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SELF-EFFICACY IN RELATION TO IMPAIRMENTS AND ACTIVITIES OF DAILY LIVING DISABILITY IN ELDERLY PATIENTS WITH STROKE: A PROSPECTIVE INVESTIGATION

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Objectives: **The objectives of this prospective study, undertaken in elderly patients with stroke undergoing rehabilitation, were to determine to what extent fall-related self-efficacy changes over time, its relationships to objectively assessed functions and activities, and the predictive capacity of self-efficacy at discharge for activities of daily living 10 months after stroke.**

Methods: **The study comprised 37 patients, aged 66–89 years. Main outcome measurement instruments were the Falls Efficacy Scale (Swedish version), Berg Balance Scale and Functional Independence Measure.**

Results: **Significant improvements occurred in all these measures from admission to discharge, but patients with low self-efficacy at discharge showed less pronounced improvements than those with high self-efficacy. Falls Efficacy Scale (Swedish version) was closely associated with all other measures and was a more powerful predictor of activities of daily living than the observer-based measures of balance.**

Conclusion: **To minimize dependence in activities of daily living, rehabilitation interventions should incorporate self-efficacy enhancement.**

Key words: self-efficacy, fear of falling, stroke, balance, activities of daily living, motor function, ambulation.

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INTRODUCTION

The overall aim of this longitudinal study was to gauge the relevance of measuring perceived self-efficacy, in terms of falls-efficacy, in geriatric stroke rehabilitation.

After stroke, many patients experience a decline in their dynamic and static balance. This can lead to an increased risk of falling, and in particular may result in fear of falling (1, 2). Fear of falling is common among elderly persons, both those who have and have not experienced a fall (3). Fall-related self-efficacy is a psychological characteristic, based on the self-efficacy concept, that can have an influence on functional decline, as fear may limit a person's function to an extent beyond that due to an underlying impairment of physical ability alone (4). Self-efficacy is a central concept in Bandura's Social Cognitive Theory (5), and is defined as the degree of confidence possessed by persons in their ability to perform specific acts successfully. Perceived self-efficacy is thought to be domain-specific; that is, it pertains to a specific behaviour in a particular context and cannot necessarily be generalized to other behaviours or other contexts (5). In Bandura's perspective of the Social Cognitive Theory, behaviours most relevant to the domain of activity limitation consist primarily of self-care tasks, including personal activities of daily living (PADL) and instrumental activities of daily living (IADL). According to this theory, perceived self-efficacy beliefs regarding self-care behaviours should influence the likelihood that such behaviours will be undertaken; thus low self-efficacy should predict greater disability.

As an aid in preventing limitation of activity in elderly stroke victims, it would be useful to be able to identify factors contributing to decreased performance of routine activities of daily living (ADL).

One of the specific aims of this prospective study was to determine, in elderly stroke patients, the extent to which falls-efficacy changes over time, and to assess the relationships of falls-efficacy to objectively assessed function (balance and motor function) and the ability to perform simple ADLs. A further aim was to estimate the extent to which the degree of self-efficacy at discharge from subacute geriatric rehabilitation can be a meaningful predictor for the level of gross ADL 10 months after the onset of stroke.

SUBJECTS AND METHODS

Subjects

A total of 146 patients with confirmed stroke were admitted consecutively for rehabilitation to a geriatric rehabilitation department between December 1, 1999 and January 31, 2001. Of these 146 patients, 60 (42%) met the following criteria for inclusion in the study: older than 65 years; first ever stroke; interval since stroke of less than 8 weeks; able to communicate and understand instructions; no other severe disabilities that might hinder their training; and lived less than 50 kilometres from the participating hospital. Of these 60 patients, 12 declined and 7 were not asked to participate, leaving 41 patients. During the course of the investigation 4 further patients were lost to the study, giving a final selected stroke sample of 37 subjects. Table I gives some pertinent descriptions of the population.

