

Discrepancy between Patients' and Nurses' Estimates of Patients' Activities of Daily Living for Fall Risk Assessment: A Quantitative Observational Study

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Abstract

Background: Patient falls are a serious problem in a rehabilitation unit. Although patient falls have been described in the healthcare literature for more than 60 years, and many risk assessment tools have been developed, the rate of falls in hospitals in Japan has remained unchanged for the last 8 years. A previous study reported that about 50% of patients in rehabilitation estimated their fall risk lower than that estimated by their nurses. We believe that patients in rehabilitation tend to overestimate their ability to perform ADLs. **Aim:** To identify discrepancies between patients' and nurses' estimates of patients' ability to perform activities of daily living (ADL) and clarify any relationship between the discrepancies and patient falls. **Methods:** Participants comprised 82 patients (42 men) admitted to a rehabilitation unit in Osaka, Japan from July to December of 2017. Patients and their nurses answered the same questionnaire about patients' ability to perform ADL. The questionnaire was developed based on the Functional Independence Measure (FIM) and administered at admission, at 1 month after admission, and at discharge. Participants were classified into the overestimating group and the accurately estimating/underestimating group, and groups were compared using Wilcoxon rank-sum tests. **Results:** The mean age of participants was 76.4 years. At admission, approximately 72% of participants estimated their own ability to perform ADL higher than did the nurses. The percentage of overestimating participants dropped to 30% at discharge. Fifteen of the participants experienced a fall; all were in the overestimating group. The ADL Discrepancy and fall-assessment scores for these 15 participants were significantly higher than

those of other participants. **Conclusions:** There are discrepancies between patients' and nurses' estimates of patients' ability to perform ADL and had important significance for assessing their risk of fall. And minimizing the discrepancy may support the prevention of falls.

Keywords

Accidental Falls, Rehabilitation, Risk Assessment

1. Introduction

The majority of older people with rehabilitation need suffer from cerebrovascular or orthopedic diseases, and therefore undergo rehabilitation to improve their ability to perform activities of daily living (ADL). However, older people with these diseases are more vulnerable to falls owing to their disease-related loss of physical function [1]. Risk factors for falls in the rehabilitation phase may be categorized as internal (e.g., age, gender, history of falls, disease-related symptoms, physical function, cognitive function, and medication) or external (e.g., physical obstacles, noise, and illumination) [2]. In addition, patients with chronic conditions who are in the rehabilitation phase must learn to accurately assess their own physical functioning, and healthcare providers must take measures to prevent them from falling.

2. Background

Japan is the world's fastest-aging society. Thanks to the remarkable development of medical care in recent years, the mortality rate for cerebrovascular disease is decreasing yearly [3]. However, the number of patients living in the community with the effects of cerebrovascular disease is increasing, as is the number receiving services under the long-term care insurance system. It has been reported that most patients with cerebrovascular disease face the effects of their disability through experiences in which they are unable to perform ADL, or they suffer a fall, or when they interact with others who have the same disease; it takes a certain period of time for these patients to accept their disability [4]. However, although many studies have shown that most rehabilitation patients' falls occur early in their hospitalization, no studies have focused on patients' pre-disability perceptions [5]. It has also been reported that about 30% of patients who suffer from a fall-induced orthopedic disease and are admitted to an acute-care unit will fall again after being discharged. The main reason for this is the typical living environment that is peculiar to Japanese houses, which includes small steps and narrow corridors inside the houses [6]. Therefore, it is recommended that instead of being discharged from an acute-care unit immediately, patients should be transferred to a rehabilitation unit where they can perform intensive rehabilitation to improve physical function, have their discharge destination environment adjusted, and review recommendations for life after discharge. Im-

portantly, the number of patients in the rehabilitation unit of many medical institutions continues to increase. There is little research available in this area because most studies on fall risk that consider the patient's perspective tend to focus on falls during the acute phase of treatment rather than during the rehabilitation phase [7].

One study about patients with acute conditions that solicited the patient's perspective was conducted by Radecki [8]; their qualitative investigation aimed to identify patient perspectives on fall prevention in acute care and to help design patient-centered strategies. Twelve patients shared their thoughts on their own fall risks, showing that awareness of fall, acceptance/rejection to their own disability, meaning, feelings, and personal planning were important to them. On the basis of their analysis, Radecki emphasized that nurses must build relationships with their patients to understand their needs [8].

