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AN EVALUATION OF MULTIDISCIPLINARY INTERVENTION GOVERNED BY FUNCTIONAL INDEPENDENCE MEASURE (FIM^{SM}) IN INCONTINENT STROKE PATIENTS

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ABSTRACT. Patients with acute hemispheric stroke and ensuing urinary incontinence were randomly allocated to a ward using conventional methods of rehabilitation ($n = 13$) or to a ward practicing rehabilitation governed by Functional Independence Measure (FIM) ($n = 21$). All patients were assessed on admission and on discharge using the Katz activities of daily living (ADL) index, the psychological general well-being index, item G of the FIM index (FIM-G), and a mobility score. Patients admitted to the ward utilizing FIM were additionally evaluated using the total FIM on admission, repeatedly during the rehabilitation period and on discharge. An individual rehabilitation programme based on the latest FIM score was used throughout rehabilitation.

There were no differences on admission between groups regarding clinical and demographic characteristics, ADL, mobility and mood. Twenty patients in the intervention group regained continence before discharge compared to 3 ($p < 0.01$) in the control group. There was also a greater improvement in well-being in the intervention group compared to the control group ($p < 0.01$). This study has indicated that rehabilitation governed by the use of FIM reduced urinary incontinence and enhanced well-being better than conventional methods of rehabilitation. The results warrant a larger study to further investigate rehabilitation of incontinent stroke patients using FIM.

Key words: activities of daily living, Functional Independence Measure (FIM), physiotherapy, rehabilitation, stroke, urinary incontinence.

INTRODUCTION

Urinary incontinence is an important complication of stroke, with an incidence ranging from 38% to 60% in the early recovery period (1–3, 8, 15). It causes personal distress, interferes with the results of rehabilitation, and influences the time to discharge and long-term outcome (13, 22, 23, 25). Therefore, the rehabilitation team should be particularly aware that urinary continence is an important factor for the successful rehabilitation of the stroke patient and carry out both appropriate diagnostic and therapeutic procedures.

According to Gelber et al. (8), urinary incontinence in stroke patients was associated with large infarcts, aphasia, cognitive impairment, and functional disability but not with age, sex or side of stroke. Brocklehurst et al. (4) concluded that urinary incontinence in stroke patients was more often a by-product of immobility and dependency rather than an involvement of the neurologic pathways. Thus, when considering urinary incontinence in stroke patients, it is also necessary to simultaneously assess the patients regarding dysphasia, depression, cognitive, perceptual, and proprioceptive deficits, visual defects, and impaired motor and postural control (7, 27, 28).

There is a strong need for objective methods of assessing disability in the management of stroke patients suffering from urinary incontinence. Such techniques are required not only for inter-patient comparisons but also for the longitudinal assessment of rehabilitative measures in the management of stroke patients. The Functional Independence Measure (FIM^{SM})[1] is an 18-item, 7-level measurement scale of physical functioning and social cognition domains (9, 10). One of the domains of this measurement scale pays particular attention to the presence and severity of urinary incontinence using item G of the FIM index (FIM-G). The FIM method of assessment indicates to the staff using the

[1] FIM^{SM} is a service mark of the Uniform Data System for Medical Rehabilitation, a division of UB Foundation Activities, Inc.

technique which particular physical and cognitive areas the patient managed independently and which areas require specific rehabilitative measures. The aim of the present study was to compare rehabilitation governed by FIM with rehabilitation according to conventional methods in urinary incontinent patients following an acute stroke.

PATIENTS AND METHODS

Study groups and procedure

During the study period, April 1994 to February 1995, 106 patients were admitted for rehabilitation following acute unilateral hemispheric stroke. Thirty-four patients (36%) had developed urinary incontinence following the stroke. The incontinent stroke patients were randomly allocated to one of two different wards depending on the availability of beds on the day of admission. They were assessed on admission and on discharge according to a fixed protocol which included an assessment of activities of daily living using the Katz activities of daily living (ADL) index, the psychological general well-being (PGWB) index, mobility, and an assessment of urinary incontinence with FIM-G.

Thirteen patients with urinary incontinence were admitted to the control ward where assessment, rehabilitation and management were based on conventional techniques using the Bobath concept (24). Twenty-one patients with urinary incontinence were admitted to the intervention ward, where a special intervention programme based on the FIM scale was applied to their assessment, rehabilitation and continuing management, in addition to the use of conventional methods of rehabilitation. These patients were also assessed by using total FIM on admission, repeatedly during the rehabilitation period and on discharge.

