



Contents lists available at ScienceDirect

Journal of Hand Therapy

journal homepage: www.elsevier.com/locate/jht

Research paper

Exploring the reasons behind the low focus on upper limb rehabilitation in the early stages after a stroke: A qualitative study

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ARTICLE INFO

Article history:

Received 1 February 2024

Revised 20 July 2024

Accepted 15 August 2024

Available online xxxx

Keywords:

Stroke

Upper limb

Rehabilitation

Hand rehabilitation

ABSTRACT

Background: One aspect that is often impaired in people living with stroke is the motor function of the upper limb.

Purpose: To explore the reasons behind the low focus on upper limb rehabilitation after stroke and to understand the views of rehabilitation professionals (RPs) on the use of upper limb rehabilitation technologies for self-management of stroke.

Study Design: A qualitative descriptive design that employs a one-on-one semistructured interview method.

Methods: A total of nine RPs (physiotherapist $n = 6$ and occupational therapist $n = 3$) participated. Interviews were held in person or via teleconferencing, recorded, and transcribed verbatim. All transcribed data were analyzed using thematic analysis, with an inductive approach.

Results: The average length of practice years of the RPs in this study was 24.7 ± 9.8 , with 16.44 ± 9.19 experience in neurological rehabilitation. The views gathered from all nine (9/9) RPs point to a low focus on upper limb rehabilitation for people living with stroke. In an inpatient setting, this was attributed to the rehabilitation goals/ priorities (of people living with stroke, RPs, and/or hospital's rehabilitation/stroke units), inadequate resources, and the inability of the RPs to deal with the high incidence of stroke. After discharge, it was attributed to the cost of securing private rehabilitation and poor knowledge of technologies that can support self-rehabilitation. The cost, design, and inadequacy of evidence on the effectiveness of some available upper limb rehabilitation technologies were noted as reasons that could make it difficult for RPs to promote the use of rehabilitation technologies.

Conclusions: There is a low focus on upper limb rehabilitation after a stroke, particularly during the early stages, owing to the pursuit of early discharge which appears to attach higher priority to the lower limb in addition to inadequate resources and lack of capacity to deal with the high incidence of stroke.

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Introduction

People living with stroke are mostly left with short and long-term disabilities which have a considerable impact on their functional independence and quality of life.^{1,2} Mobility impairment, which is due to the loss or limitation of function in the motor ability of the muscle or muscle control, is the most common and widely recognized consequence of stroke, affecting 80% of stroke survivors.³ This effect is seen in parts of their body such as the upper limb, lower limb, and face.⁴ While some recover certain functions, others do not years afterward. For instance, it has been reported that

more than 50% of those with hand impairment do not regain function.⁵ Motor impairments of the upper limb are mostly in the form of paresis and spasticity.⁶

The upper limb function is crucial in carrying out activities such as eating, drinking, dressing, etc, which are necessary for everyday life and occupational performance.^{7,8} Besides, the hand is a defining feature for human daily interactions and is useful in manipulating objects leading to learning and exploration of the environment.⁹ Impairments affecting the functional use of the upper limb would have a deleterious impact not only on independence but also on the general health and well-being of people living with stroke.¹⁰ This suggests the need for upper limb rehabilitation.

Rehabilitation has to do with any concerted efforts aimed at the recovery of function. Studies have shown that time is of the essence in the recovery of functions following a stroke, and the most

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considerable recovery occurs within the first weeks and reaches a plateau within 3 months, after which it becomes less considerable.^{1,11,12}

Spontaneous recovery of motor function after a stroke is usually minimal after 6 months, and people living with stroke may suffer chronic deficits in the functions not yet recovered afterward.¹ For example, one-third of people living with stroke lose passive range of motion in their joints 6 months after stroke.¹³ The incomplete movement recovery in lower and upper limb function after a stroke is the strongest reason for low health-related quality of life in stroke survivors.¹⁴ Thus, there is a need for early rehabilitation of motor function in the upper and lower limbs.

