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## RESEARCH ARTICLE

# Adapting stroke rehabilitation during the COVID-19 pandemic: Exploring the experiences of patients and families of an Early Supported Discharge telerehabilitation programme

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## ABSTRACT

**Purpose:** To describe stroke survivors and carer's experiences of an Early Supported Discharge programme delivered via telerehabilitation during the COVID-19 pandemic.

**Methods:** Purposive sampling was conducted to recruit stroke survivors and carers who participated in telerehabilitation programme with a regional Early Supported Discharge team. Semi-structured interviews were conducted online. Interviews were transcribed and coded. Qualitative thematic analysis was conducted.

**Results:** Eleven people were recruited including individual stroke survivors (n=4), carers (n=1) and family dyads (n=3). Four major themes were identified: (1) Channels of communication and enabling relationships (2) The importance of the daily rehabilitation routine, (3) Hands-off training and technology, (4) Virtual and non-tactile reality. Open channels of telecommunication were central to ensuring continuity of care and imparting information and education.

**Conclusion:** Despite the implications of the COVID-19 pandemic, most participants described positive experiences of 'virtual and non-tactile' video enabled rehabilitation. Telerehabilitation enabled stroke survivors and therapists to build relationships which fostered engagement and supported rehabilitation. Further work is required to examine upscaling telerehabilitation use beyond the pandemic and to better understand key factors that influence patient selection for telerehabilitation.

**Keywords:** COVID-19, stroke, early supported discharge, telerehabilitation, ehealth, virtual

## Introduction

The ongoing COVID-19 pandemic placed significant strain on healthcare systems around the world and forced healthcare professionals to adapt service delivery. As with most countries, Ireland experienced intermittent national lockdowns in 2020 and 2021 as a national response to the pandemic. Telemedicine has therefore played a central role in supporting remote assessment and management of acute and chronic medical conditions, as the most vulnerable in society self-isolated to prevent nosocomial infection. An example of how a stroke service adapted to the realities of the pandemic is described from the perspective of service users.

Strokes continued to occur at the same rate during the COVID-19 pandemic while acute stroke presentations declined in the initial first wave<sup>1,2</sup>. According to the European Stroke Organisation, fear of COVID-19 led patients to forgo attending hospital and there was the assumption that hospitals were overburdened treating patients with COVID-19. Rehabilitation services were also highly disrupted due to staff redeployment and cessation of service and the full extent of this remains unknown<sup>4</sup>. The Stroke Early Supported Discharge teams, like many other home-based therapies, were restricted given the public health measures. However, some changes in the provision of rehabilitation during the pandemic have demonstrated positive changes which have the potential to expand the equity of access and reach of rehabilitation<sup>5</sup>.

Early Supported Discharge is established as international best practice for those with mild

to moderate disability post stroke<sup>6</sup>. It is a cost-effective multidisciplinary programme which facilitates earlier discharge from hospital and the provision of intensive stroke specialist rehabilitation in the patient's home<sup>7</sup>. In Ireland, on average 5% of stroke survivors discharged from hospital to home avail of Early Supported Discharge<sup>8</sup>. Implementation of Early Supported Discharge is a fundamental aspect of the National Stroke Programme model of care<sup>8</sup>. To enable this predominantly home-based service to continue during the immediate wave of the pandemic, the Early Supported Discharge team reconfigured and adapted their service to go online, providing telerehabilitation.

Telerehabilitation is the delivery of rehabilitation services via communication technologies<sup>9</sup>. During COVID-19, protecting rehabilitation for stroke survivors including Early Supported Discharge was advocated for, by a joint collaboration between national stroke programmes in the United Kingdom and Ireland<sup>10</sup>. In the context of the public health guidance, telerehabilitation became one of the few viable options to maintain rehabilitation. The risks associated with not providing rehabilitation would intensify the burden on families or other services if patients were untreated. To date, the literature on stroke Early Supported Discharge telerehabilitation is limited and most studies describe the outcomes from a quantitative perspective at three months post stroke<sup>11,12,13</sup>. For the Early Supported Discharge programme described in this study the transition to telerehabilitation was sudden. Exploring the patient and immediate family

members' perceptions of telerehabilitation helps evaluate the effectiveness of this modality and guide future use of telerehabilitation programmes.

