

FIM Scores as an Indicator of Length of Stay and Discharge Destination in CVA Patients: A Retroactive Outcomes Study

Jamie Amundson, Amy Brunner, and Mary Ewers

Faculty Sponsor: Sally Huffman, MS, OTR, Occupational Therapy Department

ABSTRACT

The Functional Independence Measure (FIM) scale is used in in-patient occupational therapy to measure progress of functional skills such as dressing, bathing, and eating. The recent changes in healthcare, transitioning from fee-for-service to capitative service delivery model, are requiring therapists to advance their skills in the area of prognostics. If the FIM can be used as an outcomes predictor, therapists may more accurately determine patient outcomes, and upon admission, address the psychosocial effects of transition from hospital to discharge placement early in treatment.

Eighty-two charts were reviewed at a large medical facility in western Wisconsin from the years 1994 and 1998. This retroactive outcomes study explores the ability of the FIM to predict length of stay (LOS) and discharge destination of stroke survivors over the age of 65.

Both logistical and multinomial regressions were used to analyze data. Statistical models were constructed to determine if the initial total FIM score and the initial self-care total FIM score predict discharge destination. These models showed significance, with $p < .001$ and $p < .004$, respectively. Initial total FIM and initial self-care total FIM scores also predict LOS in CVA patients, with initial self-care FIMs being a more significant predictor. In conclusion, the FIM score may be used as an outcomes predictor in CVA patients.

INTRODUCTION

Occupational therapy (OT) is defined by Wisconsin Statutes (1995) as “the use of purposeful activity with persons who are limited by physical injury or illness, psychosocial dysfunction, developmental or learning disability, or the aging process in order to maximize independent function, prevent further disability, and achieve and maintain health and productivity; and encompasses evaluation, treatment, and consultation services that are provided to a person or a group of persons.” One of the diagnoses frequently treated by occupational therapists is cerebral vascular accident (CVA). A CVA, or stroke, is a disease of the blood vessels in the head, in which there is failure to supply oxygen to the cells in the brain. These cells are very susceptible to damage caused by lack of oxygen, and often result in their death

(Gillen & Burkhardt, 1998). CVAs are the third leading cause of death in the United States (Anderson, 1997). According to Reddy and Reddy (1997), 550,000 people in the U.S. suffer from strokes each year. Of these people, approximately 150,000 die and 300,000 are left disabled. This makes stroke the leading cause of brain damage and resultant disability (Reddy & Reddy, 1997).

Frequently, CVA patients undergo intensive rehabilitation following the acute stage of the stroke. This often translates into a lengthy hospital stay. Despite the fact that the length of stay is significantly shorter in comparison to previous years, there is still a push to decrease the amount of time spent in the hospital in order to cut healthcare costs. As a result, there has been a demand for outcome measures that objectively measure functional gains and may be used to predict patients' prognosis and destination.

One such scale is the Functional Independence Measure (FIM). This scale is widely used in rehabilitation facilities (Mauthe, 1996) and it measures how independent a person is on a scale from 1 – 7 (Table 1). Scores are given in the areas of self-cares (eating, grooming, bathing, etc.), sphincter control, mobility, locomotion, communication, and social cognition; and are combined for a total FIM score. These scores are used for initial assessment, to measure progress, and upon discharge; and thus, may be used as an outcome measure of progress. It is of particular importance in occupational therapy, as the largest area scored by the FIM is self-care. In addition, occupational therapists are typically the professionals assessing self-care and social cognition, which when combined, make up half of the total FIM score. Thus, occupational therapists have a significant role in assessing the total FIM score.

TABLE 1

Levels of Scoring:

Independence:

7- Complete independence

6- Modified independence

Modified dependence:

5- Supervision

4- Minimal assistance (client 75%+)

3- Moderate assistance (client 50%+)

Complete dependence:

2- Maximal assistance (client 25%+)

1-Total assistance (client 0%+)

The fact that the FIM scale offers an initial total score and a final total score leads to the question of its predictive possibilities in determining course of treatment and discharge destination of a patient. This is of considerable value in the Medicare system when reimbursements are often based on what is 'average' for a particular diagnosis. The ability of the FIM to predict length of stay would assist occupational therapists in treatment planning, as well as in preparing the patient for their discharge destination. Also, if the FIM scores have predictability, this would verify the necessity of its use in assessment by occupational therapy.

