Research
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FACTORS WHICH ARE PREDICTIVE OF RETURN TO WORK AFTER STROKE

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ABSTRACT: *Stroke impacts on a survivor's ability to participate in community activities such as return to work (RTW) and affects people who are within the working age. There is a dearth of literature on RTW after stroke in developing countries. This study aimed to bridge this gap in South Africa, and was conducted within the Gauteng province as it comprises the largest share of the South African population.*

Seventy two stroke survivors participated in this cross-sectional study. A demographic questionnaire; Barthel index; Modified Rivermead mobility index and Montreal cognitive assessment were used to determine the characteristics of study participants. The mean (standard deviation) scores for the Barthel Index (BI), Modified Rivermead mobility index (MRMI) and Montreal cognitive assessment (MoCA) were 19.6 (±0.2), 39.5 (±0.9) and 25.1 (±4.8) respectively. Thirty one (43%) of the stroke survivors returned to work at six months after stroke. Stroke survivors with left hemiplegia had a greater chance of RTW than those with right hemiplegia (odds ratio 7.7). For every unit increase in the BI and MoCA score, the likelihood of RTW increased by 1.6 and 1.3 respectively.

Conclusion: *Side of hemiplegia, independence in activities of daily living and cognitive ability were found to be predictors of RTW at six months after stroke. It is important to identify people with cognitive impairments after stroke so that efforts can be made to increase awareness of the potential role that cognitive impairments may play in RTW.*

KEY WORDS: *STROKE; RETURN TO WORK; COGNITIVE ABILITY; ACTIVITIES OF DAILY LIVING.*

INTRODUCTION

Stroke affects people who are still within the working age and the incidence of stroke in people younger than 65 years has increased over the past few years with almost 5% occurring in those younger than 45 years of age (Roding et al 2003). The increasing number of working age stroke survivors was also reported in Wolf et al (2009)'s study. They reported that a significant number of people who have had a stroke are less than 55 years old. This implies that with the increasing number of young stroke survivors and improved health services, stroke survivors are likely to live longer and would need to continue working for financial sustainability. Independent income generation would also provide a sense of purpose in life for young stroke survivors.

An independent income is more financially beneficial than relying on a social grant (de Koker et al 2006). Rehabilitation programmes for stroke survivors should focus on resumption of work where possible rather than on encouraging stroke survivors to apply for early retirement or disability grants (McLean 2007). In Duff (2012)'s study on stroke survivors within the Gauteng province, which included 97 stroke survivors up to two years after stroke, only one stroke survivor had vocational rehabilitation. This indicates that rehabilitation of stroke survivors is focused on recovery of activities necessary for daily living, while often overlooking psychosocial recovery which includes RTW (Guise et al 2010).

An important social outcome of rehabilitation for working age stroke survivors is returning to work after stroke (Daniel et al 2009). Duff (2012) found a RTW rate of 34% for stroke survivors within the Gauteng province of South Africa up to two years after a stroke. Peters et al (2012) in their Nigerian study found a RTW rate of 55% for stroke survivors up to eight years after stroke. Most of the people who RTW, do so within three to six months, with a second peak of RTW at 12 to 18 months after stroke (Treger et al 2007). Thus the focus on RTW should be within three to six months period after stroke. For those who do not RTW within six months, there might be a need to follow them up to 18 months to assist them with RTW where possible.

Stroke survivors experience poorer quality of life and worse psychosocial

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outcomes than healthy controls (Roding et al 2003). This can be due to the significant work and social dysfunction experienced by most stroke survivors (Hommel et al 2009). Return to work can improve these outcomes by contributing to life satisfaction, wellbeing, self worth and social identity, at least partly through independence gained from income generation (Medin et al 2006). It is important to acknowledge that not all stroke survivors will RTW as a variety of factors such as the level of functional ability affect RTW (Vestling et al 2003). Besides level of functional ability, high unemployment rate and poor socio-economic status may also affect RTW as disability insurance and routine social security benefits may deter stroke survivors from returning to work (Treger et al 2007).The following seven broad categories of factors were reported to have an influence on RTW: age (Rollnik and Allman 2011); type of job (Noreau et al 2010); reasonable accommodation (Medin et al 2006); functional and cognitive ability (Jones et al 2006); the presence of co-morbidities (Mars 2004); family support (Salter et al 2008); as well as community and work environmental barriers (World Health Organisation Report on Disability, 2011).