The results showed that nurses and patients agreed on the causes of falls when the patient was assisted, but they differed in their perceptions of the causes when the patient was unassisted and independent and did not seek assistance from the nurse [9].

Another study, by Barmentloo, found that acute patients were more positive than were patients with chronic conditions about the knowledge and skills of healthcare professionals. This suggests that patients in the chronic phase may be less positive about healthcare professionals [10].

Fall prevention assessment in chronic rehabilitation units is often conducted using the same fall-risk assessment tools that are used in acute care [11]. However, assessments using these tools find most patients of rehabilitation units to be at higher risk of falling (*i.e.*, high sensitivity but low specificity) [12]. Furthermore, it has been reported that about 50% of patients undergoing rehabilitation underestimate their own risk of falling compared with their nurse's estimate [2].

These findings suggest the importance of tools and educational methods for promoting fall-risk assessment that consider the perspectives of patients in chronic rehabilitation units. In addition, patients in the rehabilitation phase tend to overestimate their own physical abilities as they regain their ADL as rehabilitation progresses.

This suggests that in chronic rehabilitation units it is necessary to clarify differences between patients' self-assessments and nurses' assessments in relation to common items for assessing ADL levels. Therefore, in this study we compared patients' and nurses' estimates of abilities to perform ADL on the day of admission, one month after admission, and the day before discharge. We then investigated the relationship between the results and falls. The differences between patients' and nurses' ratings of patient ADL levels over the course of their hospitalization were used to develop a new fall-risk assessment tool that includes self-assessment for hospitalized patients.

3. Aim

We aimed to identify discrepancies between patients' self-estimates and nurses'

estimates of patients' ability to perform ADL at rehabilitation units, to clarify any relationship between the discrepancies and patient falls, and to develop a scale to identify discrepancies in estimates.

4. Method

4.1. Design

A quantitative observational study.

4.2. Sampling and Recruitment

Participants were all patients capable of having a daily conversation who were admitted to a rehabilitation unit in Osaka, Japan, from July to December 2017. In the 50-bed study unit, patients undergo rehabilitation for 2 - 3 hours per day. There were 57 falls among the 17,338 patients in the unit in 2018. Clinical staff had received previous training on using the Functional Independence Measure (FIM) to assess patients' physical function on admission.

4.3. Inclusion and Exclusion Criteria

Patients with dementia, higher brain dysfunction, or a Mini Mental State Exam (MMSE) score [13] below 14 were excluded, following the advice of a neurologist who is honorary director at this hospital. Four participants were discharged within 1 month, three were transferred because their conditions deteriorated, and 12 were not discharged within the study period. In this study, the adapted FIM questionnaire was completed by both patients and nurses, while most international measurement tools solicit only medical staff responses. We developed the new questionnaire under the supervision of a head nurse, a physical therapist, and an occupational therapist. In our analysis of the questionnaire responses, Cronbach's alpha was 0.927 for patients ($n = 82$) and 0.964 for nurses ($n = 82$), indicating that the questionnaire has strong validity and internal consistency.

4.4. Data Sources/Collection

Study researchers verbally explained the survey method to the 21 participating nurses who were working in study unit and had more than 3 years of clinical experience. Study staff assisted patients who had difficulty reading or writing due to symptoms such as paralysis or visual impairment; to avoid guiding or leading the answer, only the reading was done without explanation about the questions and options. On the day of admission, a nurse handed the questionnaire to the patient in bed, and the patient completed it. The nurse then on the same day estimated the patient's ability to perform ADL using the same questionnaire.

4.5. Instrument with Validity and Reliability

The instrument we developed is based on the FIM [14], which is widely used in rehabilitation units to estimate patients' functioning and disability levels. It has 18 items in two major categories (motor and cognition), with each item scored

on an ordinal scale from 1 to 7. The score reflects the level of assistance needed to perform ADL: a score of 1 indicates that the patient requires full assistance; a score of 7 indicates total independence. This tool has been shown to have good reliability and prognostic potential at admission, and FIM scores are inversely related to fall rates [15] [16].

Patients' fall-assessment scores were also recorded with the fall-risk assessment tool in use at the study hospital. This tool, developed by a physician, an occupational therapist, a physical therapist, and a nurse, has 15 items with a total possible score of 77 points. Items cover the patient's age, physical dysfunction, mental dysfunction, medication, and excretion. A score of 1 - 9 indicates the patient is at low risk of falling, 10 - 19 indicates a medium risk, and 20 - 77 indicates a high risk. Our modified questionnaire was administered a second time 1 month after admission and a third time the day before discharge. Each patient's self-estimate and the corresponding nurse's estimate had a total possible score of 42 points (each item = 1 - 7 points).