There have been mixed results in the research done on predicting outcomes of stroke patients. Allen (1984) states that outcomes of stroke patients can be predicted by assigning a prognostic score, looking at several variables. In contrast, Lehmann et al. (1975), suggests that pre-identified predictors were not accurate enough to predict rehabilitative outcomes. Both studies looked at predictors such as medical complications, age, and education, rather than a validated and reliable functional assessment, such as the FIM. However, Oczkowski and Barreca (1993), looked at the FIM and its use to identify rehabilitation needs in stroke survivors, but focused on the areas of age, postural control, and urinary and bowel incontinence as predictors. They found that these areas are relatively strong predictors of outcome. Yet, a major weakness of this study is that it neglected to look at over half of the areas covered by the FIM. These neglected areas fall within the realm of occupational therapy, in particular, the area of self-care.

Thus, this research project hypothesizes the following:

1. The change in total FIM scores ($FIM_{\text{final}} - FIM_{\text{initial}}$) predicts length of rehabilitation stay, with greater change indicating longer stay.
- 2a. The initial total FIM score predicts discharge destination.
- 2b. The initial total FIM score predicts length of stay.
- 3a. The initial self-care total FIM score predicts discharge destination.
- 3b. The initial self-care total FIM score predicts length of stay.

METHODS

A chart review was performed of all persons admitted to inpatient rehabilitation at a large medical facility in western Wisconsin for stroke rehabilitation during the years 1994 and 1998. The year 1994 was selected, as it was the first full year the FIM was used routinely by the rehabilitation team.

Data collection began by obtaining names of patients who experienced a stroke and received inpatient rehabilitation during the years of 1994 and 1998. The list was then submitted to medical records to obtain the needed charts. A data collection form was used for each chart reviewed. When recording the data, each chart was assigned a number for patient confidentiality. Patients were disqualified if they were younger than 65 years old at onset of stroke. The reason for the age requirement was to ensure consistency of sample. Patients were also disqualified if they died during their rehab stay, had interrupted rehabilitation stays, or had incomplete FIM assessments. In addition, patients were disqualified if their stroke was diagnosed as a brainstem or as a questionable stroke.

Information was gathered on admission and discharge dates, date of birth, age of onset of stroke, gender, stroke history, discharge destination, initial and final FIM scores for each of the 18 FIM categories, and the initial and final FIM score totals. Initial FIM scores recorded within the first seven days of admission to the rehabilitation unit were taken from the Rehabilitation Staffing Conference Sheet.

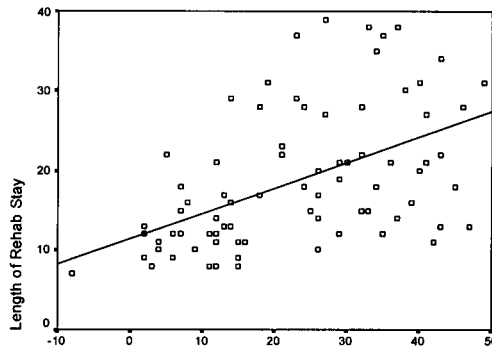
Discharge FIM scores were taken from the rehabilitation team's final FIM assessment if it was documented within the week prior to discharge. If the final assessment was incomplete, the doctor's discharge note was reviewed to fill in numbers for the categories that were lacking scores. LOS, age, FIM totals and changes in FIM scores were calculated by the research team. Data was analyzed using the Statistical Package for the Social Sciences computer software (S.P.S.S. 9.0).

RESULTS

The age, gender, length of stay, and side of CVA are reported in Table 2. From the 82 useable charts, 19.5% (n=16) patients were discharged home independently, 46.3% (n=38) patients were discharged home but received help from others (spouse, relative, home health), and 34.1% (n=28) were discharged to a skilled nursing facility (SNF).