The aim of this study was to describe stroke survivors and an immediate family member's experience of participating in an Early Supported Discharge telerehabilitation programme during the COVID-19 pandemic.

## Methods

### Design and Setting

#### Recruitment

A mixed methods study was designed to evaluate the Early Supported Discharge telerehabilitation programme. This paper describes the qualitative phase of this study; this was a cross-sectional study using purposive sampling that recruited stroke survivors who engaged in telerehabilitation with a regional Early Supported Discharge team based in Ireland between March and July 2020. The results of this survey are reported elsewhere<sup>14</sup>. Participants who completed the survey had a choice to opt in to participate in a semi-structured interview. Participants granted permission to the research team to contact them by completing an expression of interest form at the end of the electronic anonymous survey. Inclusion criteria include being (1) able to speak English (2) aged greater than 18 years of age and (3) participating in a minimum three stroke Early Supported Discharge telerehabilitation programme sessions. Following the opt in, the research team provided patients and one family member with an information leaflet and

a consent form to complete. This information was provided by post or email, based on the communication preference, indicated by stroke survivors and their usual communication mode with the team.

#### ESD Telerehabilitation Programme

This paper describes the programme delivered by one Early Supported Discharge team covering a large geographic area in the south of Ireland, which draws referrals from two university hospitals. The Early Supported Discharge team consists of a physiotherapist (1.0 Whole Time Equivalent), occupational therapist (1.0 Whole Time Equivalent), and speech and language therapist (0.5 Whole Time Equivalent). During the first wave of COVID-19, the Early Support Discharge team reorganised their service which was largely influenced by regional, sociodemographic and clinical factors such as access to broadband, digital literacy, access to technology or technological support. The team adapted the programme to provide telerehabilitation through synchronous video calling, alongside the minimum number of face-to-face sessions deemed essential based on clinical judgement and stroke survivor needs. Video calls were completed via online secure platform. Sessions lasted on average 45 minutes to one hour and participants were provided with Early Supported Discharge from one to eight weeks post discharge.

#### Ethical Consideration

Ethical approval was granted by the University Research Ethics Committee (Reference ECM 4 (e)).

### Data collection

Semi-structured interviews were conducted by two members of the research team who were not involved in the delivery of the programme. Interviews were led by a topic guide constructed by the research team. Open ended, non-leading prompts were used where necessary. Although the order and probes varied between participants, all topics were consistently covered with each participant. The researchers expanded on what the participant had previously mentioned, to allow for the generation of organic transcripts<sup>15</sup>. The interviews were recorded on a password encrypted Mp3

recorder. Following each interview, the Mp3 files were transferred to a secure password protected database for transcription.

### Data Analysis

Qualitative data analysis was prepared using Braun and Clarke's framework (See Table 1)<sup>16</sup>. Three authors participated in the data analysis which involved five, two-hour meetings using the six stage-analysis framework. This framework was selected as it promotes more credible findings as the researcher is less focused on the paradigm and enables the researcher to produce findings which are closer to the participants experience<sup>17</sup>.

Table 1. Data Analysis process

6-stage analysis	Method
1. Familiarization with the data	All open-ended responses were listened to during transcription and repeatedly re-read initially by the team to get a sense of the content, depth and breadth of the data and initial impressions.
2. Generating initial codes.	Each piece of data phrases, sentences or paragraphs relating to the research question were extracted and given a code. Codes were colour coded using coloured text and similar colours displayed and organised. Electronically using Microsoft word documents. Codes were then refined and verified by the team.
3. Searching for themes.	Similar codes were organised using colour and grouped. Broad overarching themes were then identified. Visual representation enabled the team to verify the relationship of the codes within each of the themes.
4. Reviewing of the themes.	Themes were then reviewed, revised, and refined by the team, whilst checking to ensure that all relevant data were captured within the themes.
5. Defining & naming themes.	Each theme was labelled or identified by a statement that captured a distinct aspect of telerehabilitation as described by participants. Anonymised themes, codes and transcripts were reviewed by authors not directly involved in the participant interviews ensuring credibility. Any differences were discussed, and final themes were confirmed with all authors reaching consensus.
6. Producing the report.	The final analysis that provided a detailed account of each theme was prepared.