There is a dearth of literature on RTW after stroke in developing countries. Thus, the aim of this study was to establish factors that are predictive of RTW. This study was conducted within the Gauteng province as it comprises the largest share of the South African population (Statistics South Africa 2013).

METHODS

A quantitative cross-sectional study was carried out to establish factors which are predictive of RTW. Participants were recruited from two government hospitals and one private hospital. This study was part of a randomised controlled trial (RCT) study which was testing a workplace intervention programme for stroke survivors. The sample for this cross sectional study consisted of stroke survivors who were blue and white collar employees and worked in various employment sectors. The sample size calculation was based on the principle that for every factor that is considered to have a possibility of influencing the results of the study, at least ten participants are required (Nunnaly 1978). The previously mentioned seven broad categories of factors that were reported to influence RTW were used to calculate the minimum sample size for this study (n=70). Stroke survivors were included if they were employed at the time of having stroke and were independent in activities of daily living (ADL) before the stroke. The diagnosis of stroke was primarily based on the history of the current medical condition and clinical presentation.

INSTRUMENTATION

A demographic questionnaire was developed to establish the characteristics of all stroke survivors included in the study. A project development group meeting with eight stroke rehabilitation therapists (two physiotherapists working in the field of neurological rehabilitation, two occupational therapists with vocational rehabilitation experience, three therapists with research experience, and one therapist working in the field of public health) was held to validate the content of the demographic questionnaire. Activities of daily living were established using the Barthel Index (BI).The coefficient alpha of the BI was found to be 2.0 by Green et al (2001). There are many versions of the BI, but the 10 item BI with a total score of 20 (Collin et al 1988) was used in this study. This choice was based on the high reliability coefficient of this version (0.99) when compared with the original BI (0.87), Modified BI (0.95) and the Modified scoring (0.90) (Shah et al 1989). A BI score of at least 60% indicates that a person is independent for vital care, such as moving around unassisted, sphincter control, and eating in addition to personal toileting (Sulter et al 1999). Independence with minimal assistance (e.g. ability to get dressed and move from arm-chair to bed unassisted) was found to coincide with a score of 85% (Sulter et al 1999). A BI score of 90% (18/20) signifies the turning point whereby help from another person is not required (Uyttenboogaart et al 2005).

Mobility functional level was established using the Modified Rivermead Mobility Index (MRMI). The MRMI is a valid and reliable tool that requires minimal training before use (Johnson and Selfe 2004). The MRMI has responsiveness (effect size =1.15), test-retest reliability (r = 0.731), inter-rater reliability (ICC = 0.98) and internal consistency (Cronbach's alpha = 0.93). For there to be a significant change in the patient's mobility level, there has to be a greater than 4.5 change in the MRMI score (Lennon and Johnson 2000).

The Montreal Cognitive Assessment (MoCA) was used to establish the cognitive ability of the study participants. The MoCA has sensitivity of 90% and 94% when using a cut-off score of 26 (Smith et al 2007). The test-retest reliability of the MoCA is 0.92 with an internal consistency of 0.83 (Nasreddine et al 2005). The total possible score is 30 points and a score of 27.4 (2.2) or above is considered normal, 22.1 (±3.11) signifies mild cognitive deficits and that of 16.2 (±4.8) indicates that there is severe cognitive impairment (Nasreddine et al 2005).

A return to work questionnaire was used to establish the rate of RTW. This questionnaire was developed and validated for content by Duff (2012) in the Gauteng province. It is a tick list that indicates whether stroke survivors returned to work (premorbid job or new job), duration of time they had been back at work, intention to stay at work or resign, which adaptations were made to the working environment, and the current financial role that the stroke survivor holds in the family. If he/she did not RTW, a list of possible reasons was provided for the stroke survivor to select from (for example family did not allow her/him to go back to work; lack of transport; embarrassed about the disability; building not accessible).

PROCEDURE

Physiotherapists in charge of the neurological rehabilitation sections at the three recruitment hospitals were contacted by the first author on a regular basis to identify new stroke survivors who fitted the inclusion criteria. She then contacted the stroke survivors who met the inclusion criteria telephonically to make an appointment for interviewer administered completion of the demographic questionnaire, MoCA, MRMI, BI and

RTW questionnaire, after consent was obtained. This was done at six months after the stroke at the stroke survivors' homes.

