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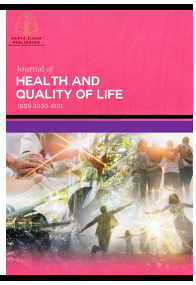

Perception and Knowledge of Trunk Rehabilitation in Stroke among Physiotherapy Students: A Cross-Sectional Study

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ABSTRACT

Stroke is an emerging public health issue and associated with substantial healthcare costs. Previous literature has provided strong evidence for supporting trunk training in improving the functional outcomes in the stroke population. Moreover, the patient's trunk performance has been found to be a valuable prognostic indicator after stroke. This study aimed to identify the perception and knowledge of trunk rehabilitation in stroke among physiotherapy students. This study used a descriptive, cross-sectional design to describe the perception and the level of knowledge targeting Bachelor of Physiotherapy students. A self-developed questionnaire was used and a total of 161 physiotherapy students participated in this study. The questionnaire used was pre-evaluated for validity and tested for reliability in a pilot study. The data were analysed using frequency and percentage analysis. Chi-Square Test and Spearman's correlation coefficient were used to identify the factors associated with the students' perception and level of knowledge of trunk rehabilitation in stroke. Almost all (96.9%) of the physiotherapy students perceived that it is important to include trunk training in the rehabilitation programme for stroke patients. However, less than one-fifth (<20%) of the students perceived themselves as having sufficient background knowledge or clinical exposure to manage the trunk impairments in stroke. Overall, the majority (72%) of them were categorised as having poor level of knowledge. The factors associated with their perception included having previous working experience, having a Diploma qualification, and ever attended continuing professional development activity. Whereas the factors associated with their level of knowledge comprised having previous working experience and duration of the clinical posting. Majority of the physiotherapy students were having poor level of knowledge and perceived themselves as unable to effectively manage the trunk impairments in stroke. This urges the need to organise more continuing professional development activities and also to look into the measures to improve the physiotherapy students' learning experience during clinical posting. These would help them to become a more competent physiotherapist once graduated in delivering rehabilitation services for the stroke population, to optimise the outcomes and reduce the associated economic burden.

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1. Introduction

Stroke is an alarming global health problem, contributing to significant level of morbidity as well as mortality, in both developed and developing countries. According to the Global Burden of Disease Study by GBD 2016 Stroke Collaborators (2019), there were about 80 million of prevalent cases of stroke worldwide in the year 2016 and stroke has contributed to about 5.5 million deaths globally, making it the second largest cause of deaths globally after ischaemic heart disease [1]. Stroke can be broadly classified into ischaemic stroke and haemorrhagic stroke. Ischaemic stroke is caused by the occlusion of one or several cerebral arteries, and it can be further subdivided into thrombotic and embolic stroke [2]. With the high mortality rate associated with stroke, it is not surprising that stroke is among the top three causes of death in Malaysia in the year 2020 according to the press release report by the Department of Statistics Malaysia (2020) [3].

The same report by the Malaysia National Neurology Registry (2017) has also found that there is great disability among the Malaysian stroke survivor population. As measured by the Modified Rankin Scale (mRS), it has been reported that only about 35% of the stroke survivors achieved independence in their activities of daily living with good outcomes (mRS≤2) at the time of discharge [4]. As high as 54% of the Malaysian stroke survivor population were found to be affected by various degrees of physical and/or cognitive disability causing them to require some form of assistance for their activities of daily living (mRS≥3). This has suggested that about half of all the stroke survivors in Malaysia could potentially benefit from physiotherapy rehabilitation services to help improve their functions for optimizing their activities of daily living independence level.

In recent years, trunk rehabilitation in the stroke population has been given considerable attention. Numerous studies have reported that trunk control is an important prognostic factor for predicting the functional outcomes after stroke. In a prospective observational study by Di Monaco *et al.,*[5], the predictive ability of trunk control on functional outcomes was examined in 68 acute stroke patients. The authors used the Trunk Impairment Scale (TIS) and the Postural Assessment Scale for Stroke Patients (PASS) to evaluate trunk control. After adjusting for 14 potential confounding factors, the study found that trunk control, as measured by TIS and PASS, was significantly and positively correlated with functional independence at discharge.