Activities of daily living using the Katz index (Katz ADL index)

Activities of daily living were assessed using the Katz ADL index (19, 21). The index summarizes an individual's dependence on another person in performing six primary activities: feeding, continence, transferring, going to the toilet, dressing, and bathing. The performance is summarized in grades A–G, A being the most independent and G the most dependent. The Swedish version of the Katz ADL index has been shown to be reliable and valid (18, 19).

Urinary incontinence

Urinary incontinence and the need for assistance because of urinary incontinence was assessed by the staff on both wards using the FIM-G (7-point scale describing the level of incontinence and the need for help with urination, 7 being independent and 1 being totally dependent).

Psychological general well-being index (PGWB)

The PGWB index (5) measures affective or emotional states reflecting a sense of subjective well-being or distress. For each of the 22 items there are six response options that are scored on a scale of 1 to 6 according to the intensity or frequency of the affective experience. From the 22 items six subscale scores without overlapping items and one overall PGWB index score can be derived. The score range for the overall PGWB is 22–132. It is preferable that it be self-administered, but it can be given in an interview form. In the present study assessment using the PGWB index was performed by a registered nurse using the interview technique.

Mobility

The ability to transfer to and from a bed/chair/toilet and the ability to use a wheelchair or walk were assessed by the staff using a 3-point rating scale (transfer and walking 10 metres: 0 = needs assistance from two helpers, 1 = needs assistance from a helper, 2 = independent; using a wheelchair 10 metres: 0 = is unable, 1 = needs assistance around corners and over thresholds, 2 = independent).

The Functional Independence Measure (FIM)

The FIM is an 18-item, 7-level measure of physical functioning and social cognition domains (9, 10). The FIM uses the level of assistance an individual needs to grade functional status from total independence (= 7) to total assistance (= 1). The FIM assesses the level of disability regardless of the nature or extent of the underlying impairment. It is discipline-free, simple to use, reliable, uses an everyday terminology to describe disability, and is sensitive to change over the course of a rehabilitation programme (9–11).

Intervention programme

The Department of Geriatrics offers specially designed education for ward staff about the symptoms caused by stroke and how to manage and rehabilitate stroke patients using a structured 24-hour programme based on the Bobath concept. The intervention programme was based on the belief that ward staff require not only knowledge about the symptoms caused by a stroke, their implications for the individual and the rehabilitation programme but also about assessment, goal-making, rehabilitation planning, and evaluation of the rehabilitation outcome. The FIM was chosen as it is discipline-free, easy to administer and uses an everyday terminology understood by all members in the team and has a specific item for bladder function. Much time and effort were spent in educating the staff from the intervention ward about the use of the FIM instrument, which indicates to the staff which particular physical and cognitive areas require specific rehabilitative measures and which areas the patient

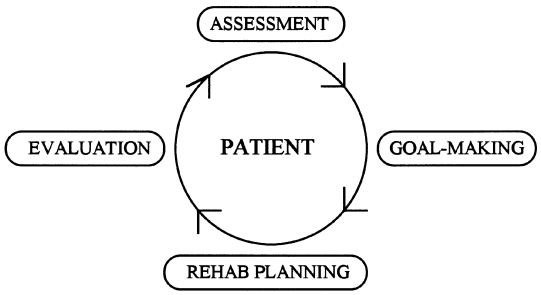

Fig. 1. Repeated assessment using Functional Independence Measure (FIM) instrument was used by the staff continually to determine rehabilitation planning and goal-making on an individual patient basis.

Table I. *Clinical and demographic characteristics of the patients*

	Intervention group $n = 21$ (mean ± SEM)	Control group $n = 13$ (mean ± SEM)	Significance of difference
Age (years)	74.0 ± 1.5	74.6 ± 1.8	n.s.
Gender (fe/male)	13/8	6/7	n.s.
Side of lesion (right/left)	9/12	4/9	n.s.
Onset to admission (days)	12.7 ± 1.1	17.5 ± 1.3	n.s.
Duration of stay (days)	83.8 ± 8.5	75.5 ± 9.0	n.s.
Dysphasia (yes/no)	9/12	7/6	n.s.

managed independently. It was easier to motivate both patients and staff to maintain the actual level of ability and concentrate rehabilitation resources on the next higher step towards independency when everyone had the same goal and spoke the same language.