An earlier study on the views of people living with stroke indicates that the focus of rehabilitation during the inpatient period after a stroke is mostly centered on regaining lower limb function,¹⁵ suggesting upper limb rehabilitation is a lower priority.

Also, advancements in technology have led to the development of home-based technologies such as electrical stimulators that are reported to have a positive impact on upper limb rehabilitation.¹⁶ Some of these home-based rehabilitation technologies can be used by people living with stroke in self-management (after discharge); however, they will need to be made aware of the availability of these devices.

The objective of this work is to explore the reasons behind the low focus on upper limb rehabilitation after stroke and to understand the views of rehabilitation professionals (RPs) on the use of upper limb rehabilitation technologies for self-management of stroke.

Methods

Study design

This study made use of a qualitative descriptive design.¹⁷ Interviewing, which is the most commonly employed format for collecting data in a qualitative study, was adopted.¹⁸ A one-on-one semistructured interview with preset open-ended questions was conducted.¹⁸

This research design is appropriate for ascertaining prominent issues¹⁹ and thus is generally used for data collection by different healthcare professionals.¹⁸

Participants

A total of nine RPs (physiotherapist $n = 6$ and occupational therapist $n = 3$), who were mostly recruited from the distribution list of the Scottish Stroke Allied Health Professional Forum (ie, Chest Heart and Stroke Scotland (CHSS), <https://www.ssahpf.org.uk/>) participated in this study. The inclusion criteria were RPs who have experience working in stroke rehabilitation, can communicate in English, and can provide informed consent. Participants in this study did not receive any incentive for doing so.

Table 1
Specialty and years of experience as a rehabilitation professional

Participants	Specialty	Length of practice (years)	Years devoted to stroke/neuro-rehabilitation
1	Physiotherapy	38	Ns
2	Occupational therapist	20	17
3	Physiotherapist	4	1.5
4	Physiotherapist	23	5
5	Physiotherapist	33	15–20
6	Occupational therapist	22	21
7	Occupational therapist	32	29
8	Physiotherapist	23	20
9	Physiotherapist	28	23
	Average	24.7 ± 9.83	16.44 ± 9.19–17.06 ± 9.24

Ns = Not specified.

Ethical considerations

This study was approved by the author's institutional ethics committee (DEC/BioMed/2022/326). A participant information sheet that gave details of the study was given to all participants at least 48 hours and written informed consent was obtained before the commencement of the interview.

Data collection and analysis

Participants were provided with the option of either being interviewed via virtual means or in person. Those who opted for a face-to-face (in-person) interview were offered a 45-minute appointment at a mutually convenient time (which was within working days and hours) at the co-creation center for rehabilitation technology.²⁰ Participants who chose to be interviewed through virtual means (teleconferencing) had a meeting set up on a virtual meeting platform and were sent meeting invites.

The interviews were recorded, and the recordings were transcribed verbatim and anonymized by assigning numbers to each participant. All transcribed data were analyzed using thematic analysis, with an inductive approach where themes were determined through a comprehensive understanding and interpretive analysis of the participant's responses.²¹ The six-phase step-by-step guide recommended by Braun and Clarke²¹ was used to guide the analysis process.

The first author is a postgraduate researcher in Biomedical Engineering, the second author is an occupational therapist, and the last author is a research physiotherapist. The first author who carried out the conduct of the interview, transcription of the verbal data, familiarization with the data, generating of initial codes and theme search did so without in-depth experience in hospital stroke management. The themes were identified by grouping the related codes to extrapolate and interpret meaningful patterns in the codes that provide insights into the aim of the study. The verbal interview, as well as transcribed data and details of the coding and identified themes, were shared with the last authors, whose supervision led to the reviewing and defining of themes with no conflict noted. Knowledge and experience from the second author were essential in understanding the healthcare system.

Results

Results from RPs

Specialty and years of experience as an RP

All nine (9/9) participants in this study had practiced for an average of 24.7 ± 9.83 before the study. Except for Participant 3, with four (4) years of experience, all other participants have had a minimum of 20 years post-qualification experience as RPs and have devoted a minimum of 16.44 ± 9.19 working in stroke/neurorehabilitation (Table 1).

