persons with SCI met these criteria and agreed to participate. One person was excluded from the analysis because he was retired prior to his SCI and therefore not expected to return to the workforce. Two participants died during the first year following discharge and thus the final study sample comprised 72 participants. Table I presents descriptive statistics for the participants' demographic and impairment characteristics, while Table II shows descriptives for categorical variables of pre-injury education and employment, level of neurological impairment, compensability status, marital status and transportation post-discharge.

The study was approved by the relevant ethics committee of the participating hospitals. Each subject gave their written informed consent prior to participation.

The injury and demographic information in Table I suggests that our study sample was comparable to the Australian SCI population (see Cripps, 20, 21) with a similar male-to-female ratio (81%:19%) and tetraplegia to paraplegia ratio (58% tetraplegia in the current study, compared with 52%–55% in the Australian population).

Procedure

Participants were interviewed at 6 weeks and 12 months after discharge from the rehabilitation unit of participating hospitals, with key study predictor and outcome measures administered (as described below). The measures were administered by an experienced clinician in SCI who was not actively involved in these participants' rehabilitation. Where possible, administration of the questionnaires occurred in person at the participant's home, however, due to some individuals living long distances away from metropolitan Sydney, telephone call administration and posting out of questionnaires were also performed.

Table I. *Participants' injury and demographic characteristics by employment status at 12 months (n = 72)*

	Not employed (n = 52)	Employed (n = 20)
Age, years, mean (SD)	35.4 (15.0)	35.2 (13.5)
Gender, *n* (%)		
Male	40 (77)	18 (90)
Female	12 (23)	2 (10)
Lesion level, *n* (%)		
Tetraplegia	34 (65)	8 (40)
Paraplegia	18 (35)	12 (60)
ASIA grade, *n* (%)		
ASIA A	33 (63)	8 (40)
ASIA B	5 (10)	1 (5)
ASIA C	5 (10)	2 (10)
ASIA D	9 (17)	9 (45)
Discharge area, *n* (%)		
Metropolitan	31 (60)	11 (55)
Rural	21 (40)	9 (45)

ASIA: American Spinal Injury Association; SD: standard deviation.

Table II. *Descriptive statistics for categorical predictor variables by employment status at 12 months, n (%)*

	Not employed ($n=52$)	Employed ($n=20$)
Pre-injury skilled work	21 (40)	17 (85)
Pre-injury education		
Primary school	3 (6)	0 (0)
High school (incomplete)	22 (42)	7 (35)
High school (complete)	9 (17)	2 (10)
University/TAFE (incomplete)	8 (15)	4 (20)
Pre-injury employed (F/T or P/T)	38 (73)	18 (90)
Impairment level		
High impairment (tetraplegia ASIA A–C)	26 (50)	4 (20)
Low impairment (paraplegia or tetraplegia ASIA D)	26 (50)	16 (80)
Compensable status	13 (25)	6 (30)
Married/defacto status	22 (42)	12 (60)
Independent use of transport at 6 weeks post discharge	20 (39)	15 (75)

Incomplete: education started but not completed; Complete: degree obtained, F/T: full-time; P/T: part-time; TAFE: technical and further education.

Measures

Predictor variables comprised the following injury-related, functional and demographic variables: impairment group, taking into account a combination of the person's level of neurological lesion as well as degree of lesion completeness (or American Spinal Injury Association (ASIA) impairment grade) (22) (high: tetraplegia ASIA A–C; low: paraplegia + tetraplegia ASIA D); Functional Independence Measure™ (FIM™) score (23) at discharge from inpatient rehabilitation; pre-injury occupation (1 = high-skill occupation; 0 = all other occupations); pre-injury education (1 = elementary school; 6 = college or university); compensation status (1 = eligible for compensation, 0 = not eligible), marital status (1 = married or defacto, 0 = all others); sex (1 = male, 0 = female). The FIM™ is an 18-item, 7-level ordinal scale aimed at assessing functional progress (or decline) in the rehabilitation setting. FIM™ item scores range from 1 (total assist) to 7 (complete independence). The FIM™ measures performance in self-care, sphincter control, transfers, locomotion, communication, and social cognition. The total score ranges from 18 (lowest) to 126 (highest) level of independence. To complete the predictor set, 2 standardized measures of early participation outcome were used as follows: the Community Integration Measure (CIM) (24), and the Craig Handicap Assessment and Reporting Technique (CHART) (25). Both CIM and CHART are self-report measures. The CIM measures a person's "sense of belonging" in the community. The CIM is a 10-item scale and results in a single summary score (range 10–50) which is the unweighted sum of the 10 items, with higher scores indicating better integration (24). The CHART is a 32-item scale specifically developed to measure handicap among SCI rehabilitation participants living in the community. It measures 6 domains: Physical Independence, Mobility, Occupation, Societal Integration, Economic Self-sufficiency, and Cognitive Independence. It offers a measurement of handicap in terms of societal expectations or norms and focuses on objective, observable criteria that are easily quantifiable rather than perceptions or attitudes (25). The total score of 5 domains (omitting Economic domain) were examined in the present study. The total score ranges from 0 to 500, with higher scores indicative of less handicap or higher community participation. In addition, independence in use of transportation and compensable status were chosen as environmental factors. Independence in transportation (whether through public transportation, taxi service, or driving one's own car) was included because transportation has previously been found to be a mediating variable in the prediction of employment post spinal cord injury and is frequently reported as a barrier to job seeking by those living with SCI (26, 27). Compensability status was included because it is considered an important factor that may provide additional resources to assist the person during community resettlement and possibly increase participation following injury. The study's employment criterion variable was dichotomous (some paid employment at time of follow-up; no paid employment). Table III shows summary descriptive statistics for participants' functional and participation outcomes post-discharge.