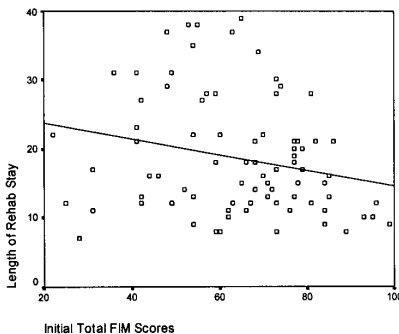
Result 1: A linear regression indicates that greater changes between final and initial FIM totals correlate with a greater length of stay, with significance of $p<.001$ and $R=.516$ (Graph 1). This indicates that patients making functional improvements in therapy tend to stay longer in in-patient rehabilitation.

GRAPH 1

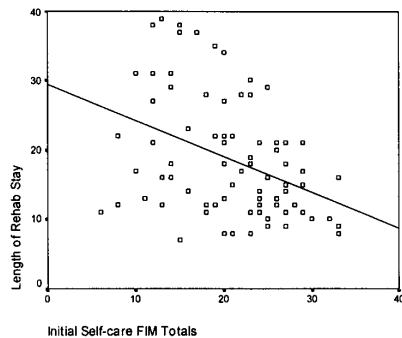


Result 2: A multinomial logistical regression was used to analyze the data of initial FIM scores, and a statistical model was created, breaking the FIM scores into categories. FIM scores ranging from 75-126 were categorized as high scores, 56-74 were categorized as medium scores, and 18-55 were categorized as low scores. Discharge destinations included home independent, home with help, and SNF. The overall model showed significance of $p<.001$, and an odds ratio was performed using SNF/low scores as the reference category (Table 3). The overall result showed that the initial FIM total score is a significant predictor of discharge destination with high scores more likely to go home independent, medium scores more likely to go home with help, and low scores more likely to go to a SNF.

GRAPH 2



GRAPH 3



A linear regression was utilized to determine if initial FIM totals predict length of stay in inpatient rehabilitation (Graph 2). Significance was $p<.035$, and the correlation coefficient was $R=.233$ ($R^2=.054$). Thus, initial FIM total is not a good predictor of length of stay, and other factors may be better determinants of length of stay.

Result 3: A multinomial logistical regression was used to compare totals in the self-care area of the FIM to discharge destination. Again, a statistical model was created, breaking FIM scores into categories. Self-care FIM score totals ranging from 27-42 were categorized as high scores, 20-26 were categorized as medium scores, and 6-19 were categorized as low scores. Discharge destinations were categorized the same as in result 2 (home independent, home with help, and SNF). The overall model has significance of $p<.004$, and an odds ratio was performed with SNF/low scores being the reference category. See Table 4. The analysis indicates that self-care totals in the FIM are significant predictors of discharge destination, with high scores more likely to go home independent, medium scores more likely to go home with help, and low scores more likely to go to a SNF. However, the model for predicting odds was slightly better using total FIM scores.

A linear regression was used to determine if initial self-care FIM total is a predictor of length of inpatient rehabilitation stay (Graph 3). Results indicated self-care FIM totals predict length of stay with significance of $p<.001$, and correlation coefficient of $R=.385$ ($R^2=.015$). The low correlation coefficient indicates that despite its significance as a predictor, other factors may be involved in determining length of stay.

TABLE 2

GENDER	34 Males
	48 Females
SIDE OF CVA	49 Right
	33 Left
STROKE HISTORY	12 Yes
	70
No DISCHARGE DESTINATION	16 Home independent
	38 Home with help
	28 Skilled nursing facility

	MINIMUM	MAXIMUM	MEAN	ST. DEV.
AGE OF ONSET	65.00	93.00	78.0122	7.8386
LENGTH OF STAY	7.00	39.00	18.3854	8.5360

TABLE 3

MODEL $p<.001$

PARAMETER ESTIMATES FOR INITIAL TOTAL FIM SCORES

	SIGNIFICANCE	ODDS RATIO
HOME INDEPENDENT	.005	
High Score Category	.001	45.000
Medium Score Category	.023	15.000
HOME WITH HELP	.020	
High Score Category	.003	9.000
Medium Score Category	.001	10.000

