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## Telerehabilitation for patients who have been hospitalised with covid-19: a qualitative study

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### ABSTRACT

**Purpose:** The aim of this qualitative study was to explore the views of participants of a group-based, supervised, telerehabilitation programme, following discharge from hospital with Covid-19. This study was part of a single-centre, fast-track (wait-list), randomised, mixed-methods, feasibility trial of telerehabilitation (Registration: Clinicaltrials.gov reference:285205).

**Methods:** Semi-structured interviews were conducted over a virtual teleconference platform with 10 participants who took part in a telerehabilitation programme following Covid-19 after discharge from an acute hospital. Data were transcribed verbatim and analysed using thematic analysis.

**Results:** Five themes were important from the participant perspective: telerehabilitation programme as part of the Covid-19 journey; the telerehabilitation programme design and delivery; peer aspects; the role of the instructor; and the role of technology and online delivery.

**Conclusions:** Overall, the telerehabilitation programme was a positive experience for participants. The instructors were central to this positive view as was the group nature of the programme. The group aspect was particularly important in supporting the broader perceived wellbeing gains, such as the sense of enjoyment and reduced social isolation. Several participants would have liked to have continued with the exercises beyond the six-week intervention indicating that the programme could be a way to help people sustain a physically active lifestyle.

### ARTICLE HISTORY

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### KEYWORDS

Telerehabilitation; covid-19; long-covid; qualitative; group based; long covid; physiotherapy

### ► IMPLICATIONS FOR REHABILITATION

- Participants who were recovering from Covid-19 following hospital admission perceived the telerehabilitation to be a positive experience overall.
- The group aspect of the telerehabilitation programme was important in supporting the broader perceived wellbeing gains such as the sense of enjoyment and reduced social isolation.
- Telerehabilitation programmes for Covid-19 may need to include pathways for participants to continue to engage in exercise beyond the time-limited six-week intervention to support ongoing self-management.

## Introduction

The emergence of the severe acute respiratory syndrome coronavirus-2 (SARS-Cov-2), also known as Coronavirus disease 2019 (Covid-19), has led to a global health crisis and mass hospitalisation worldwide [1]. The clinical spectrum of Covid-19 varies, ranging from asymptomatic to multi-organ failure and death, with respiratory symptoms being the leading cause of hospitalisation [2,3]. The rates of hospitalisation are higher amongst those with underlying health conditions [4]. In the United Kingdom (UK), it was noted that 17% of those admitted to acute services required high dependence or intensive care input [4].

Individuals who have had Covid-19 may go on to develop chronic symptoms [5]. These include fatigue, breathlessness, cognitive blunting (“brain fog”), and pain amongst others [5]. It has been estimated that approximately half of Covid-19

survivors have functional deficits that would require multidisciplinary rehabilitation [6]. Those with symptoms lasting 4–12 weeks have been defined as having ongoing symptomatic Covid-19 and symptoms beyond 12-weeks as post-Covid-19 syndrome. Long Covid is a commonly used term to describe new or persistent symptoms following acute Covid-19 and includes both ongoing symptomatic Covid-19 and post-Covid syndrome [5,7].

In a cohort of patients from Brazil, those who had been admitted to intensive care presented with more severe disability post-discharge [8]. Similarly, data from a cohort in China suggests that individuals that required high-flow nasal oxygen or ventilation (non-invasive and invasive) were more likely to have mobility impairments, anxiety, pain, and depression 6-months post-discharge compared with those who were hospitalised without

oxygen therapy [9]. Therefore, ongoing rehabilitation needs are likely for those recovering from Covid-19 [6,8].

Rehabilitation specialists from China identified the need for pulmonary rehabilitation with a view to improving lung function and exercise tolerance as well as reducing fatigue post Covid-19 [10]. This was particularly important for those who required hospitalisation [10]. Pulmonary rehabilitation is traditionally carried out in a group, face-to-face setting, providing multidisciplinary rehabilitation consisting of exercise training, education, and psychosocial/behavioural components [11,12]. Pulmonary rehabilitation has been shown to be beneficial for those with chronic respiratory disease by minimising symptoms, reducing the impact of disability, and improving quality of life [13]. However, it is not clear whether those with ongoing Covid symptoms would benefit from pulmonary rehabilitation. Indeed, policy documents on rehabilitation for Covid-19 have been produced by the Chartered Society of Physiotherapy [14], British Thoracic Society [15] and the British Society of Rehabilitation [16], yet limited evidence is available regarding the optimal pathway of delivering rehabilitation in this population.

Telerehabilitation has been proposed as a model to offer remote assessment and efficient therapy delivery to those with rehabilitation needs [6]. It uses telecommunication technology to support rehabilitation services [17]. In community-based individuals, telerehabilitation has been observed to lead to improved outcomes which were at least similar to or better than alternative interventions for a range of health conditions, such as cardiac, neurological, spinal cord injuries, and speech-language impairments [18]. However, there are barriers associated with telehealthcare. The most commonly reported barriers being technical knowledge and resistance to change [19]. Challenges such as internet connectivity or technological issues including hospital firewalls and data governance have also been reported [20]. Nonetheless, findings from an Australian survey of 254 individuals with chronic respiratory disease noted that 57% were technology competent, and 60% were willing to use telerehabilitation [21], indicating an openness among service users.

