Determining Functional/Health Status and Its Relation to Disability in Stroke Survivors

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Background and Purpose Determining the functional/health status of stroke survivors poses special difficulties because of cognitive impairments that frequently result from stroke. A possible means of assessing the status of stroke survivors who are cognitively impaired is getting proxy responses from a family member or other caregiver. Proxy agreement was evaluated for two measures of functional/health status, the Frenchay Activities Index (FAI) and the Health Status Questionnaire (HSQ), and a measure of disability, the Functional Independence Measure (FIM).

Methods Thirty-eight stroke survivors were administered the measures at follow-up (median time since the stroke, 6 months). Caregivers were instructed to answer as proxies for the stroke survivors in their care. Demographics on age, sex, race, marital status, educational level, side of lesion, and relation of stroke survivor to caregiver were collected. The purpose of this study was to evaluate proxy agreement for two measures of functional/health status, sometimes referred to as quality of life: the Frenchay Activities Index (FAI) and the Health Status Questionnaire (HSQ; formerly the SF-36 of the Medical Outcomes Study). Scores for these measures were compared with those for a frequently used measure of disability, the Functional Independence Measure (FIM). Functional/health status and quality of life are increasingly recognized as outcomes of stroke important to determine. However, they may be difficult to assess for many stroke survivors, given the frequency of significant residual cognitive and linguistic impairments that limit their ability to respond meaningfully to structured interviews and measures.

Impairments—loss or abnormality of psychological, physiological, or anatomical structure or function—can be assessed directly by professionals during follow-up evaluations. The term “disability” refers to the effects of one or more such impairments on a person’s normal level of skill or ability. Examples of disabilities are compromised abilities to feed oneself, dress, walk independently, and communicate appropriately. Other important components of functional status are the ability to take care of oneself beyond basic bodily needs (ie, to conduct “instrumental” activities of daily living), work, and leisure activities. In comparison to the identification of impairments, assessment of outcomes at the disability and particularly at the functional status levels is more difficult. The latter class of outcomes especially may involve the complex interplay of a variety of factors, eg, the stroke survivor’s abilities; environmental supports, demands, or limits on function; economic and social resources; expectations of significant others; social roles; and character-related, attitudinal, and motivational factors.

Conclusions The FAI and the FIM are useful for assessing the functional/health status of stroke survivors because answers can be obtained by proxy. Future studies should examine the relations between disability and functional/health status, with explicit attention paid to variations in the level of disability in the stroke survivors. (Stroke. 1994;25:2391-2397.)

Key Words • disability evaluation • quality of life • stroke assessment

Results Proxy agreement was excellent for the FAI (intra-class correlation, .85) and the FIM (.87), but poor for the HSQ (average proxy agreement, .32). Patients’ scores were low and positively skewed for the FAI but high and negatively skewed for the FIM. Although Spearman ρ coefficients between the measures were fairly high for both stroke survivors and proxy respondents, the correlation of scores was substantially weaker when the group of less severely impaired survivors (as established by FIM ratings) was considered separately.
A possible way around this is to ask proxies—relatives or close friends who are primary caregivers—to answer for the patient. In fact, we believe that good proxy agreement is a necessary (but not sufficient) criterion for the usefulness of an outcome measure with patients, such as those who have had strokes, who often sustain language and cognitive impairments.

Recent studies have examined the appropriateness of various measures of handicap status and quality of life for stroke patients. DeHaan et al. surveyed 10 quality of life instruments and concluded that additional studies of the reliability and validity of the FAI were necessary. They also reviewed the SF-20, a precursor of the HSQ, and suggested that data on its sensitivity in measuring outcomes for stroke patients were lacking. Schuling et al. concluded that the FAI was the best measure available, with the possible exception of the Lawton Scale, which has undergone considerable psychometric evaluation and includes items on physical self-maintenance and instrumental activities of daily living.11,12 The FAI had good homogeneity and convergent-discriminant validity. However, until now no data have been reported on the agreement between stroke patients and proxy caregivers.

Agreement between patients and their proxies on answers to the HSQ was evaluated because the questionnaire is a frequently used measure of long-term outcomes. The instrument, which continues to undergo intensive psychometric analysis, has been assessed with a variety of clinical populations for content validity, principal components analysis, data completeness and quality, and internal consistency, and has been found adequate. However, these studies have been restricted to subjects with six possible diagnoses: hypertension, diabetes, congestive heart failure, myocardial infarction, unipolar affective disorder (major depression), and depressive symptoms in the absence of major affective disorder. No reports of proxy agreement were found in our literature search, and no systematic work has been published on stroke patients or on other groups who frequently sustain cognitive deficits.