### Qualitative rigor

Measures to ensure trustworthiness during the analysis process entailed memos by the researchers (IH, MG, AB) as they immersed themselves in the data by listening to the audio files and engaged in repeated reading of the transcripts. Confirmability and dependability emerged as the researchers undertook a process of qualitative scrutiny, constant comparison, and mapping of data (i.e., participants' statements or comments) (IH, MG, AB). The researchers' field notes informed discussions on grouping codes. The codes were continuously compared in order to identify similarities and differences leading to the creation of subthemes. The period of analysis occurred close to the time of interviews while the researchers were active and engaged in the process. AB and LoR were tasked with ensuring credibility through peer reviewing the transcripts, AB and LoR were not directly involved in the interviews. Any differences which emerged were discussed and a consensus was reached.

Participant demographics, topic guide and samples of participant quotes to support codes and themes helped to ensure that the findings were dependable and transferable<sup>18,19</sup>. A detailed description and paper trail followed the research process at all stages, this promoted confirmability and dependability in the findings.

### Results

A total of fourteen participants returned expression of interest to take part in an interview to explore, further, their experience of telerehabilitation. Eight interviews were

conducted with eleven participants. The interviews involved four stroke survivors, three dyads in which an immediate family member joined them at interview, and one individual family member. Demographics of the stroke survivors are presented in Table 2 below. The mean age and standard deviation ( $\pm$ SD) of stroke survivors was 58.4 ( $\pm$ 17.7). The majority of stroke survivors were male (n=5) with a history of an ischaemic infarct in their left hemisphere (n=6). As part of Early Supported Discharge seven participants required occupational therapy, six physiotherapy and six speech and language therapy respectively. All stroke survivors were living with a family member.

Table 2: Sample characteristics and intervention received.

Nature of Interview	Pseudonym	Age of Stroke Survivor	Type of Stroke	Therapy Received*	Mode of Therapy Delivery
Dyad	Rachel (SS) & Shane (son)	64	Left ischemic	PT & OT	Telerehabilitation
Dyad	Philip (SS) & Gene (spouse)	67	Left ischemic	PT & OT & SLT	Telerehabilitation & face-to-face
Dyad	Mary (SS) & Evan (son)	73	Right ischemic	PT & OT & SLT	Telerehabilitation & face-to-face
Individual	Barry (SS)	25	Left ischemic	OT & SLT	Telerehabilitation
Individual	Dylan (SS)	42	Left haemorrhagic	PT & OT & SLT	Telerehabilitation & face-to-face
Individual	Eileen (SS)	66	Left ischemic	OT & SLT	Telerehabilitation & face-to-face
Individual	Patrick (SS)	71	Left ischemic	PT & OT	Telerehabilitation
Individual	Walter (son)	84	Left ischemic	PT & SLT	Telerehabilitation

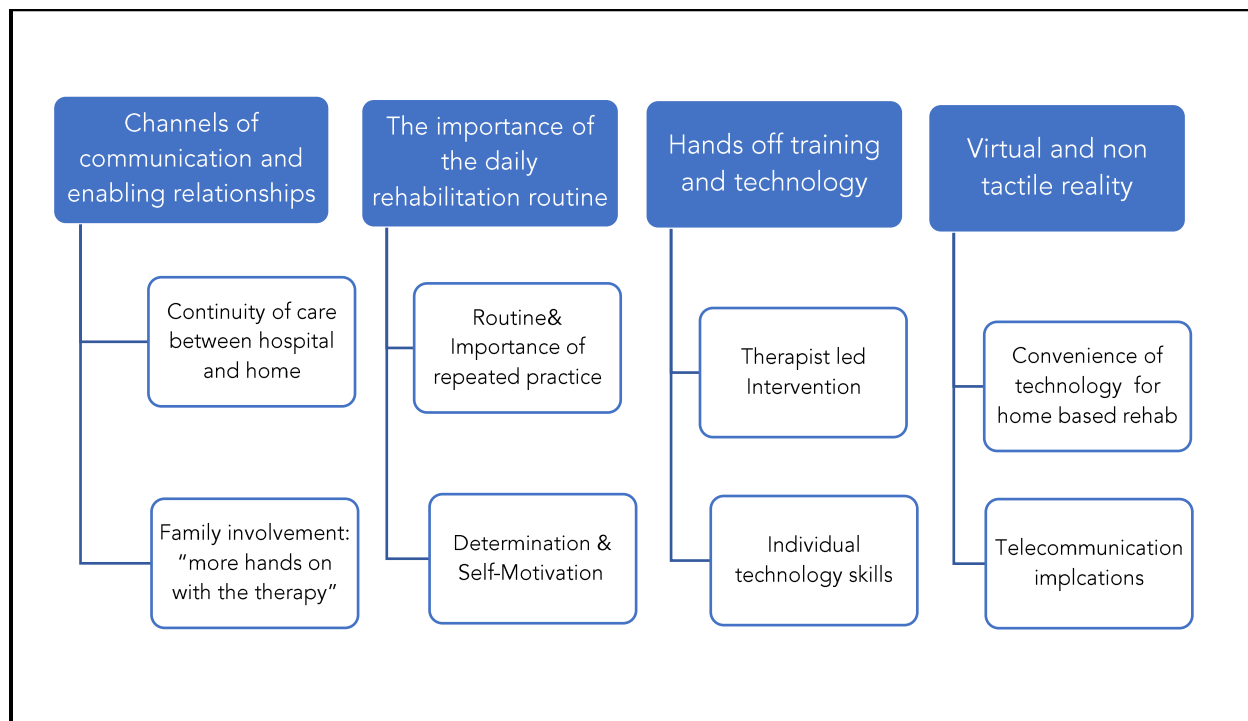
SS-Stroke Survivor  
\*Physiotherapy = PT; Occupational Therapy = OT; Speech and Language Therapy = SLT