*Reference Category is Low Score/SNF

TABLE 4
MODEL $p < .004$
PARAMETER ESTIMATES FOR INITIAL TOTAL SELF-CARE FIM SCORES

	SIGNIFICANCE	ODDS RATIO
HOME INDEPENDENT	.005	.004
High Score Category	.031	12.750
Medium Score Category	.007	10.389
HOME WITH HELP	.261	
High Score Category	.013	8.500
Medium Score Category	.076	2.747

*Reference Category is Low Score/SNF

DISCUSSION

Initial total FIM scores as a predictor of LOS, with low scores indicating a longer stay and high scores indicating a shorter stay in rehab.

Initial total FIM scores showed significance in predicting LOS with lower scores having a longer LOS and higher scores having a shorter LOS. The lower correlation coefficient, $R = .233$ ($R^2 = .054$), indicates that factors other than functional abilities may influence LOS. An individual's rate of recovery may vary due to factors not measured by the FIM, such as age, motivation, previous health status, and comorbid conditions. The effect that age has on functional outcomes has been focused on in other rehabilitation research (Hanks, 1996). However, this was not a main component of this research study. All of this goes to show that LOS may not be accurately predicted based only on functional status scores without consideration of some other factors.

Initial self-care total FIM scores as a predictor of LOS, with low scores indicating a longer stay and higher scores indicating a shorter stay.

The initial self-care total FIM scores were somewhat significant as a predictor of LOS. It is unclear as to why initial self-care FIM scores are a better predictor of length of stay than the initial total FIM scores. Further research is needed to see if these results can be validated.

This study parallels results obtained by Oczkowski and Barrecca (1994), where all patients with initial total FIM scores less than 36 were not discharge home and all patients with totals greater than 97 were discharged home. However, in this study, all patients with initial FIM scores less than 41 went to a SNF and those greater than 89 went home. It seems apparent that SNF is a logical discharge destination for scores lower than 36-41 as the average individual FIM score would be 2-2.3 per individual FIM item. A score of 89-97 (low end-range of patients discharged home) averages 4.9-5.4 per FIM category.

The change in FIM scores ($FIM_{\text{final}} - FIM_{\text{initial}}$) as a predictor of length of stay, with greater change indicating longer stay.

Patients that had little or no change between initial and final total FIM scores were discharged sooner than patients who had greater change in total FIM score. The reason for this may be linked to Medicare and the changes that have been occurring within the past few years. In the past, facilities were reimbursed more freely for rehabilitation services provided. Now, however, reimbursement is not guaranteed for services provided, but is more dependent on functional improvement made in therapy. Medicare gives healthcare facilities a predeter-

mined amount of money based on the patient's diagnosis. If the patient is making progress, the facility can continue receiving money from Medicare to provide services without losing money. However, if the patient is not making progress, Medicare will not support the patient's rehabilitation process. Therefore, the patient's rehabilitation program will be cut short, or shorter than if they were making measurable gains.

Initial total FIM scores and initial self-care FIM scores as a predictor of discharge destination.

After comparing the initial total FIM score and the initial self-care FIM score, the initial total FIM score was a slightly better indicator of discharge destination. This would make sense as the self-care portion is related mainly to OT, but the entire FIM utilizes many of the disciplines besides occupational therapy. However, the results from both models may be skewed due to the fact that each discharge destination category was not equally represented. There were many more people represented in the categories of home with help and SNF.

Since the initial total FIM score showed significance ($p < .001$), it can be used to the advantage of OTs and other medical professionals when preparing patients and their family members for discharge. If the total FIM score is low, the therapist can prepare the patient and family members that the odds of them going to a SNF is quite high and not as high for returning home. This knowledge can help the patients get accustomed to the possibility that they may not be returning to the residence of their choice. This can result in many psychosocial issues, and with the FIM scores predictability of discharge destination, this knowledge can help prepare patients both physically and psychologically for the change.

