

*Original Article***Awareness and support for post-stroke fatigue among medical professionals in the recovery phase rehabilitation ward**Mikiko Sato, MSN, RN, PHN,<sup>1</sup> Takeshi Hyakuta, PhD, RN, PHN<sup>2</sup><sup>1</sup>The University of Shimane, Izumo, Shimane, Japan<sup>2</sup>Japanese Red Cross Hiroshima College of Nursing, Hatsukaichi, Hiroshima, Japan**ABSTRACT**

Sato M, Hyakuta T. Awareness and support for post-stroke fatigue among medical professionals in the recovery phase rehabilitation ward. *Jpn J Compr Rehabil Sci* 2023; 14: 39–48.

**Objective:** To clarify the level of awareness of and support for post-stroke fatigue among medical professionals working in recovery phase rehabilitation wards.

**Methods:** We conducted a questionnaire survey targeting all medical professionals (physicians, nurses, physical therapists, occupational therapists, and speech therapists) working in recovery phase rehabilitation wards of three facilities to evaluate their awareness of post-stroke fatigue and the support they were offering to address this. Quantitative data were subjected to statistical analysis and free description data were subjected to content analysis.

**Results:** Of the 130 participants, we obtained responses from 94 (collection rate, 72.3%; valid response rate, 100%). Those who felt that post-stroke patients are always tired or tire easily comprised 63.8%. Those who acknowledged the importance of post-stroke fatigue as a problem and that it is an issue that must be addressed comprised 70.2% and 73.4%, respectively. Issues emerging due to post-stroke fatigue were extracted as follows: “Difficulty continuing with rehabilitation,” “Decreased drive,” “Difficulty with emotional control/depression,” “Fewer interactions with others,” and “Loss of goals.” Support for post-stroke fatigue was offered by 57.4% of medical professionals, most commonly as individual support such as “Ensure rest.” The effects of support were described as “Cannot say either way” (44.4%), with 3.7% noting that they were not very effective. Awareness and support rates among

therapists were significantly higher than those among nurses.

**Conclusions:** Post-stroke fatigue is acknowledged by medical professionals as a critical issue that negatively influences the patient’s physical, emotional, and daily living functions. Unfortunately, effective support is not currently being offered, demonstrating the need for the development of appropriate interventions.

**Key words:** post-stroke fatigue, support, recovery phase rehabilitation ward, survey of medical professionals

**Introduction**

According to one meta-analysis, post-stroke patients experience post-stroke fatigue at a relatively high rate of 50% (95% CI: 43–57%, range: 25–85%) [1]. Post-stroke fatigue, which can continue for long periods of time, is generally divided into “early fatigue,” defined as that within the first 3 months post-stroke, and “late fatigue,” defined as that occurring a year or longer post-stroke [2]. Several independent predictors of post-stroke fatigue have been identified, and include dependency for activities of daily living (ADL) [3], decreased quality of life (QOL) [4], and death [3]. Roughly half of all stroke patients experience post-stroke fatigue, and given the reality that continuous fatigue can lead to other severe issues, post-stroke fatigue is an important health issue.

The meta-analysis mentioned above that investigated the prevalence of post-stroke fatigue did not include data from Japan. High interstudy heterogeneity was reported, with the rates tending to be low in the Asian countries that were surveyed [1]. Causes of post-stroke fatigue include anatomical and physiological changes such as stroke onset [5] as well as multiple other factors, including personality characteristics and physical factors [6, 7], psychological factors [8], behavioral factors [9–11], and social factors [12, 13]. In other words, occurrence of post-stroke fatigue involves multiple factors, the prevalence of which varies by country [1]. Accordingly, it is important to clarify the situation in Japan as well. One study from Japan reported that the prevalence of acute post-stroke

Correspondence: Mikiko Sato, MSN, RN, PHN  
The University of Shimane, 151 Nishihayashigi, Izumo-City, Shimane 693–8550, Japan.

E-mail: m-sato@u-shimane.ac.jp

Accepted: March 10, 2023.

COI statement: The authors have no competing interests to disclose.

fatigue was 56.4% [14], while another reported a rate of 25.5% [15]. In addition, a prevalence of 29.8% was reported for the chronic phase, i.e., 1 month after being discharged [15]. However, as very few domestic studies and no large-scale surveys have been conducted, the actual situation in Japan is unclear [16]. In addition, the Japanese Guidelines for the Management of Stroke 2021 (The Japan Stroke Society) [17] includes no mention of treatment or care recommendations toward addressing post-stroke fatigue, revealing the reality that no standard treatment or care is being provided in Japan to address post-stroke fatigue. Therefore, the situation surrounding post-stroke fatigue in Japan requires investigation, preferably leading to the development of effective interventions.

