

# Relationship between Grooming Performance and Motor and Cognitive Functions in Stroke Patients with Receiver Operating Characteristic Analysis

Takaaki Fujita, OTR, PhD,\* Atsushi Sato, RPT,† Kenji Tsuchiya, OTR, MSc,‡  
Takuro Ohashi, OTR,§ Kazuhiro Yamane, OTR,§ Yuichi Yamamoto, RPT,§  
Kazuaki Iokawa, OTR, PhD,\* Yoko Ohira, MD, PhD,§ Koji Otsuki, MD, PhD,§  
and Fusae Tozato, OTR, PhD,||

*Background:* This study aimed to elucidate the relationship between grooming performance of stroke patients and various motor and cognitive functions and to examine the cognitive and physical functional standards required for grooming independence. *Methods:* We retrospectively analyzed the data of 96 hospitalized patients with first stroke in a rehabilitation hospital ward. Logistic regression analysis and receiver operating characteristic curves were used to investigate the related cognitive and motor functions with grooming performance and to calculate the cutoff values for independence and supervision levels in grooming. *Results:* For analysis between the independent and supervision-dependent groups, the only item with an area under the curve (AUC) of .9 or higher was the Berg Balance Scale, and the calculated cutoff value was 41/40 (sensitivity, 83.6%; specificity, 87.8%). For analysis between the independent-supervision and dependent groups, the items with an AUC of .9 or higher were the Simple Test for Evaluating Hand Function (STEF) on the nonaffected side, Vitality Index (VI), and FIM<sup>®</sup> cognition. The cutoff values were 68/67 for the STEF (sensitivity, 100%; specificity, 72.2%), 9/8 points for the VI (sensitivity, 92.3%; specificity, 88.9%), and 23/22 points for FIM<sup>®</sup> cognition (sensitivity, 91.0%; specificity, 88.9%). *Conclusions:* Our results suggest that upper-extremity functions on the nonaffected side, motivation, and cognitive functions are particularly important to achieve the supervision level and that balance is

From the \*Department of Rehabilitation, Faculty of Health Sciences, Tohoku Fukushi University, Sendai, Japan; †Department of Physical Therapy, Yachiyo Rehabilitation College, Japan; ‡Department of Rehabilitation, Japan Community Healthcare Organization, Gunma Chuo Hospital, Japan; §Department of Rehabilitation, Northern Fukushima Medical Center, Japan; and ||Department of Rehabilitation Sciences, Gunma University Graduate School of Health Sciences, Japan.

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Address correspondence to Takaaki Fujita, OTR, PhD, Department of Rehabilitation, Faculty of Health Sciences, Tohoku Fukushi University, 1-8-1, Kunimi, Aoba-ku, Sendai 981-8522, Japan. E-mail: [t-fujita@tfu-mail.tfu.ac.jp](mailto:t-fujita@tfu-mail.tfu.ac.jp).

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important to reach the independence level. The effective improvement of grooming performance is possible by performing therapeutic or compensatory intervention on functions that have not achieved these cutoff values. **Key Words:** Stroke—activities of daily living—grooming—cutoff.

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## Introduction

Stroke causes a decline in various motor and cognitive functions and is a major cause of difficulty in maintaining independence in activities of daily living (ADLs). Each year, 15 million people suffer from stroke worldwide, and of these, 5 million die while another 5 million have sequelae.<sup>1</sup> Between 1990 and 2010, the stroke mortality rate decreased; however, the absolute number of people who have stroke every year, stroke survivors, and the overall global burden of stroke increase.<sup>2</sup> It is important for decreased motor and cognitive functions and ADL independence levels to be improved in stroke patients by as much as possible to help patients be discharged home.

Although grooming-related tasks such as oral care, face washing, hair grooming, and handwashing are not directly related to maintaining life, they are important in maintaining personal hygiene and health. For example, failure to maintain oral hygiene has been reported as a risk factor for pneumonia,<sup>3</sup> and periodontal disease is related to stroke recurrence.<sup>4</sup> Hair grooming leads to a sense of ease and comfort and improves the general condition, depression, and fatigue experienced by hospitalized patients; it also increases motivation to participate in rehabilitation.<sup>5</sup>

Stroke patients can achieve independence in grooming relatively easily,<sup>6</sup> and compared with movement and transfer, it is an ADL that receives less attention in rehabilitation programs.<sup>7</sup> Therefore, there are very few studies on grooming in stroke patients, and cognitive and physical functions related to the grooming independence level are almost completely unknown. A study by Morone et al,<sup>7</sup> one of the few studies on grooming, showed that the prognosis for independence in grooming was affected by factors such as stroke severity, unilateral spatial neglect, and age; however, the effects of motor functions, such as affected limb and trunk functions, have not been sufficiently investigated. Furthermore, the degree of these functions necessary for independence in grooming is unknown. This knowledge would be beneficial for rehabilitation programs designed to improve the independence level in grooming. Therefore, this study aimed to elucidate the relationship between the grooming independence level of stroke patients and various motor and cognitive functions, and to examine the cognitive and physical functional standards required for grooming independence.

## Materials and Methods

In this retrospective observational study, existing data from the medical records of patients who were discharged were analyzed. The study was approved by the institutional review boards of the Northern Fukushima Medical Center and Tohoku Fukushi University (No. 56, RS1600502).

The subjects were 96 individuals who were discharged from the rehabilitation ward of a hospital between April 2011 and February 2014 and who satisfied the following criteria: initial cerebral hemorrhage or cerebral infarction, unilateral supratentorial lesions, and no missing items in the above-mentioned data. The following tests were performed at discharge as indices. The FIM<sup>®</sup> instrument<sup>8</sup> was used to determine the independence level in grooming. The Stroke Impairment Assessment Set (SIAS)<sup>9</sup> was used as an index of the motor function of the affected upper and lower extremities, trunk function, visuospatial deficits, and muscle strength on the unaffected side. The Simple Test for Evaluating Hand Function (STEF)<sup>10</sup> was used as an index for determining upper-extremity function on the unaffected side. The Berg Balance Scale (BBS)<sup>11</sup> was used as an index of balance. The Vitality Index (VI)<sup>12</sup> was used as an index of motivation. The FIM<sup>®</sup> cognitive domain was used as an index of cognitive function. Upper-extremity motor function on the affected side was measured using the total scores of the SIAS motor items “knee–mouth test” and “finger function test.” Lower-extremity function on the affected side was measured using the total scores of the “hip flexion test,” “knee extension test,” and “foot-pat test.” Trunk function was measured using the total scores of the “verticality test” and “abdominal muscle strength” of the SIAS. The characteristics and cognitive and physical functions of the subjects are shown in [Table 1](#).

Analysis was performed as follows. To investigate whether there were relationships between the grooming independence level and each cognitive and physical function, subjects who scored 6 or higher, that is, those who did not require a caregiver, were placed in the independent group (55 subjects), and those who scored 5 or lower, that is, those who required supervision or setting or physical assistance by a caregiver, were placed in the supervision-dependent group (41 subjects). Multiple logistic regression analysis was performed using the FIM<sup>®</sup> instrument of grooming as the dependent variable and each cognitive and physical functions as independent

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