In the study by Hsieh *et al.,* [6] involving 169 stroke patients, trunk control was found to be the strongest predictor of activities of daily living (ADL) function six months post-stroke. Trunk control, as measured by the Postural Assessment Scale for Stroke Patients (PASS), was more powerful than both the Barthel Index and Fugl-Meyer Assessment (FMA) in predicting ADL function. These findings were supported by a multi-center trial by Verheyden *et al.,* [7] with 102 stroke patients. In this study, the Trunk Impairment Scale (TIS) was used to measure trunk control, and a forward stepwise multiple regression analysis revealed that the TIS total score was the strongest predictor of ADL function at six months post-stroke, even stronger than the Barthel Index. The two studies found that trunk control explained 45% to 71% of the variance in functional recovery at six months post-stroke. Therefore, emphasizing trunk rehabilitation after a stroke is crucial, as it significantly influences both short-term and long-term functional recovery. Therefore, emphasizing trunk rehabilitation after a stroke is crucial, as it significantly influences both short-term and long-term functional recovery.

Building on this foundation, the present study aims to explore the perception of physiotherapy students regarding their ability to manage trunk impairments in stroke patients. In addition, this study seeks to identify the level of knowledge among physiotherapy students about trunk rehabilitation in stroke and to examine the factors associated with their perceptions and knowledge levels regarding this essential aspect of post-stroke recovery.

2. Methodology

This study utilised a quantitative approach and descriptive, cross-sectional study design to identify the perception and the level of knowledge of trunk rehabilitation in stroke among physiotherapy students. The descriptive study research design was adopted as the current study aimed to systematically describe the perception and also the level of knowledge of trunk rehabilitation in stroke among physiotherapy students [8].

Participants for this study must be Bachelor of Physiotherapy students who are in their second year or higher and pursuing their studies in Malaysia. Both Malaysian and international students are eligible, provided they can comprehend the English language. However, students in their first year of the Bachelor of Physiotherapy program, those enrolled in postgraduate physiotherapy studies, and those pursuing a Diploma in Physiotherapy were excluded from participation.

In this study, data on physiotherapy students' perception and knowledge of trunk rehabilitation in stroke were collected using a self-developed questionnaire, the Perception and Knowledge of Trunk Rehabilitation in Stroke Questionnaire. After completing the first draft of the questionnaire, it was printed and given to three experts in neurological physiotherapy for review and validation. Each expert has over a decade of experience in the field. Following their review, the researcher held individual discussions with each expert to clarify their comments and feedback. Based on their input, the questionnaire was revised accordingly, ensuring it was validated by the experts. To ensure reliability, Cronbach's alpha value indicated acceptable internal consistency.

The final version of the questionnaire consisted of three sections in total: (1) Section A – Demographic Data, (2) Section B – Perception of Trunk Rehabilitation in Stroke, and (3) Section C – Knowledge of Trunk Rehabilitation in Stroke. Section A of the questionnaire was the demographic data section. It consisted of nine items in total. Section B consisted of four closed-ended questions related to the perception of trunk rehabilitation in stroke. The responses available to three out of the four perception-related questions in Section B were either “Yes”, “No” or “Unsure”, while for the other one was either “Acute phase”, “Subacute phase”, “Chronic phase” or “Unsure”. Meanwhile, Section C consisted of 14 closed-ended questions related to the knowledge of trunk rehabilitation in stroke. The responses available to all the 14 knowledge-related questions in Section C were either “Yes”, “No” or “Unsure”. For Section C, the percentage of the total number of questions being answered correctly by the participant was used to categorise their level of knowledge of trunk rehabilitation in stroke. The level of knowledge of trunk rehabilitation in stroke was arbitrarily categorised as: <25% very poor, 25-50% poor, 51-75% good, and >75% very good. This interval of categorisation was similar to the study done by Varghese *et al.,* [17]. The participants would need to provide their informed consent prior to their participation. Chi-Square Test and Spearman’s rank-order correlation coefficient were used to identify the factors associated with the perception as well as knowledge of trunk rehabilitation in stroke.

3. Results

A total of 161 sets of questionnaire responses were included in the data analysis. The characteristics of the participants are shown in Table 1.