The Japanese Society of Fatigue Science defines “fatigue” as “a condition characterized by a unique sense of malaise and desire for rest accompanied by declining physical activity function, due to extreme physical or psychological activity or disease” [18]. Given that fatigue develops as a result of extreme physical or emotional burden or disease, and is a decline in physical activity capacity, the issue of post-stroke fatigue may manifest in patients in the recovery phase rehabilitation ward, where the primary aim is to push forward with rehabilitation. In terms of addressing post-stroke fatigue after the patient is transferred to receive home care services, support from medical professionals is currently inadequate, and due to a lack of knowledge among patients, it is clear that some system or method is needed [19]. One possible setting for intervention is the hospital, where the patient stays before they are discharged to live in their own home.

Given the possibility that the issue of post-stroke fatigue will manifest, data must be collected on the state of post-stroke fatigue in recovery phase rehabilitation wards (where the need for intervention is clear), and interventions must be developed. However, data on this topic are lacking, and thus the current state remains unclear. In order to develop interventions to improve the situation for those suffering from post-stroke fatigue, it is important to first gain a better understanding of the actual state of post-stroke fatigue.

The UK Medical Research Council (MRC)’s “New framework for developing and evaluating complex interventions: update of Medical Research Council guidance” [20] requires subjects targeted by an intervention, those providing the intervention, and other relevant stakeholders to be involved when developing new interventions. In order to clarify the actual state of post-stroke fatigue and develop realistic and practical interventions that can be applied in clinical settings, surveys must be conducted of patients as well as the medical professionals who will provide the interventions to better understand the perceptions of each regarding post-stroke fatigue and the types of support currently being offered. To that end, before

conducting a patient survey, the present study aimed to clarify the awareness surrounding post-stroke fatigue among medical professionals (physicians, nurses, physical therapists, occupational therapists, and speech therapists) involved in the treatment, care, and rehabilitation of stroke patients in recovery phase rehabilitation wards, and to determine the nature of support currently being offered to address post-stroke fatigue.

## Definitions of Terms

### *Fatigue*

The Japanese Society of Fatigue Science defines fatigue as follows: “Fatigue is a condition characterized by a unique sense of malaise and desire for rest accompanied by declining physical activity function, due to extreme physical or psychological activity or disease” [18]. Fatigue is often separated into “fatigue” and “sense of fatigue,” where the former indicates the condition of declined activity function and the latter, the sense that one feels fatigued [18]. Fatigue and the sense of fatigue are both evaluated using various indices that assess the autonomic nervous system, oxidative stress, sleep, and subjective symptoms, to name a few. The sense of fatigue is nearly identical to the definition used for the general malaise, lack of energy, and languor that accompany disease [18].

Using the definition of fatigue above, we defined post-stroke fatigue as a condition characterized by a unique sense of malaise and desire for rest accompanied by declining physical activity function, due to extreme physical or psychological activity or disease observed in stroke patients [18].

### *Support for post-stroke fatigue*

We define support for post-stroke fatigue as “acts of medical professionals which aim to manage post-stroke fatigue.” Notably, for actions such as medication treatment, cognitive behavioral therapy, and education, for which the medical professional takes charge and uses methods anticipated to effectively address post-stroke fatigue with clearly set outcomes, the term “intervention” is used.

## Methods

### 1. Survey period

September 1, 2021 through November 30, 2021.

### 2. Participants

From the recovery phase rehabilitation wards of three facilities, we used convenience sampling to identify all medical professionals (physicians, nurses, physical therapists, occupational therapists, and speech therapists) in charge of post-stroke patient treatment, care, and rehabilitation; all were considered targets of this study.

### 3. Survey method

We conducted an anonymous self-administered questionnaire survey. A collection box was placed for participants to return their completed surveys. Return of a completed survey was assumed as consent to participate.

### 4. Survey contents

#### 4.1 Participant characteristics

Participants were asked to select the applicable occupation (nurse, physician, physical therapist, occupational therapist, or speech therapist).

#### 4.2 Awareness among medical professionals about post-stroke fatigue

After defining and explaining “fatigue” and “post-stroke fatigue” in the manner described above at the beginning of the survey form, the following questions were asked to elicit responses from participants.

- (1) Do you feel that stroke patients are always tired or tire very easily?

This question was established based on a previously published method that screened for post-stroke fatigue, in which “yes/no” responses were solicited from the question, “Since the stroke, do you feel constantly fatigued, or easily fatigued?” [21].

- (2) Do you feel that post-stroke fatigue is a serious problem?
- (3) Do you consider post-stroke fatigue to be a problem that must be addressed?
- (4) Do you feel that post-stroke fatigue complicates patient progress in rehabilitation?