In addition to testing the scales' proxy agreement, we wished to compare responses to the FAI and HSQ (if appropriate because of adequate proxy agreement) with responses to the FIM, a measure of disability that has been developed for general rehabilitation patients, including those with stroke. FIM items rate the patient on the basic skills and abilities that, we hypothesize, form a foundation for functional/health status and quality of life. We hypothesized that disability scores would be significantly related to functional/health status and quality of life, although the relation would be less than perfect because of the other factors that affect social roles and activities and one's perceptions of them.

Subjects and Methods

During the summer of 1993, subjects who had undergone rehabilitation for stroke were recruited, with their caregivers (family members or close friends), into a follow-up study. They were identified through computerized discharge data from the MossRehab Hospital, contacted by phone, and asked to come in for a 1.5-hour battery of tests measuring physical disability, communication effectiveness, handicap, quality of life, and life satisfaction.

Inclusion criteria based on computerized discharge data were that subjects had had their stroke 3 to 10 months previously, that they had received in-patient rehabilitation for the stroke, and that they had a caregiver who lived at home with them or spent time with them every day. Inclusion criteria, ascertained during telephone recruitment, were that survivors and caregivers were English speaking and had either no aphasia or mild aphasia restricted to loss in verbal fluency and slowness in speech. Of 107 consecutively contacted potential subjects, 24% were unable to participate because of language impairments; 14% declined citing excessive travel distance or caregiver unavailability; 14% were not interested in participating; and 11% had severe health problems precluding their participation. Forty pairs were interviewed; two of the caregivers did not complete the FAI and the FIM, so the study population was 38 stroke survivor-caregiver pairs.

Information obtained from computerized discharge data were each survivor's age, sex, and stroke laterality. Information obtained from survivors and caregivers was caregiver's age and sex; survivor's and caregiver's ethnic background, education, and marital status; and the kind of stroke survived. Before the interviews, survivors and caregivers were administered the orientation, language comprehension, naming, memory, and judgment scales of the Neurobehavioral Cognitive Status Examination (NCSE);15 each respondent's scale scores were averaged as a quick indicator of cognitive impairment.

Median age of the 38 stroke survivors was 65 years (range, 33 to 84). Twenty-one (55%) were women; medians for men's and women's ages were at the median for the sample. Twenty-three (61%) were African-American; with the exception of one Asian, the rest were Caucasian. African-American stroke survivors were younger than their Caucasian counterparts (median, 62 years compared with 70 years; Mann-Whitney U test, 104.5, P < 0.07), corresponding to population-based studies of stroke.16 Twenty-five (66%) were married; 11 (29%) were divorced or widowed; 2 were single. Twenty-five (66%) had not completed high school and only 5 (13%) had some higher education; educational status was independent of race. These results are consistent with patient profiles at our institution.

The median time since the index stroke was 6 months. Twenty subjects (53%) had lesions on the right side and 16 (42%) on the left; 1 stroke was bilateral and 1 was at the brain stem. Only 11 patients were able to identify their stroke types; 8 of those strokes (73%) were thromboembolic and the other 3 were hemorrhagic. Thirty-four (89%) had no or mild impairments according to NCSE scores. Medical profiles, eg, location of stroke and kind of stroke, were consistent with the general stroke population,17,18 although brain stem strokes were underrepresented. A major purpose of the study was to measure proxy agreement, and this dictated that language and cognitive impairments also be underrepresented.

Caregivers were younger than stroke survivors: the median age was 54 years. Thirty-one (82%) were women. Twenty-seven (71%) were married and 6 (16%) were divorced or widowed. Seventeen (44%) had completed high school, but only 9 (24%) had some years of college. Twenty-one (53%) were spouses, 10 (26%) were daughters caring for mothers, and 7 were siblings and friends. No caregiver had cognitive difficulties as measured by the NCSE.

Measures

FAI

The FAI rates the frequency with which respondents perform 15 activities (eg, gardening, washing dishes) that have been content-validated for application to the stroke population.1 It was developed 10 years ago at Frenchay Hospital in England to measure functional and social activities on three subscales: domestic work/leisure, and outdoors/other ("reading books" is in the outdoors/other category). Scores can range from a low of 15 to a high of 60. The questionnaire takes 5
by mail. The FAI is reproduced in Table 1.