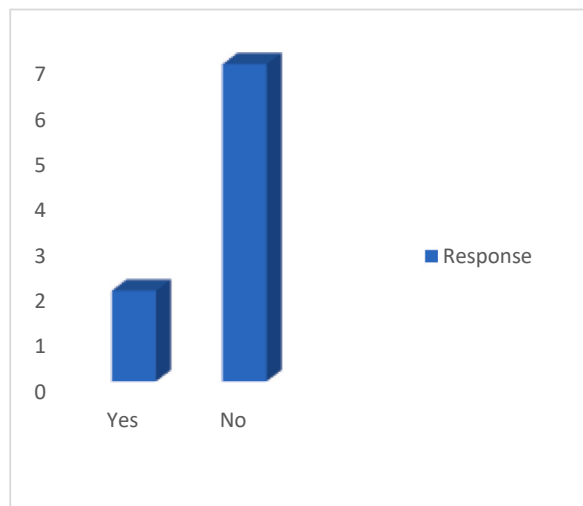


Fig. 1. Response on the availability of upper limb rehabilitation opportunities for persons with stroke.

Upper limb rehabilitation opportunities for people with stroke

In a bid to get the perspectives of RPs on the extent to which people living with stroke get upper limb rehabilitation, seven (7/9) of the RPs informed that the available opportunities for people living with stroke to receive upper limb rehabilitation were low (Fig. 1).

“I think sometimes they could benefit from more. It’s just that the priority sometimes is walking and getting up from the bed to the chair, and so no, I think there needs to be more done” RP6.

“I think the early part of the patient’s journey when there are in-patients they could do with more therapy sessions, its often neglected because the patients prioritize getting back on their feet ... I think as they move into the community, those opportunities for therapy lessen so they can get less intensive input and as the recovery period lengthen, you know as they progress to become

chronic stroke survivors, I think there are even less opportunity to practice and rehab” RP9.

“No ... In the early days after stroke if you are thinking of the goals with the patients mostly their goal is to get standing, get walking again so that they can get out of the hospital” RP5.

“ ... So I guess the answer is No. I think there is more that can be done, we need to look at doing things in different ways to increase the intensity with therapy sessions.” RP2.

Two (2/9) RPs, however, commented that there were adequate opportunities for people living with stroke to receive upper limb rehabilitation, although they gave reasons that did not differ from the seven who reported otherwise.

“I think there are opportunities. I think it can be difficult, it can be difficult. The focus quite often in hospitals and for patients in fact is to get walking ... Unfortunately, if you’ve got a therapy time it’s quite often focused around the lower limb or functional standing” RP8.

“Yeah ... So, depends on what patient’s priorities are because in acute settings in the hospital, they are obviously bed-bound and they mainly focus on being able to get up and walk and get to the toilet and go home basically that. So, they have the opportunity, but very often the rehab is more focused on walking because they want to go home like now” RP3.

The views gathered from all nine (9/9) of the RPs point to a low focus on upper limb rehabilitation for people living with stroke mostly in an inpatient setting.

Reasons for the low focus on upper limb rehabilitation for people with stroke

Five reasons were noted as responsible for the low focus on upper limb rehabilitation after stroke. These five reasons deduced from the participants were derived from two themes; during inpatient rehabilitation (which refers to the rehabilitation given to stroke survivors in hospitals and/or rehabilitation units before discharge) and rehabilitation that takes place after discharge from the hospital (Fig. 2).

