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ORIGINAL REPORT

CHANGES IN SATISFACTION WITH ACTIVITIES AND PARTICIPATION BETWEEN ACUTE, POST-ACUTE AND CHRONIC STROKE PHASES: A RESPONSIVENESS STUDY OF THE SATIS-STROKE QUESTIONNAIRE

Édouard Bouffioulx, PT, Carlyne Arnould, PhD, Laure Vandervelde, PhD and Jean-Louis Thonnard, PhD

From the Unité de Réadaptation et de Médecine Physique, Université Catholique de Louvain, Brussels, Belgium

Objective: **To investigate clinical changes among the acute, post-acute and chronic phases in stroke patients' satisfaction with activities and participation. The SATIS-Stroke questionnaire's sensitivity to change was investigated with a sample of 45 stroke patients.**

Methods: **The SATIS-Stroke questionnaire was used to collect data from the 45 patients (mean age 69 years, 64% men) in the acute, post-acute and chronic stroke phases. Responsiveness of the questionnaire was investigated using a sample approach (effect size and standardized response mean indices) and an individual approach (*t* statistic). The clinical significance of change was also calculated using the empirical rule of effect size and the minimal clinically important difference.**

Results: **Analysis of variance showed a significant difference among evaluations in the 3 phases ($F = 13.662$; 2 df; $p < 0.001$). *Post-hoc* analysis showed a significant change between the acute and post-acute phases, but no significant change between the post-acute and chronic phases. Effect size and standardized response mean indices showed that the greatest change in satisfaction with activity and participation was between the acute and the chronic phases. Analysis of the clinical significance of change indicated that greater changes in satisfaction were necessary to detect clinically relevant improvement over time than clinically relevant deterioration.**

Conclusion: **The SATIS-Stroke questionnaire successfully determined changes in satisfaction among stroke patients.**

Key words: stroke; ICF activity; ICF participation; rehabilitation, responsiveness.

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Correspondence address: Jean-Louis Thonnard, Université Catholique de Louvain, Unité de Réadaptation, Tour Pasteur (5375), Avenue Mounier, 53, BE-1200 Bruxelles, Belgium. E-mail: Jean-Louis.Thonnard@uclouvain.be

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INTRODUCTION

The International Classification of Functioning, Disability, and Health (ICF) (1) is a conceptual framework that provides health professionals with a common language for the description of human functioning (2). A fundamental goal of rehabilitation is to improve the patient's abilities to manage daily activities and achieve autonomous living (3). The ICF defines 3 domains of functioning according to body, individual and social perspectives: body functions and structures, activity and participation. The present paper focuses on the ICF dimensions of activity and participation. An activity is defined as the execution of a task or action by an individual, and participation is defined as involvement in a life situation (1). Activity limitations are difficulties an individual may have in executing tasks, such as taking care of one's physical appearance. Participation restrictions are problems an individual may experience with involvement in life situations, such as employment, education, spirituality and culture (4).

Activity and participation can be measured in various ways: degree of patient performance in activities and life situations, required assistance, or experienced difficulty. These dimensions may also be measured as the satisfaction perceived by patients in their experience of activities and life situations, regardless of their degree of performance (5). Satisfaction with activity and participation is a latent variable corresponding to an individual's perspective of whether his or her performance in activities and life situations meets his or her needs (5). The patient's perceived satisfaction with activities and life situations may be measured with a questionnaire (6).

The SATIS-Stroke questionnaire was developed to measure chronic stroke patients' satisfaction with activity and participation in the actual environment (5). The validity, reproducibility, linearity and unidimensionality of this questionnaire have been demonstrated, but its responsiveness has not yet been tested. Responsiveness is the ability of a scale to clinically detect relevant changes over time (7–9). It is usually quantified by indices such as effect size (10, 11) and standardized response mean (11). The present study thus investigates the responsiveness of the SATIS-Stroke questionnaire by examining changes in satisfaction with activity and participation perceived by an adult stroke cohort during the acute, post-acute and chronic phases.