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Table I. *Characteristics of the patients (*n *= 37)*

Variable	Measurement
Age (years, mean (SD))	78 (5.5)
Days post onset on admission (mean (SD))	22 (6.6)
Length of in-patient stay (mean (range))	20 (15.0) (8–68 days)
Female/male (*n*)	15/22
Stroke types	CI 29, ICH 7, SH 1
Stroke site	Right 9, Left 25, Brainstem 2, Cerebellum 1
Motor deficits*	Massive 10, Marked 5, Moderate 11, Mild 9, None 2
Walking ability (*n*)	None 12, With aid 19, Independent 6

* Classification according to Fugl-Meyer (12). Scores between 0 and 50 = massive hemiplegia, scores between 51 and 84 = marked motor impairment, scores between 85 and 95 = moderate impairment, scores between 96 and 99 = mild impairment, a score of 100 = normal motor function.
CI = cerebral infarction; ICH = intracerebral haemorrhage; SH = subarachnoid haemorrhage.

The Ethical Committee of the Faculty of Medicine at the University of Uppsala approved the investigation.

Procedures

Assessments were made on entry into the study (admission), at discharge and 10 months after stroke. Follow-up assessment was conducted at home or at the rehabilitation department. Measurements were performed by one and the same physiotherapist, who was not involved in the treatment of the patients.

Rehabilitative interventions were not standardized or in any way controlled. Each subject received all available interventions provided by the members of the geriatric rehabilitation unit team according to his or her individual needs. These interventions included medical, nursing, social and therapeutic interventions. The therapeutic interventions were designed by occupational therapists and physiotherapists following assessment of each individual and could include training in ADL, balance, mobility and low intensity strengthening. No specific training aimed at increasing self-efficacy was carried out.

Assessment instruments

In the present study only instruments with established reliability and validity were used.

Falls-efficacy was measured with the FES(S) (6), a modified version of the Falls Efficacy Scale (7) described previously in our reports (6, 8, 9). FES(S) assesses an individual's perceived confidence in task performance without falling in 13 items common in everyday life. The scale is divided into 2 subscales, 1 encompassing PADL (items 1–6) and 1 covering IADL (items 8–13). Item 7 (walking up and down stairs) is regarded as an intermediate item. The confidence in performing each activity without falling was rated on a visual analogue scale from 0 to 10 varying from "not at all confident" to "completely confident", giving a possible total score of 130. The maximal possible score for PADL and for IADL is 60. The FES(S) has a high test-retest reliability for the total scale (intra-class correlation, ICC = 0.97) and for the subscales PADL (ICC = 0.93) and IADL (ICC = 0.97) (20). The internal consistency of the instrument, expressed as Cronbach's alpha, is between 0.92 and 0.95 both for the subscales and for the overall scale (8). The FES(S) has been shown to be sufficiently responsive to indicate changes during the subacute rehabilitation period (9).

Balance was measured both with the Berg Balance Scale (BBS) (10) and with the balance subscale of the Fugl-Meyer Stroke Assessment Instrument (FMB) (11). The former encompasses 14 items. Each item is scored 0–4, giving a possible aggregated total score of 56. The latter, is a 7-item test for bedside use, particularly for assessment of sitting and standing balance after stroke. A 3-point scale (0–2) is applied to each item, providing a maximal possible aggregated score of 14.

For evaluation of *motor function,* the Fugl-Meyer Stroke Assessment Instrument was used (11, 12). Each of 50 functions is rated on a 3-point scale (0–2). The minimum possible aggregated score is thus 0 and the maximum is 100.

The Functional Ambulation Classification (FAC) (13, 14) was applied in order to document *walking ability*. The test includes 6 categories of walking ability. Level 0 describes a patient who cannot walk or requires help of 2 or more people to walk. At level 5, the subject can walk independently anywhere.

The Functional Independence Measure (FIM^{TM}) (15), manual number 4.0 of the Swedish translation, was used to measure *level of ADL disability*. Each of 18 items is rated on a 7-point scale along a continuum from 1 (total assistance needed) to 7 (complete independence), yielding an aggregated score from 18 to 126. The areas measured are basic self-care or ADL, sphincter control, transfers, locomotion, communication and social cognition. In the present investigation the areas of communication and social cognition were excluded; thus FIM motor comprised the sections of self-care, sphincter control, transfers and locomotion, giving a possible score ranging from 13 to 91. An FIM mobility score included only transfers and locomotion with a score between 5 and 35.