Data analysis

Logistic regression was used to answer the main research question concerning the usefulness of contextual variables when attempting to predict post-discharge employment. A sequential approach was taken as there was the desire specifically to evaluate the contribution to the explanation of employment status made by the set of participation and environmental contextual variables when they were entered into the equation after the more frequently studied injury and demographic variables. Spearman's correlation coefficients were interpreted to determine the significance of bivariate associations. All analyses were performed using SPSS v 14.0.1.

RESULTS

Of the original 72 participants, 72.5% reported no paid employment and 27.5% some paid employment at the 1-year follow-up.

Bivariate relationships

Table IV displays the correlations between study variables. The successful search for improved understanding of post-injury employment outcomes is dependent, logically, on finding new variables that, while correlated with the criterion, are not too strongly associated with previously established indicators of post-injury vocational status. Among the independent variables, the highest correlations involved variables from within their own set. Thus, the 2 injury variables correlated 0.669. Within the demographic variables, age at injury correlated with marital status ($r=0.533$); and within the participation and environmental variables, CHART scores correlated with transport independence ($r=0.453$). The median correlation of an independent variable with another independent variable from outside its nominal set was suitably low ($r=0.095$). With respect to correlations of the independent variables with the study's criterion variable (i.e. being in paid employment at the time of follow-up) the 4 significant ($p<0.01$) simple correlations involved variables from across the three sets of predictors. FIM™ at discharge was the best of the injury predictor variables

Table III. *Descriptive statistics for continuous predictor variables by employment status at 12 months*

	Not employed ($n=52$)		Employed ($n=20$)	
Variable	Mean (SD)	Median (IQM)	Mean (SD)	Median (IQM)
FIM™	83.0 (22.7)	81.0 (43.5)	106.8 (18.5)	114.0 (11.8)
CIM	39.5 (7.8)	40.7 (13.0)	43.6 (4.7)	45.0 (9.0)
CHART	373.2 (48.1)	374.5 (65.8)	423.2 (60.2)	435.4 (99.7)

CIM: community integration measure; CHART: Craig Handicap Assessment and Reporting Technique; FIM™: functional independence measure; IQM: interquartile mean; SD: standard deviation.

Table IV. *Correlations between study variables*

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
1. High impairment	–	–0.669**	–0.121	–0.131	–0.048	–0.160	–0.067	0.045	–0.409**	0.076	0.315**	0.005	0.051
2. Functional independence		–	–0.058	–0.096	–0.084	0.151	0.100	–0.003	0.507**	0.048	–0.438**	0.061	0.492**
3. Age at injury			–	0.123	0.533**	0.281*	–0.035	0.113	–0.324**	–0.196	–0.078	–0.137	0.012
4. Gender				–	0.082	–0.098	0.004	–0.244*	0.105	–0.045	0.057	0.024	–0.148
5. Marital status					–	0.170	–0.034	0.172	–0.261*	–0.073	0.087	–0.103	0.127
6. Skilled occupation						–	0.403**	0.230	0.154	–0.080	–0.252*	0.124	0.400**
7. Pre-injury education							–	0.052	0.136	–0.145	–0.073	0.202	0.184
8. Pre-injury employment								–	–0.049	–0.068	–0.052	0.017	0.182
9. CHART									–	0.298*	–0.453**	–0.042	0.411**
10. CIM										–	–0.066	–0.444**	0.211
11. Independent with transportation											–	0.078	–0.327**
12. Compensable status												–	0.051
13. Paid employment at one year													–

*$p<0.05$; **$p<0.01$.
CHART: Craig Handicap Assessment and Reporting Technique; CIM: Community Integration Measure.