Prior to the Covid-19 pandemic, the uptake of telerehabilitation into physiotherapy practice had been relatively slow [22]. Restricted access to face-to-face therapy to reduce the exposure and transmission of Covid-19 led to a rapid transition to the use of digital technologies for remote physiotherapy [20]. Since existing community services are lacking in capacity to deliver the rehabilitation required to support those with Long Covid [6], telerehabilitation may offer therapists opportunities to provide effective exercise and education-based interventions to help those with Covid-19 improve or maintain function [22].

The body of evidence for pulmonary rehabilitation is strong [23], however, the evidence for pulmonary rehabilitation *via* telerehabilitation is much smaller, with heterogeneity in the rehabilitation protocols [23]. Moreover, the effectiveness of pulmonary rehabilitation for a Covid-19 population is currently unknown. Thus, there is a need for studies which examine post-hospitalisation telerehabilitation pathways for Covid-19 patients. This paper reports on the qualitative aspects of a single centre, fast-track (wait-list), randomised, mixed-methods, feasibility trial of telerehabilitation for patients who have been hospitalised with Covid-19. The research question being addressed is 'what are the views of patients hospitalised with Covid-19 on a telerehabilitation programme?'. This is important in understanding the feasibility of a telerehabilitation pathway which draws on principles of pulmonary rehabilitation for Covid-19 patients with ongoing symptoms.

## Methods

### Study design

A qualitative approach was taken to understand the insider perspective of the telerehabilitation participants in depth such that attention can be given to participants rather than the researcher [24,25]. The study was located within a critical realist paradigm and data were analysed using thematic analysis. The kind of knowledge produced based on this paradigm is to some extent dependent upon the questions asked in relation to the world around us and unavoidably a reflection of the researcher's own perspective [26,27]. Therefore, given the inherent reflexive and active role qualitative researchers play as part of the data collection, the key credentials of the lead qualitative researcher (CK) are included to help readers assess how these factors may have influenced the research process [28]. CK was a physiotherapist by background and an experienced qualitative, post-doctoral researcher who now works in pre-registration physiotherapy training. She was independent to the delivery of the telerehabilitation programme. This background in physiotherapy may have led to CK holding certain views and assumptions about how telerehabilitation might be experienced by participants. As such, pre-conceptions prior to data collection and throughout the analytical process were documented by the first author in a reflexive diary [29,30]. Regular dialogue was maintained with the research team to debrief the research process and address any epistemological conflicts of the views of the researcher.

### Qualitative study context

The telerehabilitation programme was designed by a qualified strength and conditioning coach. It was structured using conventional pulmonary rehabilitation principles using 12 sessions of group exercise, with educational sessions and peer support [23,31]. The delivery method for the programme was a video conferencing application (Cisco WebEx Meetings, Cisco Systems Inc, USA). Prior to commencing the telerehabilitation programme, a physiotherapist conducted an initial assessment virtually to check for study eligibility, accessibility, and safety to exercise with remote supervision. Twice a week for six weeks, participants were invited to join a virtual group-based exercise programme with three-six people. The exercise programme was physiotherapist led and included a structured warm-up, guidance/demonstration, exercises (consisting of cardiovascular, flexibility and strength-based movements), and a cool down. An additional member of the research team monitored the video conference platform during the exercise class and provided real-time supervision/guidance on participant's technique and monitored their safety.

Participants received an individualised exercise programme based on their current levels of exercise tolerance and functional ability and were requested to undertake exercises on up to three additional days of the week, as appropriate. The individual exercise programme was reassessed and progressions/regressions to the exercises were made at each session. Opportunities were provided for participants to share experiences to encourage peer support. Once a week, participants were invited to an educational session on relevant topics including rehabilitation of Covid-19, principles of exercise, managing breathlessness, managing fatigue, return to work/social issues, and nutrition. These education sessions were not delivered by the exercise instructors but rather by medical and allied health staff independent of the programme.

### Participant recruitment

A convenience sample was used to recruit participants [32]. To be eligible for the qualitative study, participants had to have completed the telerehabilitation programme. All 40 participants who completed the programme were invited to be involved in the study through an email invitation from the telerehabilitation lead instructor (MN). Ten participants responded to this email invitation and consented to be involved in the study. Eligibility criteria for the telerehabilitation programme and the trial study design are available in the study protocol [33].

Participants were provided with an information sheet about the qualitative study and informed written consent was obtained prior to data collection. Ethical approval for the study was obtained from the Health Research Authority and NHS Research Ethics Committee (reference number; 20/IEC08/0017). The trial was registered with clinicaltrials.gov (reference; 285205).

### Data collection

Semi-structured interviews provided the participants with the opportunity to reflect upon their experiences of the telerehabilitation programme. The interviews were conducted *via* Microsoft Teams due to the impact of Covid-19 using an interview guide (see Table 1) [33]. The interview guide was developed through consideration of the literature, the research question, and the overarching aim of the study. Interviews were conducted by the first author (CK) and were audio recorded following written informed consent. Only the first author and participant were present for the interviews which were conducted between May and

July 2021. The interviewer was introduced to participants as a researcher with a background in physiotherapy.

### Data analysis

The audio recorded interviews were transcribed verbatim by an experienced qualitative researcher (MT). Transcripts were cross checked for accuracy by CK. Transcripts were not returned to participants for comment. Computer assisted qualitative data analysis software (NVivo 12) was used to ensure transparency and provide an audit trail of the data analysis process [34]. Data were analysed using inductive thematic analysis following a six phase process [35].