Four major themes were identified: (1) Channels of communication and enabling relationships (2) The importance of the daily rehabilitation routine, (3) Hands-off training and technology, and (4) Virtual and non-tactile reality. Themes are further broken down into subthemes and presented in Figure 1 below. Theoretical saturation was reached at the seventh interview. It was evident that the data gathered allowed enough information to

understand the phenomenon under study comprehensively. An eighth interview was conducted which did not add any new insights. Table 2 provides an overview of participants and diverse perspectives and experiences which adds to the richness of the data for this uncomplicated topic.



Figure 1: Overview of themes and subthemes



### Theme 1. Channels of communication and enabling relationships

#### *Continuity of care between hospital and home*

The continuity of care from hospital to home was challenged due to visitor restrictions: "It was very hard not to see my family, one day my husband came and left some food at the reception and just had to go back home" Rachel (stroke survivor). *Family members were: "Relying on the patient to pass on the information to their families"* Gene (spouse). Naturally, families were concerned about the impact of the stroke on their loved one: "we've never got a briefing on how serious his stroke was" Walter (son).

Early telecommunication with the Early Supported Discharge team supported a

seamless transition home and eased concerns regarding discharge. "It was just like sitting in the office...and talking to them face to face" Eileen (stroke survivor). Participants knew they would be speaking with the therapist in a few days: "Everyone gave me their numbers...to contact them...so I didn't feel like I was going to be alone" Barry (stroke survivor)

The open channel of communication between the Early Supported Discharge team and stroke survivors was reassuring along with appreciation of the therapists' knowledge: "They really cared about you, they're damn good at their jobs, cared enough to look after you and help with physical recovery through the iPad," Dylan (stroke survivor). Participants were encouraged by the responsiveness of the therapy programme at home albeit telerehabilitation: "We were impressed that

she (stroke survivor) was home on Friday and physio started on Monday" Evan (son).

**Family involvement: "more hands on with the therapy"**

The impact of COVID-19 was felt by both stroke survivors and family: The separation was felt differently by both the stroke survivor and the family member: *"In a normal environment, the family would be in and around the ward"* Philip (stroke survivor). "I did not see any family for three weeks, I was emotional enough, when I came home it took a while to adjust" Patrick (stroke survivor). Opportunity for a window visits or social distant visits were not possible: *'He was on the third floor there was no access, seven weeks without seeing any family"* Gene (spouse). COVID-19 seemed to confound the situation further for stroke survivors: *"the fact that COVID-19 was happening simultaneously with my own stroke, and the tools weren't in place to be able to communicate properly with people, in a normal environment, the family would be in and around the ward"* Philip (stroke survivor).