MATERIAL AND METHODS

Subjects

This study was approved by the medical ethics committees of the Université Catholique de Louvain. Patients gave written informed consent before evaluation. The participants in this study were recruited from

a sample of adult patients admitted to Belgian stroke units between March 2007 and September 2008 with a primary diagnosis of stroke (cerebrovascular accident; CVA). Eligible stroke patients were identified by a review of weekly admission records.

To be included in this study, subjects must have had a confirmed eligible stroke, as defined by the World Health Organization (WHO). The WHO defines stroke as "rapid onset of vascular origin reflecting a focal disturbance of cerebral function, excluding isolated impairments of higher function and persisting longer than 24 hours" (12). Subjects were excluded if they: (*i*) had stroke onset more than 8 days prior to admission; (*ii*) were unable to care for themselves prior to stroke; (*iii*) had stroke due to sub-arachnoid haemorrhage; (*iv*) were not expected to survive for at least 6 months; or (*v*) were lethargic, obtunded, or comatose.

Forty-five patients (16 women, 29 men) with a mean age of 69 ± 10.7 years participated in the study. Demographics and baseline stroke characteristics are described in Table I. The patients presented moderately impaired functional statuses, as measured by the Stroke Impairment Assessment Set (SIAS) (13), showed no major cognitive dysfunctions, as observed with the Mini Mental State Examination (MMSE) (14), and were not depressed, as measured by the Hospital Anxiety Depression Scale (HADS) (15).

Procedure

The patients were followed up for 6 months after stroke onset. This period encompassed 3 clinical phases: (*i*) acute phase (1 week after CVA onset); (*ii*) post-acute (recovery) phase (3 months after CVA onset); and (*iii*) chronic phase (6 months after CVA onset) (16, 17). Patients' satisfaction with activity and participation was assessed 3 times (at intervals of 90 ± 15 days), during acute (1 week: t1), post-acute (3 months: t2) and chronic (6 months: t3) phases. The patients were asked to characterize perceived changes in global functional status twice, during post-acute and chronic phases.

Instrument

Perceived satisfaction was measured using the SATIS-Stroke questionnaire. This questionnaire consists of items referring to 36 daily activities and life situations (5), with responses given on a 4-level scale: (0) very dissatisfied, (1) dissatisfied, (2) satisfied and (3) very satisfied. It was developed using the Rasch model, which allows the conversion of ordinal scores into linear measures on a unidimensional scale (18). These linear measures are constantly expressed in logits (i.e. log-odd units a measurement unit constant throughout the measurement scale). When analysing SATIS-Stroke questionnaire response data, a higher value in logits corresponds to a higher degree of satisfaction with activities and participation. The pre-established logits for transformation of our data according to Bouffioulx et al. (19) were used.

The SATIS-Stroke questionnaire was used for 3 assessments (t1–t3) to characterize patients' perceived satisfaction in performing each activity and life situation, even if they used technical or human aids. The patients subjectively rated their perceptions of changes in global functional status between acute and post-acute phases, and between post-acute and chronic phases. These changes were expressed with an ordinal scale (0–10). A score of 5 indicated stable status, a score < 5 indicated deteriorating status and a score > 5 indicated an improved status.

Table I. *Sample description (*n = *45)*

Characteristics	
Sex, *n*	
Men	29
Women	16
Age, years, mean (range)	69 (45–93)
CVA side, *n*	
Right brain	26
Left brain	19
Residence place, *n*	
Home residence	34
Nursing home residence	11
Social status, *n*	
Married	28
Unmarried	17
Impairment Status in SIAS, median (IQR)	38 (32–45)
Cognitive Status in MMSE, median (IQR)	21 (18–24)
Mood Status in HADS, median (IQR)	6 (5–8)

CVA: cerebrovascular accident; SIAS: Stroke Impairment Assessment Set; MMSE: Mini Mental State Examination; HADS: Hospital Anxiety Depression Scale; IQR: interquartile range.