In the first phase of analysis, each interview was read and re-read multiple times by the first author to allow immersion and gain familiarity with the depth and breadth of the data. In phase two initial codes were generated and sought to express the data as forms of concepts. In phase three, these initial codes were then sorted into potential themes. These themes were then reviewed (phase four), defined and named (phase five) and finally reported on using vivid extract examples [35]. MT independently cross-checked sections of the qualitative data analysis by comparing the codes and themes to the transcripts. Any discrepancies with the themes or coding were resolved through discussion with the wider research team to reach consensus. This was a valuable process as it assisted the refinement and interpretation of themes [36].

### Results

A total of 10 participants consented to be involved in the study (four male and six female). They had a mean age of 52 years (age

Table 1. Semi-structured interview guide.

Topic	Example questions [and prompts]
Experience of rehabilitation programme	<ul style="list-style-type: none"> <li>• How would you describe your experience of the rehabilitation programme? [What was your favourite part? What did you find most challenging?]</li> <li>• How do your experiences compare to the expectations you had prior to the programme?</li> <li>• If you missed any of the sessions, what were the reasons? [Time, diary conflict, health, not motivated]</li> <li>• How does participating in the sessions make you feel? [Physical health (muscle strength, level of breathlessness, ability to do jobs around the house); mental health (mood); social aspects]</li> </ul>
Attitudes towards exercise / physical activity	<ul style="list-style-type: none"> <li>• What were your attitudes towards exercise prior to Covid-19?</li> <li>• How have these changed since contracting Covid-19?</li> <li>• Has the rehabilitation programme affected these attitudes in any way?</li> <li>• Have you participated in other exercise programmes in the past? What's the difference between this programme and your past experiences?</li> <li>• If there was an opportunity to keep exercising together is this something you would be keen to do? Would you prefer ongoing exercise in a group or individual setting?</li> </ul>
Specific comments on the exercise components	<ul style="list-style-type: none"> <li>• How would you describe your relationship with exercise during the programme?</li> <li>• Tell me about how the specific exercises have been for you. [Have any been particularly easy or difficult?]</li> <li>• How do you feel after the class? [Tired, energetic, motivated]</li> <li>• Tell me about any exercise you completed outside of the group session. [Did you engage in any? Did you find it easy or difficult? Did your engagement differ between the online sessions and the prescribed exercise outside of the classes?]</li> </ul>
Specific comments on the education and social elements	<ul style="list-style-type: none"> <li>• Tell me about the social aspects of the group.</li> <li>• How have you found the educational aspects of the sessions? [Which ones have been most helpful? Which ones have not been as relevant for you? Is there a topic you would have liked to have been included?]</li> </ul>
Role of the instructor	<ul style="list-style-type: none"> <li>• How did you find the delivery method/s employed in the programme?</li> <li>• Is there anything about the way that the group is led that is helpful for you? Anything that makes it challenging for you?</li> </ul>
Experience with technology	<ul style="list-style-type: none"> <li>• How did you find the delivery platform / technology used in this project?</li> <li>• Have you any previous experience of using this type of technology?</li> <li>• Is there an alternative platform / delivery method you feel would work better / be more effective? [Preferences regarding face-to-face or online delivery]</li> <li>• If you experienced any problems / issues with the technology what were these? How do you feel these could best be overcome?</li> </ul>

range 40–69 years). Interviews were between 24–67 min in length. Thematic analysis of the interviews led to five themes that were important from the perspective of those involved in the telerehabilitation programme: 1) telerehabilitation programme as part of the Covid-19 journey; 2) telerehabilitation programme design and delivery; 3) peer aspects; 4) instructor; 5) role of technology and online delivery. These themes will be presented with direct quotations from participants.

### **Telerehabilitation programme as part of the covid-19 journey**

This theme highlights the experiences of participants with Covid-19 and the role that telerehabilitation played in their journey towards recovery. Covid-19 had had a substantial impact on the day to day lives of participants. Challenges included reduced grip strength such that it was difficult to open tins or bottles, changes in taste and smell, persistent coughs, neuropathies, hair loss, pain, pins and needles, fatigue, breathlessness, poor balance, memory loss, brain fog, reduced strength, poor concentration, or reduced mobility. Participants noted that the telerehabilitation programme helped them overcome some of these challenges. Perceived improvements included building up stamina for walking, improved muscle strength and tone, managing breathlessness and breathing control, weight loss, improved sleep quality, and fatigue management.

There was an acceptance that pacing had become part of their post-Covid life and the skills they learned through the telerehabilitation programme helped support them in this understanding:

*... I'm thinking why can't I Hoover? Why can't I do the garden? Why can't I cook the tea? and then I would crash and burn for two days, and I wouldn't have known if I hadn't had these lessons, they were brilliant for that.... Listen to our body, take things nice and slow to avoid any relapses, and when you're tired, you're tired, and you've just got to stop. And that to me was priceless. (Participant 8, female, 50s)*

This shows how the programme taught participants to manage the ebbs and flows of energy that accompany long Covid by providing strategies to manage these by giving time to rest.