Statistics

The SPSS^{TM} version 10.0 was used for all analyses. As all instruments in the study used ordinal scales, non-parametric statistics were generally applied, namely Spearman's rho to examine the associations between the FES(S) and the other measurements, the Mann-Whitney U test to assess differences between groups, and Wilcoxon's signed-rank test to assess the level of significance of changes. The level of statistical significance was set at $p < 0.01$ for all tests, as a large number of independent tests were performed and this could lead to a relatively high risk of type I errors.

Based on earlier research (16) regarding self-efficacy and disability, we decided to assign all patients retrospectively into 2 different groups on the basis of their falls-efficacy scores (FES(S) total) at discharge. Patients who scored above the group median were assigned to a high self-efficacy group, and those scoring below the median were assigned to a low self-efficacy group. The scores of the new groups were then analysed for differences on admission, at discharge and at 10-month follow-up.

Linear multiple regression was performed to analyse the predictive effects of variables at discharge on ADL disability at follow-up as defined by the FIM motor and FIM mobility scores. Relationships between the predictive factors and outcome variables were first explored by calculating the Pearson product-moment correlation coefficients. To select variables to include in the multivariate regression model the backward selection method was used. The following variables were screened: age, gender, stroke type, BBS, FMB, FES(S) total. FIM motor and FIM mobility were included in respectively model.

RESULTS

For all the objective motor and balance scores, the 2 FIM scores and all 3 FES(S) measures, Wilcoxon's signed rank test showed significant improvements from admission to discharge, and further significant improvements from discharge to follow-up occurred for all measures except for FES(S) total, FES(S) PADL, motor function and FMB (Table II).

Table II. *Median values and ranges for confidence in task performance (FES(S)), motor function, balance (BBS; FMB), ambulation (FAC) and ADL (FIM) on admission (A), on discharge (D) and at 10-months follow-up (F). Level of significance given for differences between time points (*n *= 37)*

Variable	Admission median (Q1–Q3)	Discharge median (Q1–Q3)	Follow-up median (Q1–Q3)
FES(S) Total	47.0 (13–104)***	79.0 (43–113)	100.0 (44–129)
FES(S) PADL	32.0 (11–53)**	45.0 (28–53)	52.0 (29–60)
FES(S) IADL	15.0 (0–45)***	27.0 (13–54)****	37.0 (16–60)
Motor function	91.0 (33–97)***	96.0 (75–99)	95.0 (80–100)
BBS	36.0 (8–41)***	40.0 (21–49)****	45.0 (25–52)
FMB	10.0 (8–10)*	10.0 (9–11)	10.0 (10–12)
FAC	3.0 (0–4)***	4.0 (4–5)*****	5.0 (4–5)
FIM: Motor	58.0 (40–75)***	85.0 (66–90)*****	89.0 (80–91)
FIM: Mobility	18.0 (13–30)***	32.0 (26–35)*****	34.0 (28–35)

* $p < 0.01$, ** $p < 0.001$, *** $p < 0.0001$ admission vs discharge, **** $p < 0.001$, ***** $p < 0.001$ discharge vs follow-up.
FES(S) = falls efficacy scale (Swedish version); BBS = Berg balance scale; FMB = Fugal-Meyer stroke assessment balance instrument; FAC = functional ambulation classification; ADL = activities of daily living; PADL = personal ADL; IADL = instrumental ADL; FIM = functional independence measure.

Neither on admission nor at discharge were there any significant differences in scores in relation to age (dichotomized into 80 years of age or older vs those younger), gender or side of lesion.

At follow-up the older group of patients had significantly lower balance (BBS and FMB $p < 0.001$, and 0.01 respectively) than the younger group.

Relations between perceived confidence, balance, ambulation and ADL

At all 3 assessment times all concurrent correlations between FES(S) and the other measures related significantly, with rho ranging from 0.53 ($p < 0.01$) to 0.87 ($p < 0.001$). The BBS scores and the ambulation scores were relatively most closely correlated with FES(S) both on admission and at discharge, while at follow-up the total FIM score showed the greatest correlation with both FES(S) total and FES(S) PADL. All initial FES(S) scores correlated significantly with both discharge and follow-up balance, ambulation and ADL scores (rho = 0.56–0.81). Discharge FES(S) scores were also correlated significantly with follow-up scores (from rho = 0.49 between FES(S) PADL at discharge and FMB at follow-up to rho = 0.82 between FES(S) IADL at discharge and FAC at follow-up).