LIMITATIONS

One limitation that may have affected our data collection is the documentation of discharge destinations. Often the physician stated in the discharge report that the patient would go home with the help of a spouse. It is questionable whether or not they actually required help. This form of documentation may have been used as a safety net for physicians if someone was questionable to return home without assistance. The documentation by physicians may have biased our results in the direction of home with help.

Also, during our data collection, not all of the Rehabilitation Staffing Conference Sheets were completely filled out. If the most current summary FIMs were within one week of discharge, those numbers were used. However, if those numbers were more than seven days before discharge, the doctor's discharge summary was used to obtain final FIM scores. If the discharge FIM scores were not recorded on the Rehabilitation Staffing Conference Sheets, the most recent FIM scores found were used. One week allows for a great deal of recovery to occur; therefore, the scores may not be as current as possible.

We recommend that when researching this topic further, it should be done as a proactive study instead of a retroactive study, as in this case. This may help decrease some of the above limitations. Also, we would narrow the focus of this study considerably, as this project extended beyond the scope of undergraduate research. This could be performed by reducing the amount of hypotheses investigated. Simply investigating the FIM's prognostic use in length of stay or the FIM's prognostic use in determining discharge destination (but not both) would be sufficient.

SUMMARY

This study proved that the FIM scale has predictive value in determining length of stay and discharge destination of stroke survivors. As changes in healthcare progress with increasing pace, universal assessments based in function are becoming a necessity, not only to measure progress, but also to assist in prognostic preparation of the patient and family. Helping the patient prepare for changes ultimately leads to a more holistic approach to treatment. This knowledge makes OTs better equipped to deal with psychosocial issues of adjustment, and in transitioning the patient from hospital to discharge destination. As helpful as research of this nature is, it is important to consider that not every patient's score fits this statistical model. Rehabilitation outcomes are dependent on many subjective, non-measurable factors such as motivation, ability to adapt, and physical, emotional, and social supports. Thus, the FIM's predictive uses should only be used as a general guideline, and each person's potential for recovery should never be limited to a set of numbers.

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REFERENCES

- Allen, C. (1984). Predicting the outcome of acute stroke: A prognostic score. *Journal of Neurology, Neurosurgery, and Psychiatry*, 47, 475-480.
- Anderson, E. (1997). Different strokes. *Patient Care*, 31, 13.
- Gillen, G. & Burkhardt, A. (1998). Stroke rehabilitation: A function based approach. St. Louis, MS: Mosby.
- Hanks, R., & Lichtenberg, P. (1996). Physical, psychological, and social outcomes in geriatric rehabilitation patients. *Archives of Physical Medicine and Rehabilitation*, 77, 783-792.
- Lehmann, J., DeLateur, B., Fowler, R., Warren, C., Arnhold, R., Schertzer, G., Hurka, R., Whitmore, J., Masock, A., & Chambers, K. (1975). Stroke rehabilitation: Outcome and prediction. *Archives of Physical Medicine and Rehabilitation*, 56, 383-389.
- Mauthe, R., Haaf, D., Hayn, P., & Krau, J. (1996). Predicting discharge destination of stroke patients using a mathematical model based on six items from the Functional Independence Measure. *Archives of Physical Medicine and Rehabilitation*, 77, 10-13.
- Oczkowski, W. & Barreca, S. (1993). The Functional Independence Measure: It's use to identify rehabilitation needs in stroke survivors. *Archives of Physical Medicine and Rehabilitation*, 74, 1291-1294.
- Reddy, P. and Reddy, V. (1997) Stroke rehabilitation. *American Family Physician*, 55, 1742-1752.
- Sandstrom, R., Mokler, P. & Hoppe, K. (1998). Discharge destination and motor Classification System. *Archives of Physical Medicine and Rehabilitation*, 79, 762-765. function outcome in severe stroke as measured by the Functional Independence Measure / Function – Related Group