For questions (1) to (4) above, participants were asked to select a number on a 5-point Likert scale as follows: 1, Strongly disagree; 2, Disagree somewhat; 3, Neither agree nor disagree; 4, Agree somewhat; and 5, Strongly agree.

- (5) We asked participants to freely answer the question, “What types of problems are emerging due to post-stroke fatigue?”

#### 4.3 Support for post-stroke fatigue

- (1) “Yes/No” responses were solicited in response to the question, “Do you currently offer some form of support for post-stroke fatigue?”
- (2) In response to the question, “What type of support do you currently offer for post-stroke fatigue?”, we asked participants to select as many of the following as appropriate: “Ensure rest,” “Promote physical activity,” “Promote psychological activity,” and “Other.” Participants were also asked to write freely about the specific contents of their selected responses. The items “Ensure rest,” “Promote physical activity,” and “Promote psychological activity” were identified in a previous study [16] as items anticipated to alleviate post-stroke fatigue.
- (3) In response to the question, “Do you feel that the

support offered for post-stroke fatigue has effectively alleviated the fatigue?”, participants were asked to select a number on the 5-point Likert scale ranging from 1 (Strongly disagree) to 5 (Strongly agree).

- (4) Finally, we asked participants to write down any other thoughts they had concerning post-stroke fatigue.

### 5. Analysis methods

Quantitative data were analyzed using descriptive statistics. The Mann—Whitney *U* test and Fisher’s exact test were used to analyze the differences in awareness surrounding post-stroke fatigue based on participant characteristics (occupation). Statistical significance was assumed at  $p < 0.05$ . IBM SPSS Statistics (Ver. 26) software was used for statistical analyses.

Descriptive data pertaining to problems that emerge due to post-stroke fatigue and the support offered for post-stroke fatigue were analyzed using content analysis, following the parameters outlined in a previous study [22], as follows. 1) From the descriptive data, target data were extracted and divided such that one content was contained in each recording unit. 2) After aggregating the recording units with the same expression or those with different expressions but the same meaning, the collected recording units were assigned a particular term (identical recording unit group). 3) The identical recording unit groups were categorized based on content similarity, and a category name was created to precisely express the similarity. 4) Category reliability was assessed by a university professor specializing in chronic illness nursing care, who was asked to take the list of identical recording unit groups from which the category name had been deleted and select category numbers for each from the list of categories. Scott’s Pi method was used to calculate the level of agreement, taking into account the rate of random agreement. We considered agreement of 70% or higher as suitable reliability. All other descriptive data were summarized.

### 6. Ethical considerations

The present study was approved by the University of Shimane Izumo Campus ethics review committee (Approval No. 341). The research ethics committee of the facility where the research was conducted also approved the study.

A written explanation was given to each participant concerning the study objectives and methods, and it was clarified that their participation was entirely voluntary, non-participation would not result in any disadvantage, submission of the questionnaire would be considered consent to participate, the survey was anonymous, once a survey form was submitted it (or the consent to participate) could not be retracted, advantages and disadvantages of study participation,

how to avoid the disadvantages, how the research data would be handled, how the research results would be published, and how to contact the researchers (affiliation and contact details).

In order to minimize the burden of completing the questionnaire, we minimized the number of questions such that the survey could be completed within 5 minutes. No researcher was standing nearby the questionnaire collection box, and due to the survey being anonymous, all personal information was de-identified. Data were used only in the present study and kept on a password-protected USB drive in a locked safe in the personal office of a research representative. Research results were to be kept for 10 years following the final publication of the research results, after which they would be destroyed in a manner that ensured that they were not reproducible.

## Results

### 1. Questionnaire collection and valid response rates

Survey forms were distributed to 130 individuals, of whom 94 returned their responses (collection rate, 72.3%). All were valid responses (100.0% valid response rate).

### 2. Participant characteristics

Participants comprised 63 nurses (67.0%), 19 physical therapists (20.2%), 8 occupational therapists (8.5%), 3 speech therapists (3.2%), and 1 physician (1.1%).

## 3. Awareness about post-stroke fatigue among medical professionals

### 3.1 Awareness about post-stroke fatigue

In response to the question about whether stroke patients were always tired or tire very easily, 60 participants (63.8%) selected “Strongly agree/Agree somewhat.” In addition, with regard to whether they felt that post-stroke fatigue was a serious problem, that post-stroke fatigue was a problem that must be addressed, and that post-stroke fatigue was complicating patient progress with rehabilitation, 66 (70.2%), 69 (73.4%), and 71 (75.5%) participants, respectively, selected “Strongly agree/Agree somewhat” (Figure 1).