Low and high self-efficacy

Nineteen patients were assigned to the group with low self-efficacy, i.e. their FES(S) total scores at discharge were below the median score of 79, and 18 patients with scores above the median were assigned to the high self-efficacy group. The Mann-Whitney U test indicated that these 2 groups did not differ significantly in age, gender, diagnosis or length of time since stroke onset ($p > 0.05$). Patients with low falls-efficacy at discharge had significantly lower scores than those with high falls-efficacy concerning balance ($p < 0.01$) and locomotion ($p < 0.01$) on admission (Table III). At discharge and follow-up significant and more pronounced differences were evident between the 2 groups with lower values for balance ($p < 0.0001$), locomotion ($p < 0.0001$), and both FIM motor and FIM mobility ($p < 0.0001$) in the group with low self-efficacy at discharge.

Table III. *Median values and ranges for motor function, balance, locomotion and ADL in the groups with low and high self-efficacy at discharge. Low self-efficacy = FES(S) values below or at median (*n *= 19); high self-efficacy = FES(S) values above median (*n *= 18). p values are given for differences between groups*

	Admission		Discharge			
	Self-efficacy		Self-efficacy		Follow-up	
Measure	Low	High	Low	High	Low	High
Motor function	60.0 (16–99)	95.0 (25–91)	90.0 (9–100)	95.0 (31–100)	85.0 (3–100)	99.0 (47–100)
Balance (BBS)	21.0 (3–44)	39.0 (5–56)*	28.0 (4–48)	48.0 (13–56)***	25.0 (3–51)	50.0 (13–56)***
Balance (FMB)	8.0 (4–10)	10.0 (7–14)*	10.0 (4–14)	10.0 (8–14)	10.0 (4–13)	11.0 (7–14)*
Locomotion (FAC)	2.0 (0–5)	4.0 (0–5)*	4.0 (0–5)	5.0 (4–5)***	4.0 (0–5)	5.0 (4–5)***
ADL total (FIM)	47.0 (13–87)	71.0 (32–91)	75.0 (25–91)	87.0 (72–91)**	80.0 (38–91)	91.0 (84–91)***
ADL mobility (FIM)	17.0 (5–32)	27.0 (12–35)	27.0 (6–35)	34.0 (28–35)	28.0 (8–35)	35.0 (33–35)***

* $p < 0.01$, ** $p < 0.001$ and *** $p < 0.0001$ for low vs high.
ADL = activities of daily living; FES(S) = falls efficacy scale (Swedish version); BBS = Berg balance scale; FMB = Fugal-Meyer stroke assessment balance instrument; FAC = functional ambulation classification; FIM = functional independence measure.

Table IV. *Correlation coefficients between predictor variables measured at discharge and ADL disability 10 months post-stroke* (n = *37)*

	Outcome: FIM motor 10 months post-stroke		Outcome: FIM mobility 10 months post-stroke	
Predictor variables	Correlation coefficient	*p*-value	Correlation coefficient	*p*-value
Age	−0.34	0.04	−0.39	0.02
Gender	0.17	0.49	0.16	0.34
Diagnosis	−0.01	0.95	0.03	0.87
BBS	0.72	0.000	0.72	0.000
FMB	0.63	0.000	0.67	0.000
FES(S) total	0.73	0.000	0.74	0.000
FIM motor	0.81	0.000	–	–
FIM mobility	–	–	0.85	0.000

ADL = activities of daily living; BBS = Berg balance scale; FMB = Fugal-Meyer stroke assessment balance instrument; FES(S) = falls efficacy scale (Swedish version); FIM = functional independence measure.