Table 1
Characteristics of participants (N=161)

Variables	Mean (± SD) or *n* (%)
Age (year)	23.34 (± 2.00)
Gender	
Male	49 (30)
Female	112 (70)
Current year of study	
2nd year	63 (39)
3rd year	47 (29)
4th year	51 (32)
Duration of neurological clinical posting (week)	3.69 (± 3.17)
Holder of Diploma in Physiotherapy qualification	
Yes	90 (56)
No	71 (44)
Previous working experience in treating stroke patients	
Yes	98 (61)
No	63 (39)
Attended conference/ seminar/ workshop related to stroke rehabilitation	
Yes	78 (48)
No	83 (52)

The participants' mean age was 23.34 years (± 2.00), ranging from 19 to 35 years old. Around 30% of the physiotherapy students were male, while the rest were female. In terms of their current year of study, 39% were in their second year, 29% in their third year, and 32% in their fourth and final year. The students had an average of 3.69 weeks (± 3.17) of neurological clinical posting, ranging from zero to 12 weeks. At the time of data collection, 28% had no neurological posting. Additionally, 56% held a Diploma in Physiotherapy, and 61% had prior experience treating stroke patients. About 48% had attended professional development events related to stroke rehabilitation, such as conferences, seminars, or workshops.

Table 2 tabulated the responses given by the physiotherapy student participants for each of the questions in Section B of the questionnaire, related to the perception of trunk rehabilitation in stroke. From question 1, nearly half (49%) of the participants were unsure whether they had sufficient background knowledge in managing trunk impairments in stroke. Only less than one-fifth (17%) of the physiotherapy students perceived that they have sufficient background knowledge to manage the trunk impairments in stroke.

Table 2
Responses given for each item in Section B – Perception of Trunk Rehabilitation in Stroke (N=161)

Questions	Response options	Responses obtained, *n* (%)
Question 1		
Do you think you have sufficient background knowledge to manage trunk impairments in stroke?	Yes	28 (17)
	No	54 (34)
	Unsure	79 (49)
Question 2		
Do you think you have sufficient clinical exposure to manage trunk impairments in stroke?	Yes	25 (16)
	No	92 (57)
	Unsure	44 (27)
Question 3		
Do you think is important to include trunk trainings in the rehabilitation programme for stroke patients?	Yes	156 (96.9)
	No	2 (1.2)
	Unsure	3 (1.9)
Question 4		
When do you think the rehabilitation of trunk impairments in stroke should be started?	Acute	106 (65.8)
	Subacute	45 (28.0)
	Chronic	1 (.6)
	Unsure	9 (5.6)

Similarly, less than one-fifth (16%) of all the physiotherapy students perceived that they have sufficient clinical exposure to manage trunk impairments in stroke patients. The majority of them felt that either they were unsure (27%) or did not have sufficient (57%) clinical exposure to manage trunk impairments in stroke patients. It is interesting to notice that almost all (96.9%) of the physiotherapy students agreed that it is important to include trunk training in the rehabilitation programme for stroke patients. However, their responses with regard to when the rehabilitation of trunk impairments in stroke should be started were less consistent. For question 4, regarding at which phase of stroke the rehabilitation of trunk impairments should be started, the majority (65.8%) of the participants perceived that it should be started in the acute phase, followed by the subacute phase (28.0%), unsure (5.6%) and chronic phase (0.6%).

Table 3 displayed the result of the Chi-Square Test regarding the association between the participants' demographic profile and the perception of trunk rehabilitation in stroke.

Table 3
Chi-Square test for association between participants' demographic variables and perception of trunk rehabilitation in stroke (N=161)

Characteristic	Having sufficient background knowledge	Having sufficient clinical exposure	Importance of including trunk training	When the rehabilitation of trunk impairments should be started
Age (in year)	27.42	39.62*	12.85	35.00
Gender	.06	2.09	6.94*	5.54
Year of study	4.81	2.72	10.63*	8.91
Duration of neurological clinical posting (in week)	27.82	16.76	12.45	39.23
Diploma holder	9.75*	15.55*	3.44	10.84*
Working experience	9.99*	11.88*	3.83	5.31
Attended CPD	12.32*	10.77*	3.06	1.40