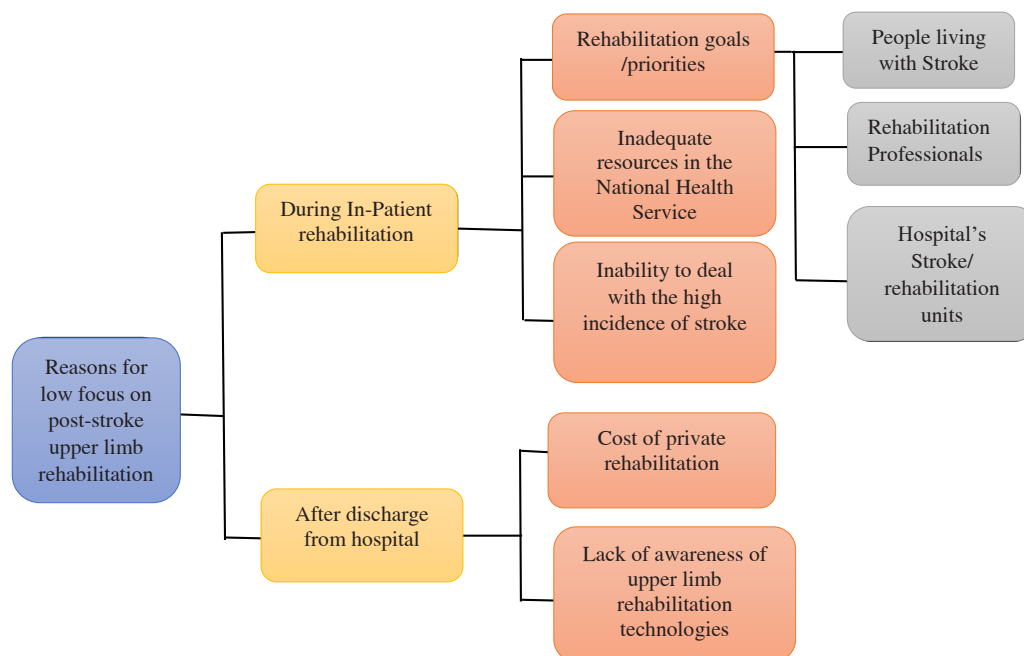


Fig. 2. Reasons responsible for the low focus on upper limb rehabilitation after stroke.

In parts of the UK, all inpatient care is delivered under the National Health Service (NHS) and is free at the point of delivery (though funded through taxation). During inpatient care in a hospital, people living with stroke receive the medical care/ intervention they require, as well as rehabilitation. Once medically well enough, individuals are referred to rehabilitation in the stroke unit or rehabilitation ward until they attain the minimal functional level necessary for discharge.

In some hospitals, the stroke units are integrated (equipped to provide hyperacute/acute and rehabilitation care), while in some others, the hyperacute/acute units are separate from the rehabilitation unit. In the latter, people living with stroke may receive hyperacute/acute care in one hospital and be transferred to a rehabilitation unit in a different hospital.

On discharge, people living with stroke may, where appropriate, be visited at home by community stroke teams (for a time-limited period) and they are also sometimes referred to local gyms at the end of their rehabilitation through active health schemes like the general practitioner exercise referral system.

During inpatient rehabilitation

Rehabilitation goals/priorities

Most participants (6/9) noted that rehabilitation goals/priorities are responsible for the low focus on upper limb rehabilitation after stroke (see above section on upper limb rehabilitation opportunities for people with stroke for some comments). It appears that the people living with stroke, the RPs as well as rehabilitation units (where these stroke survivors receive inpatient rehabilitation) all prioritize lower limb over upper limb rehabilitation.

According to the participants, people living with stroke often neglect upper limb rehabilitation in their goal-setting and the reason for this is.

It is often neglected because the patient's prioritize getting back on their feet because they know that that would be what gets them out of the hospital." RP9.

The RPs who responded in this study did not exclude themselves as they also admitted to having a role to play.

"... and I think as physios we are probably guilty of ignoring the upper limb maybe because if you are talking about the patient's goal, the patient's goal is to go home, they can get out of the hospital sometimes their focus can be more on the lower limb activities, walking" RP5.

"You have assessments and then you set up the goals which the patient is supposed to agree to certain goals. But I think given opportunity, they prefer to work on legs most of the time but yeah I would say there is sufficient opportunity but maybe not always as prioritized" RP3.

The hospital's stroke/rehabilitation units appear to also influence the goal-setting process.

"The focus quite often in hospitals and for patients, in fact, is to get walking ... because hospitals want them to get up and standing so they can get home and walk so there's that push being honest" RP8.