4.6. Data Analysis

The difference between the nurses' estimates and the patients' self-estimates was defined as the ADL Discrepancy, with a larger ADL Discrepancy score reflecting greater discrepancies between the patient's and the nurse's estimates. A positive score indicated that the patient was overestimating their ability to perform ADL, and a negative score indicated that the patient was underestimating their ability. A score of zero indicated perfect agreement.

Participating patients were classified into two groups: the overestimating group (ADL Discrepancy score > 0) and the accurately estimating/underestimating group (ADL Discrepancy score ≤ 0). Participants were also classified into the falling group or the not-falling group based on whether or not they fell during the study period, using the standard and common-sense definition of a fall as "an incident in which a patient suddenly and involuntarily comes to rest upon the ground or surface lower than their original situation" [17]. The study groups were compared using t-tests and Wilcoxon rank-sum tests. Microsoft Excel and JMP statistical software were used for data aggregation and analysis. The level of significance was set at less than 0.05.

4.7. Ethical Considerations

This study was approved by the Research Ethics Committee of the participating hospital (Approval number: 2017-03). Written informed consent was obtained from all participants.

5. Results

Of the 105 patients admitted to the rehabilitation unit during the study period, 23 (21.9%) were excluded because of an MMSE score lower than 14 points. Eighty-two patients (mean age 76.4 years; 42 men) remained for inclusion in the analyses. Participant characteristics by group (overestimating group and accu-

rately estimating/underestimating group) are presented in **Table 1**. Approximately 72% of the participants were in the overestimating group. The overestimating group also had significantly higher fall-assessment scores ($p = 0.043$) than the other group. The only nonsignificant difference was observed between the discrepancy between patients' and nurses' estimates of patients' ability to perform ADL and MMSE, but patients with low MMSE scores tended to overestimate their physical function.

Most participants had self-assessment scores of 31 - 40 points on admission and 41 - 42 points on discharge. The majority of participants received assessment scores from their nurses of 11 - 20 points on admission and 41 - 42 points on discharge. Most participants received fall-assessment scores of 20 - 29 points on admission and <19 points on discharge.

The percentage of participants in the overestimating group dropped from 72% at admission to 30% at discharge. Not only did the nurses' estimates of 87% of participants in the overestimating group rise, but the self-estimates of 18% participants also fell at 1 month after admission. The number of participants who accurately estimated their ability to perform ADL gradually increased, reaching 65% on discharge.

There were 15 patients who experienced a fall, nine of whom fell within 1 month of admission. The characteristics of participants in the falling and not-falling groups are presented in **Table 2**. The falling group demonstrated significantly higher ADL Discrepancy scores ($p = 0.048$) and fall-assessment scores ($p = 0.042$) than the not-falling group. Notably, all participants in the falling group were in the overestimating group. There were no significant differences between the two groups for the other items. Four participants had fall-assessment scores (7, 10, 13, and 19) that were lower than the overall average (21.7 points).

Table 1. The overestimating group and the accurately/underestimating group on admission day and 1 month later: A comparison of estimates.

Item	On admission			One month after		
	Overestimating group (n = 56)	Accurately/ underestimating group (n = 26)	p-value	Overestimating group (n = 35)	Accurately/ underestimating group (n = 43)	p-value
Sex n (%)	Men	25 (44.6)	0.26	16 (45.7)	24 (55.8)	0.47
	Women	31 (55.4)		19 (54.3)	19 (44.2)	
Disease n (%)	Cerebrovascular	27 (48.2)	0.11	16 (45.7)	24 (55.8)	0.087
	Orthopedic	23 (41.1)		14 (40.0)	13 (30.2)	
	Others	6 (10.7)		5 (14.3)	6 (14.0)	
Average age, years	78.1 ± 12.3	72.1 ± 12.9	0.053	77.4 ± 11.6	73.1 ± 12.3	0.12
Mean self-estimate score	33.1 ± 8.4	24.5 ± 14.5	0.084	36.5 ± 11.2	35.1 ± 14.7	0.88
Mean nurses' estimate score	23.9 ± 9.9	25.5 ± 14.3	0.098	29.5 ± 8.7	36.0 ± 15.9	0.072
Mean fall assessment score	23.3 ± 6.6	18.4 ± 7.3	0.043*	26.4 ± 8.9	16.8 ± 4.1	0.033*
Mean MMSE score	24.6 ± 4.7	27.7 ± 2.1	0.066			

* $p < 0.05$ (Wilcoxon rank-sum test).