Data analysis

A sample approach and an individual approach were used to analyse changes between clinical phases. In the sample approach, repeated analysis of variance (ANOVA), effect size (ES) and standardized response mean (SRM) were calculated between each pair of phases (11). Changes in satisfaction between phases were tested with a repeated-measure ANOVA (RM-ANOVA). Significant effects detected by the RM-ANOVA were then investigated with a Tukey *post-hoc* analysis (acute vs post-acute; post-acute vs chronic; and acute vs chronic).

ES enables the comparison of responsiveness between different studies or outcome measures by standardizing the change effect in units of standard deviation (SD) without influence from the sample size (11). It is calculated as the mean change observed between the average measures of two evaluations, divided by the SD of the first evaluation. Consequently, ES is sensitive to the distribution of the measures obtained during the first evaluation.

$$ES = \frac{\text{mean change}}{SD_{t1}}$$

SRM standardizes change independently of sample size, but incorporates information about change distribution (20). The SRM is calculated by dividing the mean change observed between two evaluations by the SD of the change.

$$SRM = \frac{\text{mean change}}{SD_{Change}}$$

Higher ES and SRM values indicate a greater magnitude of changes between two evaluations.

The individual approach takes into account the standard error of measurement associated with each patient's satisfaction measure. A *t* statistic was computed for each patient to test the extent to which the satisfaction measures had changed (21):

$$t_{m12} = \frac{m_2 - m_1}{\sqrt{(SE_1)^2 + (SE_2)^2}}$$

M_1 and m_2 are the satisfaction measures at the first and second evaluations, respectively, and SE_1 and SE_2 are the associated standard errors. This *t* statistic approximates a standardized normal distribution (21). Therefore, patients with a *t* statistic above 1.96 or below –1.96 show significantly improved or deteriorated satisfaction, respectively.

Responsiveness implies the ability to detect important clinical changes (22). Sloan et al. (23) employed two principal methods to assess the clinical significance of change. The empirical rule of effect size (ERES) is based upon the fact that 99% of any normal distribution falls into 3 SD of the mean, and that the measurement range of any instrument can be represented by 6 SD. If the measurement range is defined as 0–100, 1 SD would therefore correspond to 17% of that range (23). The ERES thus defines the clinical significance of change as one-half SD, according to Cohen's classification of ES (0.2 times the SD = small change, 0.5 times the SD = moderate change, and 0.8 times the SD = large change) (23). The second method used by Sloan et al. (23) estimates the minimal clinically important difference (MCID) using, among others, a patient's self-reported global rating of change. In this study, a patient's self-reported change in global functional status

was used to measure health status changes. This estimation was based on Juniper et al.'s (24) definition of MCID as "the smallest difference in score which patients perceived as beneficial". In other words, MCID is the smallest change that patients perceive as meaningful and that would cause clinicians to consider a change in the patient's management. The mean change in patients who reported a deteriorated or improved "small change" can therefore be considered the MCID (23).

RESULTS

Sample approach

Repeated-measure ANOVA. The mean satisfaction measures of the 45 patients were –1.19 logits SD = 1.43 logits in the acute phase, –0.09 logits SD = 1.22 logits in the post-acute phase, and 0.42 logits SD = 1.80 logits in the chronic phase. The RM-ANOVA showed a significant difference between the 3 evaluations ($F = 13.662$; 2 df; $p < 0.001$). The *post-hoc* analysis, illustrated in Fig. 1, indicated that the mean satisfaction measure significantly increased between the acute and post-acute phases ($q = 4.934$; $p < 0.001$) and between the acute and chronic phases ($q = 7.234$; $p < 0.001$). No significant difference was observed between the post-acute and chronic phases ($q = 2.301$; $p > 0.05$). The mean satisfaction measure observed 6 months after stroke onset was similar to that reported for the initial calibration of SATIS-Stroke questionnaire, strengthening its validity (5).

Effect size and standardized response mean. Table II reports the responsiveness indices of the SATIS-Stroke questionnaire. The greatest changes in satisfaction as indicated by ES and SRM were logically observed between the acute and chronic phases.