"Often in a busy ward, you can be pulled away on patients discharge... because people are keen to walk fast and if they can walk, they can go home" RP6.

In a bid to elucidate what could be the reason for the low priority given to upper limb rehabilitation in an inpatient setting a participant informed that.

"I think in the hospital so many things are done for them they don't see that importance of their hand initially because they don't have to go and make cups of tea or you know they get help to the toilets, they get help with things and then I see patients in hospitals and community and then longer time in spasticity clinic it's not until further down the line that they actually realize the importance of their arm. It seems very simple and easy, but I think that they just want to walk precisely" RP8.

One point that can easily be deduced from the three groups (people living with stroke, RPs, stroke/rehabilitation unit) as responsible for the lower priority on upper limb rehabilitation during goal setting resulting in a low focus on upper limb rehabilitation after stroke in an inpatient setting is the pursuit for early discharge which seemingly assigns more priority to lower limb rehabilitation.

Inability to deal with the high incidence of stroke

A lack of capacity to deal with the high incidence of stroke was also noted as a reason responsible for the low focus on upper limb rehabilitation after a stroke.

"No, because the NHS is breaking, it's absolutely breaking, and they are getting less and less and less input because the amount of stroke patients has gone up and up and up and it's going to continue to go up and also went up with COVID. We were struggling before COVID but now we are really struggling" RP7.

From the response above, the rehabilitation clinics appear to be faced with more stroke cases than they have the capacity for. It is equally possible that the increase in the cases of a stroke may also influence the quest for early discharge and thus the low focus given to upper limb rehabilitation.

This can be better understood from the response of a participant when asked why most of the RPs who took part in this study ascribe the sufficiency or not of upper limb rehabilitation to the rehabilitation priorities of stroke survivors even when the interview was conducted individually and independently,

"It's quite sad and I think when I graduated, we had more time so we were doing walking and standing then we would go back to do maybe hand stuff. You've got that choice " RP8.

The number of stroke cases could overburden the available facilities, especially where the hospital's stroke/rehabilitation units do not get inputs in terms of the resources needed to upscale to meet the number of cases.

Inadequate resources in the NHS

Inadequate resources within the NHS have also been noted as a reason that is responsible for the low focus on upper limb rehabilitation in inpatient settings.

"I think the problem is the lack of resources within the NHS, so I think we have to rely a lot more on self-management now because we can't provide the level of intensity of hands-on or one-to-one therapy as we know we should be because the National clinical guideline tells us at least 45 minutes, 5 days a week of each discipline but we can't provide that at the moment" RP2.

The inadequacy of resources seems to affect the intensity of rehabilitation delivered. There was no specific mention as to what resources are referred to whether financial, personnel, or material resources; however, the impact of the inadequacy of resources is that it affects the ability to provide the minimum required rehabilitation intensity for upper limb rehabilitation as recommended by the National Institute for Health and Care Excellence²² during inpatient rehabilitation.

This subsequently gets worse as people living with stroke get discharged.

“I think as they move into the community, those opportunities for therapy lessen so they can get less intensive input, and as the recovery period lengthens, you know as they progress to become chronic stroke survivors, I think there are even less opportunity to practice and rehab” RP9.

This situation leaves people living with stroke with the decision to rely on other options to get the needed upper limb rehabilitation after they are discharged from the hospital.

After discharge from hospital

Cost of privately securing the services of RPs

The cost of securing the services of RPs is an option people living with stroke would have to consider if they have to continue their rehabilitation program and improve their upper limb function and other areas impacted by stroke.

“Privately it’s probably governed more by how much they can afford and how much they can pay” RP1.

Lack of awareness of upper limb rehabilitation technologies to support self-rehabilitation

Besides securing the services of RPs, the use of appropriate upper limb rehabilitation technologies to support self-management would be vital in regaining functions. However, people living with stroke may not be aware of the rehabilitation equipment that could be useful in enhancing their rehabilitation.

“From what I have seen, when I pick up patients, they’ve not had that input from the NHS and a lot of them aren’t aware of equipment/ technologies that they could potentially buy to help them with their Rehab.” RP 4.