Prediction of disability of ADL

Table IV summarizes the correlation coefficients of background and predictor variables, measured at discharge, with the outcome 10 months post-stroke. To adjust for potential non-linear associations, second-order term FES(S)**2 of the independent variables FES(S) total were included (see Fig. 1). The model which best predicted the level of ADL total at 10 months post-stroke included the variables FE(S) total, FES(S)**2 and FIM motor at discharge. This combination explained 77% of the variance of the outcome measure (Table V). FES (S) total accounted for the largest proportion of the variance. FIM mobility at 10 months was best explained by the combination of 4 predictor variables: FES motor, FES(S)**2, age and FIM mobility. This model accounted for 84.3% of the explained variance (Table V). Again, FES(S) total showed the highest unique contribution.

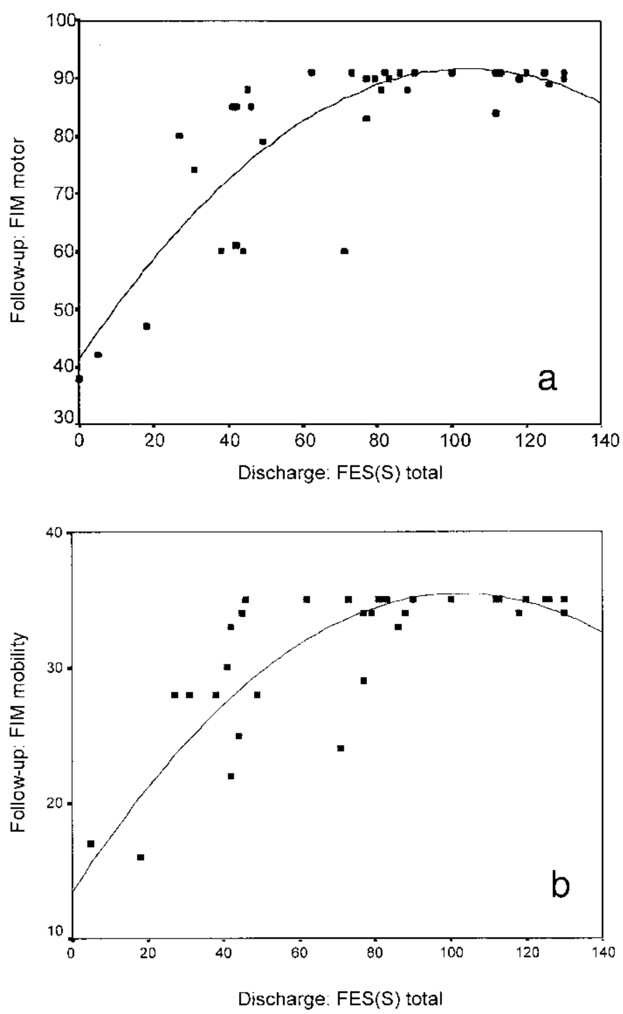

Fig. 1. Scatterplot of the relation between the predictor variable: Falls Efficacy Scale Swedish FES(S) total at discharge and the outcome variables (a) FIM motor and (b) FIM mobility.

DISCUSSION

First it must be said that in this investigation the selected sample of elderly stroke patients should not be regarded as representative. However, the major finding in this study was that the independent variable FES(S) had the highest explanatory value for ADL disability 10 months after stroke. Furthermore, the findings in the univariate analyses that there were close concurrent correlations at all points of measurement between the FES(S) and its subscales and all other types of measurement, and that the FES(S) measurements showed prospective (or predictive) close correlations with the other measures indicate that, although demonstrated in a small sample, FES(S) has acceptable predictive validity. The fact that the second order term of FES(S) was the major predictor indicates a non-linear correlation. This may perhaps best be explained by a ceiling effect of the dependent variable FIM motor. In most studies on predictors of ADL improvement, early predictors are identified in the acute stage. In a cross-validation study Löfgren et al. (17) failed to identify a sufficiently accurate model for predicting chances of late ADL improvement in stroke patients. Feys et al. (18) found that very early predictive accuracy diminished as predictions were made to a later stage in the recovery process, while assessments of variables at 2 and 6 months increased the percentage of explained variance at 12 months. Thus, accuracy in predicting ADL performance at follow-up can be improved substantially by using predictors obtained from discharge.