DATA ANALYSIS

The STATA software programme version 12.1 was used to analyse data. Categorical data were summarised as numbers and percentages. Continuous data were summarised as means and standard deviations. The percentage of stroke survivors who returned to work and those who did not RTW was calculated to obtain the rate of RTW after stroke. To identify factors that are predictive of RTW the following methods were used: an initial univariate analysis was done to identify all the variables that had significance in the prediction of RTW. This was followed by a stepwise multivariate analysis, dropping insignificant variables in the process. The significance of the study was set at $p<0.05$.

Permission to conduct the study at the research sites and Gauteng Department of Health was sought and granted. Ethical clearance was granted by the University of the Witwatersrand committee for research on human subjects.

RESULTS

Seventy two stroke survivors participated in this study. The average age for the study sample was 45 (±8.7) years, 41 (51%) were male and 41 (51%) had right hemiplegia. The majority (55%) of the stroke survivors were married, breadwinners (63%), had a grade 11 to 12 educational level (64%), an income above R5000 (46%) and had a helper (74%) whom they did not have to pay (81%). The average number of people who were financially dependent on the stroke survivor was 3 (±1.8). Thirty nine percent of the stroke survivors had speech problems with the most common speech problem being dysphasia (45%). Thirty five (49%) of the stroke survivors received a workplace intervention programme within the RCT study.

Figure I illustrates the most common co-morbidities found in the study sample. All stroke survivors in this study received physiotherapy, followed by occupational therapy (78%), psychology/social work (48%) and speech therapy (44%).

The average BI, MRMI and MoCA scores indicating the stroke survivors' ADLs, mobility and cognitive ability six months after stroke are shown in Table 1. The BI mean score was above 18 (90%) indicating that most stroke survivors were independent with ADLs. The mean MoCA score was 25.1 (±4.8) which is less than the score for normal cognitive ability of 27.4 (2.2) (Nasreddine et al 2005) indicating that some of the stroke survivors had cognitive impairments.

Thirty one (43%) of the stroke survivors returned to work six months after the stroke. The job description was changed for most (55%) of the stroke survivors (light duty or changed from labour intensive to administrative); however very few (23%) had work adaptations made. The majority (97%) of stroke survivors who had returned to work returned to full time employment. The most common occupation was that of administrators (34%) followed by domestic workers/shop packers (23%); however in total there were more blue (55%) than white (45%) collar occupations. White collar workers in this study are those that perform work in an office environment and may involve sitting at a computer or desk and blue collar workers are members of the working class who perform manual labour which involve skilled or unskilled, manufacturing, mining, construction, mechanical, maintenance, technical installation and many other types of physical work.

Table 2 shows results of the occupations and key physical job demands of stroke survivors who returned to work and those who did not RTW at six months after the stroke. There was no statistically significant difference between RTW rate and the stroke survivors' occupation and physical job demands. The average number of years that stroke survivors had in their current occupation was 10.5 (±8.6) and the average sick leave duration was 7.2 (±3.3) weeks. The reasons for returning or not returning to work after the stroke are presented in Table 3. The most common reason for RTW was financial (61%) and