The analysis showed that holding a Diploma in Physiotherapy was significantly associated with the perception of having sufficient knowledge to manage trunk impairments in stroke patients (X^2 = 9.75, p < .05, Cramer's V = .25). Diploma holders were more likely to feel confident in their knowledge. Similarly, the Chi-Square test found a small but significant association between prior work experience and the perception of having enough knowledge to manage stroke-related trunk impairments (X^2 = 9.99, p < .05, Cramer's V = .25). Students with prior stroke-related work experience and those who attended stroke rehabilitation conferences, seminars, or workshops also felt more confident in their knowledge (X^2 = 12.32, p < .05, Cramer's V = .28). However, factors like age, gender, current year of study, and the duration of neurological clinical postings were not significantly associated with this perception. In contrast to perceptions of sufficient knowledge and clinical exposure, the analysis showed a different pattern for the perception of the importance of including trunk training in stroke rehabilitation. Gender (G^2 = 6.94, p < .05, Cramer's V = .31) and the current year of study (G^2 = 10.63, p < .05, Cramer's V = .31) were significantly associated with this perception. Female students and those in their fourth year of study were more likely to view trunk training as important for stroke rehabilitation. No other demographic variables were significantly linked to this perception.

Figure 1 displays the physiotherapy students' level of knowledge based on the percentage of questions being answered correctly in Section C of the questionnaire. The result showed that the majority of the physiotherapy students were categorised as having a poor level of knowledge in trunk rehabilitation in stroke, which constituted 72% of all the studied participants. This was followed by good level and very poor level of knowledge, at 21.7% and 5.6%, respectively. Out of all the participants, only one (.6%) participant was categorised as having very good level of knowledge in trunk rehabilitation in stroke. Overall, only slightly more than one-fifth (22.3%) of all the physiotherapy student participants were categorised as having either a good or very good level of knowledge in trunk rehabilitation in stroke.

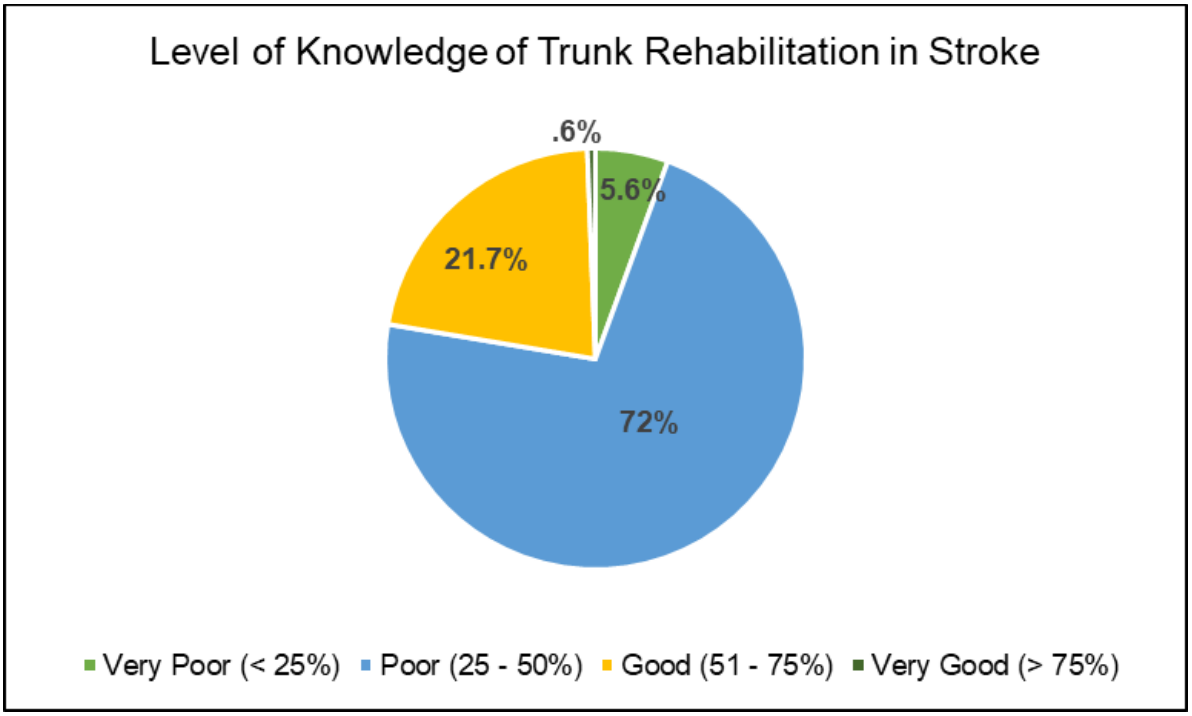

Fig. 1. Level of knowledge of trunk rehabilitation in stroke among the physiotherapy students (N=161)