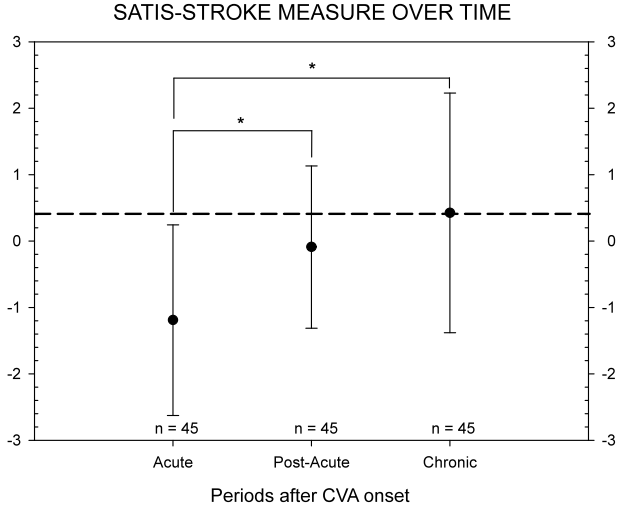

Fig. 1. Mean and standard deviation for satisfaction (in logits) among chronic stroke patients in the acute (1 week), post-acute (3 months) and chronic (6 months) phases. Significant differences between the 3 assessment periods are indicated by asterisks. The dotted black line represents the mean satisfaction with activity and participation found in the initial scale (0.41 logits).

Table II. *SATIS-Stroke responsiveness indices based on sample-approach*

Phases	Mean change (logits)	ES	SRM
Post-acute vs acute	1.10	0.76	0.59
Chronic vs post-acute	0.51	0.42	0.27
Chronic vs acute	1.61	1.12	0.62

SRM: standardized response mean; ES: effect size.

Individual approach

Fig. 2 shows the changes in satisfaction computed with the *t* statistic. Between the acute and post-acute phases, 29 patients (64%) who expressed a significant improvement ($t > 1.96$) presented a mean change in satisfaction of 2.09 logits, while 6 patients (14%) who expressed a significant deterioration ($t < –1.96$) presented a mean satisfaction change of –2.30 logits. Eight patients (18%) who reported a non-significant improvement ($0 < t < 1.96$) presented a mean change in satisfaction of 0.39 logits during the same period.

Between the post-acute and chronic phases, 17 patients (38%) who expressed a significant improvement presented a mean satisfaction change of 2.36 logits, while 9 patients (20%) who expressed a significant deterioration presented a mean satisfaction change of –2.03 logits. Nine patients (20%) who expressed a non-significant improvement presented a mean change in satisfaction of 0.56 logits, while 9 patients (20%) who expressed a non-significant deterioration presented a mean change of –0.43 logits during the same period.

Clinical significance of change

As the range of the initial SATIS-Stroke questionnaire was equal to 10.19 logits (5), one theoretical SD corresponds to 1.70 logits (10.19 logits/6). Consequently, ERES defines clinically significant change as equivalent to 0.34 logits (0.2 times the SD) for a small change, 0.85 logits (0.5 times the

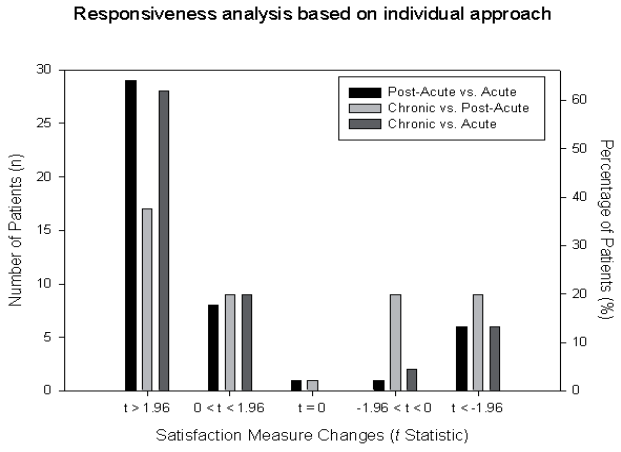

Fig. 2. Number (left ordinate) and percentage (right ordinate) of patients according to satisfaction changes expressed as a *t* statistic: $t > 1.96$ = significantly improved; $1.96 > t > 0$ = improved); $t = 0$ = no change; $0 > t > –1.96$ = deteriorated; $t < –1.96$ = significantly deteriorated. Data are reported as comparisons of the 3 assessments.