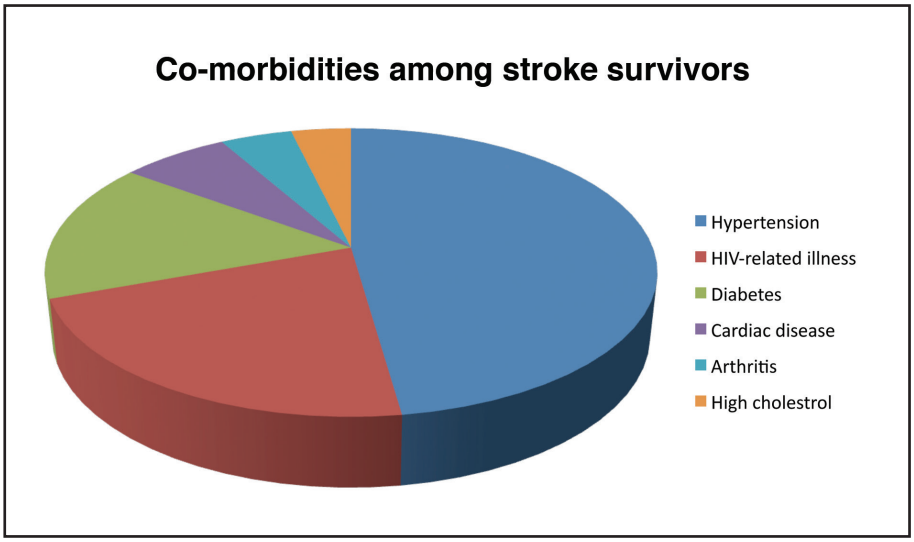

Figure I: Co-morbidities among stroke survivors

Table 1: Stroke survivors' activities of daily living, mobility and cognitive ability (n = 72)

	BI (out of 20)	MRMI (out of 40)	MoCA (out of 30)
Mean (SD)	19.6 (0.2)	39.5 (0.9)	25.1 (4.8)
Minimum score	16.5	37	7.5
Maximum score	20	40	30

for not returning to work was that their previous employer would not offer them their job again (29%).

Factors which were predictive of RTW are shown in Table 4. Stroke survivors who had left hemiplegia had a 7.7 greater odds of RTW than those with right hemiplegia ($p < 0.001$; CI: 2.6 – 23.2). Results of the stepwise multivariate analysis indicate that for every unit increase in the BI and MoCA score, the likelihood of RTW increased by 1.6 and 1.3 respectively. An analysis to establish if the influence of side of hemiplegia on RTW could be due to speech problems was done. Stroke survivors with right hemiplegia were 7.1 times more likely to have speech problems than those with left hemiplegia ($p < 0.001$; CI: 2.4 – 20.7). Stroke survivors who received a workplace intervention in the RCT study were 6.9 times more likely to RTW than those who did not receive the intervention.

DISCUSSION

The primary goal of this study was to establish factors that are predictive of RTW among stroke survivors in Gauteng at six months after stroke. Factors which were found to have a significant relationship with RTW were independence in ADL (BI), cognitive ability (MoCA); and side of hemiplegia.

Improvement in independence with ADL increased the likelihood of RTW for stroke survivors in this study. This confirms Saeki (2000)'s findings that independence with ADL is an important indicator of whether a stroke survivor would RTW or not. Independence in ADL has also been identified as a significant determinant of RTW by other researchers (Treger et al 2007). Poor performance in ADL is indicative of severity of hemiplegia which is a negative predictor of RTW (Peters et al 2012; Treger et al 2007).

Functional ability should not be considered in isolation as a factor that influences RTW because most stroke survivors in this study were independent in ADL at six months following the stroke but less than half eventually returned to work. This indicates that a combination of factors contribute towards ability to RTW. Most of the stroke survivors

Table 2: Occupations and key physical job demands of stroke survivors who returned work and those who did not RTW at six months follow-up (n = 72)

	Did not RTW (n = 41)	Returned to work (n = 31)	p value
	n (%)	n (%)	
Occupation			
Engineer	0 (0)	1 (3)	
Administrator	14 (34)	10 (32)	
Driver	2 (5)	1 (3)	
Police officer	2 (5)	2 (7)	
Accountant	0 (0)	2 (7)	
Domestic worker/ Shop packer	11 (27)	4 (13)	0.54
Teacher	4 (10)	3 (10)	
Nurse	1 (2)	1 (3)	
Baker/confectionery worker	1 (2)	1 (3)	
Mail sorter	0 (0)	1 (3)	
Machine operator	4 (10)	4 (13)	
Plumber	2 (5)	1 (3)	
Key physical job demands			
Admin sitting	7 (17)	7 (23)	
Labour intensive sitting	1 (2)	1 (3)	0.74
Admin standing	2 (5)	3 (10)	
Labour intensive standing	22 (54)	13 (42)	
Walking/running	0 (0)	1 (3)	
Driving	2 (5)	1 (3)	
Admin talking	7 (17)	5 (16)	