Table 2. Comparison of the falling group and the not-falling group on admission.

Item	Falling group (n = 15)	Not-falling group (n = 67)	p-value
Age	81.6 ± 13.0	75.1 ± 12.5	0.10
Mean self-estimate score	32.3 ± 9.2	30.0 ± 11.7	0.23
Mean nurses' estimate score	21.0 ± 8.2	25.1 ± 11.9	0.14
Mean ADL Discrepancy score	11.3 ± 6.9	4.8 ± 6.0	0.048*
Mean fall assessment score	25.4 ± 6.3	21.0 ± 7.1	0.042*
Mean MMSE score	23.3 ± 3.4	26.1 ± 5.8	0.11

*p < 0.05 (Wilcoxon rank-sum test).

6. Discussion

The present study investigated discrepancies between patients' self-estimates and nurses' estimates of patients' ability to perform ADL and found that, at admission, patients in the rehabilitation unit tended to overestimate their ability to perform ADL. This discrepancy was correlated with the rate of falls among patients.

Patients receiving rehabilitation may overestimate their ADL because of a lingering pre-injury body image or a body image from an earlier stage of their disease. While nurses may, by contrast, underestimate their patients' abilities, in the present study the likelihood of this occurring was low because our questionnaire had high internal consistency, and the participating nurses were familiar with the FIM.

All patients who fell during the study had on admission overestimated their ability to perform ADL. Patients who overestimated their ability to perform ADL experienced significantly higher fall rates than those who accurately estimated/underestimated their ADL. Moreover, patients who overestimated their ability had significantly higher fall-assessment scores. Interestingly, Yamada [18] reported a marked lack of body image accuracy in older people who had experienced falls. They showed, furthermore, that the accuracy of a person's body image reflects their physical function, and that this factor is also useful for assessing fall risks. Thus, those with an inaccurate body image were likely at higher risk for falls; addressing ADL Discrepancy may be one strategy for enhancing fall prevention.

Notably, by the end of hospitalization, the self-estimates of most of our participants in the overestimating group approximately matched their nurses' estimates. This may have been because patients improved their physical function through rehabilitation, and during hospitalization learned more about their physical disability and about behavior commensurate with their abilities. It therefore suggests that rehabilitation unit admission is a meaningful period for addressing ADL Discrepancy and preventing falls. When a patient who overestimates his or her own physical function falls, the fall may cause not only sec-

ondary injuries and deterioration of physical function, but also induce a loss of self and a fear of falling again. In particular, fear of falling has been shown to limit one's ADL and to reduce quality of life, which is likely to lead to a vicious cycle of further decline in physical function and strength, and increased risk of falling [19] [20]. Fear of falling can also negatively affect walking speed and balance, which in turn increases the risk of falling and hinders rehabilitation progress [21] [22]. Therefore, preventing falls is an essential component of effective rehabilitation.

It is also difficult to judge the risk of falls using only our questionnaire, but although our findings suggest that ADL Discrepancy is a risk factor for falls, no existing assessment tool includes this item. Therefore, the creation of new tools that include ADL Discrepancy items, which can also be used in combination with existing tools, will lead to the development of better fall prevention.

In our study most falls occurred, and ADL Discrepancy was highest, within the first month following admission; after that period, ADL Discrepancy declined. Arguably, the degree of patients' overestimation of their ability to perform ADL and the frequency of their falls has a parallel relationship. Indeed, our finding that most falls occurred during the first month after admission was consistent with the results of previous studies [5] [23].

Because patients tended to overestimate their own ADL levels and were more likely to fall shortly after admission to rehabilitation, the first month following admission should be viewed as the most crucial period for fall prevention, and specific care should be taken to that end. Given the gradual narrowing of the gap between patients' and nurses' assessments of ADL after the initial 1-month period, admission to a rehabilitation unit clearly can reduce the risk of falls. Thus, nurses should collaborate and plan patient care with physical therapists not only during rehabilitation but also during daily unit life to help patients develop their own accurate body image and learn to perform activities safely within their current physical function levels. Additionally, because patients with impaired cognitive function tend to overestimate their abilities, it is necessary to assess cognitive function as well as physical function, and to perform a comprehensive risk assessment for each patient at the admission stage.