The control ward used a more conventional method of assessment following the Bobath concept. The Bobath concept underlines the need of inhibiting abnormal muscle tone by handling and guiding the stroke patient in specific ways to relearn normal movements, which makes the patient dependent on ward staff for a longer period of time.

The incontinent stroke patient alloted to the intervention ward was assessed on admission by the staff using the FIM. An individual rehabilitation programme based on the FIM score started at once and was carried out day and night. Both wards had team conferences every week discussing rehabilitation outcome and setting new goals for the coming week. On the intervention ward the rehabilitation team evaluated the rehabilitation outcome and set new goals using the FIM as a communication instrument as well as an assessment and evaluation instrument (Fig. 1). The training programme was continuously discussed and altered depending on the patient's improvements and needs.

Statistical methods

The results are expressed as median or mean ± SEM unless otherwise stated. Median and mean values for respective group were compared using Pitman's permutation test and a two-sided *t*-test.

RESULTS

There were no differences between the intervention group and the control group regarding clinical and demographic characteristics, as shown in Table I.

Katz ADL index

There was no significant difference in the assessment of the Katz ADL index on admission between the intervention group and the control group (Table II). There was a greater improvement ($p < 0.01$) in the Katz ADL index in the intervention group than in the control group on discharge compared to admission (Table II).

Urinary incontinence

There was no significant difference in the functional assessment of urinary incontinence on admission between groups according to the FIM-G assessment (Table II). There was a greater improvement ($p < 0.01$) in the functional assessment of urinary incontinence in the intervention group than in the control group on discharge compared to admission (Table II). All but 1 of the 21 patients in the intervention group were continent on discharge (1 patient had an indwelling catheter on discharge). In the control group 3 of the 13 patients were continent on discharge, 6 patients used incontinence pads day and night, and 4 patients still required an indwelling catheter.

Table II. *Median values of Katz ADL index (scale A—G where, B=dependent in one activity, F=dependent in all activities) and FIM-G (scale 7–1 where 7, 6 = continent, 1 = incontinent) for all patients*

	Intervention group $n = 21$			Control group $n = 13$		
	Before	After	Significance of difference	Before	After	Significance of difference
Katz	F	B	$p < 0.01$	F	F	n.s.
FIM-G	1	6	$p < 0.01$	1	1	n.s.

Table III. *A comparison between the intervention group and the control group before and after the intervention period in psychological general well-being index (PGWB)*

	Intervention group, $n = 21$			Control group, $n = 13$		
	Before (mean ± SEM)	After	Significance of difference	Before (mean ± SEM)	After	Significance of difference
	n.s.					
PGWB	51.2 ± 5.5	103.0 ± 3.6	$p < 0.0001$	57.7 ± 7.4	70.5 ± 6.5	$p < 0.05$
		p<0.0001				

Psychological general well-being index (PGWB)

There was no significant difference in the PGWB index on admission between groups. There was an improvement in the PGWB index in both the intervention group ($p < 0.0001$) and the control group ($p < 0.05$) on discharge compared to admission as shown in Table III. The improvement was greater ($p < 0.01$) in the intervention group compared to the control group (Table IV).

Mobility

There were no significant differences in mobility and transfer ability on admission between groups. Both groups showed improvement in the ability to transfer from bed to wheelchair and from wheelchair to toilet, and in the ability to use a wheelchair or walking between admission and discharge. There was a greater improvement ($p < 0.05$) in the intervention group in transferring from bed to wheelchair than in the control group. Fifteen patients in the intervention group made the transfer from bed to chair independently, and 6 patients needed a supervisor or helper. Four patients in the control group were independent when transferring from bed to chair on discharge, while 6 patients needed physical guidance or help from 1 person and 3 patients needed 2 helpers.

There was a greater improvement ($p < 0.01$) in transferring from wheelchair to toilet in the intervention group than in the control group. Fifteen patients in the intervention group managed to transfer from a wheelchair to the toilet by themselves, 6 patients needed supervision or help from 1 person. In the control group only 2 patients managed the transfer to the toilet independently, 5 patients needed help from 2 persons, and 6 patients needed supervision or help from 1 person.

There was a greater improvement ($p < 0.01$) in the intervention group than in the control group in managing their wheelchair. In the intervention group all patients were able to manage their wheelchairs 10 metres, around corners and over thresholds. In the control group 5 patients were independent in managing their wheelchairs 10 metres, around corners and over thresholds, 4 patients needed help around corners and over thresholds, and 4 patients had difficulties in managing their wheelchairs at all on discharge.

