

Cognitive Functioning in the Acute Phase Poststroke: A Predictor of Discharge Destination?

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Cognitive dysfunction occurs in more than half of stroke survivors and can have far-reaching consequences for functioning in daily life. Assessment of cognitive function can play a major role in determining the appropriate discharge destination after a hospital stay. The present study aimed to determine the feasibility of cognitive screening in the acute phase poststroke and to investigate whether this cognitive screening can accurately predict discharge destination to either a dependent or an independent living situation. A total of 287 patients with a first-ever cerebral stroke consecutively admitted to a stroke unit of a general hospital were eligible for the study. All patients underwent neuropsychological screening, consisting of the Mini-Mental State Examination (MMSE), Cognitive Screening Test (CST), and Clock-Drawing Test, within 7 days poststroke. Screening was feasible in 73.2% of the patients. Logistic regression analysis showed that the Barthel Index (BI) score (ie, ability to perform activities of daily living) could predict the discharge destination with 47% explained variance when age and BI score were taken into account. Adding the 3 cognitive tests to the model with age and BI improved the explained variance substantially (53%), with a significant contribution of BI and CST. Cognitive screening in the acute phase poststroke appeared to be feasible and capable of supporting the decision of whether to discharge a patient to home or to a dependent living situation. Functional status improved the predictive value of the model; the MMSE was not suitable for prediction. A comprehensive set of various predictors, including cognition, is recommended to support discharge planning. **Key Words:** CVA—cognition—discharge planning.

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Cognitive dysfunction poststroke occurs in more than half of stroke survivors¹⁻⁴ and can have far-reaching consequences for daily life functioning,⁵⁻⁷ quality of life,⁸ and return to work.⁹ Through neuropsychological examination, Tatemichi et al³ found cognitive disorders in 78% of 228 patients studied. The most frequently affected cognitive domains were orientation, memory, attention, and language. In addition, Rasquin et al¹⁰ found impaired speed of cognition in 50% of 115 stroke patients.

Identifying poststroke cognitive impairment at an early stage might increase the possibility of reducing or even preventing further cognitive decline.¹¹ Moreover, an early diagnosis of specific cognitive deficits, such as amnesia or executive dysfunction, could be of great importance to determining an appropriate discharge destination because of the effect on daily functioning.⁵

Determining the appropriate discharge destination from a hospital stroke unit is based largely on the prognosis of future deficits in activities of daily living (ADL) and ambulation, as well as the availability of social support.¹² Thus, the assessment of acute cognitive functioning poststroke can play a role in determining the best discharge destination.

Unfortunately, relatively little is known about acute (defined as the first few days after stroke) cognitive disorders poststroke, and few studies have examined the prognostic value of these impairments.¹³ Accurately determining the extent of cognitive dysfunction through a quick screen is not easy in acute stroke patients; however, extensive neuropsychological testing is not relevant and often not possible at this stage, when patients can be medically unstable or undergo dramatic changes.^{10,14} Moreover, extensive neuropsychological testing is time-consuming and can be exhausting for the patient. Thus, short cognitive screening seems to be the obvious best way to detect cognitive impairments in the early days poststroke. Previous studies have indicated that cognitive examination is feasible within the first 2 weeks after stroke; neuropsychological examination could be performed within the first 3 weeks poststroke in 77%-88% of the stroke patients studied.^{4,5} The feasibility of cognitive screening in the first days after stroke had not yet been studied, however.

Accordingly, our first goal in the present study was to determine the feasibility of cognitive screening in the acute phase poststroke—in other words, how many patients can be tested within the first few days poststroke. Second, we tested whether screening data on cognitive function obtained through various cognitive tests can accurately predict discharge destination, and whether the tests differ in terms of predictive value. Because long-term independence in ADL is strongly influenced by age and level of disability on hospital admission,¹⁵ we took these factors into account in the prediction of discharge destination.

Patients and Methods

Patients

Between November 2004 and February 2007, 373 patients were admitted consecutively to the stroke unit of a general hospital (Catharina Hospital, Eindhoven, The Netherlands). Patients who had a first-ever cerebral stroke of any type confirmed by brain computed tomography (CT) were eligible for the study. This resulted in 287 patients who were eligible for the study. Testing feasibility was evaluated in this group. To ensure that screening was valid, patients age <40 were excluded from the study, to avoid atypical strokes ($n = 7$), as were those with a Mini-Mental State Examination (MMSE)¹⁶ score <15 ($n = 79$). Patients with persistent impaired consciousness, aphasia, or a major neurologic or other psychiatric comorbidity, such as prestroke dementia, were excluded as well ($n = 13$), along with patients who spoke a foreign language or

refused to participate. These exclusions resulted in a final sample of 188 patients. For each patient, discharge destination was determined by the multidisciplinary stroke team.

Procedure

Each patient was contacted by the neuropsychologist at the stroke unit within 8 days after admission to the hospital. Demographic information, including age, sex, and educational level, was collected. Educational level was scored as 1, primary school; 2, secondary school and vocational education; or 3, higher education and university. Stroke-related information (ie, date, type, and location) was obtained from the patient's medical records. The bedside cognitive screening was performed by a neuropsychologist within the first week poststroke at the stroke unit. The patient was informed that he or she would be asked to answer a number of questions designed to evaluate cognitive function, which should take about 15 minutes to complete. The data collection process was approved by the local Medical Ethics Committee.

Measures

The neuropsychological screening comprised the MMSE,¹⁶ the CST,¹⁷ and the Clock-Drawing Test.¹⁸ The MMSE assesses various cognitive functions, including orientation to time and place, verbal imprinting, attention, short-term memory, language, and constructive skills. It consists of 11 short questions and tasks that can be completed in 5-10 minutes.¹⁹ For each cognitive function, the highest obtainable score indicates no sign of cognitive dysfunction in that area. In the highest attainable score, we considered the fact that patients with a paralyzed arm cannot write, and thus their highest obtainable score is somewhat lower than that for other patients. In the present study, in each category of cognitive function, a deviation from the highest obtainable score was considered to indicate a cognitive problem. An MMSE cutoff score of 24 is commonly used to distinguish between cognitively intact and impaired patients.²⁰

The CST consists of 20 short questions designed to assess 3 categories of cognitive functioning: orientation to time, simple general knowledge, and personal data (eg, date of birth, place of residence). The item scores for each category are summed to provide a total score of 6 for each cognitive category, demonstrating intact cognitive function. For each cognitive category, a score <6 is considered to indicate a cognitive problem.

The Clock-Drawing Test, which assesses visuospatial planning skills, requires the patient to fill in the face of a clock in a predrawn circle. First, the numbers have to be printed, and then the hands of the clock have to be drawn to indicate 11:10 a.m. (or 11:10 hours). The scoring method of Schulman^{21,22} differentiates 6 scores, ranging from 1 (a perfect clock drawing) to 6 (no match at all). A score of ≥ 3 is considered to indicate cognitive impairment.^{21,22}

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