### 3.2 Problems that emerge from post-stroke fatigue

According to medical professionals, post-stroke fatigue created [Difficulty continuing with rehabilitation] such as rejecting rehabilitation, [Decreased drive] such as a decrease in motivation, [Difficulty with emotional control/depression] such as feeling depressed, [Obstacles preventing ADL improvement] such as not achieving skills that could be achieved, [Disuse syndrome] such as a reduction in postural endurance, [Sleep disorders] such as insomnia, [Disruption of daily routine] such as a lengthened time spent in bed, [Constricted life space assessment] such as restricted range of movement, [Fewer interactions with others], [Loss of goals], and [Negative cycle of functional decline due to long-term fatigue] (Table 1). The rate of category agreement was 88.6%, demonstrating that category reliability was maintained.

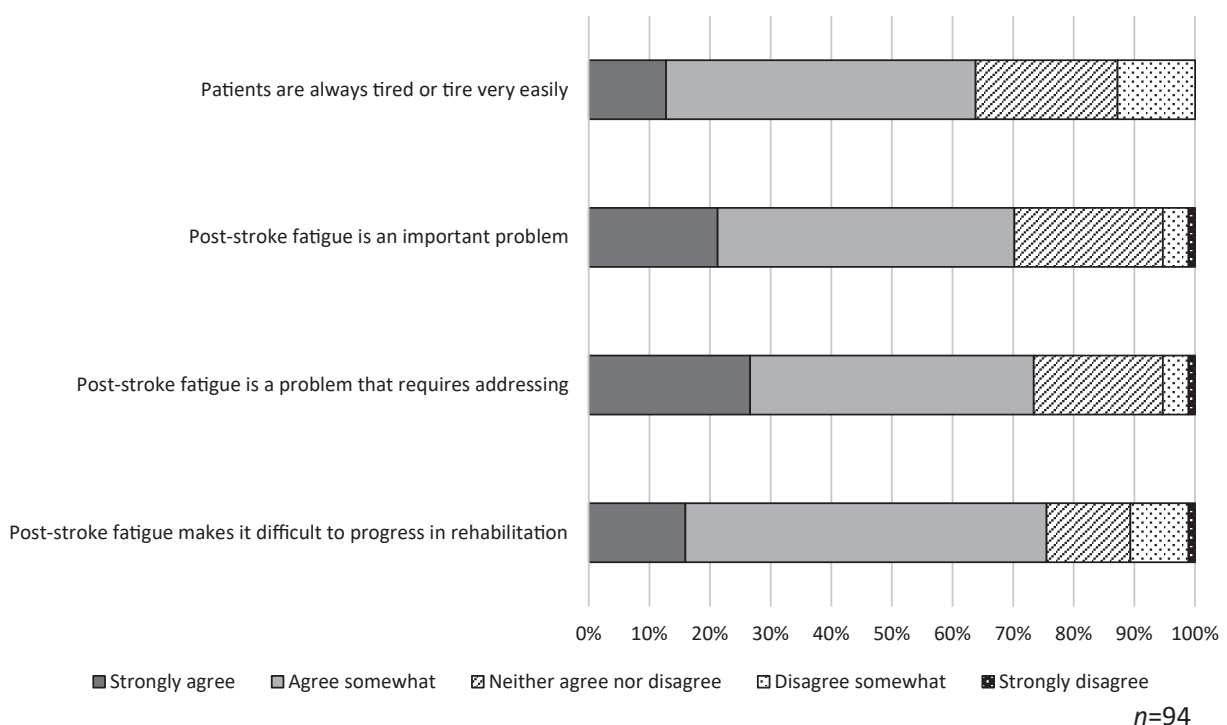


Figure 1. Awareness of post-stroke fatigue among medical professionals.

**Table 1.** Problems that emerge due to post-stroke fatigue.

Category	Content
Difficulty continuing with rehabilitation	Shortened rehabilitation time Difficulty progressing in rehabilitation Refusal to do rehabilitation activities
Decreased drive	Decreased drive Apathy Lower motivation
Difficulty with emotional control/depression	Depression Feel unmotivated Difficulty controlling emotions
Obstacles preventing ADL improvement	Care dependency Not achieving skills that could be achieved Prevents or halts ADL improvement
Disuse syndrome	Disuse syndrome Reduced tolerance for postural maintenance Increased fall risk Aches and pains Loss of appetite, weight loss, bedsores
Sleep disorders	Sleeping during the day Circadian rhythm disruption Insomnia
Disruption of daily routine	Lengthened time spent in bed Disruption of daily routine
Constricted life space assessment	Restricted perimeter of movement Narrowed activity perimeter
Fewer interactions with others	Fewer interactions with others
Loss of goals	Loss of goals
Negative cycle of functional decline due to long-term fatigue	Long-term fatigue Fatigue and the negative cycle of physical/ psychological functional decline

#### 4. Support for post-stroke fatigue

##### 4.1 Presence/absence of support for post-stroke fatigue, content of support, and outcomes of support

In response to the question, “Do you currently offer some sort of support for post-stroke fatigue?”, 54 (57.4%) participants responded “Yes,” while 40 (42.6%) responded “No.”