The telerehabilitation programme played an important role in encouraging participants, providing support, and giving confidence to keep moving forward on their post-Covid-19 journey. The telerehabilitation programme was described as:

*Just encouraging you to do things and move things and pace yourself and eat properly and do all the rest of it... a big part of gently pushing me forward. (Participant 9, female, 50s)*

Beyond the physical changes brought on by Covid-19, the mental health impact was also significant. Anxiety and/or depression were reported among eight of the participants, particularly in the early stages of discharge post-hospital when there was a sense of having “a cloud over me” (Participant 5, female, 50s). As the study was wait-listed, those who had had to wait longer for the programme had worked through some of their anxieties by the time they joined the group:

*But by the time the class was being done, I'd recovered from a lot of that. I'm not a depressive type of personality. I get fed up, but this is the closest I've ever been in my life to the edge of depression, and I think perhaps earlier on it would have been useful to have somebody say, “this is normal”. (Participant 10, female, 60s)*

Participants also reported broader wellbeing gains from the programme which supported their recovery. There was a sense of fun and enjoyment from being in the group and exercising together:

*... and you look forward to them, “oh it's the exercise group”. You look forward to them coming online, really and it was fun, to be honest. (Participant 6, female, 60s)*

### **Telerehabilitation programme design and delivery**

This theme encompasses the views of participants regarding the design and delivery of the telerehabilitation programme. Four sub-themes are included as part of this overarching theme: exercise specifics; exercise between group sessions; educational aspect; and exercise post programme.

#### **Exercise specifics**

The individual participants each had their own health challenges related to how Covid-19 had affected them which meant they struggled with different aspects of the exercises. For some it was the balance exercises which were most challenging, for others it was the stretching or upper limb exercises. There was an overall appreciation by participants for the way that the exercises worked on different aspects of their body so that they felt they got a well-rounded work out.

The use of common household items to carry out the exercises was appreciated, particularly in the early stages of recovery when even a tin of beans to help with upper limb weight resistance exercises was sufficient. The programme motivated participants to do different types of exercise rather than just walking:

*Participating in the classes motivates me to do different types of exercise where I was just walking before. So, I ended up setting up some resistance band training stuff up and started to exercise different parts of your body because you don't realise how weakened you are from it. And especially if you're quite sedentary afterwards, you lose a lot of muscle tone. (Participant 3, male, 50s)*

Participants appreciated the fact that the exercises were adapted for their stage of recovery and the individual adaptations meant that participants with a range of abilities could exercise together and see individual progress.

*It was very good because they adapted because I had to do most of it sitting down. And they adapted everything so that you could do it sitting down, but still feel as though you were exercising. (Participant 10, female, 60s)*

#### **Exercise between group sessions**

The telerehabilitation programme was designed such that participants were encouraged to do exercises on up to three days per week between the scheduled online exercise sessions. Participants' ability to exercise on additional days varied greatly. Those who were more physically able did the exercises daily. Some participants felt that the scheduled exercises sessions on two days per week were all they could manage and that this was sufficient for them to see physical and wellbeing gains. Others would pick out the exercises that they knew they needed to work on such as the balance exercises and just focus on those or they would integrate the exercises into their daily lives. This was about seizing the smallest moments of exercise rather than talking about going out to exercise as part of a daily routine:

*she [the instructor] said if you're doing things like with your kettle or anything, doing this exercise and while you're waiting for things to boil, I did do a bit in-between. (Participant 6, female, 60)*

For those who struggled more with fatigue they were aware that they needed to pace themselves and it would take the two-three days between the sessions to recover. As their strength improved, they noted that:

...but by the end of it I could put in half an hour here and there between the sessions without it massively affecting me. (Participant 2, male, 40s)

### Educational aspect

The educational sessions were not delivered by the exercise group instructors. Instead they were provided by medical and allied health staff independent of the programme. Participants were at various stages of recovery from Covid-19 and to some extent this determined the usefulness of the education sessions. For example, one participant noted that the session on exercise goal setting was quite early in the course:

*I was nowhere near setting myself goals for exercise at that point. It was getting through day to day. If that had been near the end, maybe the last session or the last but one, so it was "ok you're nearly finished with your physio, here's how you're going to carry on", that would have possibly been a little bit easier to access. (Participant 4, male, 50s)*

Some participants felt they would have benefited from a more focused education session on the impact of Covid-19 on their mental health such as anxiety and coping with anxiety post-Covid as this was a common experience. Others felt that they did have a chance to talk about anxiety as part of the general peer discussions. Talking about mental health was perceived as a taboo topic for some and not something they would necessarily discuss with their partners or their doctor, particularly as it was felt that the hospital was only concerned with their physical health. They felt that having someone as part of an education session specifically ask them about how they were managing with their mental health may have been beneficial.

The education sessions on managing breathlessness, assessing limitations, pacing, and managing fatigue were viewed as being the most helpful as these were ongoing challenges for many of the participants. For those in the process of returning to work, the occupational health session was highly beneficial.

The pedagogic approach taken by some of the individuals delivering the sessions was found to be unengaging:

*...quite boring... And he went on and on and I'm thinking, it was almost like he was talking to himself!... It was almost like he switched the tape player, and he couldn't stop. (Participant 1, male, 60s).*

Furthermore, some of the educational sessions were dependent on the use of PowerPoint slides which was perceived by participants as employing a tick box approach. This was not as helpful as those speakers who made it more personal by drawing on their own stories and life experiences. Thus, there was a perception that the education aspect of the programme could do with further development.

### Exercise post programme

At the time of interview, participants were between one – six months post-programme completion. Participants had mixed experiences of maintaining exercises after the programme ended. Some had continued in doing the specific telerehabilitation exercises on their own whereas others did not continue with the exercises after the programme ceased. This was in part because they were back to doing what was important to them such as taking their dog out for walks, so they felt they had achieved their goals. Others used the fitness levels they developed through the programme to transition back to the types of exercises they were doing before they contracted Covid-19 such as going to the gym.