The opportunity for a family member to be able to attend telerehabilitation sessions was very meaningful. It enabled the family members, in many cases, for the first time to become directly involved in the rehabilitation process. *"The second person involved can pick up information during the course of an online session"* Shane (son). There was an added benefit to the therapists as it was often necessary to have a family member present to support the functional, task based activities or move the camera angle during telerehabilitation

sessions: *"It was very much a two-person thing when I was doing the sessions, they would both ask me to move around the kitchen.....ask me to take stuff out of presses"* Philip (stroke survivor)

**Theme 2. The importance of the daily rehabilitation routine**

**Routine and importance of repeated practice**

Rehabilitation involves repetitive task-specific practice along with a systematic plan. This evidence-based practice was still implemented through virtual means. Participants had to be organised and ready to get the most out of the virtual therapy session. Participants described the telerehabilitation *"like being back in college or school, just like a routine"*, Barry (stroke survivor). It involved preparation: *"you make sure you've the right pair of shoes on you, things like that and you just follow the instructions"* Patrick (stroke survivor). Participants felt the benefits of repeated practice *"as we went through all of the weeks it became second nature"* Philip (stroke survivor). Despite being delivered through virtual means, participants outlined how they were able to carry tasks over to everyday activities of daily living to support their recovery: *"Every day, I found that I needed to speak to as much as possible and to as many people as I could for as long as possible, sort of sped up the improvement"* Barry (stroke survivor). Furthermore, repetitive practice provided structure for eight weeks five days a week: *"One thing that really worked for me was when they were scheduling the times, I*



had (OT) every single day at 9 or 10 and it brought an element of structure into my post stroke rehab" Barry (stroke survivor).

### Determination and self-motivation

Personal attributes and motivational strategies enhanced participants' adherence to rehabilitation and improved outcomes. This was evident from various stories participants shared: "After I got the exercises, I am making improvements, through the physio exercises every day, I'm feeling better than before. I hope I will be...get better like before" Rachel (stroke survivor). Determination was described by family members as important for the individual: "He was quite determined to get back.... instructions were made clear and encouraging, she (occupational therapist) had a way with words that made the inevitable possible...you could see big improvements in him" Walter (son). Similarly, some therapists were described as very strict and precise, this fostered participants' compliance with exercises and determination. Also, the improvements witnessed by family members and stroke survivors were encouraging "The hand will come in time because she is working at it, she (the physiotherapist) is motivating Dad every time she speaks with him" Shane (son). Intrinsic to participant's determination and self-motivation was goal setting. The process of goal setting positively influenced participants' perceptions of self-care ability and engagement in rehabilitation: "I was painting yesterday, cut the garden, that was my goal you know, the garden. I just wanted to get back that way, and I've got back with determination." Patrick (stroke survivor).

### Theme 3. Hands off training and technology

#### Therapist led intervention

Unbeknownst to themselves, participants were developing new skills as they engaged in 'hands-off training' with the Early Supported Discharge team. This process, learning to use technology, supported by therapists, fostered active learning skills and problem-solving abilities for all participants. The therapists were described by participants as very understanding, which aided the process, "They would send me text messages, this is how you do it, we would also talk it through on the phone...yeah I'm pushing such and such a thing, yes I am opening your email, yes I'm clicking this link...they know what they are talking about." Dylan (stroke survivor).

Participants described therapist confidence and creativity with technology that enabled their engagement with rehabilitation. "They were really good at using what they had, for example when I had problems with the stuff... (OT) would literally just write on the screen as she was doing it. She was very good at using what she had at her disposal." Barry (stroke survivor). Therapists overcame challenges and were innovative in conducting task specific training through virtual means, which permitted participants engagement, and facilitated recovery. One participant described it as "they would both ask me to move around the kitchen.....ask me to take stuff out of presses.....or carry a glass of water over to the worktop and pour it.....we were on the move quite a lot of the time." Philip (stroke survivor).

### Individual technology skills

Participants reported that they had limited technological skills, participants' accounts described their abilities *"I wouldn't consider myself to be computer savvy in terms compared to young people"* Eileen (stroke survivor) and *"I wouldn't be computer savvy...but not a complete dumbo either"* Philip (stroke survivor). The average participant would have only used the internet to send an email or check an online website for the national news or local deaths. Most participants reported that they would need support from a family member *"I did find that hard, I am not technically minded, I had to have (son) with me"* Mary (stroke survivor) and *"It was my son and his partner...she used to set it up and everything"* Eileen (stroke survivor).