Prediction variables such as admission disability, urinary

Table V. *Selected models of regression analyses for the prediction of disability: FIM motor and FIM mobility at 10 months post-stroke from a clinical examination at discharge from geriatric rehabilitation (n = 38)*

FIM motor 10 months follow-up			FIM mobility 10 months follow-up		
Model: $R^2 = 77.0\%$			Model: $R^2 = 84.3\%$		
Predictors	Beta	*p*-value	Predictors	Beta	*p*-value
Constant	29.26	<0.000	Constant	26.61	0.002
FES(S) total	0.67	<0.000	FES(S) total	0.30	<0.000
FES(S)**2	−0.003	0.002	FES(S)**2	−0.003	<0.000
FIM motor	0.33	0.008	Age	−0.20	0.034
			FIM mobility	0.29	0.008

FIM = functional independence measure; FES(S) = falls efficacy scale (Swedish version).

continence, degree of motor impairment, age, orientation and level of consciousness, balance and perceived social reports have all been found to predict recovery after stroke (19) but we have located no studies in which the ability of self-efficacy to predict degree of independence in activities of daily living after stroke has been addressed. In community-residing elderly persons, Mendes de Leon et al. (20) found a significant interaction between self-efficacy and change in physical performance.

Female gender has been reported (3, 21) to be a significant risk factor for developing fear of falling. However, we did not observe any differences in falls-related self-efficacy between men and women. Nor did we find that patients with right hemispheric strokes, who are likely to have difficulties in perception, had a particularly great fear of falling.

It is well known that sub-acute improvement is common even in very elderly patients after stroke (22, 23), but the question of self-efficacy has been less well studied. However, the present findings substantiate those of Robinson-Smith et al. (24), who, using another self-efficacy measure in a sample of 77 patients with a mean age of 71 years, demonstrated that self-care self-efficacy improved with time after stroke.

In our study generally significant improvements were found between discharge and follow-up with the exceptions of FES(S) total and FES(S) PADL. The absence of significant improvements in FES(S) PADL may be explained by the fact that during the course of rehabilitation the patients had been trained in PADL to such a degree that they perceived adequate confidence in these tasks at discharge.

The present finding that at follow-up the low self-efficacy group showed a decline in motor function and balance, while the high self-efficacy group had increased their motor function and balance and the observation that the differences between the low and high self-efficacy groups increased over time, substantiate previous reports indicating that activity is related to level of self-efficacy (20). It may be argued that relatively more serious stroke would lead to a lower level of falls-efficacy. Although we cannot postulate with certainty that there were no differences in the severity of stroke, there were, in fact, no significant differences in motor function between the 2 groups at any of the assessment times. It appears that older stroke patients with low confidence in task performance are likely to have a poorer functional outcome and make less improvements than patients with high self-efficacy. After an acute event, high self-efficacy may help patients to regain their ability to perform activities of daily living, resulting in less ADL decline from their premorbid levels compared with individuals with low self-efficacy. This view is consistent with other observations on the influence of self-efficacy in the recovery process (25, 26). It therefore seems that identification and treatment of low confidence in task performance need to be considered in preventing decline and boosting further improvements.

CONCLUSION

Stroke patients admitted for geriatric rehabilitation made significant overall improvements in measures of functions and abilities from admission to discharge, but patients with low self-efficacy at discharge showed less improvement than those with high self-efficacy. Self-efficacy, as measured by the FES(S) scale at discharge, was a powerful predictor of ADL performance 10 months post-stroke, indicating that the benefit from rehabilitation interventions may increase by incorporation of self-efficacy into assessment and treatment.

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REFERENCES

1. Legters K. Fear of falling. Phys Ther 2002; 82: 264–272.
2. Forster A, Yong J. Incidences and consequences of falls due to stroke: a systematic inquiry. BMJ 1995; 311: 83–86.
3. Maki B, Holiday P, Topper A. Fear of falling and postural performance in the elderly. J Gerontol 1991; 46; 4: M123–131.
4. Tinetti ME, Mendes de Leon CF, Doucete JT, Baker DJ. Fear of falling and fall related efficacy in relationship to functioning among community-living elders. J Gerontol 1994; 49: M140–147.
5. Bandura A. Self-efficacy: the exercise of control. New York: WH Freeman and Co.; 1997.