The 54 participants who responded “Yes” were asked to select the support content (multiple answers allowed) that they offered. Forty-six (48.9%) selected “Ensure rest,” 19 (20.2%) selected “Promote physical activity,” 17 (18.1%) selected “Promote psychological activity,” and 1 (1.1%) selected “Other.”

Descriptive data pertaining to “Ensure rest” comprised content that included [Comfortable positioning], [Reduced activity levels], [Secure time for rest], [Ensure mini breaks during activities], [Short naps], [Ensure time to sleep], [Relaxation methods], [Schedule adjustment], and [Accommodate to ensure a balance between activity

and rest]. “Promote physical activity” comprised content that included [Rehabilitation], [Promote walking], [Encourage patient to get out of bed], and [Living support to accommodate ADL]. “Promote psychological activity” comprised [Encourage patient to converse with others], [Promote interactions with others], [Recreational activities], [Attentive listening], [Reminiscence method], and [Consider the need for a psychiatric consultation]. “Other” comprised answers such as [Establish goals] and [Education on how to operate the television, etc.] (Table 2). Category agreement was 85.1%, demonstrating sufficient reliability.

In response to the question, “Do you feel that the support offered for post-stroke fatigue has effectively alleviated the fatigue?”, none (0.0%) of the participants selected “Strongly agree,” 27 (50.0%) selected “Agree somewhat,” 24 (44.4%) selected “Neither agree nor disagree,” 2 (3.7%) selected “Disagree somewhat,” and none (0.0%) selected “Strongly disagree.”

**Table 2.** Content of support offered by medical professionals to address post-stroke fatigue.

Category	Content
Ensure rest	
Comfortable positioning	Consider different positioning methods Position the patient comfortably
Reduced activity levels	Encourage patient to rest and not push themselves Respond to patient cues about an activity, i.e., do not perform it if an activity is rejected Change patient's eating posture from a seated position to lying in bed with the head of the bed raised
Secure time for rest	Establish rest time Encourage patient to rest, even if there is only a little time before the next scheduled item
Ensure mini breaks during activities	Work small breaks in between rehabilitation Remind patient to rest between rehabilitation Encourage patient to take frequent breaks during long rehabilitation sessions Remind patient to rest when they can
Short naps	Encourage patient to take short naps during the day Establish time to nap
Ensure time to sleep	Adjust the environment to allow for sleep Use sleep aids to promote sleep
Relaxation methods	Intervention to reset the autonomic nervous system
Schedule adjustment	Plan to shower after rehabilitation Encourage participation after a short break following rehabilitation Perform rehabilitation with 30-60 minute breaks in between
Accommodate to ensure a balance between activity and rest	Consider the appropriate balance between activity and rest
Promote physical activity	
Rehabilitation	Roughly 2-3 hours of rehabilitation each day Offer bedside rehabilitation as indicated by patient condition
Promote walking	Promote walking outside of rehabilitation
Encourage patient to get out of bed	Encourage patient to get out of bed Encourage patient to get out of bed to improve endurance Encourage patient to get out of bed during the day to avoid circadian rhythm disruption
Living support to accommodate ADL	Living support to accommodate current ADL Encourage patient to do what they can on their own, and assist them with other tasks
Promote psychological activity	
Encourage patient to converse with others	Promote communication with family Perform "free talk" Make time to go and talk with patient Increase the frequency of visits and verbal connections Talk with patient about their interests
Promote interactions with others	Promote interactions with others Establish visitation opportunities with family
Recreational activities	Encourage patient participation in recreation activities Perform recreation activities
Attentive listening	Listen attentively to patient Respond to patient requests
Reminiscence method	Perform the reminiscence method
Consider the need for a psychiatric consultation	If needed, consider psychiatric consultation
Other	
Establish goals	Establish goals
Education on how to operate the television, etc.	Introduction on how to use the television and smartphone

#### 4.2 Free description responses about post-stroke fatigue

In the free writing space that allowed participants to write other comments about post-stroke fatigue, the most common (6 participants) comment was [Cannot judge if it is post-stroke fatigue] (e.g., “It’s difficult to judge from the appearance if it’s post-stroke fatigue,” “I don’t know if it’s post-stroke fatigue”). In addition, some also commented on [The emergence of fatigue due to the excessive burden during rehabilitation] (e.g., “The fatigue due to the rehabilitation is worse than that caused by the disease,” “Physical therapy and occupational therapy can quickly become too much”). Finally, others commented on [The need for psychological support] (e.g., “A clinical psychiatrist needs to be stationed in the recovery phase rehabilitation ward,” “Psychological support is necessary”).