There was no statistical difference on admission between groups in walking ability. Fourteen patients in the intervention group were able to walk 10 metres independently on discharge, 1 patient needed help from another person, and 6 patients could not walk 10 metres. In the control group 4 patients walked 10 metres by themselves with or without walking aids, 4 patients walked 10 metres with 1 helper or supervisor, and 5 patients could not walk 10 metres.

Table IV. *A comparison of the difference in psychological general well-being index (PGWB) between admission and discharge in the two groups*

	Intervention group $n = 21$ (mean ± SEM)	Control group $n = 13$ (mean ± SEM)	Significance of difference
PGWB	51.8 ± 4.5	12.8 ± 4.3	$p < 0.01$

The Functional Independence Measure index (FIM)

The results of FIM assessment in 1 patient from the intervention ward on admission and on discharge are shown in Fig. 2. There was a significant difference ($p < 0.01$) in FIM scores for the intervention group before and after the intervention: physical 30 and 75, respectively, and cognitive 27 and 32, respectively, median values.

Discharge from hospital

In the intervention group 18 of the 21 patients were discharged to home, 1 patient to another type of community

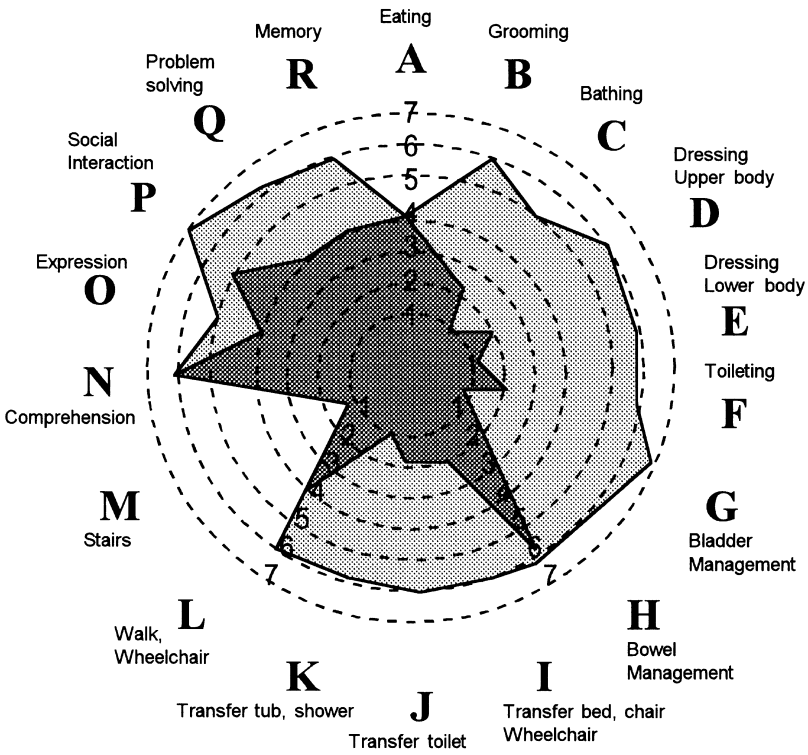

Fig. 2. The results of FIM assessment in the same patient on admission ■ and on discharge □.

living and 2 patients to a nursing home (Fig. 3). In the control group only 5 patients were able to return home after discharge from hospital, and 8 patients were discharged to a nursing home.

DISCUSSION

Urinary incontinence is a cause of great discomfort, shame, and loss of self-confidence and may hinder rehabilitation outcome, and it has been shown to have a major impact on the quality of life (12, 16, 20, 29). Urinary incontinence is often an important factor in the decision whether or not to institutionalize an elderly person (14, 26). Control of hygiene activities and the ability to be independent of personal assistance are perhaps the most important daily life activities as far as maintaining integrity and well-being.

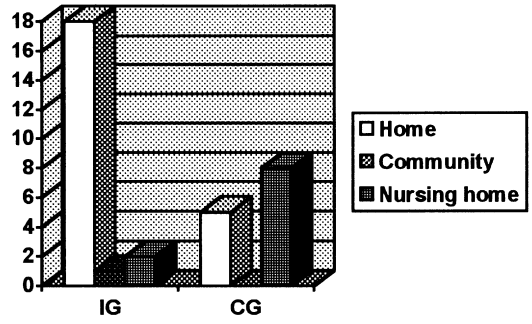

Fig. 3. Frequency of discharge to home or the community for the two groups of patients, intervention group (IG) ($n = 21$) and control group (CG) ($n = 13$).