As populations age, the number of frail and vulnerable older people also increases. As a result, the number of patients who will be unable to return home immediately after acute treatment is also expected to increase, as will consequently the number of patients who wish to be admitted to rehabilitation units. To ensure that patients can live safely both during their hospital stay and after discharge, it is necessary not only to improve their physical functions but also to keep them involved throughout the rehabilitation process, including by soliciting and considering their thoughts and wishes. We recommend that nurses support patients in multiple ways, beginning at the time of admission, so when they are discharged there are minimal gaps between patient and nurse assessments of patients' ADL.

7. Conclusion

This study found consistent discrepancies between patients' self-estimates and nurses' estimates of patients' ability to perform ADL in a rehabilitation unit. Approximately 70% of patients overestimated their physical abilities on admission; this group included every patient who fell during rehabilitation in the study period. Therefore, minimizing the discrepancy between patients' and nurses' estimates of patients' ability to perform ADL may support the prevention of falls.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

- [1] Campanini, I., Mastrangelo, S., Bargellini, A., Bassoli, A., Bosi, G., Lombardi, F., Tolomelli, S., Lusuardi, M. and Merlo, A. (2018) Feasibility and Predictive Performance of the Hendrich Fall Model II in a Rehabilitation Department: A Prospective Study. *BMC Health Service Research*, **18**, Article No. 18.
<https://doi.org/10.1186/s12913-017-2815-x>
- [2] Mihaljcic, T., Haines, T.P., Ponsford, J.L. and Stolwyk, R.J. (2015) Self-Awareness of Fall Risk among Elderly Patients: Characterizing Awareness Deficits and Exploring Associated Factors. *Archives of Physical Medicine and Rehabilitation*, **96**, 2145-2152.
<https://doi.org/10.1016/j.apmr.2015.08.414>
- [3] Ministry of Health, Labour and Welfare (2020) Vital Statistics in Japan. MHLW. (Original work published in Japanese)
- [4] Aihara, S., Kitamura, S., Dogan, M., Sakata, S., Kondo, K. and Otaka, Y. (2021) Patients' Thoughts on Their Falls in a Rehabilitation Hospital: A Qualitative Study of Patients with Stroke. *BMC Geriatrics*, **21**, Article No. 713.
<https://doi.org/10.1186/s12877-021-02649-1>
- [5] Vassallo, M., Sharma, J.C., Briggs, R.S. and Allen, S.C. (2003) Characteristics of Early Fallers on Elderly Patient Rehabilitation Wards. *Age and Ageing*, **32**, 338-342.
<https://doi.org/10.1093/ageing/32.3.338>
- [6] Ota, T., Enoki, H. and Hashimoto, M. (2019) Relationship between Aging in Place among the Elderly with Disabilities and the Living Environment: Effects of Awareness of the Living Environment after Discharge. *The Journal of Japanese Occupational Therapy Association*, **38**, 567-574. (Original work published in Japanese)
- [7] Jong, L.D., Francis-Coad, J., Waldron, N., Ingram, K., McPhail, S.M., Etherton-Ber, C., Haines, T.P., Flicker, L., Weselman, T. and Hill, A.-M. (2021) Does Free-Text Information in Falls Incident Reports Assist to Explain How and Why the Falls Occurred in a Hospital Setting? *Journal of Patient Safety*, **17**, e1472-e1479.
<https://doi.org/10.1097/PTS.0000000000000533>
- [8] Radecki, B., Reynolds, S. and Kara, A. (2018) Inpatient Fall Prevention from the Patient's Perspective: A Qualitative Study. *Applied Nursing Research*, **43**, 114-119.