#### 5. Differences in awareness of post-stroke fatigue by participant characteristics (occupation)

We compared awareness levels between nurses and therapists (physical, occupational, and speech).

With regard to whether the participants felt that stroke patients were always tired or tired very easily, a significant difference between the two groups was noted, with the therapists responding “Strongly agree” significantly more frequently than nurses ( $p = 0.003$ ) (Table 3). When asked whether they felt that post-

stroke fatigue was a problem that must be addressed, the therapists responded “Strongly agree” significantly more frequently than nurses ( $p = 0.047$ ) (Table 3). When asked whether they thought post-stroke fatigue was a serious problem, or that it complicates patient progress in rehabilitation, no significant difference was found between the two groups.

A significant association was observed between the presence/absence of support for post-stroke fatigue and occupation ( $p = 0.003$ ), indicating that more therapists provided support for post-stroke fatigue than nurses (Table 4).

### Discussion

In the present study, roughly 60% of medical professionals working in recovery phase rehabilitation wards noted that stroke patients were always tired or tired very easily, demonstrating their awareness of the possibility that their stroke patients may have post-stroke fatigue. The actual percentage of patients in the recovery phase rehabilitation wards exhibiting post-stroke fatigue remains unclear. However, from our findings that roughly 60% of medical professionals were aware that their patients may be exhibiting post-stroke fatigue, and that fatigue develops as a result of extreme load on the mind and body, as well as from the written content about the emergence of fatigue

**Table 3.** Differences in awareness of post-stroke fatigue according to participant characteristics (occupation).

	Nurses		Therapists		Significance
	Mean	Standard deviation	Mean	Standard deviation	
Do you feel that stroke patients are always tired or tire very easily?	3.5	0.8	4.0	0.8	0.003**
Do you feel that post-stroke fatigue is a serious problem?	3.8	0.8	4.0	0.8	0.190
Do you consider post-stroke fatigue a problem that must be addressed?	3.8	0.9	4.2	0.8	0.047*
Do you feel that post-stroke fatigue complicates patient progress in rehabilitation?	3.8	0.9	3.9	0.7	0.583

$n = 93$

Mann-Whitney  $U$  test \* $p < 0.05$  \*\* $p < 0.01$

1: Strongly disagree, 2: Disagree somewhat, 3: Neither agree nor disagree, 4: Agree somewhat, 5: Strongly agree.

**Table 4.** Presence/absence of support offered to address post-stroke fatigue by nurses and therapists.

	Presence of support		Absence of support		$p$
	No. (people)	Percentage (%)	No. (people)	Percentage (%)	
Nurses	30	47.6	33	52.3	0.003**
Therapists	24	80.0	6	20.0	

$n = 93$

Fisher’s exact test \* $p < 0.05$  \*\* $p < 0.01$

accompanying an excessive load during functional recovery drills, the rate of post-stroke fatigue in patients admitted to the recovery phase rehabilitation ward is likely to be high. Given that the awareness of post-stroke fatigue was significantly higher among therapists than nurses, problems with post-stroke fatigue will likely become readily apparent when patients are undergoing functional recovery training such as physical therapy, occupational therapy, and speech therapy. Meanwhile, awareness of post-stroke fatigue was lower among nurses, possibly because it is more difficult to notice the presence of post-stroke fatigue in the clinical environment, in comparison to when patients are undergoing functional recovery training.

Rehabilitation is a process of relearning and efforts aimed at regaining the previous way of life and lifestyle [23]. Regardless of the post-stroke course or living conditions, it is something that must be carried out continuously; accordingly, it is critical that the patient and family are able to collaborate closely with a team of various professionals. Therefore, an important challenge in providing the necessary rehabilitation training and care is for medical professionals to acknowledge that functional recovery training is a setting where fatigue is easily generated due to the activity load, and to share information between the various professionals about the patient's level of fatigue before and after rehabilitation. By sharing information among relevant medical professionals and having an acute awareness of the situation surrounding post-stroke fatigue, adjustments can be made to ensure a proper balance between activity and rest, which ideally would help prevent the onset of fatigue accompanying a higher activity load or decreased activity. Because fatigue is a subjective feeling, and since some descriptive content noted the difficulty of objectively evaluating this feeling, we hope that future studies will focus on the development of evaluative indices of post-stroke fatigue and relevant applications, as well as clarify the actual state of post-stroke fatigue in Japan.

