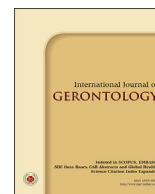


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Original Article

Clinical Effectiveness of Board-certificated Psychiatrists on Functional Recovery in Elderly Stroke Patients During Convalescence: A Retrospective Cohort Study[☆]Ryo Momosaki^{1,2*}, Wataru Kakuda³, Shoji Kinoshita², Naoki Yamada², Masahiro Abo²¹ Department of Rehabilitation Medicine, Teikyo University School of Medicine University Hospital, Mizonokuchi, Kanagawa, ² Department of Rehabilitation Medicine, The Jikei University School of Medicine, ³ Department of Rehabilitation Medicine, Mita Hospital, International University of Health and Welfare, Tokyo, Japan

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SUMMARY

Background: Rehabilitation is an important determinant of functional recovery in elderly stroke patients. The purpose of this study was to clarify the clinical effectiveness of board-certificated psychiatrists as responsible physicians on functional recovery in elderly stroke patients during convalescence.

Methods: In this retrospective study, we analyzed the data of post-stroke patients admitted to rehabilitation wards entered into the Japan Rehabilitation Database between 2005 and 2013. The main outcome was Functional Independence Measure efficiency. For analysis, we used propensity scores and inverse probability weighting adjustment to reduce selection bias. A generalized estimation equation was used to account for confounding by cluster.

Results: A total of 2873 patients (mean age: 70) were eligible after applying exclusion criteria. The responsible physicians caring for 1214 stroke patients were board-certificated psychiatrists. Using inverse propensity score weighting, patients' baseline characteristics were closely balanced between patients who were managed by board-certificated psychiatrists and those without board-certificated psychiatrists. After adjustment, patients who were managed by a board-certificated psychiatrist as a responsible physician had significantly higher scores for Functional Independence Measure efficiency than those without a board-certificated psychiatrist (mean: 0.31 vs 0.28; $p = 0.035$).

Conclusions: Our results suggest that clinical management provided to elderly stroke patients by board-certificated psychiatrists is associated with good functional improvement. Board certification should be encouraged to improve the quality of rehabilitative management of post-stroke patients.

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1. Introduction

Stroke mostly occurs in elderly people, and post-stroke functional outcome is poorer in elderly than young patients¹. The number of stroke patients is increasing especially in elderly individuals in the developed nations. Stroke causes physical disabilities and rehabilitation is an important aspect of care in these patients. In Japan, after the acute phase, patients who need more

in-hospital rehabilitation are usually transferred to a convalescent rehabilitation ward.

Several countries have educational training programs and board certification processes for psychiatrists (rehabilitation physicians)². Psychiatrists evaluate disability and plan an exercise program³. In addition, psychiatrists arrange an environment that is appropriate for rehabilitation, set goals for each therapist, and prescribe medications in the context of rehabilitation. A board-certificated psychiatrist (BCP) is a psychiatrist who has obtained the skills and knowledge that are certified by a board. In general, such board certification improves the quality of clinical practice⁴. A previous study showed that clinical management provided by BCPs lead to good functional recovery after stroke in the acute phase⁵. However, the effectiveness of BCPs on rehabilitation outcome in elderly stroke patients during the convalescent phase is not clear.

[☆] Conflicts of interest: All contributing authors declare that they have no conflicts of interest.

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The aim of this retrospective cohort study was to determine the real world effectiveness of BCP as the responsible physician on the rehabilitation outcome of post-acute elderly stroke patients in a convalescent rehabilitation ward. We used propensity score analysis methods and the Japan Rehabilitation Database to collect the data.

2. Materials and methods

2.1. Japan Rehabilitation Database

The Japan Rehabilitation Database was developed with financial support from the Ministry of Health, Labour and Welfare of Japan⁶. Detailed clinical data have been collected since 2005 on rehabilitation in-patients who are discharged from the participating hospitals. The Japan Rehabilitation Database only comprises voluntary samples, not random samples, and includes unique identifiers for the following data on stroke patients: age, sex, the Functional Independence Measure (FIM: scores range from 18 [totally dependent] to 126 [totally independent])⁷, duration of hospitalization, time since onset of stroke, stroke subtype; modified Rankin Scale (mRS: [no symptoms] to [severe disability])⁸, and type of physician (BCP or non-BCP). The rehabilitation staff collects baseline data at admission and discharge. These data are submitted to the Japan Association of Rehabilitation Database. The Association extracts the data and sends them to interested researchers. By the end of 2013, 78 hospitals had contributed structured data on 29,339 patients to the database. All personal data are coded, deleting any information related to personal identification.