A lot of equipment/technologies have been designed that persons with stroke can interact with to possibly improve upper limb recovery. These will need to be introduced to them as most of them may not be aware of these technologies at the time of stroke or even during in-patient rehabilitation. Lack of awareness of these technologies may however affect the opportunity of exercising the upper limb.

Reasons that may affect encouraging stroke survivors to make use of rehabilitation technologies/equipment

When participants were asked if they had encouraged people living with stroke to make use of any equipment/technology that focuses on upper limb rehabilitation, eight (8/9) of the participants noted that they had.

“So, encouraging them often promotes the use of electric muscle stimulators, mirror box therapy, and sometimes some additional technologies ... We are encouraging people to buy their own muscle stimulators and mirror boxes” RP9.

“Yes ... but they have to buy that themselves” RP5.

“Yes, absolutely” RP7.

“I have encouraged them to use things like the mirror box, and the thing they will find around the house maybe cutleries or bottles or whatever” RP1.

One, however, was not exact as to whether they have encouraged the use of any rehabilitation devices.

“Well, not a specific rehabilitation equipment because we use everything as an opportunity for rehab. So definitely, our glasses are rehabilitation equipment” RP3.

In addition to noting their position, the RPs added that they also tend to encourage people living with stroke to make use of the everyday things/equipment they find around (see comments from RP3 and RP1 above and others below).

“What I am asking people to do isn’t specifically technology so say for example maybe tasks that are to encourage movements for example tasks like flapping cards, and flapping pages of magazines, so would be simple activities I could give to someone to work on specific movements” RP2.

“I just use everyday items in the kitchen we go through them” RP4.

Furthermore, RPs went on to express concerns and reservations on why it is difficult for them to promote the use of rehabilitation equipment/devices to people living with stroke. These reservations were grouped into themes such as cost (cost of some of this equipment), inadequate evidence, and design (Fig. 3).

Cost of rehabilitation technology

The cost of these devices/ equipment may bring about drawbacks to why RPs will recommend or even use them in rehabilitating stroke survivors.

“I know there’s like the Gripable and the SAEBO, well we’ve not used any of them with patients I think some have self-practiced with them. I suppose things like that there is a cost, so we generally don’t use those because we won’t get funding” RP8.

“We had one patient that used the SAEBO, so they bought that privately. That was a long time ago. In fact, I think we’ve had two recently ... I mean these patients had funds and wanted to try everything” RP6.

“I had two or three patients who have bought the GripAble and used that at home independently ... A lot of it is just everyday equipment around the house as well as those expensive things” RP4.

The cost of rehabilitation devices could determine their availability to people living with stroke as only those who can afford them purchase and use them.

Inadequate evidence

Besides the cost, the effectiveness of the technologies/equipment in bringing about the improvement of upper limb function could be a reason that will dissuade RPs from promoting their usage. Insufficient or low-quality evidence to support the efficacy of any device may make it difficult for RPs to recommend such to people living with stroke especially when the device equally comes at a cost. This was expressed by some of the respondents.

“I think ethically as a physio it’s very difficult when there is not a lot of evidence for its use. I think that it’s difficult for us to say

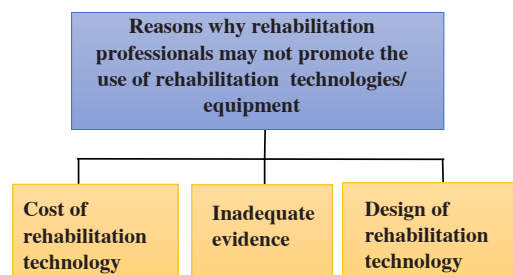


Fig. 3. Blocks showing reasons that may affect encouraging stroke survivors to make use of rehabilitation devices.

you need to go and spend £100 to buy an electrical stimulator.” RP5.

“Like I occasionally use Lycra, Lycra gloves, and Lycra sleeves for tone management ... They can function quite well, you know... Not a lot of evidence about Lycra but clinically, we find it does work maybe with a small amount of people” RP8.