SD) for a moderate change and 1.36 logits (0.8 times the SD) for a large change.

The MCID of all patients between the acute and post-acute phases indicated that 14 patients who reported a deteriorated status (perceived change in global functional status < 5) presented a mean decrease in satisfaction of 0.23 ± 2.31 logits, while 23 patients who reported an improved status (perceived change in global functional status > 5) presented a mean increase in satisfaction of 1.77 ± 1.27 logits. In contrast, the MCID of all patients between the post-acute and chronic phases showed that 12 patients who reported a deteriorated status presented a mean decrease in satisfaction of –0.97 logits (SD = 1.28 logits), while 19 patients who reported an improved status showed a mean increase in satisfaction of 1.45 logits (SD = 1.24 logits).

DISCUSSION

The present study investigated the responsiveness of the SATIS-Stroke questionnaire by examining the changes in satisfaction with activity and participation perceived by 45 adult stroke patients among the acute, post-acute and chronic phases. A patient-focused approach showed that satisfaction significantly increased between the acute and the post-acute phases. However, no significant satisfaction change was observed between the post-acute and chronic phases. These results are confirmed by the ES and SRM indices. During the acute phase, the patients were critically ill and therefore frequently bedridden with short standing and ambulatory periods. Moreover, they required substantial assistance in meeting basic needs. Physical, occupational and speech therapy became progressively important and served patients' needs to recover the loss of functions (25). At the beginning of the post-acute phase, patients' returns to a home environment may have contributed to greater optimism, expressed in their perceived satisfaction with activities and participation (26). In the post-acute phase, patients gradually regained psychological well-being and most body functions and activities (27, 28).

While satisfaction increased in the first 3 months, it improved only slightly between the post-acute and chronic phases. During this period, patients recovered roles and abilities and were confronted with more demanding daily activities and life situations. Patients thus probably changed their view on their performance in activities and life situations, reducing the degree of improvement in satisfaction between the post-acute and chronic phases (26).

The responsiveness of the SATIS-Stroke questionnaire was also investigated with an individual approach. Our results corroborate the dominant pattern of satisfaction improvement (82% of the sample) between the acute and post-acute phases shown in the global approach. In contrast to the global approach, no dominant pattern emerged between the post-acute and the chronic phases: as shown on Fig. 2, 58% of the sample reported an improvement and 40% reported a decrease in satisfaction. However one cannot reject that a significant change in satisfaction could appear between the post-acute and chronic phase in a lager sample of patients. The global approach was useful in our study to describe the change in satisfaction from the acute to the post-acute phases. Nevertheless, since this approach showed no pattern from the post-acute to the chronic phase, the individual approach was essential to understand and explain the decreased rate of satisfaction improvement. Therefore, this patient-focused approach better apprehended individual environmental factors and patient needs that hindered or facilitated satisfaction improvement. Indeed, the important change for each patient may not have had the same significance as for the sample as a whole (29, 30). The individual approach thus provides clinicians with an alternative method of drawing conclusions from sample results at the patient level.

The "small improvement" observed in the MCID corresponded to a large change in the ERES. The MCID "small deterioration" corresponded to a moderate change in the ERES. However, the ERES method remains a theoretical method based upon the distribution of persons and, as the observed half SDs in our study are equal to 0.56, 0.46 and 0.67, this method does not lead to false conclusions. This means that greater changes in satisfaction were necessary to detect clinically relevant improvements over time than clinically relevant deterioration with the SATIS-Stroke instrument. Therefore, in future studies, the sample size required given reported size effects of 0.76, 0.42 and 1.12 (see Table II) should be 25, 76 and 11 patients, respectively. Nevertheless, some caution is necessary in interpreting these results because the MCID of the SATIS-Stroke questionnaire (ICF activity and participation domains) was calculated on the basis of a perceived global functional status (ICF activity domain only).

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