Informed consent was waived for this study because of the anonymous nature of the data. The Institutional Review Board of The Japanese Association of Rehabilitation Medicine approved the study.

2.2. Patients

Not all 78 hospitals had convalescent rehabilitation wards. This study included patients who were admitted to the convalescent rehabilitation wards of 34 participating rehabilitation hospitals with a diagnosis of stroke between January 2005 and December 2013, sourced from the Japan Rehabilitation Database. Exclusion criteria were as follows: at admission, stroke onset was longer than 60 days ago; duration of hospitalization was longer than 180 days; or lack of complete data. The reasons for these exclusions are that the upper limit of the onset-to-admission interval to the convalescent rehabilitation ward is 60 days, and the duration of hospitalization for stroke patients is restricted to 180 days in the Japanese medical insurance system⁹. We also excluded rehabilitation patients who were not part of the medical insurance system. Convalescent rehabilitation wards are the main facilities that provide in-patient clinical rehabilitation care covered by the Japanese medical insurance system¹⁰. In Japan, both BCPs and non-BCPs are present in almost all of the rehabilitation hospitals.

2.3. Rehabilitation program

A typical gym exercise program in the rehabilitation hospitals comprises 40 m of physical therapy and 40 m of occupational therapy per day, 5–7 days per week¹¹. Physical rehabilitation focuses on gait and exercise-related to activities of daily living. This program includes passive range of motion exercises for the affected side and muscle strengthening exercises for the unaffected side. Post-stroke occupational therapy includes upper limb exercise and self-care skill training to maximize the ability to perform activities of daily living. Speech therapy is also provided when necessary.

Furthermore, patients are encouraged to stay out of bed during the day.

2.4. Board-certificated physiatrists

In this study, we defined the “BCP group” as patients who received care from a BCP as a responsible physician. The “non-BCP group” was defined as patients who did not receive care from a BCP as a responsible physician. In the current study, a non-BCP was a rehabilitation doctor working at a convalescent rehabilitation ward and was not certified by a board. Physical medicine and rehabilitation associations in several countries define the requirements for board certification, which usually includes residency training for 2–6 years followed by written and clinical examinations¹². The requirements for BCPs, as set up by the Japanese Association of Rehabilitation Medicine, include a 3-year residency program that covers the entire field of rehabilitation medicine (e.g., brain injury, spinal cord injury, cerebral palsy, musculoskeletal diseases, neurological diseases, and amputation) at institutions that are certificated by the Japanese Association of Rehabilitation Medicine. The residency program is followed by final written and clinical examinations¹³. In Japan, BCPs are required to renew their certification every 5 years after the last registration.

The background clinical experience required to start training for BCP certification varies among countries. However, the curriculum and certification systems for BCPs share many similarities across the world and are similar with those of the Japanese Board^{12,14}. BCPs working in rehabilitation wards evaluate impairment, set rehabilitation goals, and lead a rehabilitation team. Medical issues that are specific to rehabilitation include pain management, neurogenic bowel and bladder, management of spasticity, and education of disease. A BCP also manages other co-morbid conditions to prevent further medical complications¹⁵.

2.5. Variables and outcome measurement

The following data were extracted from the database: age, sex, specialty of the responsible physician (BCP or non-BCP), FIM at admission and discharge, time since stroke onset, stroke subtype, comorbidities (hypertension, diabetes, atrial fibrillation, past history of stroke), premorbid mRS, mRS at admission, number of family members, Japan Coma Scale at admission¹⁶, National Institutes of Health Stroke Scale at admission¹⁷, Japan Stroke Scale at admission¹⁸ and duration of stay at the rehabilitation hospital. The outcome was FIM efficiency, which was calculated as: $[(\text{discharge FIM} - \text{admission FIM}) / \text{duration of hospitalization}]^{19}$. The FIM is a basic indicator of patient disability. The FIM consists of 18 items, each of which is assessed against a seven-point ordinal scale; the higher the score for an item, the more independently the patient is able to perform the tasks required by that item. The FIM is commonly used in Japanese rehabilitation hospitals, and almost all rehabilitation staffs are familiar with it.

2.6. Data analysis

In this study, we conducted inverse probability weighting (IPW) using the propensity score. IPW is a propensity score method that uses weights based on the propensity score to create a synthetic sample in which the distribution of measured covariates is independent of treatment assignment²⁰. A major problem in the design of the present study was selection bias. Allocation of BCPs is affected by prior information on patients' characteristics and hospital reference. Consequently, the characteristics of the BCP group differed systematically from those of the non-BCP group. Therefore, we needed to account for these systematic differences in the

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