### HSQ

The HSQ consists of 39 items on nine scales—health perception, physical functioning, role limitations attributed to physical health, role limitations attributed to emotional problems, social functioning, mental health, bodily pain, energy/fatigue, and a depression risk screen. Scales are not summed for a total score. We used a version, the SF-36, that did not include the physical functioning scale. We used a version, the SF-36, that did not include the mental health scale, and the others are shorter (two to five items). Questions concern the respondent’s perceptions about his or her limitations on the various scales; response categories for some items are simple yes/no dichotomies and others are measured on five- or six-point Likert-type scales. An example of an item on the scale measuring role limitations attributed to physical health is “During the last four weeks, as a result of your physical health, have you accomplished less than you would like (yes/no)?” The HSQ can be administered as a 15-minute interview or a mailed questionnaire. The complete instrument and scoring instructions are available from the Health Outcomes Institute. The 20-year effort that led to development of the SF-36 and the HSQ has been well described elsewhere; its appropriateness for use during rehabilitation has not been established, although there have been suggestions that it is reliable and valid for assessing stroke patients and other patients in rehabilitation.

### FIM

The FIM is a measure of disability widely used in the United States. It was implemented in the mid-1980s by Uniform Data System (UDS) in Buffalo, NY, which administers a database of more than 150,000 discharged patients from more than 190 rehabilitation facilities. The 18 items of the FIM are organized into six subscales and assess two dimensions: the physical dimension (self-care [eating, grooming, bathing, upper- and lower-body dressing, and toileting], sphincter control [bladder and bowel], mobility [bed, toilet, and bath transfers], and locomotion [walking or using a wheelchair and climbing stairs]) and the cognitive dimension (communication [comprehension and expression] and social cognition [social interaction, problem solving, and memory]). Measurement of each item is on a scale from complete dependence (1) to complete independence (7). The FIM can be administered as either an in-person assessment or a telephone version. The FIM has been evaluated for scaling properties and as a prognostic indicator as well as an outcomes indicator for rehabilitation.

### Procedures

Two research assistants, graduate students in the occupational therapy department of a nearby university, recruited the subjects, who were each paid $20 for their participation; if they could not come to the hospital but were willing to be interviewed at home, they received $10 each. Only five survivor-caregiver pairs were interviewed at home; the rest traveled to the hospital. The study had been approved by the Institutional Review Board at the MossRehab Hospital, and procedures for obtaining informed consent were followed.

Both research assistants received 2 weeks of training on all measures, including viewing of three FIM training videotapes produced by UDS, participating in two training sessions with the hospital’s head of program evaluation, who credentials clinicians for data submission to UDS, and simulating interviews with the principal investigators. The research assistants interviewed the stroke survivor and proxy at the same time in separate private offices or rooms, and were counterbalanced across stroke survivors and caregivers to avoid systematic effects for a particular interviewer in the proxy agreement analysis. The order of scale administration was randomly assigned so there would be no systematic effects of subject fatigue.

### Interrater Reliability and Data Analysis Procedures

Interrater reliability was measured by videotaping 8 of the FIM and FAI interviews (4 survivors and 4 caregivers). The research assistant who did not conduct a given videotaped interview independently watched and scored it. Scoring agreement between the two research assistants using the FAI and the FIM was excellent: the intraclass correlation (ICC) for the FAI was .97 and for the FIM, .96. Six HSQ interviews were videotaped and scored by both raters. ICCs were not com-
TABLE 2. Proxy Agreement for the Frenchay Activities Index Scales

<table>
<thead>
<tr>
<th>Scale</th>
<th>Intraclass Correlation</th>
<th>Confidence Interval</th>
</tr>
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<tbody>
<tr>
<td>Domestic Activities</td>
<td>.77</td>
<td>.60-.87</td>
</tr>
<tr>
<td>Work/Leisure</td>
<td>.59</td>
<td>.34-.76</td>
</tr>
<tr>
<td>Outdoors/Other</td>
<td>.77</td>
<td>.60-.87</td>
</tr>
</tbody>
</table>

Data were analyzed using SYSTAT.26 Proxy agreement for the FAI and the HSQ was determined using ICCs and confidence intervals (CIs). Scales with low proxy agreement were tested with Wilcoxon matched pairs tests to determine whether caregivers systematically overreported or underreported scores compared with survivors. Scales with adequate proxy agreement were described using medians and ranges rather than means because the scores were not normally distributed (see “Results”). Differences in scores according to demographic factors were tested with Mann-Whitney U tests, and associations between scales were determined by computing Spearman’s ρ correlation coefficients.