($r=0.492$), pre-injury occupation the best of the demographic predictor variables ($r=0.400$), and CHART the best of the participation and environment variables ($r=0.411$).

Multivariate findings

Logistic regression was performed to assess the incremental contribution of each of the 3 sets of variables to the explanation of employment status at 12-month follow-up. Initially the injury variables (impairment, and FIM™ scores) were entered (step 1), then the demographic variables were included (step 2) and, finally, the 4 participation and environmental variables (CHART, CIM, transport independence, and compensation status) were entered (step 3). The classification results from each step of the sequential logistic regression (LR) are presented in Table V. At each step there was an increase in the percentage correctly classified. Hosmer & Lemeshow's goodness-of-fit testing revealed that the model was a good fit for the data at all steps of the analysis: step 1, $p=0.277$; step 2, $p=0.868$; step 3, $p=0.953$. The results from this sequential LR analysis are shown in Table V.

Step 1. Using two injury variables, separation between the 2 groups was achieved. In all, 81% of participants were correctly classified. One variable significantly added to the prediction (discharge FIM™ score, $p<0.01$). Using injury-related variables only, 21% of the variance in employment status was able to be explained (Cox & Snell $R^2=0.209$).

Table V. *Classification results from the hierarchical logistic regression analysis*

	Step 1	Step 2	Step 3
Correct classification			
Not employed	92.3%	92.3%	94.2%
Employed	50.0%	60.0%	65.0%
Total	80.6%	83.3%	87.0%
Chi-square	16.881*	30.654*	42.628*
Cox & Snell R^2	0.209	0.347	0.447

*$p<0.001$.

Step 2. After the addition of the demographic variables, significant separation was maintained and the percentage of cases correctly classified increased to 83%. In addition to FIM™ score at discharge, previous skilled occupation was found to be significantly related to employment status at 12-month post-discharge. Using injury-related, functional and demographic variables, the explained variance increased to 35% (Cox & Snell $R^2=0.347$).

Step 3. When the participation and environmental variables were added, 87% of cases were correctly classified. The final model was more efficient in classifying those not in employment (94% confidence interval (CI): 88–100%) than it was in classifying those in employment (65% CI: 44–86%). Encouragingly, the use of the contextual variables helped improve the accuracy of classification of those subsequently found to be employed (see Table V). With the inclusion of injury, demographic, and participation and environmental variables, 45% of the variance in employment status could be explained (Cox & Snell $R^2=0.447$). In the final model, discharge FIM™, pre-injury skilled occupation, and community integration scores were the variables that significantly contributed to prediction (see Table VI for further details). There exists, however, high uncertainty around the impact of skilled pre-injury employment (odds ratio (OR): 8.3, 95% CI: 1.1–63.0).

The information in Table VI indicates that the FIM™ score at discharge is a useful, reliable predictor of subsequent employment status. For every additional FIM™ point at discharge, the odds of an individual being employed at 12-month follow-up increased by 7%. Those in a skilled occupation pre-injury were 8 times more likely to be employed at post-discharge follow-up. Additionally, for every additional point of reported community integration at discharge, the odds of subsequently being employed increased by over 25%.

DISCUSSION

This study aimed to investigate the extent to which early participation (community reintegration) and environmental

Table VI. *Variables in the Logistic Regression*

Variable	B	SE	Wald	OR	95% CI for OR	
					Lower	Upper
Impairment level (high)	–0.222	1.171	0.036	0.801	0.126	12.396
FIM™ at discharge	0.065	0.029	5.062	1.067**	1.008	1.128
Age at injury	0.024	0.037	0.439	1.025	0.954	1.101
Skilled preinjury profession	2.114	1.035	4.172	8.285**	1.089	63.012
Preinjury educational level	0.373	0.394	0.894	1.452	0.670	3.145
Preinjury paid employment	1.819	1.373	1.755	6.164	0.418	90.863
CHART	0.003	0.010	0.068	1.003	0.984	1.022
CIM	0.229	0.086	7.123	1.257*	1.063	1.488
Independent with transport	0.627	0.902	0.484	1.873	0.091	3.128
Compensible status	2.470	1.295	3.639	11.827***	0.935	149.668
Constant	–22.726	7.918	13.237	0.000		

*$p<0.01$; **$p<0.05$; ***$p<0.1$.