<https://doi.org/10.1016/j.apnr.2018.08.001>

- [9] Hoke, L.M. and Zekany, R.T. (2020) Two Sides to Every Fall: Patient and Nurse Perspectives. *Critical Care Nurse*, **40**, 33-41. <https://doi.org/10.4037/ccn2020289>
- [10] Barmantloo, L.M., Dontje, M.L., Koopman, M.Y., Olij, B.F., Oudshoorn, C., Mackenbach, J.P., Polinder, S. and Erasmus, V. (2020) Barriers and Facilitators for Screening Older Adults on Fall Risk in a Hospital Setting: Perspectives from Patients and Healthcare Professionals. *International Journal of Environmental Research and Public Health*, **17**, Article 1461. <https://doi.org/10.3390/ijerph17051461>
- [11] Saverino, A., Benevolo, E., Ottonello, M., Zsirai, E. and Sessarego, P. (2006) Falls in a Rehabilitation Setting: Functional Independence and Fall Risk. *European Journal of Physical and Rehabilitation Medicine*, **42**, 179-184.
- [12] Ruggieri, M., Palmisano, B., Fratocchi, G., Santilli, V., Mollica, R., Berardi, A. and Galeoto, G. (2018) Validated Fall Risk Assessment Tools for Use with Older Adults: A Systematic Review. *Physical & Occupational Therapy in Geriatrics*, **36**, 331-353. <https://doi.org/10.3390/ijerph17051461>
- [13] Folstein, M.F., Folstein, S.E. and McHugh, P.R. (1975) "Mini-Mental State": A Practical Method for Grading the Cognitive State of Patients for the Clinician. *Journal of Psychiatric Research*, **12**, 189-198. [https://doi.org/10.1016/0022-3956\(75\)90026-6](https://doi.org/10.1016/0022-3956(75)90026-6)
- [14] Granger, C.V., Cotter, A.C., Hamilton, B.B., Fiedler, R.C. and Hens, M.M. (1990) Functional Assessment Scales: A Study of Persons with Multiple Sclerosis. *Archives of Physical Medicine and Rehabilitation*, **71**, 870-875.
- [15] Benjamin, F.-G. and Michele, C. (2019) Using Functional Independence Measure Subscales to Predict Falls-Rapid Assessment. *Rehabilitation Nursing*, **44**, 236-244. <https://doi.org/10.1097/rnj.0000000000000130>
- [16] Forrest, G., Huss, S., Patel, V., Jeffries, J., Myers, D., Barber, C. and Kosier, M. (2012) Falls on an Inpatient Rehabilitation Unit: Risk Assessment and Prevention. *Rehabilitation Nursing*, **37**, 56-61. <https://doi.org/10.1002/RNJ.00010>
- [17] Tinetti, M.E., Williams, T.F. and Mayewski, R. (1986) Fall Risk Index for Elderly Patients based on Number of Chronic Disabilities. *The American Journal of Medicine*, **80**, 429-434. [https://doi.org/10.1016/0002-9343\(86\)90717-5](https://doi.org/10.1016/0002-9343(86)90717-5)
- [18] Yamada, M., Hurukawa, Y. and Higashino, E. (2007) Motor Imagery for Walking Is Associated with Fall in Elderly People. *Sogo Rehabilitation*, **35**, 705-710. (Original work published in Japanese)
- [19] Hannna, E., Janssen, H., Crowfoot, G., Mason, G., Vyslysel, G., Sweetapple, A., Callister, R. and English, C. (2019) Participation, Fear of Falling, and Upper Limb Impairment are Associated with High Sitting Time in People with Stroke. *Occupational Therapy in Health Care*, **33**, 181-196. <https://doi.org/10.1080/07380577.2019.1587675>
- [20] Jeon, M., Gu, M.O. and Yim, J. (2017) Comparison of Walking, Muscle Strength, Balance, and Fear of Falling between Repeated Fall Group, One-Time Fall Group, and Nonfall Group of the Elderly Receiving Home Care Service. *Asian Nursing Research*, **11**, 290-296. <https://doi.org/10.1016/j.anr.2017.11.003>
- [21] Hussain, N., Hansson, P. and Persson, C.U. (2021) Prediction of Fear of Falling at 6 Months after Stroke Based on 279 Individuals from the Fall Study of Gothenburg. *Scientific Reports*, **11**, Article No. 13503. <https://doi.org/10.1038/s41598-021-92546-9>
- [22] Guan, Q., Jin, L., Li, Y., Han, H., Zheng, Y. and Nie, Z. (2015) Multifactor Analysis for Risk Factors Involved in the Fear of Falling in Patients with Chronic Stroke from

Mainland China. *Topics in Stroke Rehabilitation*, **22**, 368-373.

<https://doi.org/10.1179/1074935714Z.0000000048>

- [23] Sato, M., Takahashi, T., Sakata, N., Takahashi, M., Uozumi, H. and Omae, T. (2019) Characteristics of Falls and Falling Patients in an Acute Hospital. *Journal of the Japanese Association of Rural Medicine*, **68**, 510-516. (In Japanese)
<https://doi.org/10.2185/jjrm.68.510>