A number of participants reported that they would have liked to have kept exercising online as a group beyond the six-weeks of the telerehabilitation programme. This was because the regular

time of the classes and group nature helped motivate them and provided accountability as well as the benefits of the social aspect of this ongoing contact. For those who would have liked to have continued, some felt that having an instructor present for ongoing online classes would have been helpful, but others felt that they were familiar with the exercises, and they could keep going without an instructor as long as they had a tele-communications platform that worked for everyone.

### Peer aspects

Being part of a telerehabilitation programme with peers who had been through similar experiences was a highly positive aspect to the programme. Several participants struggled with a sense of isolation after returning home from hospital. The social aspect of exercising in a group helped alleviate some of this isolation and participants encouraged each other to try their best which created a positive exercise environment:

*You got to meet other people as well, which was good. You weren't isolated so you sort of did it together and as a group, which was really good cos I think we sort of inspired each other to sort of go on a little bit further really. (Participant 3, male, 50s)*

There was a sense of reassurance and togetherness from meeting others going through similar health and wellbeing challenges:

*We're all connected because we've all got the same respiratory problem. We're struggling somehow breathing, there's a reason why we're not breathing as we should be, so we had all that in common. (Participant 8, female, 50s)*

Most of the participants reported a positive group experience but one participant found that she struggled to interact with the others in her programme. This may have been due in part to her concerns that she was the only female in the group:

*When I saw three men, I thought, "oh God, why couldn't there have been another fat woman? (Participant 7, female, 50s)*

The group dynamic did take time to build and initially participants were quite quiet and said they felt nervous about their exercise capability and self-conscious about being seen on camera, but once a group connected it added an element of fun and enjoyment.

*It was really good fun. As I said, we were all very quiet and we didn't know what to do or what to say at the beginning. But by the end of it, we're having a right laugh. And I think that's part of the thing, it's part of your recovery, isn't it? (Participant 3, male, 50s)*

The social aspect of the programme appeared to vary from group to group. Some groups carried on talking over the WebEx platform after the formal aspect of the telerehabilitation programme was finished for that session. Others exchanged contact details to keep in touch via social media after the programme ended.

### Instructor

This theme expresses the views of participants regarding the role of the instructor in the telerehabilitation programme. The instructors were viewed as being central to the positive experience. Qualities such as cheerful, positive, informative, full of joy, full of life, encouraging, cheery personality, and caring were used to describe the instructors.

### **Everything you'd expect from somebody who's trying to help people (participant 10, female, 60s)**

The instructors were not patronising; rather they provided supportive feedback to participants. The instructors were perceived as being person-centred in their approach by treating participants as unique individuals: "this intervention of these experts here, they treat you as an individual" (Participant 8, female, 50s).

Whilst one instructor was leading the exercises, another was observing the participants to provide feedback to ensure that exercises were adapted to the level that was safe for them and were suitably paced. This approach helped participants feel safe with the instructors and their expertise was appreciated. Participants also liked the fact that the instructors had a sense of humour which made the programme more fun.

### **They were having a laugh and a joke whilst they were doing it as well, they made it enjoyable. (participant 4, male, 50s)**

Instructors were available over email between sessions so that they could ask questions if they needed clarification on anything. There was also a sense from participants that the instructors really wanted to be there which meant they were enthusiastic and helped motivate the participants.

*You could tell they [the instructors] wanted to be there. And I think that's so important, when you can actually see somebody's enthusiasm and the participation that they had was brilliant. You know, the really did motivate us. (Participant 3, male, 50s)*

### **Role of technology and online delivery**

This theme reflects the views of participants on the technology used in the tele-communications aspect of the programme and their experiences of it being delivered online. Two sub-themes are included under this theme: technology and the role of online delivery.

#### **Technology**

Most of the participants found the WebEx platform relatively easy to use, particularly as a number had already used similar platforms to keep in touch with family during lockdown or for work purposes. For those who had not used this type of technology before they sought support from their partners, their children, or from the instructors.

Connectivity issues were noted by some participants. This was particularly evident for two participants who had returned to work and were doing the programme at their work locations as their firewalls would block WebEx or the signal would drop. They would then have to move to their mobile devices to connect with the session. This variable connectivity for these participants added a humorous dimension to the group exercise class as participants teased each other that they were doing it on purpose to avoid doing the exercises:

*"Oh, he's stopped to finish his lunch look, I bet he's got half a sandwich in his mouth" and I could hear them all and I'm talking to them and we're just laughing our heads off, but every so often my camera would just stop, and I had to manually reconnect my camera. (Participant 2, male, 40s)*

#### **Role of online delivery**

Some participants initially found being online quite daunting. Having the camera on was especially difficult but they reported that they soon got used to it. There was also an understanding that with the pandemic, more and more of life has moved online:

*People have got used to doing things on TV screens now haven't they... So, once you'd done it the first time, it was ok. (Participant 9, female, 50s)*

The online delivery of the exercise programme was preferable to just being sent a list of exercises to do at home:

*Doing it interactively on Zoom or whatever it was, is much better than being sent a list of exercises. You know because sometimes now if you go to physios, NHS physios, all you get is a list of exercises, isn't it? And it helps a bit, but it's actually not as good as somebody being there showing you or helping you. (Participant 10, female, 60s)*

Given that for many of the participants, the programme was delivered during national lockdown periods the regular online connection was highly valued. In the early stages of recovery from Covid-19, participants noted that it would have been too much exertion for them to travel for a face-to-face exercise class and then perform the exercises as their levels of fatigue were so high. Even if they had been able to manage the travel and do the exercises it would have led to greater exhaustion post class, so the online aspect helped conserve their energy.