CHART: Craig Handicap Assessment and Reporting Technique; CI: confidence interval; CIM: Community Integration Measure; FIM™: functional independence measure; OR: odds ratio; SE: standard error.

contextual variables may help explain post-injury employment status, independent of the contribution of any demographic or injury variables. A range of predictor variables was used so that the relative contribution of injury, demographic, participation and environmental contextual variables could be assessed. Using sequential LR, significant results were achieved at each step of the analysis. In the final step modelling the prediction of employment at 12 months, 3 variables made significant independent contributions (FIM™ at discharge, having a high-skill occupation pre-injury, score on the CIM at discharge). The significant results obtained from the use of the first 2 predictors (from the injury and demographic domains) are in line with results from previous studies, but the identification of perceived community integration as a participation-environment variable predictive of post-discharge employment is a novel finding since the CIM has not previously been used with this population, and participation-environmental variables are rarely studied as predictors of post-discharged employment. In cross-sectional studies of those persons suffering traumatic brain injury, CIM scores have been shown to be positively associated with ratings of quality of life post-discharge (28).

Using a range of predictor variables that encompassed injury, demographic, participation and some contextual (environmental) factors has enabled a fuller understanding of post-injury employment to be gained. The findings with respect to the predictive value of functional independence reinforce the traditional importance of the physical rehabilitation component of in-hospital rehabilitation. Every point of increased functional independence is important in raising the individual's chances of post-discharge employment. Influential also, is the occupation held at the time of injury; those with pre-injury occupations demanding high-level knowledge or skill are much more likely to be employed when followed up post-discharge. The size of this occupation effect has obvious implications for the targeting of vocational rehabilitation services delivered to different groups within this injury population. However, beyond the effects of these well-recognized injury and demographic factors, the individual's sense of integration ("belonging") in their community post-discharge community, also made a practically-significant contribution to the explanation of post-discharge employment success. The ability of additional "contextual" variables to improve the overall classification efficiency, and particularly the correct classification of those subsequently employed, supports the earlier recommendation of Krause & Anson (16) for SCI vocational rehabilitation researchers to broaden the set of independent variables to include environmental factors when making further attempts to better understand the gaining of employment following SCI.

The overall rate of employment at 12 months (approximately 28%), although relatively low for an Australian cohort (15), was in line with employment rates reported in similar studies of those living with traumatic SCI (29), and sufficient to allow an examination of hypothesized predictor-employment status correlations. This study involved a relatively small number of participants (72 participants), which is a major limitation for a study wishing to study combinations of variables drawn from 3 domains. The unfavourably low subjects-to-variables ratio (along with a relatively low proportion of employed "cases") most likely contributed to the extremely wide confidence intervals associated with some of the predictor variable findings (see, for example, the uncertainty associated with the estimated effect size of having a skilled pre-injury profession). Another potential limitation in this current study was combining subjects with tetraplegia ASIA D impairments and paraplegia into low impairment group, as it is acknowledged that different mobility and functional abilities may affect vocational outcomes. Similarly, medical factors, such as neuropathic pain and severe spasticity that can interfere with return to work were not examined in the current study. Having a better ratio of subjects to variables in future studies would obviously allow for better model building. However, equally important would be the re-examination of the stability of the currently identified predictors when participants are followed up at more distant points in time, such as 2–5 years post-discharge. Many studies have reported higher return to work rates when individuals are assessed after more than one year post-discharge (30), but a key question is the stability of predictors across different follow-up time periods. Ideally, for intervention development, a small number of malleable factors will be predictive of post-

discharge employment achievements across the whole of the initial decade post-discharge, when most returns to work are first attempted.

One of the most important conclusions from the present study is that, when attempting to predict employment achievement post-discharge from SCI rehabilitation, useful classification accuracy can be obtained by using a set of variables covering injury, demographic, and community reintegration domains. The stability and relative contribution of the novel participation variable, as well as other potential environmental and personal contextual predictors, need to be further investigated, particularly when used in studies involving longer follow-up periods than the present 12 months.

