ORIGINAL ARTICLE

Selecting Patients for Rehabilitation After Acute Stroke: Are There Variations in Practice?

Paul A. Ilett, BAppSc (Physio), Kim A. Brock, PhD, Christine J. Graven, PostGradDip (Health Research Methodology), Susan M. Cotton, PhD

ABSTRACT. Ilett PA, Brock KA, Graven CJ, Cotton SM. Selecting patients for rehabilitation after acute stroke: are there variations in practice? Arch Phys Med Rehabil 2010;91: 788-93.

Objective: To investigate whether there were variations in practice in selection for rehabilitation after stroke, after adjustment for case mix.

Design: Prospective multicenter audit.

Setting: Seven acute stroke units in metropolitan and regional Victoria, Australia.

Participants: Consecutive acute stroke admissions (N=616).

Interventions: None.

Main Outcome Measures: Mobility Scale for Acute Stroke Score and Modified Barthel Index (MBI) scores for continence at day 3 poststroke, discharge destination from the acute hospital.

Results: Data were analyzed for 616 stroke survivors. Considerable variability in the percentage of cases accessing inpatient rehabilitation was observed in severe stroke (27%–67%) and mild stroke (27%–73%). To assess adjustment for case mix, a multinomial logistic regression was conducted with the outcome variable being discharge destination (home, rehabilitation, or nursing home), and the predictors being Mobility Scale for Acute Stroke Score, MBI continence scores, age, and social situation. The overall amount of variability explained in discharge destination by the predictors was 63% (Nagelkerke pseudo R^2). The regression analysis was repeated, adding unit code as a predictor. Unit code was a significant contributor to the model ($P<.01$).

Conclusion: The results of the study indicate that, after adjusting for case mix, there may be variations in practice in selection for rehabilitation leading to inequities of access.

Key Words: Diagnosis-related groups; Health services accessibility; Prognosis; Rehabilitation; Stroke.

© 2010 by the American Congress of Rehabilitation Medicine

IN STROKE REHABILITATION, it is common practice for rehabilitation units to send an assessor to the acute hospitals to evaluate the potential of individual patients with stroke to benefit from rehabilitation and determine whether they should be offered inpatient rehabilitation. While there is a considerable body of literature investigating prognostic factors for recovery poststroke,[1-3] there is no widely accepted model for objectively determining patients' potential to improve and recover sufficient independence to return home and/or their potential to benefit from rehabilitation.[4] Key prognostic factors that have been identified include age; previous functional ability; initial disability poststroke; various neurologic impairments including conscious state, continence, sitting balance, and severity of paralysis; and social support.[2,5,6] The decision of the rehabilitation assessor must be informed by the literature regarding prognostic factors but is necessarily multifactorial, taking into account many aspects of the patient's presentation.[4,7]

In selection for rehabilitation, a balance should be maintained between people who will clearly benefit from rehabilitation and those who may benefit.[4,8] If only those who have a high likelihood of benefiting are admitted, then many who may have benefited will miss out. If every patient with stroke is admitted to rehabilitation, including all those with very severe stroke, then a significant number of episodes of rehabilitation will not deliver a functional benefit. Some studies investigating prediction of functional abilities or discharge home have demonstrated good sensitivity (ie, those who are predicted to have a good recovery were very likely to do so), but only moderate specificity (ie, those predicted not to have a good recovery or return home often did better than expected).[9-11] Because it is sometimes difficult to discern at this early stage a patient's potential to improve, it is important to ensure that those patients with a less positive initial prognosis are not excluded by the system.[12] At the same time, it is important to avoid admitting patients with little likelihood of benefit (eg, those with very poor prognosis and minimal potential for improvement and those who have very mild stroke and are likely to recover full function with outpatient-based interventions only).[8]

It has been recognized that the process of selection for rehabilitation may lead to inequities of access for patients with stroke.[13] This is particularly pertinent where funding models for rehabilitation are case mix–based and likely to favor certain patient groups over others[14] (eg, mild or moderate stroke compared with severe stroke). Given the complexity of the decision-making process in selection for rehabilitation, it is possible that access to rehabilitation may be variable across health services. Evidence for variation in rate of discharge from the acute hospital setting to nursing home care after stroke, after adjusting for case mix, has been demonstrated by Portelli et al.[15] Evidence for significant variability in the case mix of patients with stroke admitted to rehabilitation units has been shown by Putman et al.[16] In this latter international study, nonpatient-related factors such as funding

List of Abbreviations

BI	Barthel Index
MBI	Modified Barthel Index

models played a significant role. Our interest was to examine selection for rehabilitation where the funding model was uniform across all units. Most stroke rehabilitation in Victoria is government-funded, using a funding model with 2 categories for stroke-based on-admission BI score (0–59, 60–100), with higher per-day payment for shorter stay patients and a lower rate of payment for those staying beyond specified periods. The funding model is designed to reward efficient practice financially, resulting in shorter length of stay, while still providing a lower level of reimbursement to allow a longer length of stay for those patients whose circumstances (clinical or social) require it.