Results

Proxy Agreement

Proxy agreement for the FAI was good: the ICC was .85 (CI, .74 to .92). Proxy agreement for FAI scales is shown in Table 2. Items for which there was low proxy agreement on the work/leisure scale were frequency of social occasions, actively pursuing a hobby, and travel outings. However, there were no systematic differences in underreporting or overreporting scores by survivors or caregivers. Agreement did not differ from that of the entire sample when calculated separately for survivors with right or left side lesions, or when data from the 4 survivors with more than minimal deficits on the NCSE were removed from the analysis.

In contrast, proxy agreement for the HSQ was low. The median ICC of the eight scales was .32. The ICCs for the HSQ scales and their CIs are listed in Table 3. The low proxy agreement suggested the HSQ was inadequate as an outcome measure for stroke, so we did not calculate descriptive statistics or include the HSQ in analyses of the relation between disability and functional health status.

Proxy agreement for total scores on the FIM was good: ICC was .87 (CI, .77 to .93). Proxy agreement for the 13 items assessing the physical dimension (on the self-care, sphincter control, mobility, and locomotion scales) was excellent: ICC was .91 (CI, .83 to .95). Proxy agreement for the two scales assessing the cognitive dimension was not as good: .60 (CI, .35 to .77). Agreement for the individual FIM scales is shown in Table 4.

The only FIM scale for which there were systematic differences between patients’ and caregivers’ scores was the sphincter control scale, on which caregivers rated patients significantly lower than patients rated themselves (Wilcoxon test, z = -2.06, P < .04).

Description of the FAI and FIM Distributions

FAI total and scale scores were positively skewed. Median FAI score was 26, calculated by either survivors’ or proxies’ reports. Median scores for the domestic scale were 10 for patients’ reports (8 for proxies’ reports); for work/leisure, 8 (8); and for outdoors/other, 9 (10). The scales are calibrated with a possible low of 5 and high of 20.

There were differences in FAI scores by demographic indicators for educational status of survivors: those who had not finished high school reported a median score of 22, while those who had finished high school or beyond reported a score of 29 (U test, 86.5, P < .03). Caregivers also reported a difference in the same direction, although it did not reach statistical significance (P < .08). The only individual FAI item for which there was a significant difference by level of education was reading books (survivors’ self-reports, U test, 80.5 [P < .01] and caregivers’ proxy reports, U test, 89 [P < .02]).

FAI total scores did not differ by age, sex, ethnic background, marital status, side of brain lesion, or relationship of survivor to caregiver. The domestic scale was the only one for which there were any differences by demographic predictors: according to caregivers, women scored 11 on this scale and men scored 6 (U test, 101, P < .02). Patients also reported a difference in the same direction, although it did not reach statistical significance (P < .10).

The median for total FIM scores was 110 (range for this sample, 50 to 126 on a possible scale range of 18 to 126). The median for the physical dimension was 81 (study range, 18 to 91 on a possible scale range of 13 to 91) and for the cognitive dimension 32 (study range, 15 to 35 on a possible scale range of 5 to 35). Distributions of all FIM scales were negatively skewed, with most scores clustering at the high end of the scale.

Relation Between the FAI and the FIM

The correlation between the FAI and the FIM total scores was .80 for survivors’ reports and .75 for proxies’
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Scatterplot of caregivers’ reports of stroke survivors’ disability scores (on the Functional Independence Measure [FIM]) and functional/health status scores (on the Frenchay Activities Index [FAI]) for 38 stroke survivors at follow-up. Overall Spearman \( \rho \) correlation for the sample is .75.

reports \( (P<.0001, \text{two-tailed, for both}) \). However, the Figure shows that the correlation was not the same for all FIM scores. For the 13 FIM scores below 100, the correlation was .72 for survivors’ reports \( (P<.01, \text{two-tailed}) \) and .87 for proxies’ reports \( (P<.001, \text{two-tailed}) \). For the 25 FIM score totals above 100, the correlation was .36 for survivors’ reports and .37 for proxies’ reports \( (P<.07, \text{two-tailed, for both}) \). The matrix of correlations of FAI and FIM scale scores is shown in Table 5.