Table 3: The main reasons for RTW and no RTW after stroke

Reasons for returning to work (n = 31)	n (%)	Reasons for not returning to work (n = 41)	n (%)
Finance	19 (61)	Old employer would not offer the job	12 (29)
Boredom	8 (26)	Expressive aphasia	5 (12)
Contact with colleagues	2 (7)	Inability to access transport	4 (10)
Enjoyment of work	2 (7)	Upper limb dysfunction	4 (10)
Personal development	1 (3)	Fatigue	3 (7)
Motivation from family	1 (3)	Difficulty walking and demotivation	2 (5)
Personal development	1 (3)	Poor memory, vision and cognition and depression	1 (2)

*A person could give more than one reason

Table 4: Factors that had an influence on RTW after stroke: multivariate analysis

Variable	OR	SE	z	p>|z|	95% CI
Received workplace intervention	6.9	3.7	3.6	<0.001	2.4 – 19.8
BI six month score	1.6	0.3	2.1	0.04	1.0 – 2.4
MoCA six month score	1.3	0.1	3.2	0.001	1.1 – 1.5
Left hemiplegia	7.7	4.3	3.7	<0.001	2.6 – 23.2

*OR = odds ratio; SE = standard error; CI = confidence interval

would seem to be independent in ADL and functional ability even though they may not be able to leave their homes because of activity limitations such as decreased walking velocity (Schmid et al 2007). A limitation of this study is that walking speed and endurance were not assessed; however Allen et al (2011) found that people with hemiparesis generally have low walking speeds with values ranging from 0.23 to 0.73 metres/second. It is thus possible that inability to RTW in this study population which had good ADL and mobility scores, might be due to poor walking speed and endurance which is required to RTW. Reduced walking speed may add to the travelling time of the stroke survivor if they have to walk to get public transport on their way to work. This may be the case for stroke survivors who indicated that their inability to access transport was the main reason they did not RTW.

Improvement in cognitive ability as measured with the MoCA was related to an increased likelihood to RTW in this study. These findings agree with those reported by Roding et al (2003). Jones et al (2006) also showed that when a person has cognitive impairments, they experience the lowest employment rates as they are less likely to be employed in the competitive labour market. If a less cognitively demanding job is not available for stroke survivors with cognitive impairments at their workplace, the employer might not be able to accommodate them. It is important to identify people with cognitive impairments early after stroke so that efforts can be made to increase awareness of the potential role that the cognitive impairments may play in the RTW process (O'Connor et al 2011). Therapists' knowledge of a stroke survivor's cognitive level will also increase her/his chances of receiving cognitive training during the rehabilitation process and thus increase the likelihood of RTW (McDowd et al 2003). Most stroke survivors in this study did not select cognitive impairments as the main reason for not returning to work even though the mean MoCA scores were below the normal score. This is not an unexpected finding as cognitive impairments are common following stroke (Roding et al 2009). There is a possibility that cognitive impairments were barriers to RTW even though it was not specifically identified by the stroke survivors.

The majority of the stroke survivors with left hemiplegia returned to work and had greater odds of RTW than those with right hemiplegia. It was also found that those with right hemiplegia had a much higher likelihood to suffer speech problems than those with left hemiplegia. Speech problems were more of a limiting factor for RTW than the hemisphere lateralisation of stroke and this can be seen in that 12% of the stroke survivors indicated that expressive aphasia was their main reason for not returning to work. Bernspang and Fisher (1995) also established that stroke survivors with left and right hemiplegia have hemispheric-specific differences in motor impairments, but do not differ significantly in ADLs. Social functioning, including RTW, was also not significantly related to hemisphere lateralisation of stroke in a study by Hommel et al (2009). It would be reasonable to conclude that speech impairments, and not hemisphere lateralisation, influenced RTW in this study.

Since most jobs require speech skills, speech impairments could make some types of work difficult. This may result in some stroke survivors having to change occupations if they cannot be reasonably accommodated for speech impairments in their current occupation. The limiting effect of speech impairments and the negative association between RTW and aphasia was also reported by Alaszewski et al (2007). The results of this study confirm the findings of these researchers.