When investigating variations in practice between health services, it is necessary to control for patient case mix, because simply considering descriptive data may lead to invalid conclusions.[15,17,18] We reviewed the literature for studies predicting discharge destination from the hospital, using patient characteristics indicative of prognosis after stroke. Three studies have investigated prediction of discharge destination (home, rehabilitation, or nursing home) from the acute setting. Mauthe et al[19] used 6 items from the FIM (bathing, bowel management, toileting, social interaction, dressing lower body, eating), scored at 3 days poststroke, with 70% accuracy of prediction. Rieck and Moreland[20] achieved 58% accuracy of prediction of discharge destination using the Orpington Prognostic Scale (measuring motor function and cognition) scored at 7 days poststroke and 65% accuracy when scored at 14 days poststroke. Unsworth[8] demonstrated 74.9% accuracy of prediction using 5 FIM items (bowel management, stairs, dressing upper body, expression, social interaction) scored 3 days prior to discharge. Inclusion of social situation, instrumental activities of daily living, and premorbid housing and cognitive status improved accuracy to 79.4%. A number of studies have investigated prediction of discharge destination (home vs residential care) from inpatient rehabilitation, with accuracy of prediction levels of 75% to 87%,[10,11,21,22] and/or the amount of variation explained ranging between 21% and 67%.[10,23,24] All models used either a functional status measure (FIM) or motor function measure (Chedoke McMaster Stroke Assessment, Motor Assessment Scale, Berg Balance Scale), and most measured social support.

In a preliminary study for this project, the accuracy of prediction of discharge destination from the acute hospital was investigated using 3 measures: the Mobility Scale (Mobility Scale for Acute Stroke),[25] the BI,[26] and the MBI,[27] assessed at day 3 poststroke.[28] The study took place in an acute stroke unit of a tertiary teaching hospital, with 86 participants. The accuracy of prediction of discharge destination was above 75% for all scales, with the most accurate classification being 83% for the combination of Mobility Scale scores and the MBI bowel item.

The primary purpose of the current study was to investigate whether there are variations in practice in selection for rehabilitation. The study focuses on both access to rehabilitation for patients with more severe stroke and use of inpatient rehabilitation resources for those with more mild stroke. In order to adjust for case mix, level of function poststroke was measured using the variables tested in the preliminary study (unpublished) described above (Mobility Scale and MBI continence). Prior to investigating variations in practice in selection for rehabilitation, we assessed the suitability of these variables to control for case mix in a multicenter study by examining the overall accuracy of prediction of discharge destination.

The aims of the study were to (1) investigate accuracy of prediction of the indicators developed in the pilot study in a multicenter study, and (2) investigate whether there were vari-

ations in practice in selection for rehabilitation at different acute hospitals.

There were 2 hypotheses: (1) that the variables used in the preliminary study would be accurate predictors of discharge destination in the multicenter study, and (2) that, after adjusting for case mix, the acute hospital unit would be a significant variable in prediction of discharge destination.

METHODS

Study Design

This was a prospective, observational cohort study, conducted as a benchmarking project.

Setting

The setting was 7 acute stroke services in large, tertiary referral hospitals in metropolitan Melbourne and 1 stroke service in a large regional hospital in Victoria. All units admitted more than 100 patients with stroke a year.

Ethics

This project was conducted as a multisite benchmarking prospective audit in which deidentified data were provided to a central location by the facilities. Because all data in the main study were anonymous and obtained from routine clinical care, this was deemed by the ethics committees of the participating units not to require informed consent.

Participants

Data were collected from a cohort of consecutive patients admitted with the primary diagnosis of stroke (including cerebral infarct, intracerebral hemorrhage, intraventricular hemorrhage, and subarachnoid hemorrhage). Day of stroke was classed as day 0. Patients with previous strokes were included in this project.

Patients were excluded in the following circumstances: admitted from residential care, admitted with another primary illness or incident, stroke was not the main cause of disability, had a stroke onset more than 3 days prior to admission, or symptoms had resolved by day 3. Only data from patients who survived were analyzed. Data from patients discharged from one acute hospital to another acute hospital were not included. Each participating center undertook to provide data on 100 prospective consecutive patients.

Measures

The scale used in the preliminary study, the Mobility Scale,[25] was selected as an indicator of motor function at the early poststroke. This scale rates the level of assistance required for the patient to do 6 simple mobility tasks: bridging, sitting up from lying, balanced sitting, sit to stand, balanced standing, and walking (appendix 1). The rating scale has 6 levels, from "unable to do" to "independent." Minor changes were made to items of the Mobility Scale to facilitate ease of use in the very acute patient. Three tasks (bridging, sitting from supine, sit to stand) were performed once rather than 3 times, and the balanced sitting item was tested for 1 minute rather than 3 minutes. The sit to stand item was performed from the hospital bed rather than a chair.

Intrarater, interrater, and test-retest reliability have been demonstrated for the Mobility Scale, with weighted kappa ratings of greater than .75, greater than .75, and .64 to .88, respectively, representing fair to excellent levels of agreement.[25] The Mobility Scale has been used at 2 weeks poststroke to predict length of stay in rehabilitation, explaining