Given the global pandemic and the public health restrictions that ensued, it was not possible to attend the hospital for rehabilitation and one participant described it as ironic and frustrating as they had lost arm function yet had to learn a new skill of mastering technology to regain use of their arm *"someone who was trying to regain old skills first had to first discover a new skill...I thought that was rather foolish...asking a great deal"* Evan (family). Challenges described related to the device as well as instructions provided by the therapist, *"It's a mirror image so when they are asking me to raise your right shoulder a bit you know on the iPad it's a little bit different to me, sometimes it ended up in a little bit of confusion."* Patrick (stroke survivor). It was not very practical to *"hold a phone steady for 20 minutes"* Gene (spouse). Some participants invested in a

tripod to overcome this and others used an iPad.

### Theme 4. Virtual and non-tactile reality

#### Convenience of technology for home-based rehab

The impact of using augmented reality was described by most participants. The opportunity to avail of telerehabilitation was described as convenient yet a compromise during a global pandemic. Stroke survivors said, *"Just sit down at the kitchen table switch on and there you go"* Eileen (stroke survivor) and *"I understand you are trying to make the best of a bad situation"* Dylan (stroke survivor).

It enabled participants to return home early however it did not seem to surpass the preferred option of *"one-to-one real-life interaction"* Philip. Nevertheless, other benefits described were that participants were *"doing it in your own surroundings"* and *"in your tracksuit at home"*, Patrick (stroke survivor). All participants had witnessed the impact of COVID 19 on family or friends and were nervous about this yet comforted that they did not have to attend the hospital *"At least you don't have to go out, I'm not bringing her (mum) out"* Evan (son) *"and I'm not going out either, I wouldn't like to get buses"* Mary (stroke survivor). COVID-19 restrictions and post stroke limitations were felt by participants as described *"In terms of COVID, we take reasonable precautions, but life has to go on"*- Gene (spouse) and *"sitting on the couch in the house all day is not a life"* Evan.

### Telecommunication implications

Telecommunication challenges occurred for some participants, which were related to broadband and Wi-Fi connectivity. Some participants were not bothered by this in the scheme of things as described by one participant *"it was all surmountable"* Philip (stroke survivor) and *"we talked through it over the phone"* Dylan (stroke survivor). However, others voiced that without a good telecommunication, telerehabilitation was not feasible *"none of this therapy would have been possible without good broadband"* Walter (Son) and *"Once it's set up its fine, because it's literally back and forth between the therapist, but for someone who didn't have someone there to set it up it could be very difficult"* Barry (stroke survivor).

Issues related to possible cyber security did not seem to feature as a concern amongst participants; the risk associated with COVID-19, if attending for appointments in hospital or still in hospital, were of greater concern. Stroke survivors commented that *"they were very good about, letting me know exactly who was in the room...it felt secure"* Barry (stroke survivor) and *"not very concerned about security.....I would say I'm too laid back about those things"* Barry (stroke survivor).

### Discussion

To our knowledge, this is the first study exploring the experience of telerehabilitation as part of an Early Supported Discharge programme from a patient and family member perspective and during the first wave of the pandemic. Findings provide insight into a variety of significant issues in terms of stroke

survivor's rehabilitation due to the COVID-19 pandemic and how the Early Supported Discharge telerehabilitation programme provided them with the support and structure to continue their recovery. These findings are also relevant for the delivery of both stroke and indeed non-stroke telerehabilitation beyond the pandemic.

Transitioning from hospital to home is stressful for patients and carers, more specifically with a newly acquired disability following a stroke<sup>20</sup>. While the arrival of the COVID-19 pandemic significantly affected traditional discharge processes, telerehabilitation was described as an adequate means of supporting the discharge process. The timely commencement and routine of telerehabilitation were also positively commented on by the respondents. Early initiation of therapy upon discharge is an essential evidence-based component of the ESD programme, and the study found that telerehabilitation allowed for this to be achieved. Additionally, telerehabilitation allowed for stroke survivors to contribute to individualized goal-setting and be more engaged in rehabilitation, which is an important aspect of stroke rehabilitation. A successful telerehabilitation programme correlates with a mutually trusting relationship between the patient and therapist<sup>21</sup>. This was echoed by participants who discussed the importance of having communication with a supportive clinical contact as they transitioned home. Similarly, while epidemic public health measures meant that family members were not allowed to visit participants prior to discharge home, telerehabilitation provided them with the opportunity to be involved in

the rehabilitation and recovery process. Family members could also be provided with support and education which has been shown to be effective in supporting successful discharge and imperative to recovery<sup>12,22</sup>. Overall, the Early Supported Discharge telerehabilitation programme was perceived positively in relation to the discharge process during the pandemic by stroke survivors and family members.