**Discussion**

**Proxy Agreement**

The FAI total and scale scores had good proxy agreement. Thus, the FAI seems appropriate for use with cognitively impaired stroke patients who have relatives or friends who are primary caregivers and can answer for them. These results add to the construct validity of the FAI and, with the results from other validation studies, suggest that it can be used as a general outcome measure of stroke. The FAI is behaviorally based and was deliberately constructed to identify frequency of activities, not patients’ assessment of the quality of these activities, to reduce the subjective element.2

Proxy agreement was poor for the HSQ, which may limit its usefulness in studying outcomes for persons with significant cognitive deficits. HSQ items are largely subjective, which is probably appropriate for a measure

**TABLE 5. Spearman \( \rho \) Correlations Between Frenchay Activities Index and Functional Independence Measure Scores**

<table>
<thead>
<tr>
<th>Functional Independence Measure Score</th>
<th>Frenchay Activities Index Score</th>
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<tbody>
<tr>
<td></td>
<td>Domestic</td>
</tr>
<tr>
<td>Self-Care</td>
<td>.65*</td>
</tr>
<tr>
<td></td>
<td>(.63*)</td>
</tr>
<tr>
<td>Sphincter Control</td>
<td>.15</td>
</tr>
<tr>
<td></td>
<td>(.29)</td>
</tr>
<tr>
<td>Mobility</td>
<td>.58*</td>
</tr>
<tr>
<td></td>
<td>(.63*)</td>
</tr>
<tr>
<td>Locomotion</td>
<td>.63*</td>
</tr>
<tr>
<td></td>
<td>(.64*)</td>
</tr>
<tr>
<td>Communication</td>
<td>.22</td>
</tr>
<tr>
<td></td>
<td>(.33)</td>
</tr>
<tr>
<td>Social Cognition</td>
<td>.23</td>
</tr>
<tr>
<td></td>
<td>(.26)</td>
</tr>
<tr>
<td>Total</td>
<td>.63*</td>
</tr>
<tr>
<td></td>
<td>(.62*)</td>
</tr>
</tbody>
</table>

Calculations of \( \rho \) are based on patients’ self-reports (calculations based on caregivers’ proxy reports are in parentheses).

* \( P<.05, \) with Bonferroni correction applied for multiple significance tests.
of perceived quality of life. For our sample, even with a relatively low frequency of cognitive impairment and the close relationships between the stroke survivors and their proxies (50% of proxies were spouses), agreement was much lower than with the FAI.

Another problem with HSQ items may involve the educational status that is optimal for understanding them. Some of the wording is complex, and the generally low educational status of our sample may have led to difficulties in item comprehension. In a mail survey of more than 3000 patients, respondents with lower levels of educational status completed significantly fewer items than those with higher educational status.12

Total FIM scores and the physical dimension of the FIM and its scales had generally excellent agreement. The only exception was the sphincter control scale; other reports have suggested that the format of the sphincter control scale is confusing,23 which can reduce agreement. In this study, survivors rated themselves more independent than caregivers rated them. This is a very personal item, and we assume survivors were underreporting problems rather than that caregivers were overreporting them. Whether survivors actually perceived themselves as more independent than their caregivers did or were embarrassed to admit problems to the research assistants cannot be determined. However, according to anecdotal reports, some survivors seemed especially uncomfortable with these questions, judging by lack of eye contact and hesitation.

The only other problems with FIM proxy agreement were on the cognitive dimension, particularly the communication scale. In other investigations, items on this dimension have had poor agreement, suggesting general confusion about their meaning when measured on the same patients within a week’s time by therapists at different institutions27 and during mastery testing with standardized, videotaped case presentations.28 The items may need substantial revision. The cognitive dimension did not seem to be a scale that could be applied in the same way for all impairment groups classified by UDS when analyzed by item,23 and in a study of spinal cord–injured patients there was a low correlation between FIM cognition and results of validated neuropsychological tests.29

One caveat regarding the generally high agreement for the FAI and FIM is that stroke survivors in this study were relatively unimpaired cognitively. This constraint was imposed by the design of the proxy study, because aphasia (except for loss of fluency) and lack of ability to understand the interview questions were necessary exclusion criteria. A question remains about the ability of caregiver proxies to respond accurately for more cognitively impaired survivors. We assume that because the FAI and the physical dimension of the FIM measured observable, quantifiable behavior, they should be appropriate for more cognitively impaired patients. A method of testing proxy ratings for a more cognitively impaired sample would be to measure agreement between two proxies who know the patient well.