REFERENCES

1. Guttmann L. Statistical survey on one thousand paraplegics and initial treatment of traumatic paraplegia. Proc R Soc Med 1954; 47: 1099–1113.
2. Britell C. Why aren't they working? J Am Paraplegia Soc 1991; 14: 1–2.
3. Levi R. The Stockholm Spinal Cord Injury Study: Medical, economical and psychosocial outcomes in a prevalence population. Karolinska Institutet: Stockholm; 1996.
4. Trieschmann R. Spinal cord injuries: psychological, social and vocational rehabilitation. Demos Publications: New York; 1988.
5. Kuoppala J, Lamminpaa A. Rehabilitation and work ability; a systematic literature review. J Rehabil Med 2008; 40: 796–804.
6. World Health Organization (WHO). International Classification of Functioning, Disability and Health. Geneva: WHO; 2001.
7. McColl M, Stirling P, Walker J, Corey P, Wilkins R. Expectations of independence and life satisfaction among aging spinal cord injured adults. Disabil Rehabil 1999; 21: 231–240.
8. Linn M, Sandifer R, Stein, S. Effects of unemployment on mental and physical health. Am J Public Health 1985; 75: 502–506.
9. McKee-Ryan F, Song Z, Wanberg C, Kinicki A. Psychological and physical well-being during unemployment: a meta-analytic study. J Appl Psychol 2005; 90: 53–76.
10. DeVivo M, Richards J. Community reintegration and quality of life following spinal cord injury. Paraplegia 1992; 30: 108–112.
11. Krause J, Sternberg M, Maides J, Lottes S. Employment after spinal cord injury: differences related to geographic region, gender, and race. Arch Phys Med Rehabil 1998; 79: 615–624.
12. Kreuter M, Siosteen A, Erkholm B, Bystrom U, Brown D. Health and quality of life of persons with spinal cord lesion in Australia and Sweden. Spinal Cord 2005; 43: 123–129.
13. Schonherr M, Groothoff J, Mulder G, Eisma W. Participation and satisfaction after spinal cord injury: results of a vocational and leisure outcome study. Spinal Cord 2005; 43: 241–248.
14. Murphy G, Athanasou J. Vocational potential and spinal cord injuries: a review and evaluation. J Appl Rehab Counsel 1994; 25: 47–52.
15. Murphy G, Young A. Vocational achievement following traumatic spinal cord injury. In: Craig A, Tran Y, editors. Psychological aspects associated with spinal cord injury rehabilitation: new directions and best evidence. New York: Nova Science Publishers; 2008, p. 83–92.
16. Krause J, Anson C. Employment after spinal cord injury: relation to selected participant characteristics. Arch Phys Med Rehabil 1996; 77: 737–743.
17. Young M, Alfred,W, Rintala D, Hart K, Fuhrer M. Vocational status of persons with spinal cord injury living in the community. Rehabil Couns Bull 1994; 37: 229–243.
18. Tate D, Stiers W, Daugherty J, Forchheimer M, Cohen E, Hanson N. The effects of insurance benefits coverage on functional and psychosocial outcomes after spinal cord injury. Arch Phys Med Rehabil 1994; 75: 407–414.
19. MacKenzie E, Shapiro S, Smith R, Siegel J, Moody M, Pitt A. Factors influencing return to work following hospitalization for traumatic injury. Am J Public Health 1987; 77: 329–334.
20. Cripps R. Spinal cord injury, Australia 2004–2005. Injury Research and Statistics Series Number 29. Adelaide: AIHW (AIHW cat no. INJCAT86); 2006.
21. Cripps R. Spinal cord injury, Australia 2003–2004. Injury Research and Statistics Series Number 25. Adelaide: AIHW (AIHW cat no. INJCAT77) (reissued with corrections: 23 January 2006); 2005.
22. American Spinal Injury Association. International standards for neurologic and functional classification of spinal cord injury. Chicago: American Spinal Cord Association; 1992.
23. Keith RA, Granger CV, Hamilton BB, Sherwin FS. The functional independence measure: a new tool for rehabilitation. Adv Clin Rehabil 1987; 1: 6–18.
24. McColl M, Davies D, Carlson P, Johnston J, Minnes P. The Community Integration Measure: Development and preliminary validation. Arch Phys Med Rehabil 2001; 82: 429–434.
25. Whiteneck G, Charlifue S, Gerhart K, Overholser J, Richardson G. Quantifying handicap; a new measure of long-term rehabilitation outcomes. Arch Phys Med Rehabil 1992; 73: 519–526.
26. McShane S, Karp J. Employment following spinal cord injury: a covariance structure analysis. Rehabil Psych 1993; 38: 27–40.
27. Lidal I, Huynh T, Biering-Sorensen F. Return to work following spinal cord injury: a review. Disabil Rehabil 2007; 29: 1341–1375.
28. Minnes P, Carlson P, McColl M, Nolte M, Johnston J, Buell K. Community integration: a useful construct, but what does it really mean? Brain Injury 2003; 17: 149–159.
29. Forchheimer M, Tate D. Enhancing community re-integration following spinal cord injury. NeuroRehabilitation 2004; 19: 103–113.
30. Meade M, Lewis A, Jackson M, Hess D. Race, employment, and spinal cord injury. Arch Phys Med Rehabil 2004; 85: 1782–1792.