LIMITATIONS

Age, educational level, higher income and type of occupation were found to have an influence on RTW in other studies (Rollnik and Allman 2011; Trygged et al., 2011; Grammenos 2003; Vestling et al 2003), but did not have an influence on RTW in this study. This might be due to the workplace intervention received by 49% of the stroke survivors as the studies referred to were mainly observational with no intervention to facilitate the RTW. Return to work in this study may have been facilitated more by the RTW intervention which may have resulted in employer understanding and willingness to accommodate some of the stroke survivors, irrespective of their age, educational level and type of occupation. Thus, it may be useful to conduct another study with no deliberate intervention group in order to get a true reflection of factors which predict RTW after stroke.

CONCLUSION

Side of hemiplegia, independence in activities of daily living and cognitive ability were found to be predictors of RTW at six months after stroke. Vocational rehabilitation for stroke survivors should include early identification of cognitive and speech impairments and should strive for improvement in ADL and mobility functional ability. In addition to improving functional, cognitive and speech function, it is important for therapists to identify stroke survivors with potential to RTW and assist them with the RTW process. This will require involvement in the workability assessment process and will require that therapists explore possibilities of reasonable accommodations.

REFERENCES

Alaszewski A, Alaszewski H, Potter J, Penhale B 2007 Working after a stroke: Survivors' experiences and perceptions of barriers to and facilitators of the return to paid employment. Disability and Rehabilitation 29 (24): 1858 – 1869

Allen L, Kautz A, Neptune R 2011 Step length asymmetry is representative of compensatory mechanisms used in post-stroke hemiparetic walking. Gait and Posture 33: 538–54

Bernspang B, Fisher AG 1995 Differences between persons with right or left cerebral vascular accident on the Assessment of Motor and Process Skills. Archives of Physical Medicine Rehabilitation 76 (12): 1144 - 1151

Collin C, Wade DT, Davies S, Horne V 1988 The Barthel ADL Index: A reliability study. International Disability Studies 10: 61 – 63

Daniel K, Wolfe C, Busch M, McKevitt C 2009 What are the social consequences of stroke for working-aged adults? A systematic review. Stroke 40 (6): 431 – 440

De Koker C, de Waal L, Vorster J 2006 A profile of social security beneficiaries in South Africa: Volume 3. Data Desk, Department of Sociology and Social Anthropology: Stellenbosch University

Duff N 2012 Perceived factors that influence return to work after stroke. Unpublished research report. Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, South Africa

Green J, Forster A, Young J 2001 A test-retest reliability of the Barthel Index, the Rivermead Mobility Index, the Nottingham Extended Activities of Daily Living Scale and the Frenchay Activities Index in stroke patients. Disability and Rehabilitation 23: 670 – 676

Grammenos S 2003 Illness, disability and social inclusion. Dublin, European Foundation for the Improvement of Living and Working Conditions http://www.eurofound.europa.eu/pubdocs/2003/35/en/1/ef0335en.pdf (Accessed 6 August 2010)

Guise J, McKinlay A, Widdicombe A 2010 The impact of early stroke on identity: a discourse analytic study. Health 14: 75 – 90

Hommel M, Trabucco-Miguel S, Joray S, Naegele B, Gonnet N, Jaillard A 2009 A Social dysfunctioning after mild to moderate first ever stroke at vocational age. Journal of Neurosurgery Psychiatry 80: 371 – 375

Johnson L, Selfe J 2004 Measurement of mobility following stroke: a comparison of the Modified Rivermead Mobility Index and the Motor Assessment Scale. Physiotherapy 90: 132 - 138

Jones MK, Latreille PL, Sloane PJ 2006 Disability, gender and the British Labour market. Oxford Economic Papers 58: 407 – 449 DOI: 10.1093/oep/gp1004

Mars M 2004 HIV – Implications for exercise on treatment and rehabilitation. The South African Journal of Physiotherapy 60 (4): 9 - 14

McDowd J, Filion D, Pohl P, Richards L, Stiers W 2003 Attentional Abilities and Functional Outcomes Following Stroke. The Journals of Gerentology 58 (1): 45 - 53

McLean R 2007 Employment Status Six Months after Discharge from Inpatient Rehabilitation for a Mild-to-moderate Physical Disability. Annals Academy of Medicine Singapore 36 (1): 18 - 21

Medin J, Barajas J, Ekberg K 2006 Stroke patients' experiences of return to work. Disability and Rehabilitation 28 (17): 1051 – 1060