6. Hellström K, Lindmark B. Fear of falling in patients with stroke: a reliability study. Clin Rehabil 1999; 13: 509–517.
7. Tinetti ME, Richman D, Powell L. Falls efficacy as a measure of fear of falling. l J Gerontol 1990; 45: P239–P243.
8. Hellström K, Nilsson L, Fugl-Meyer AR. Relationship of confidence in task performance with balance and motor function after stroke. Physiother Theory Pract 2001; 17: 55–65.
9. Hellström K, Lindmark B, Fugl-Meyer A. The falls efficacy scale, Swedish version: does it reflect clinically meaningful changes after stroke? Disabil Rehabil 2002; 9: 471–481.
10. Berg K, Wood-Dauphinée S, Williams SI. The balance scale: reliability assessment with elderly residents and patients with an acute stroke. Scand J Rehabil Med 1995; 27: 27–36.
11. Fugl-Meyer AR, Jääskö L, Leyman I, Olsson S, Steglind S. The post-stroke hemiplegic patient. I: a method for evaluation of physical performance. Scand J Rehabil Med 1975; 7: 13–31.
12. Fugl-Meyer AR. Post stroke hemiplegia assessment of physical properties. Scand J Rehabil Med Suppl 1980; 7: 56–60.
13. Holden MK, Gill KM, Magliozzi MR. Clinical gait assessment in the neurologically impaired: reliability and meaningfulness. Phys Ther 1984; 64: 35–40.
14. Holden MK, Gill KM, Magliozzi MR. Gait assessment for neurologically impaired patients: standards for outcome assessment. Phys Ther 1986; 66: 1530–1539.
15. Granger CV, Hamilton BB, Keith RA, Zielezny M, Sherwin FS. Advances in functional assessments for medical rehabilitation. Top Geriatr Rehabil 1986; 1: 59–74.
16. Söderlund A, Lindberg P. Cognitive behavioural components in physiotherapy management of chronic whiplash associated disorders (WAD)—a randomized group study. Physiother Theory Pract 2001; 17: 229–238.
17. Löfgren B, Nyberg L, Mattson M, Gustafson Y. Three years after in-patient stroke rehabilitation: a follow-up study. Cerebro Vasc Dis 1999; 9: 163–170.
18. Feys H, De Weerdt W, Nuyens G, Van de Winckel A, Selz B, Kiekens C. Predicting motor recovery of the upper limb after stroke rehabilitation: value of clinical examination. Physiother Research Int 2000; 5: 1–18.
19. Kwakkel G, Wagenaar RC, Kollen BJ, Lankhorst GJ. Predicting disability in stroke—a critical review of the literature. Age Ageing 1996; 25: 479–489.
20. Mendes de Leon C, Seeman T, Baker D, Richardson E, Tinetti E. Self-efficacy, physical decline, and change in functioning in community-living elders: a prospective study. J Gerontol: Soc Sci 1996; (51B); 4: S183–190.
21. Vellas BJ, Wayne SJ, Romero LJ, Baumgartner RN, Garry PJ. Fear of falling and restriction of mobility in elderly fallers. Age Ageing 1997; 26: 189–193.
22. Kong K-H, Chua KSG, Tow AP. Clinical characteristics and functional outcome of stroke patients 75 years and older. Arch Phys Med Rehabil 1998; 79: 1535–1539.
23. Löfgren B, Nyberg L, Österlind PO, Gustafson Y. In patients rehabilitation after stroke: outcome and factors associated with improvement. Disabil Rehabil 1998; 20: 55–61.
24. Robinson-Smith G, Johnston MV, Allen J. Self-care self-efficacy, quality of life, and depression after stroke. Arch Phys Med Rehabil 2001; 81: 460–464.
25. Bandura A. Self-efficacy mechanisms in physiological activation and health-promotion behavior. In: Madden J, Matthysse S, Brchas J, eds. Adaptation, learning and affect. New York: Raven Press; 1992.
26. Allegrante JP, Kovar PA, Mackenzie CR, Peterson M, Gutin B. A walking education programme for patients with osteoarthritis of the knee: theory and intervention strategies. Health Education Quarterly 1993; 20: 63–81.