Respondent's comments on the timely commencement and routine of telerehabilitation were generally very positive. The early initiation of therapy upon discharge which patients narrated is an essential evidence-based component of the Early Supported Discharge programme<sup>7</sup>. Many rehabilitation routines were disrupted due to public health measures. This left many patients without rehabilitation in the community, which was particularly stressful for family members<sup>4</sup>. Caregivers of those with dementia found that when routines were disrupted, their relatives' condition deteriorated much faster during periods of lockdown<sup>23</sup>. In Ireland, Early Supported Discharge teams reported a greater increase in activity in 2019 compared to during the first wave of COVID-19<sup>8</sup>. This was linked to the provision of telerehabilitation by Early Supported Discharge teams and the limited number of alternative egress pathways to other rehabilitation settings. A sense of determination and forward momentum towards their recovery was also frequently voiced. Despite the therapy being delivered virtually, these findings support previous research reporting home-based therapy allows patients to contribute to individualised

goals setting and be more engaged in rehabilitation<sup>24,25</sup>. Adherence to such core components of Early Supported Discharge through telerehabilitation may result in the continued effectiveness of Early Supported Discharge programmes but warrants further in-depth analysis<sup>7</sup>.

Stroke rehabilitation often involves completing functional task-based activities<sup>26</sup>. Participants described the therapists' implementation of this including moving around their home during their telerehabilitation sessions. Interestingly, no comments were made regarding patient safety considering the fall risk associated with stroke survivors<sup>27</sup>. Adverse events during telerehabilitation are also poorly described in the quantitative literature<sup>12</sup>. While no participant described themselves as an expert in telecommunication, it was a challenge for some to participate in some functional activities while still trying to learn how to participate in telerehabilitation. The burden of this must be considered when selecting patients for telerehabilitation. While Early Supported Discharge programmes provide services for those with mild to moderate disability post stroke, an individualised approach may be required to consider stroke survivor ability to participate safely. Participants discussed how their family members assisted them with the telerehabilitation from an information technology and physical perspective. The potential prerequisite for having a person available to support telerehabilitation could be deliberated but the context must also be considered<sup>12</sup>. This research was conducted during a global pandemic where people were

advised to stay at home increasing the availability of a family member to support the sessions. The feasibility of having a family member available for telerehabilitation beyond the pandemic should be considered.

The involvement of family members in assisting stroke survivors with telerehabilitation from both an information technology (IT) and physical perspective is an important aspect highlighted by the participants. Family members play a crucial role in supporting and facilitating the telerehabilitation process, ensuring that the stroke survivor can effectively engage with the therapy sessions. From an IT perspective, family members may assist stroke survivors with the technological aspects of telerehabilitation. This may include setting up the necessary equipment, such as webcams or video conferencing software, and troubleshooting any technical issues that may arise during the sessions. Some stroke survivors may have limited familiarity with technology, so having a family member who can provide guidance and support in navigating the virtual rehabilitation platform can be invaluable.

On the physical front, family members may provide physical assistance and support during telerehabilitation sessions. Stroke survivors may require assistance with positioning themselves or setting up their environment to ensure a safe and conducive space for therapy. Family members can help with tasks such as adjusting chairs, providing support during exercises or movements, and ensuring that the necessary equipment or props are readily available. The involvement of family members in telerehabilitation not

only facilitates the practical aspects of the sessions but also contributes to the emotional support and motivation of the stroke survivor. Having a familiar and trusted person actively engaged in the rehabilitation process can enhance the stroke survivor's confidence, compliance, and overall well-being. However, it is important to acknowledge that the availability and capacity of family members to assist with telerehabilitation can vary depending on individual circumstances, such as work commitments, proximity to the stroke survivor, and other caregiving responsibilities. Further exploration may be necessary to consider the feasibility of having a family member available for telerehabilitation even after the pandemic.