The occurrence of incontinence after stroke may decrease the individual's self-confidence and increase dependency. Dysphasia and confusion may hinder communication about the need to urinate. Dyspraxia, visual field defects, and impaired motor and postural control may limit use of the toilet, commode, or urinal. Difficulty in walking, transferring, and/or ambulation contributed to incontinence in many cases, as did difficulty in dressing/undressing. Thus, difficulties associated with urinary incontinence may impair stroke patients under rehabilitation to be discharged from hospital.

There is thus a need for multidisciplinary intervention in the management of incontinent stroke patients. The aim of the intervention programme used in this study was for the stroke patient to obtain functional continence as soon as

possible. The FIM assessment instrument was chosen as part of this intervention programme as it contributed to the development of rehabilitation competence in the nursing staff. Repeated assessment using the FIM instrument was used by the staff continually to determine rehabilitation planning and goal-making on an individual patient basis. The FIM concept helped the staff to understand in which areas the limitations or disabilities of the patient lay and in which areas his or her resources were required. The use of the FIM instrument united the staff towards the goal of making the stroke patient as independent as possible, as soon as possible.

This study has shown that the intervention programme was effective, as there was a greater reduction in urinary incontinence in the intervention group compared to the control group. Twenty of the 21 patients in the intervention group regained continence before discharge compared to 3 of 13 in the control group. There was also a greater improvement in well-being in the intervention group compared to the control group as judged by the results of the PGWB assessments. This increase in general well-being may be due to improved continence function and its subsequent influence on self-esteem and integrity, which in turn is of importance for the individual's motivation and successful rehabilitation outcome.

The time and efforts the doctors, nursing and rehabilitating staff spent on FIM assessment, goal-making, rehabilitation planning and evaluation each week undoubtedly contributed to the successful intervention. In this respect it was of great importance that the assessment instrument chosen easily assessed functional and cognitive ability, and used everyday terminology familiar to all staff as well as the patient.

The goal for the rehabilitation efforts was for the individual to regain independence, experience as little handicap as possible and to increase the safety in daily living activities and mobility. In the longer term an increased likelihood of discharge from hospital to home and a speedier discharge were the ultimate goals. The FIM assessment scale assessed the level of dependence and/or the use of assistance devices. Using this instrument, it was possible to quantify the level of dependency in a way that could be understood by all staff in the team and emphasize factors of importance for the patient's independence in different activities. The Bobath concept, on the other hand, may have contributed to preserve the patient's dependence on qualified staff for transferring and, thus, contributed to prolong the hospital stay. It should, however, be noted that other factors in the management in the intervention ward than the use of FIM may have contributed to the successful outcome. When the nursing staff and the rehabilitating staff had the same goals and had achieved a better understanding, it was possible to plan a 24-hour individual training programme towards independency. This rehabilitation plan was continuously discussed, assessed, and altered to suit the individual's exact needs for the moment. Not only were functional abilities discussed but also the environment, which was altered to suit the individual's needs, e.g. the positioning of a movable toilet commode by the bed at night or using a urinal with a handle. Before returning home the patients had the opportunity to visit their homes with the physiotherapist and learn transfers and wheelchair management or walking in their own environment. At the same time relatives or helpers were shown how to assist in transfers etc.

The differences between the two groups in their ability to transfer to the toilet and managing their wheelchairs around corners and over thresholds were of practical significance for their ability to reach the bathroom or commode independently or with 1 helper or just a supervisor. Both the patients in this study and their relatives were elderly, and it was important that the strain on the helpers at home was as little as possible if the patient were to return home. In this respect it is important that the ability of stroke patients to reach the toilet be seen as a critical item for the individual's discharge from hospital and subsequent return home after a stroke.

The present study has indicated that the described multidisciplinary intervention governed by FIM in incontinent stroke patients helped to reduce urinary incontinence. There was also a greater improvement in well-being in the intervention group. The social and financial costs of urinary incontinence are extremely high (6, 17). The majority of these costs relate to the care of the elderly, many of whom are incontinent following a stroke. Thus, the results of this study warrant a larger study to further investigate rehabilitation of incontinent stroke patients using FIM.

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