With regard to the effects of post-stroke fatigue, roughly 70% of medical professionals felt that it hindered the progress of rehabilitation. In addition, medical professionals felt that post-stroke fatigue negatively affected the physical and emotional well-being of patients in addition to their living functions, and that chronic and long-lasting fatigue could lead to a downward spiral in the patient's functional capabilities. As noted previously, post-stroke fatigue not only heightens ADL dependency [3], reductions in QOL [4], and mortality risk [3], but it can also make a patient more vulnerable to depression if not appropriately managed [24]. Patient surveys conducted outside of Japan have revealed the negative effects of post-stroke fatigue on physical, psychological, and living functions of patients; these were consistent with

the awareness among medical professionals working in the recovery phase rehabilitation wards. One novel finding was the possibility that post-stroke fatigue resulted in a negative cycle of functional decline. In general, inappropriate management of symptoms accompanying chronic illnesses leads to exacerbation of the symptoms, and in turn, to a subsequent decline in the patient's health condition [25]. In order to avoid such negative cycles, it is important to provide comprehensive management of all physical, emotional, and daily living functions related to post-stroke fatigue.

With regard to acknowledging the importance of post-stroke fatigue as a serious problem, roughly 70% of medical professionals surveyed were aware that it is a serious problem that must be addressed. Unfortunately, although just under 60% of our participants had attempted to offer individual support such as ensuring rest, the outcomes or effects of the support were less clear, with roughly half of the participants indicating neutral or non-existent outcomes. In recent years, findings from interventional studies outside Japan have been reported, but according to a statement from the American Heart Association, "an insufficient amount of scientific basis is available for non-pharmaceutical treatment of post-stroke fatigue" [26]. Interventions to address post-stroke fatigue have yet to be established, and simply ensuring more rest cannot be expected to achieve desired outcomes; effective support is clearly not being provided. Medical professionals appear to be aware of the seriousness of the problem and the need to address it, and we look forward to the development of interventions with a scientific basis. Fortunately, given the high level of awareness about the importance of this issue, the interventions developed will likely be welcomed in clinical settings.

## Conclusions

Roughly 60% of medical professionals working in recovery phase rehabilitation wards were aware of the possibility that their patients had post-stroke fatigue. Roughly 70% recognized that post-stroke fatigue hindered the progress of rehabilitation and negatively impacted the physical, emotional, and living functions of their patients, and that it was an important problem that required addressing. Just under 60% of medical professionals had attempted to offer individual support by, for example, ensuring rest, but roughly half assessed the outcomes of these efforts as either neutral or non-existent. The awareness of post-stroke fatigue as well as the rate at which support was offered showed significant occupation-dependent differences, with therapists demonstrating a significantly higher awareness and support rate than nurses. Clarification of the actual state of post-stroke fatigue and the development of appropriate interventions are



anticipated in the future. As medical professionals are already demonstrating a high level of awareness about the importance of this problem and acknowledge the need for ways to address it, any interventions developed to this end would likely be welcomed in clinical settings.

### Study Limitations

Our results derive from the opportunistic sampling of medical professionals working in three different recovery phase rehabilitation wards, so there may have been some sampling bias. In addition, the sample size was small, with limited data from physicians. A larger scale survey based on random sampling is warranted. Our results are from a survey of medical professionals queried about post-stroke fatigue and the support they offered to address this. As fatigue is a subjective feeling, a survey of medical professionals would be well complemented by a patient survey, which would help to better assess the true state of post-stroke fatigue.

### Acknowledgements

We thank the head nurse of the institution where the survey was conducted, as well as all medical professionals who participated in this study. The present study was conducted as part of the research study, "Development of the Post-Stroke Fatigue Self-Management Program," which received funding from JSPS Kakenhi (JP20K19215). We are grateful for the financial support.