Design of rehabilitation technology

The design of rehabilitation technology plays a role in determining the users of such technologies. Even when some of the upper limb rehabilitation technologies have the potential for effectiveness, they may be designed in such a way that restricts accessibility for some of those who will need them.

“Some of the companies making some assistive gloves, but I have found those gloves to be really tricky for patients to put on and they are not great if you’ve got any spasticity or loss of active range of movement” RP9.

“... I mean maybe these devices are more suited for people that have mild to moderate impairment” RP6

“I think sometimes the issue with some of the equipment or some of the technology that is out there is that there is more of a focus on flexion and grip than there is on extension so I think that’s probably a challenge” RP2.

The choice of rehabilitation technologies for upper limb rehabilitation should be determined based on the type and level of impairment as it may be difficult to get a single device that will be equally beneficial for the functional recovery of all upper limb impairments after a stroke. For instance, it may become difficult to encourage people living with stroke who have spasticity to make use of technologies that will improve grip strength or to encourage those whose level of a particular impairment is severe to make use of technologies designed for those with mild or moderate levels of the same impairment. Where the design of rehabilitation technologies does not consider the degree of impairment or type of impairment of a particular person with a stroke, it may be difficult for RPs to promote such equipment to the person.

Discussion

The outcome of this study reveals there is a low focus on upper limb rehabilitation, particularly during the early days after a stroke. These findings are from the views of RPs who have had many years of experience working with people living with stroke. The approach of getting the perspectives of RPs in understanding the current rehabilitation practices as well as seeking ways of improving the rehabilitation of people living with stroke has been employed by different studies in the past.^{23,24}

Our finding agrees with the reports from an earlier study on the views of people living with stroke¹⁵ and also with another study that emphasized that the present provision of upper limb rehabilitation is less than what can be described as effective.²⁵

This study also provided reasons for the low focus on upper limb rehabilitation, which in an inpatient setting included, firstly, the rehabilitation goal (of people living with stroke, RPs, or the hospital’s stroke/rehabilitation units).

Setting rehabilitation goals is an important practice intended to motivate people living with stroke and bring about improved participation as well as ensure the required rehabilitation is delivered.²⁶ The process of goal setting is to ensure teamwork, and this involves both people living with stroke and RPs²⁶; however, conflicts may exist during the process of goal setting, which could be a result of differences in standpoints of either the people living with stroke, RPs

or at the organizational level (management of the hospital’s stroke/rehabilitation unit where the people living with stroke receive inpatient rehabilitation).^{27,28} For instance, when people living with stroke do not find the goals meaningful, their level of motivation, participation, and adherence becomes affected.²⁸⁻³⁰

Besides the rehabilitation goals, the inability of the RPs to effectively deal with the increase in stroke prevalence/incidence, and the inadequate resources in the NHS were other reasons for the low focus on upper limb rehabilitation in inpatient settings. Researchers have reported that about 17 million people in the world suffer from stroke each year.³¹ Specifically, in the UK, the occurrence of stroke each year is reported as over 113,000³² and this number is projected to increase by 60% between 2015 and 2035³³ this is likely to cause a rapid increase in the cost of stroke in the UK in the next two decades.³³ Besides the increase in cost, a major factor to consider in providing rehabilitation is the number of persons who are equipped to provide such rehabilitation services, as available evidence shows that rehabilitation services provided by RPs fall short of the demand for rehabilitation.³⁴ For instance, the World Federation of Occupational Therapists stipulates that for every one million population, there should be a minimum of 750 occupational therapists; however, the WHO reports that the number of registered occupational therapists is far below the specified minimum in countries which are regarded as high-income countries with an even worse number in low-income countries which suggests the inadequacy of human resources to meet the growing demand for rehabilitation.³⁵