**Description of the FAI and FIM Distributions**

Norms on the FAI were similar to norms in a recent sample of 96 Dutch stroke patients at 6-month follow-up: their mean score was 30.8, somewhat higher than the mean score for our sample. A study of 6-month stroke survivors in England reported average FAI scores of 27.5, according to the scoring system we used.2 Thus, our FAI results are comparable to others. These cross-cultural comparisons must be sensitive to possible cultural bias as well as impairment and disability differences between samples. The FAI is rarely used in published reports of stroke survivors’ status in the United States.

Stroke survivors from a more middle-class sample than reported in this study may have higher norms on measures like the FAI; work is now in progress to explore this issue. The socioeconomic indicator we used, level of education, was positively related to FAI scores. It would be interesting to know whether this trend was present premorbidly, or whether educational status affected functional status as a covariate in the rehabilitation process. The effect of educational status appeared to be a small, general trend, because the only item for which there was a significant difference was reading books. This item was included in the FAI because it represented a greater level of activity than simply perusing the newspaper or doing other forms of more casual reading (e.g., looking at magazines). However, it may also reflect socioeconomic and cultural effects independent of stroke. Other work has suggested that this item (along with the one on gainful work) is clinimetrically weak, is not predictive of change between premorbid and postmorbid status, and could be deleted.8

The average FIM scores in this study are similar to those in another US study of stroke patients at 6-month follow-up who closely resembled our sample in terms of age, sex, and marital status.30 In our study FAI scores were low and distributions positively skewed, but for the FIM the average scores were high and distributions negatively skewed. For this group, although physical and cognitive disabilities were relatively infrequent, functional status tended to be poor.

**Relation Between the FAI and the FIM Scores**

The relation between the FIM and FAI scores was strong, as had been expected. For other comparisons of the FAI and disability scores there has been a similar pattern. Wade et al2 calculated that the Pearson correlation between scores on the FAI and the Barthel Index of Daily Living Index was .60. This is similar to our finding in this study for the Pearson correlation of .62 between the FAI and the FIM for caregiver report; we have chosen in this paper to report Spearman rank coefficients because they are more appropriately applied to non-normal distributions. A similar Pearson correlation (.66) was found between the Barthel Index and the FAI by Schuling et al.8

We had not anticipated that the relation between FIM and FAI scores would be inconsistent for various levels of disability, but in retrospect this finding makes intuitive sense. Functional status or quality of life may be governed by disability when subjects are relatively severely disabled. For less disabled subjects, the effects of social support, personality, community resources, previous interests and activity level may all play a role as important or more so than the level of disability. The relation between disability and functional/social activities for stroke patients is not well documented, and has not to our knowledge previously been compared for more and less disabled patients. We suggest that in
future studies, functional/health status outcomes should be presented for both more and less severely disabled stroke survivors.

Analysis of the FIM and FAI scores showed that the FIM self-care, mobility, and locomotion scales were strongly related to the FAI domestic activities and outdoors/other scales and somewhat less so to the work/leisure scale, on which the distribution of scores was the lowest. The cognitive dimension and the sphincter control scale were not highly related to FAI scores, suggesting a lack of predictive power.

Supporting these findings, a recent study of almost 28 000 patients in general rehabilitation showed that the FIM cognitive dimension at admission was relatively unimportant in predicting length of stay. For the almost 11 000 stroke patients in the sample, less cognitive function at admission was associated with shorter stays (a stronger relationship for instrumental activities), and laterrality of stroke was unrelated to discharge cognitive function.22 However, the results of our study are inconclusive because scores on these scales were restricted in range: serious communication deficits precluded acceptance into the study. Although sphincter control has been suggested as a predictor of inpatient rehabilitation outcome for stroke survivors,21 it has not to our knowledge been shown to be a predictor of functional status for survivors living at home.

The relation shown in the Figure between the FIM and the FAI was replicated for the domestic and outdoors/other FAI scales but not for the work/leisure scale, where the relation of the FAI with the FIM was weak across all levels of disability. Further work, perhaps using in-depth structured interviews and qualitative research designs, can help determine why the items on the FAI work/leisure scale had the lowest distributions, the lowest proxy agreement, and the least relation with disability scores even when disability scores were low. Despite questions about the work/leisure scale, the FAI has been shown to have overall validity for use with stroke survivors at follow-up.

Acknowledgments

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