### References

- Cumming TB, Packer M, Kramer SF, English C. The prevalence of fatigue after stroke: a systematic review and meta-analysis. *Int J Stroke* 2016; 11(9): 968–77.
- Wu S, Mead G, Macleod M, Chalder T. Model of understanding fatigue after stroke. *Stroke* 2015; 46(3): 893–8.
- Glader EL, Stegmayr B, Asplund K. Poststroke fatigue: a 2-year follow-up study of stroke patients in Sweden. *Stroke* 2002; 33(5): 1327–33.
- Tang WK, Lu JY, Chen YK, Mok VC, Ungvari GS, Wong KS. Is fatigue associated with short-term health-related quality of life in stroke? *Arch Phys Med Rehabil* 2010; 91(10): 1511–5.
- Kuppuswamy A, Rothwell J, Ward N. A model of poststroke fatigue based on sensorimotor deficits. *Curr Opin Neurol* 2015; 28(6): 582–6.
- Cumming TB, Yeo AB, Marquez J, Churilov L, Annoni JM, Badaru U, et al. Investigating post-stroke fatigue: an individual participant data meta-analysis. *J Psychosom Res* 2018; 113: 107–12.
- Zhang S, Cheng S, Zhang Z, Wang C, Wang A, Zhu W. Related risk factors associated with post-stroke fatigue: a systematic review and meta-analysis. *Neurol Sci* 2020; doi: 10.1007/s10072-020-04633-w.
- Wu S, Barugh A, Macleod M, Mead G. Psychological associations of poststroke fatigue: a systematic review and meta-analysis. *Stroke* 2014; 45(6): 1778–83.
- Duncan F, Lewis SJ, Greig CA, Dennis MS, Sharpe M, MacLulich AM, et al. Exploratory longitudinal cohort study of associations of fatigue after stroke. *Stroke* 2015; 46(4): 1052–8.
- Braaten RS, Askim T, Gunnes M, Indredavik B. Fatigue and activity after stroke. Secondary results from the Life After Stroke study. *Physiother Res Int* 2020; 25(4): e1851. doi: 10.1002/pri.1851. (accessed 2020-10-26)
- Shepherd AI, Pulsford R, Poltawski L, Forster A, Taylor RS, Spencer A, et al. Physical activity, sleep, and fatigue in community dwelling stroke Survivors. *Sci Rep* 2018; 8(1): 7900.
- Pihlaja R, Uimonen J, Mustanoja S, Tatlisumak T, Poutiainen E. Post-stroke fatigue is associated with impaired processing speed and memory functions in first-ever stroke patients. *J Psychosom Res* 2014; 77(5): 380–4.
- Michael KM, Allen JK, Macko RF. Fatigue after stroke: relationship to mobility, fitness, ambulatory activity, social support, and falls efficacy. *Rehabil Nurs* 2006; 31(5): 210–7.
- Mutai H, Furukawa T, Hourai A, Suzuki A, Hanihara T. Factors associated with multidimensional aspect of post-stroke fatigue in acute stroke period. *Asian J Psychiat* 2017; 26: 1–5.
- Su Y, Asamoto M, Yuki M, Saito M, Hasebe N, Hirayama K, et al. Predictors and short-term outcomes of post-stroke fatigue in initial phase of transition from hospital to home: A prospective observational study. *J Adv Nurs* 2021; 77(4): 1825–38.
- Sato M, Hyakuta T. Review of Japanese and overseas literature on post-stroke fatigue. Program and Abstracts of the 8th Japanese Academy of Neuroscience Nursing 2021; 28. Japanese.
- The Japan Stroke Society. Japanese Guidelines for the Management of stroke 2021. Tokyo: Kyowa Kikaku; 2021. Japanese.
- Japanese Society of Fatigue Science. Guideline on the clinical evaluation of fatigue 2011. Japanese. <http://www.hirougakkai.com/guideline.pdf> (cited 2022 September 27)
- White JH, Gray KR, Magin P, Attia J, Sturm J, Carter G, et al. Exploring the experience of post-stroke fatigue in community dwelling stroke survivors: a prospective qualitative study. *Disabil Rehabil* 2012; 34(16): 1376–84.
- Skivington K, Matthews L, Simpson SA, Craig P, Baird J, Blazeby JM, et al. A new framework for developing and evaluating complex interventions: update of Medical Research Council guidance. *BMJ* 2021; 374: n2061.
- Wu S, Chalder T, Anderson KE, Gillespie D, Macleod MR, Mead GE. Development of a psychological intervention for fatigue after stroke. *PLoS One* 2017; 12(8): e0183286.
- Funashima N. Challenges in Qualitative Research 2nd ed. Tokyo: Igaku Shoin; 2007. p. 40–80. Japanese.
- The Japan Academy of Nursing Science. Steering Committee for Scientific Nursing Terminology. Rehabilitation

- [Internet]. JANSpedia. <https://scientific-nursing-terminology.org/terms/rehabilitation/> (cited 2022 September 27).
24. Ormstad H, Eilertsen G. A biopsychosocial model of fatigue and depression following stroke. *Med Hypotheses* 2015; 85(6): 835–41.
25. Lorig K, Laurent D, González V, Sobel D, Minor M, Gecht-Silver M. *Living a Healthy Life with Chronic Conditions*, 5th ed. Colorado: Bull Publishing Company Boulder; 2020. p. 9–12.
26. Hinkle JL, Becker KJ, Kim JS, Choi-Kwon S, Saban KL, McNair N, et al. American Heart Association Council on Cardiovascular and stroke Nursing and stroke Council. Poststroke fatigue: Emerging Evidence and Approaches to Management: A Scientific Statement for Healthcare Professionals From the American Heart Association. *Stroke* 2017; 48(7): e159–e170.