Barriers to telerehabilitation include not having a suitable device, stable, good quality internet, and/or low familiarity with technology<sup>28</sup>. A survey of patients' perceptions of telehealth during the COVID-19 pandemic reported that people were more engaging and overcame barriers to avoid waiting rooms and potential infection<sup>29</sup>. Similarly, our participants indicated telerehabilitation was convenient and acceptable in the midst of a pandemic. They were willing and able to overcome barriers with support but outside of that context, the acceptability is unclear. The concept that it could not substitute for in-person rehabilitation in all cases was mirrored in our quantitative results<sup>14</sup>. Clinicians must be cognisant of patients' barriers to telerehabilitation in choosing appropriate patients for telerehabilitation and designing programmes that support their participation and engagement<sup>30</sup>. Proposed concepts to consider



for telerehabilitation include recording patient preference and ability for telerehabilitation and offering it in suitable circumstances in the future or if completing initial assessments in-person to establish a rapport before transitioning to telerehabilitation<sup>21,31</sup>. Nonetheless, the use of telehealth improved the provision of services in a safe and interactive way during the pandemic<sup>31</sup>. Future generations' interactions with telehealth will evolve as broadband infrastructure and technological usability improves. Clinicians must be cognizant of these barriers in selecting appropriate patients for telerehabilitation and designing programs that support their participation and engagement. Recording patient preference and ability for telerehabilitation and offering it in suitable circumstances in the future may also be considered. Overall, telerehabilitation has emerged as a viable alternative for providing rehabilitation services to stroke survivors during the pandemic. The positive experiences of stroke survivors and their family members with telerehabilitation provide valuable insights for the delivery of stroke and non-stroke telerehabilitation beyond the pandemic. Further research is required to explore how to overcome barriers to telerehabilitation beyond the pandemic including aligning healthcare services with government policy.

#### **Limitations and recommendations for future practice**

While the use of qualitative methodology permits in-depth exploration of respondents' perceptions and experiences, several limitations must be acknowledged. The

current study was conducted during a global pandemic. It is unclear whether perspectives would change beyond the pandemic. Study findings are based on participants' reports and, therefore, they are open to biases related to self-evaluation and reflection as they had completed the programme at the time of interview. Respondents' willingness to provide feedback that would satisfy the researchers may have led to more positively skewed descriptions. Further, the sampling methods may have resulted in selection bias. Participants were from a regional ESD team and findings may not generalise to all Early Supported Discharge telerehabilitation. Although the COVID-19 pandemic resulted in a widespread adoption of telerehabilitation services for rehabilitation and support, more research is needed to investigate use beyond COVID-19.

#### **Conclusion**

The study reports new findings of the experience of patients and families of Early Supported Discharge telerehabilitation during a global pandemic, which are to our knowledge, the first of their kind. The majority of participants described positive experiences of 'virtual and non-tactile' video enabled rehabilitation. However, the extent to which the findings are generalizable requires further study. Nonetheless, the unique experiences and key factors that facilitated and hindered telerehabilitation are identified for this cohort of stroke survivors. This therapist-led programme supported rehabilitation through relationships, which fostered engagement and supported rehabilitation, albeit virtually.



Essential evidence-based component of the Early Supported Discharge programme and stroke were maintained in large geographic area. Lessons learnt from the pivot to online delivery of Early Supported Discharge programme will contribute substantially to

developing the programme further and enhancing the stroke survivor and family experience. Equity of access, patient selection and reach of rehabilitation needs to be explored furthered in future research.

### **Implications for Rehabilitation:**

- Stroke is a disabling condition which was hindered further when access to rehabilitation was restricted due to the COVID-19 pandemic.
- Early Support Discharge through telerehabilitation is a viable technique to support stroke survivors to engage in rehabilitation at home.
- Initial assessments in-person, before transitioning to telerehabilitation, is recommended to help determine patient suitability for telerehabilitation and to establish a rapport between the stroke survivor and therapist.
- Telerehabilitation is one of many remote telehealth services which provides a safe interactive mode of communication between patients and clinicians.

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All authors contributed to the study design. IH and MG conducted the interviews. MG, AB and MC conducted the data analysis and the interpretation of data. IH, MG and AB drafted the manuscript. All authors contributed, read and approved the final manuscript.

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