The Chi-Square test analysis has also been performed to find out the association between the physiotherapy students' level of knowledge of trunk rehabilitation in stroke and their demographic variables that were of nominal and ordinal level of measurement. Table 4 indicated the results from the Chi-Square test regarding the association between the participants' demographic variables and the level of knowledge of trunk rehabilitation in stroke. Of all the analysed demographic variables, only having previous working experience in treating stroke patients was found to be significantly associated with the physiotherapy students' level of knowledge of trunk rehabilitation in stroke (G^2=8.43, p<.05, Cramer's V=.5). The effect size of the association was moderate. Otherwise, all the other investigated demographic variables were not significantly associated with the level of knowledge of trunk rehabilitation in stroke.

Table 4

Chi-Square test for association between participants' demographic variables (nominal and ordinal level) and the level of knowledge of trunk rehabilitation in stroke (N=161)

Characteristic	Level of knowledge of trunk rehabilitation in stroke
Gender	5.09
Year of study	10.24
Diploma holder	3.74
Working experience	8.43*
Attended conference	7.46

Spearman's rank-order correlation coefficient has also been performed to investigate the correlation between age and duration of neurological clinical posting to the level of knowledge of trunk rehabilitation in stroke. The duration of neurological clinical posting was found to be significantly and positively correlated with the level of knowledge of trunk rehabilitation in stroke (ρ=.31, p<.05).

4. Discussions

The present study found that less than one-fifth (17%) of physiotherapy students felt they had sufficient background knowledge to manage trunk impairments in stroke, while nearly half (49%) were uncertain, and the remainder believed they lacked adequate knowledge. Similarly, only 16% felt they had enough clinical exposure to manage trunk impairments, with the majority (57%) perceiving a lack of clinical experience. The study identified that having completed a Diploma in Physiotherapy, having prior experience treating stroke patients, and attending professional development activities related to stroke rehabilitation was significantly associated with students' confidence in their knowledge and clinical exposure.

Over half (56%) of the participants held a Diploma in Physiotherapy. This formal education and clinical experience likely explain the positive association found in this study between holding a Diploma and the perception of being prepared to manage trunk impairments in stroke patients.

Previous experience in treating stroke patients was significantly associated with physiotherapy students' perception of having sufficient knowledge and clinical exposure to manage trunk impairments. About 61% of participants had this experience. Physiotherapy, especially in neurorehabilitation, involves a patient-centered approach and requires careful consideration of various factors, including personal and environmental influences, to develop effective management plans. Experience in treating stroke patients helps refine clinical reasoning, assessment, and treatment skills. As a result, students with this experience are more likely to feel confident in their ability to manage trunk impairments in stroke patients.

Moving forward, despite that only less than one-fifth (<20%) of all the participants perceived that they have sufficient background knowledge or clinical exposure to manage the trunk impairments seen in stroke patients, it is encouraging to find out that almost all of them (96.9%) agreed that it is important to include trunk training in the rehabilitation programme for stroke patients. This has suggested that the majority of the participants were aware of the importance of improving the truncal control in stroke patients, even though they perceived themselves do not have sufficient background knowledge or clinical exposure to effectively manage the trunk impairments seen in stroke patients. The present study has found that the physiotherapy students' current year of study was significantly associated with their perception of the importance of including trunk training in the rehabilitation program of stroke patients

For knowledge of trunk rehabilitation in stroke, only slightly more than one-fifth (22.3%) of all the physiotherapy students were categorised as having either a very good or good level of knowledge in trunk rehabilitation in stroke. The majority (72%) of the physiotherapy students were categorised as having a poor level of knowledge in trunk rehabilitation in stroke. The impacts of the COVID-19 pandemic on the higher education sector could have contributed to the poor knowledge among the physiotherapy student participants.