### **Discussion**

The aim of this study was to explore the views of participants of a telerehabilitation programme for those who had been hospitalised with Covid-19. This study has found that the telerehabilitation programme was perceived to play an important role in the recovery of individuals who have been hospitalised with Covid-19. The programme design and delivery with individually adaptable exercises that were holistic in nature along with the education sessions supported their rehabilitation. The group nature of the programme with peer support was highly valued by participants. The instructors were viewed as being central to the positive experience with the programme. Most of the participants were able to manage the technology platform and found the online delivery to be beneficial. This knowledge is important in understanding whether telerehabilitation is a feasible pathway to support the recovery of those with Covid-19. This study has five contributions to make to how best to support those with ongoing Covid-19 symptoms via telerehabilitation.

Firstly, this study reports that the overarching experience for participants of the telerehabilitation programme was a positive one. This is similar to findings from a telerehabilitation programme from Spain where participants carried out daily individual exercises (for 14-days) with WhatsApp and video support [37]. They reported perceived improvements in their physical and psychological health [37]. The telerehabilitation programme in this current study was slightly different in that it followed the principles of pulmonary rehabilitation which has the benefit of being a group rather than individual exercise programme. The group nature of the model used for this study appeared to be important for participants in aiding their recovery. For example, it helped support some of the broader perceived wellbeing gains such as peer support in managing ongoing symptoms, reduced social isolation, and a sense of enjoyment.

Social interactions as part of community group exercise programmes and pulmonary rehabilitation have been found to provide a source of support, enjoyment, belonging, and ongoing engagement in exercise [38–42]. Given the isolating nature of Covid-19, especially during periods of national lockdown when some of these groups were taking place, the social aspect of the group appeared to be more important than ever. However, not all groups developed strong social bonds, and this was particularly the case for participants who were the only female in their group. Having a more

equitable balance of males and females in each group should be considered going forwards to support a more positive experience.

The second key contribution this study makes to telerehabilitation for Covid-19 is around the importance of mental health support. Mental health symptoms such as anxiety and depression were a common experience for participants and this mental health impact cannot be underestimated. This experience is borne out in the wider literature where research suggests that those who have contracted Covid-19 have been observed to have elevated symptoms of anxiety, depression, and stress [43]. Education topics in pulmonary rehabilitation often include anxiety, depression, and stress management [44]. Unfortunately, the research team in this current study were unable to secure specialists to teach about managing mental health symptoms post Covid. This was due to additional service pressures from supporting grieving families. Based on the findings of this study, the inclusion of peer discussion and education sessions on dealing with anxiety and depression following Covid-19 would be beneficial to participants. This would align with a more biopsychosocial approach to the telerehabilitation programme.

The third consideration for the role of telerehabilitation in Covid-19 was around the pedagogic approach with the education sessions. Participants preferred those delivering the education sessions to make it more personal by drawing on their own stories and life experiences rather than just relying on PowerPoint presentations. This has similarly been reported by pulmonary rehabilitation participants who would prefer more interactive education sessions [45]. A recent systematic review of the education aspects of pulmonary rehabilitation suggests that education sessions seemed to be delivered using traditional didactic lectures and written information [44]. It is suggested that the pedagogic approach to the education sessions be considered more explicitly. Using social constructivist approaches to foster a more interactive learning environment may be beneficial. For example, the use of social constructivist approaches where the person leading the session facilitates participants understanding of the content and as such foster a more interactive learning environment may be valuable [46].

The fourth contribution to telerehabilitation for Covid-19 is the role of the programme in supporting ongoing health management. This is important because part of the role of pulmonary rehabilitation is to equip participants with the knowledge and self-efficacy to continue doing exercises and managing ongoing symptoms beyond the six-week time limited nature of the programme [47]. It was therefore interesting to note that whilst some participants had achieved their goals after six-weeks, others reported that they would have liked to have kept exercising as a group (with or without the instructor) after the programme ended. This was an interesting finding given that in a pulmonary rehabilitation context, uptake and adherence is often low [48], although it is important state that the population of Covid-19 participants is different to those who attend pulmonary rehabilitation programmes. In the UK, there is call for personalised care which promotes patient activation and supported self-management [49]. Thus, telerehabilitation programmes for Covid-19 may need to include pathways for participants to continue to engage in exercise beyond the time-limited six-week intervention to support ongoing self-management. In this way, the initial intervention could be used to help individuals transition to ongoing health management. This is important given that public health figures indicate that fewer than 31% of men and 23% of women aged 16 and above achieve the recommended weekly dose of physical activity [50]. The telerehabilitation programme could be a gateway programme to helping

sustain a physically active lifestyle with a supportive group of peers. This aspect would require further evaluation.

Finally, having two instructors present for the online sessions (one to lead the session the other to monitor and provide feedback to participants) was helpful and made participants feel safe and supported. The instructors were seen as being key to the positive experience with the programme; indeed, the instructors added a sense of fun to the group which made it more enjoyable. This is supported by findings from community-based exercise programmes in that the personality, professionalism, and humanised approach of the instructor supports exercise adherence [41].