One point that has been expressed in this study is that the rehabilitation goals during inpatient rehabilitation are targeted toward the recovery of lower limb function, and this agrees with a previous study that investigated the views of people living with stroke concerning their priorities for life after stroke in which out of the 589 participants, the majority (290 [49%]) of the prioritized walking and balance followed by poststroke fatigue (173 [29%]).³⁶ Also, another study reported that the rehabilitation priority of people living with stroke during inpatient rehabilitation is centered on regaining the lower limb function and only seems to change to upper limb recovery after discharge from the hospital.¹⁵ The reason for prioritizing the lower limb rehabilitation was expressed as based on the belief that lower limb recovery will facilitate their early discharge from the hospital, and it can also be understood that the rehabilitation of the lower limb and balance will likely be beneficial in avoiding accidents that may arise as a result of a fall.³⁶

The limitation of this study was the inability to get the views of all the RPs on details of how rehabilitation goals are decided as well as the criteria for the discharge of people living with stroke from the hospital. Although an RP had noted that “you have assessments and then you set up the goals which the patient is supposed to agree to certain goals” RP3.

Even after discharge from the hospital, the cost of privately engaging the services of an RP can lead to a decrease in access to rehabilitation for persons who cannot afford it and thus, consequently, result in a low motivation for upper limb rehabilitation this concern has been expressed in a study which investigated the barriers to care in outpatient rehabilitation and reported the cost of securing the services of RPs as a barrier to care.³⁷ Besides the cost of privately engaging RPs, poor knowledge of upper limb rehabilitation technologies that could be used for self-rehabilitation was noted to be part of the reasons for the low focus on upper limb rehabilitation. The importance of self-management has been emphasized for people living with stroke who believe they could have the ability to engage in certain activities or with certain rehabilitation equipment/ technologies. The National clinical guidelines for stroke in the UK stipulate that “People with stroke should be offered self-management support based on self-efficacy, aimed at the knowledge and skills needed to manage life after stroke, with particular attention given to this at reviews and transfers of care.”³⁸ For instance, home-

based upper limb interventions such as electrical stimulators have been shown to have a better impact on upper limb functional post-stroke recovery compared to conventional therapy (Standardized mean difference (SMD): 0.28, $p < 0.001$)¹⁶ however, barriers may arise when people living with stroke do not know of the existence or even the type of technologies they could use.³⁹ To help overcome this barrier, RPs have some role to play in educating people living with stroke and their caregivers about rehabilitation equipment/technologies that can be beneficial to them even before they are discharged from the rehabilitation clinic.

It appears, however, that certain factors may affect the level of willingness of RPs to recommend these equipment/ technologies, these include the high cost of some of the technologies. According to an earlier report, robotic devices and exoskeletons that can be used at home for hand rehabilitation attract high costs.⁹ Other reasons deduced are the level of evidence that supports the effectiveness of these technologies in improving hand function as well as the design of these technologies, which may limit their application in some impairments for instance, it has been reported that the current level of evidence available does not support the introduction of some of the robotic technologies into clinical practice which means that high-quality evidence is still required to support its effectiveness in upper limb rehabilitation.⁴⁰ These factors that affect the RPs' willingness to recommend rehabilitation equipment may perhaps also contribute to the poor knowledge of the availability of these equipment.

Conclusions

There is a low focus on upper limb rehabilitation after a stroke, particularly during the early stages. This has been associated with the pursuit of early discharge, which appears to attach higher priority to lower limb rehabilitation during goal setting. In addition to the inadequate resources and a lack of capacity to deal with the high incidence of stroke.

Also, people living with stroke are not aware of the relevant upper limb technologies that can support their self-rehabilitation before they are discharged from in-patient rehabilitation.

It is therefore recommended that health organizations as well as RPs set minimum requirements for the discharge of persons with stroke, which should consider each aspect of their impairments (especially aspects where recovery may be affected by time) and identify meaningful goals in each of these aspects.

Also, people living with stroke and their caregivers should be educated on the relevant self-rehabilitation approaches and technologies that may be beneficial in helping them recover hand function before they are discharged from in-patient rehabilitation.

Further studies involving more RPs are needed to substantiate these findings and clarify the conditions for the discharge of stroke survivors from inpatient rehabilitation.

Declaration of Competing Interest

None declared.

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