Abbasi *et al.,* [9] surveyed 382 medical and health science students in Pakistan during the COVID-19 lockdown and found that many had a negative view of e-learning. About 85% preferred traditional face-to-face teaching, and 86% felt e-learning had little impact on their learning. Similarly, Sheth *et al.,* [10] surveyed 2,025 physiotherapy students in India and found that around half did not favor e-learning. About 75% believed e-learning was unsuitable for physiotherapy education, which relies heavily on hands-on practice. Although technology enables real-time communication, it still cannot fully replace practical training. Additionally, e-learning presents challenges such as prolonged screen time, which some students find uncomfortable. These factors may contribute to the lower knowledge levels observed in physiotherapy students. Both Abbasi *et al.,* [9] and Sheth *et al.,* [10] found that e-learning negatively affects students' mental well-being, which might explain the poor knowledge levels observed in physiotherapy students in this study. Abbasi *et al.,* [9] reported that 84% of students felt e-learning worsened student-teacher interactions, increasing feelings of isolation. Similarly, Sheth *et al.,* [10] found that about two-thirds of physiotherapy students were uncomfortable with e-learning due to the lack of face-to-face interaction with peers. Previous research shows that interaction with peers and teachers is crucial for academic success, as it promotes socialization, diverse perspectives, and critical thinking, which enhance knowledge and performance.

Even though the current study has found a statistically significant correlation between the physiotherapy students' duration of neurological clinical posting and their level of knowledge, it should be noted that the two variables were only weakly correlated (ρ=.31). This could be attributed to the possibility of reduced patient availability in view of the movement restriction associated with the COVID-19 pandemic, which may have affected the students' learning experience during their clinical posting. Previous literature has provided a large body of research evidence in advocating the importance of clinical educators for enriching the physiotherapy students' learning experiences during their clinical posting [11-13]. Pedagogy practices are buttressed with complex psychological, behavioural, and social theory, and the clinical educator would need to undergo appropriate training to be equipped with the ability to facilitate as well as to maximize the student's learning experience [12,14]. Despite that, it is a normal practice in Malaysia that all the physiotherapy students were guided by clinical educators during the clinical posting, but the clinical educators' pedagogical training and previous experience in guiding physiotherapy students in the clinical setting were not being investigated in the current study. The lack of understanding of pedagogical teaching principles by the

clinical educators may have affected the quality of the clinical education imparted to the physiotherapy students. Therefore, this may also potentially have explained the weak correlation found between the physiotherapy students' duration of neurological clinical posting and their level of knowledge.

It was surprising to find that the physiotherapy students' current year of study was not significantly associated with their level of knowledge. It is logical to assume that physiotherapy students who were currently at the final year of their study would have a better level of knowledge compared to those who were currently in their 2nd or 3rd year of study, as they would have learned more modules. One of the possible explanations for this finding could be their learning experiences were affected due to the sudden shift to e-learning in view of the COVID-19 pandemic. Studies have found that the majority of the physiotherapy students felt that e-learning was not suitable for physiotherapy learning and had little impact on their learning [9,10]. Furthermore, e-learning may have also negatively impacted their mental and psychosocial well-being, causing them unable to achieve the desired learning outcomes [15, 16]. In relation to that, it could therefore possibly have explained the lack of significant association between the physiotherapy students' current year of study and their level of knowledge of trunk rehabilitation in stroke, especially since it has been more than a year since the COVID-19 pandemic hit the nation and causing the shift of all teaching and learning activities to e-learning.

5. Conclusions

As a conclusion, the findings indicate that fewer than one-fifth of the students felt they had sufficient background knowledge or clinical exposure for managing trunk impairments post-stroke. Despite recognizing the importance of trunk training in stroke rehabilitation, many students lacked confidence in their ability to manage such impairments effectively. Significant associations were found between having a Diploma in Physiotherapy, previous work experience with stroke patients, and attendance at stroke-related professional development activities with students' perceptions of their knowledge and clinical exposure. The study highlights the need for enhanced professional development and improved clinical education to better equip students with the necessary skills and knowledge.

The findings suggest a need for more targeted continuing education activities, including practical skills training, to address gaps in knowledge and clinical experience. Institutions should focus on providing effective clinical training and support for educators to improve students' practical skills and overall competency. This approach could enhance the quality of neurorehabilitation services and potentially reduce the long-term impact of stroke on patients. Future research should explore students' perceptions in more depth through qualitative methods and larger, longitudinal studies to better understand the causal relationships and identify effective strategies for improving physiotherapy education and stroke rehabilitation outcomes.

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