Clinical Management Provided by Board-Certificated Physiatrists in Early Rehabilitation Is a Significant Determinant of Functional Improvement in Acute Stroke Patients: A Retrospective Analysis of Japan Rehabilitation Database

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Background: Early rehabilitation for acute stroke patients is widely recommended. We tested the hypothesis that clinical outcome of stroke patients who receive early rehabilitation managed by board-certificated physiatrists (BCP) is generally better than that provided by other medical specialties. *Methods:* Data of stroke patients who underwent early rehabilitation in 19 acute hospitals between January 2005 and December 2013 were collected from the Japan Rehabilitation Database and analyzed retrospectively. Multivariate linear regression analysis using generalized estimating equations method was performed to assess the association between Functional Independence Measure (FIM) effectiveness and management provided by BCP in early rehabilitation. In addition, multivariate logistic regression analysis was also performed to assess the impact of management provided by BCP in acute phase on discharge destination. *Results:* After setting the inclusion criteria, data of 3838 stroke patients were eligible for analysis. BCP provided early rehabilitation in 814 patients (21.2%). Both the duration of daily exercise time and the frequency of regular conferencing were significantly higher for patients managed by BCP than by other specialties. Although the mortality rate was not different, multivariate regression analysis showed that FIM effectiveness correlated significantly and positively with the management provided by BCP (coefficient, .35; 95% confidence interval [CI], .012-.059; $P < .005$). In addition, multivariate logistic analysis identified clinical management by BCP as a significant determinant of home discharge (odds ratio, 1.24; 95% CI, 1.08-1.44; $P < .005$). *Conclusions:* Our retrospective cohort study demonstrated that clinical management provided by BCP in early rehabilitation can lead to functional recovery of acute stroke. **Key Words:** Board-certificated physiatrist—acute stroke—early rehabilitation—Functional Independence Measure—home discharge.

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The clinical importance of early rehabilitation for acute stroke has been recently emphasized in the field of Physical Medicine and Rehabilitation (PM&R) in addition to other medical fields. Several clinical studies have already confirmed the beneficial effects of early stroke rehabilitation.[1,2] In addition, the guidelines for acute ischemic stroke published by the American Heart Association and the American Stroke Association also highlight the importance of early stroke rehabilitation.[3]

Provision of appropriate early rehabilitation to acute stroke patients requires active participation of physiatrists. Physiatrists are usually involved in the clinical management of multidisciplinary rehabilitation team that consists of nurses, physical therapists, occupational therapists, speech therapists, and medical social workers.[4] In some countries, a legal body of the PM&R oversees the certification of physiatrists after an appropriate residency training program.[5,6] Therefore, it is desirable to have board-certificated physiatrists (BCP) with sufficient knowledge and experience about stroke rehabilitation as the primary care providers in the early rehabilitation of patients after stroke.

In Japan, however, early stroke rehabilitation at acute hospitals is not always provided by BCP. At some hospitals, physicians with other specialties head the team that provides early stroke rehabilitation. This is in part due to the shortage in the number of certified BCP. So far, there are no clinical data regarding the impact of BCP involvement in early rehabilitation management for acute stroke patients in Japan.

We hypothesized that the involvement of BCP in early poststroke rehabilitation correlates with good functional recovery compared with management provided by other specialties. To test the hypothesis, we performed retrospective cohort study to clarify the impact of participation of BCP in early stroke management on functional recovery after acute stroke using the Japan Rehabilitation Database containing the clinical data of a large number of acute hospitals throughout Japan.

Subjects and Methods

Data Source

The Japan Rehabilitation Database was established with financial support from the Ministry of Health, Labor, and Welfare of Japan in 2012.[7] The database contains detailed clinical data collected on patients who were discharged from the participating hospitals during the period between January 2005 and December 2013. The database is divided into different sections based on the diagnosis, such as stroke, femoral neck fracture, spinal cord injury, and other disorders. The database for stroke patients includes mainly the identifiers of the following patient characteristics: age, sex, Functional Independence Measure (FIM, scores range from 18 for totally dependent to 126 for totally independent),[8] length of stay at the acute hospital, days from stroke onset, type of stroke, discharge destination, amount of rehabilitative exercise per day, 5-grade modified Rankin Scale (mRS level 1, no significant disability; level 5, severe disability),[9] National Institutes of Health Stroke Scale (NIHSS) score, self-exercise, regular conferencing, and involvement of a BCP as the responsible physician. The medical staff (physicians, therapists, and nurses) at each participating hospital recorded the data and submitted them electronically through the Internet to the office of Japan Association of Rehabilitation Database. Because of the anonymous nature of the data, informed consent was waived.

Subjects

Among the acute hospitals that provided clinical data for the database, we selected 19 acute hospitals where both BCP and other physicians (non-BCP) provided clinical management for acute stroke patients. For this study, the clinical data of patients who were admitted to these 19 hospitals with a diagnosis of stroke during the period between January 2005 and December 2013 were collected from the Japan Rehabilitation Database. We only included patients for whom the following data were recorded: diagnosis of cerebral infarction or cerebral hemorrhage; admission within 3 days of onset; length of stay of less than 6 months; available information on attending physician (BCP or non-BCP); and FIM score at admission/discharge at acute hospitals. Because the distinction of functional recovery between subarachnoid hemorrhage and other subtypes of stroke has been previously reported,[10] we excluded patients with the diagnosis of subarachnoid hemorrhage from this study.

Board-Certificated Physiatrist

The PM&R Associations in some countries define the requirement for board certification, which includes residency trainings for 2-6 years followed by examination.[5,6,11] The requirements for BCP, which were set up by Japanese Association of Rehabilitation Medicine (JARM) include[12,13] a 3-year residency program that covers the entire field of PM&R (eg, brain injury, spinal cord injury, cerebral palsy, musculoskeletal diseases, neurologic diseases, and amputation) at the institutions that were certificated by JARM, followed by submission of 2 abstracts at scientific PM&R meetings, 30 case reports, and a list of 100 cases, before receiving the final written and oral examinations. Currently, 80% of the trainees pass the examinations and are certified every year. In addition, JARM requires renewing of certification every 5 years after the last registration. In 2014, there are 1959 certified BCP in Japan. Because Japanese physicians are allowed to acquire more than 1 board certification, almost 70% of BCP hold board certification in another specialty.

Outcome Measures

For this study, 2 widely accepted measures were applied, FIM effectiveness and discharge destination. Evaluation of FIM was performed and recorded at admission to and discharge from the acute hospitals. The outcome measure of this study, FIM effectiveness, was calculated using the following equation: ([discharge FIM – admission FIM]/[maximum FIM – admission FIM]).[14] In addition, data regarding discharge destination