### **Strengths and limitations**

This study complements and adds to the growing body of literature on telerehabilitation for those hospitalised with Covid-19. There were however a limited number of participants who consented to be involved in the study. The study was limited to one acute hospital trust in one geographical location which may reduce the transferability of the findings. It must also be pointed out that participants self-selected to be involved in these interviews and all the participants had completed the full telerehabilitation programme, thus the population might represent a highly motivated group. Although these views cannot be generalised to all telerehabilitation participants, they do provide an insider perspective on the experiences of this programme.

### **Conclusion**

This qualitative exploration of patient experiences of a telerehabilitation programme provides an important perspective on the use of remote assessment during Covid-19. Results highlight that the telerehabilitation programme played an important role in their recovery. The programme design and delivery with individually adaptable exercises that were holistic in nature along with the education sessions were perceived to have supported the rehabilitation process. The group-based nature, a unique feature of this telerehabilitation programme, with peer support was highly valued by participants. It was identified that most of the participants were able to manage the technology and found the online delivery to be beneficial. This knowledge is important in understanding whether telerehabilitation is a feasible pathway to support the recovery of those with Covid-19.

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## References

- [1] Goërtz YMJ, Herck MV, Delbressine JM, et al. Persistent symptoms 3 months after a SARS-CoV-2 infection: the post-COVID-19 syndrome? *ERJ Open Res.* 2020;6(4):00542–2020.
- [2] Onder G, Rezza G, B S. Case-Fatality rate and characteristics of patients dying in relation to COVID-19 in Italy. *J Am Med Assoc.* 2020;323(18):1775–1776.
- [3] Larsson E, Brattström O, Agvald-Öhman C, Karolinska Intensive Care COVID-19 Study Group, et al. Characteristics and outcomes of patients with COVID-19 admitted to ICU in a tertiary hospital in Stockholm, Sweden. *Acta Anaesthesiol Scand.* 2021;65(1):76–81.
- [4] Docherty AB, Harrison EM, Green CA, et al. Features of 20 133 UK patients in hospital with covid-19 using the ISARIC WHO clinical characterisation protocol: prospective observational cohort study. *BMJ.* 2020;22:m1985.
- [5] Greenhalgh T, Knight M, Buxton M, et al. Management of post-acute covid-19 in primary care. *BMJ.* 2020;370:m3026.
- [6] Salawu A, Green A, Crooks MG, et al. A proposal for multi-disciplinary Tele-Rehabilitation in the assessment and rehabilitation of COVID-19 survivors. *IJERPH.* 2020;17(13):4890.
- [7] National Institute for Health and Care Excellence (NICE). COVID-19 rapid guideline: managing the long- term effects of COVID-19. 2021.
- [8] Leite VF, Rampim DB, Jorge VC, Prevent Senior COVID-19 Rehabilitation Study, et al. Persistent symptoms and disability after COVID-19 hospitalization: data from a comprehensive telerehabilitation program. *Arch Phys Med Rehabil.* 2021;102(7):1308–1316.
- [9] Huang CH, Wang Y, Li X, et al. 6-month consequences of COVID-19 in patients discharged from hospital: a cohort study. *Lancet.* 2021;397(10270):220–232.
- [10] Zhao HM, Xie YX, Wang C, Chinese Association of Rehabilitation Medicine; Respiratory Rehabilitation Committee of Chinese Association of Rehabilitation Medicine; Cardiopulmonary Rehabilitation Group of Chinese Society of Physical Medicine and Rehabilitation Recommendations for respiratory rehabilitation in adults with COVID-19. *Chin Med J.* 2020;133(13):1595–1602.
- [11] Hill N. Pulmonary rehabilitation. *Proc Am Thorac Soc.* 2006; 3(1):66–74.
- [12] Spruit MA, Wouters E. Organizational aspects of pulmonary rehabilitation in chronic respiratory diseases. *Respirology.* 2019;24(9):838–843.
- [13] Lan CC, Chu WH, Yang MC, et al. Benefits of pulmonary rehabilitation inpatients with COPD and normal exercise capacity. *Respir Care.* 2013;58(9):1482–1488.
- [14] CSO P. Rehabilitation and Covid-19 - CSP policy statement. 2020.
- [15] Society BT. Delivering rehabilitation to patients surviving COVID-19 using an adapted pulmonary rehabilitation approach – BTS guidance. 2022
- [16] BSORM. Rehabilitation in the wake of Covid-19: a phoenix from the ashes. 2020.
- [17] Russell TG. Physical rehabilitation using telemedicine. *J Telemed Telecare.* 2007;13(5):217–220.
- [18] Kairy D, Lehoux P, Vincent C, et al. Systematic review of clinical outcomes, clinical process, healthcare utilization and costs associated with telerehabilitation. *Disabil Rehabil.* 2009;31(6):427–447.
- [19] Scott Kruse C, Karem P, Shifflett K, et al. Evaluating barriers to adopting telemedicine worldwide: a systematic review. *J Telemed Telecare.* 2018;24(1):4–12.
- [20] Bearn L, Gregory W, Hurley M. Remotely delivered physiotherapy: can we capture the benefits beyond COVID-19? *Rheumatology.* 2021;60(4):1582–1584.
- [21] Seidman Z, McNamara R, Wootton S, et al. People attending pulmonary rehabilitation demonstrate a substantial engagement with technology and willingness to use telerehabilitation: a survey. *J Physiother.* 2017;63(3):175–181.
- [22] Quigley A, Johnson H, McArthur C. Transforming the provision of physiotherapy in the time of COVID-19: a call to action for telerehabilitation. *Physiother Can.* 2021;73(1):1–2.
- [23] Bolton C, Bevan-Smith E, Blakey J, British Thoracic Society Pulmonary Rehabilitation Guideline Development Group, on behalf of the British Thoracic Society Standards of Care Committee, et al. British thoracic society guideline on pulmonary rehabilitation in adults. *Thorax.* 2013;68(Suppl 2): ii1–ii30.
- [24] Guba EG, Lincoln YS. Competing paradigms in qualitative research. In: Denzin NK, Lincoln YS, editors. *Handbook of qualitative research.* Thousand Oaks (CA): Sage Publications, Inc; 1994. p. 105–117.
- [25] Holloway I, Wheeler S. *Qualitative research in nursing.* 2nd ed. Oxford: Blackwell Science; 2002.
- [26] Danermark B, Ekstrom M, Jakobsen L, et al. *Explaining society: an introduction to critical realism in the social sciences.* London, UK: Taylor & Francis; 2005.
- [27] Maxwell JA. *A realist approach for qualitative research.* Thousand Oaks, CA: SAGE Publications; 2012.
- [28] Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *Int J Qual Health Care.* 2007;19(6):349–357.
- [29] Renganathan S. Exploring the researcher–participant relationship in a multiethnic, multicultural and multilingual context through reflexivity. *Qual Res J.* 2009;9(2):3–17.
- [30] Holt R, Thorpe R. *The sage dictionary of qualitative management research.* London: SAGE; 2008.
- [31] De Biase S, Cook L, Skelton D, et al. The COVID-19 rehabilitation pandemic. *Age Ageing.* 2020;49(5):696–700.
- [32] Polit D, Beck C. *Nursing research: generating and assessing evidence for nursing practice.* Philadelphia: Wolters Kluwer Health/Lippincott Williams & Wilkins; 2012.
- [33] Hyde L, Simpson A, Nettleton M, et al. Tele-rehabilitation for patients who have been hospitalised with covid-19: a mixed methods feasibility trial protocol. *Phys Ther Rev.* 2022;27(3): 230–238.
- [34] Saunders M, Lewis P, Thornhill A. *Research methods for business students.* 6th ed. Harlow, England; New York: Pearson; 2012.
- [35] Braun V, Clarke V. Using thematic analysis in psychology. *Qual Res Psychol.* 2006;3(2):77–101.
- [36] Barbour R. Checklists for improving rigour in qualitative research: a case of the tail wagging the dog? *BMJ.* 2001; 322(7294):1115–1117.
- [37] Bernal-Utrera C, Anarte-Lazo E, De-La-Barrera-Aranda E, et al. Perspectives and attitudes of patients with COVID-19 toward a telerehabilitation programme: a qualitative study. *IJERPH.* 2021;18(15):7845.
- [38] Farrance C, Tsofliou F, Clark C. Adherence to community based group exercise interventions for older people: a