Nasreddine Z, Phillips NA, Bedirian V, Charbonneau S, Whitehead V, Collin I, Cummings J, Chertkow H 2005 The Montreal Cognitive Assessment, MoCA: A Brief Screening Tool For mild Cognitive Impairment. Journal of the American Geriatrics Society 53: 695 – 699

Noreau L, Escorpizo R, von Elm E, Miller WC, Tawashy A 2010 Work and Employment. In Eng JJ, Teasell RW, Miller WC, Wolfe DL, Townson AF, Hsieh JTC, Connoly SJ, Mehta S, Sakakibara BM, editors. Spinal Cord Injury Rehabilitation Evidence. Volume 3.0 Vancouver: pages 1 - 14

Nunnaly JC 1978 Psychometric theory, 2nd edn. Pages 230 – 245. McGraw-Hill, New York

O'Connor M, Meuller L, Van Ormer A, Drake R, Penk W, Rosenheck R, Semiatin A, Drebing C 2011 Cognitive impairment as barrier to engagement in vocational services among veterans with severe mental illness. Journal of Rehabilitation Research and Development 48 (5): 597 – 608

Peters G, Buni S, Oyeyemi A, Hamzat T 2012 Determinants of return to work among Nigerian stroke survivors. Disability and Rehabilitation Early Online 1-5 DOI: 10.3109/09638288.2012.697251

Roding J, Lindstrom B, Malm J, Ohman A 2003 Frustrated and invisible-younger stroke patients' experiences of the rehabilitation process. Disability and Rehabilitation 25 (15): 867 – 874

Roding J, Glader E, Malm J, Eriksson M, Lindstrom B 2009 Perceived impaired physical and cognitive functions after stroke on men and women between 18 to 55 years of age – a national survey. Disability and Rehabilitation 31 (13): 1092 – 1099

Rollnik J, Allman J 2011 Occupational Rehabilitation of neurological patients – long term outcome data. Rehabilitation (Stuttg) 50 (1): 37 – 43

Saeki S 2000 Disability management after stroke: its medical aspects for workplace accommodation. Disability and Rehabilitation 22 (13-14): 578 – 582

Salter KL, Moses MB, Foley NC, Teasell RW 2008 Health-related quality of life after stroke: what are we measuring? International journal of Rehabilitation Research 31 (2): 111 – 117

Schmid A; Duncan PW; Studenski S; Min Lai S; Richards L; Perera S; Wu SS 2007 Improvements in Speed-Based Gait Classifications Are Meaningful. Stroke 38: 2096-2100. doi: 10.1161/STROKEAHA.106.475921

Smith T, Gildeh N, Holmes C 2007 The Montreal Cognitive Assessment: validity and utility in a memory clinic setting. Canadian Journal of Psychiatry 52: 329 - 332

Statistics South Africa 2013 Mid-year population estimates http://www.statssa.gov.za/publications/P0302/P03022013.pdf (Accessed 05 August 2013)

Sulter G, Steen C, de Keyser J 1999 Use of the Barthel Index and Modified Rankin Scale in acute stroke trials. Stroke 30: 1538 – 1541

Treger I, Shames J, Giaquinto S, Ring H 2007 Return to work in stroke patients. Disability and Rehabilitation 29 (17): 1397 – 1403

Trygged S, Ahacic K, Kareholt I 2011 Income and education as predictors of return to working life among younger stroke patients. BMC Public Health 11: 742. http:/www.biomedcentral.com/1471-2458/11/742

Uyttenboogaart M, Stewart RE, Vroomen PC, de Keyser J 2005 Optimizing cut off scores for Barthel index and Modified Rankin Scale for defining outcome in acute stroke trial. Stroke 36: 1984 - 1987

Vestling M, Tufvesson B, Iwarsson S 2003 Indicators for return to work after stroke and the importance of work for subjective well-being and life satisfaction. Journal of Rehabilitation Medicine 35 (3):127 – 131

Wolf T, Baum C, Connor L 2009 Changing face of stroke: Implications for occupational therapy practice. American Journal of Occupational therapy 63 (5): 621 - 625

World Health Organisation Report on Disability 2011. World Health Organisation whqlibdoc.who.int/publications/2011/9789240685215_eng.pdf (Accessed 15 July 2012)