- mixed-methods systematic review. *Prev Med.* 2016;87:155–166.
- [39] Hartley SE, Yeowell G. Older adults' perceptions of adherence to community physical activity groups. *Age Soc.* 2015;35(8):1635–1656.
- [40] Hawley-Hague H, Horne M, Skelton DA, et al. Older adults' uptake and adherence to exercise classes: instructors' perspectives. *J Aging Phys Act.* 2016;24(1):119–128.
- [41] Killingback C, Tsofliou F, Clark C. Older people's adherence to community-based group exercise programmes: a multiple-case study. *BMC Public Health.* 2017;17(1):1–12.
- [42] Robinson H, Williams V, Curtis F, et al. Facilitators and barriers to physical activity following pulmonary rehabilitation in COPD: a systematic review of qualitative studies. *Prim Care Resp Med.* 2018;28:19.
- [43] Yao H, Chen JH, Xu YF. Patients with mental health disorders in the COVID-19 epidemic. *Lancet Psychiatry.* 2020;7(4):e21.
- [44] Roberts N, Kidd L, Kirkwood K, et al. A systematic review of the content and delivery of education in pulmonary rehabilitation programme. *Respir Med.* 2018;145:161–181.
- [45] Rodgers S, Dyas J, Molyneux AWP, et al. Evaluation of the information needs of patients with chronic obstructive pulmonary disease following pulmonary rehabilitation: a focus group study. *Chron Respir Dis.* 2007;4(4):195–203.
- [46] Saunders L, Wong M. *Learning theories: understanding how people learn.* (IL): Windsor & Down Press; 2020.
- [47] The Health Foundation Inspiring Improvement. *Developing an enhanced pulmonary rehabilitation programme to promote self management. case study: Cambridge University Hospitals NHS Foundation Trust.* 2013.
- [48] Oates GR, Niranjana SJ, Ott C, et al. Adherence to pulmonary rehabilitation in COPD: a qualitative exploration of patient perspectives of barriers and facilitators. *J Cardiopulm Rehabil Prev.* 2019;39(5):344–349.
- [49] NHS. Personalised care. 2021. <https://www.england.nhs.uk/personalisedcare/>
- [50] Scholes S, Neave A. *Health survey for England: physical activity in adults.* Leeds Health and Social Care Information Centre; 2017.