

COVID-19 Overcoming adversity: Building a remote interdisciplinary neurorehabilitation service during the COVID-19 pandemic

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ABSTRACT

Background

The COVID-19 pandemic necessitated rapid change in neurorehabilitation delivery at the Defence Medical Rehabilitation Centre (DMRC), with a reduction in inpatient capacity.

Aims and method

An interdisciplinary remote working group developed a novel neurorehabilitation telerehabilitation (TR) model. The plan, do, study, act (PDSA) model was used to develop and monitor activity in the changing pandemic context and to identify clinical outputs, key themes and learning points.

Results

Eight PDSA cycles were performed, including video outpatient clinics, multidisciplinary team meetings, virtual ward rounds and TR for patients at home. Ten patients and 21 staff members provided feedback. Qualitative themes emerged including information technology, consultation environment, access to clinical notes and record keeping, clinical considerations, consent, patient and staff feedback, and feasibility.

Conclusion

COVID-19 accelerated the implementation of TR at DMRC, allowing maintenance of service during lockdown. TR was acceptable to patients but placed a significant burden on staff. Practical suggestions for establishing a TR service are provided alongside challenges and limitations.

KEYWORDS: COVID-19, telerehabilitation, neurorehabilitation, telemedicine, multidisciplinary

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Introduction

The COVID-19 pandemic resulted in a precipitous UK 'lockdown' from 23 March 2020, necessitating an immediate and unprecedented shift in methods of healthcare delivery.

The Defence Medical Rehabilitation Centre (DMRC) normally provides neurological rehabilitation to UK military personnel via a 20-bedded inpatient service. Following lockdown, a crisis arose: within 1 week, inpatient numbers were reduced by 60% to eight beds (to allow social distancing in ward and therapy areas), while the workforce suffered a 52% reduction (due to vulnerable staff shielding at home and loss of locum staff). Rapid implementation of an alternative service delivery was required to match clinical demand. The team lacked experience, infrastructure and processes to allow for a sudden seamless transition to remote working but were determined to deliver continuity of care and access to therapy in the lockdown environment.

Telemedicine (TM), is a 'consultation at a distance, using various technologies to achieve connectivity, encompassing teleconsultation, teleconferencing and tele-education', whereas 'telerehabilitation' (TR) refers to remote clinical rehabilitation services including diagnosis, treatment and evaluation.^{1,2} A review of the available published literature across TM and TR for stroke, traumatic brain injury (TBI), multiple sclerosis (MS), spinal cord injury and other neurological conditions found a limited number of studies.^{1,3–7} Systematic reviews were restricted by the low methodological quality of the studies, and heterogeneity of outcomes meant that meta-analysis was not possible.^{5–7} However, the evidence base suggests non-inferiority of TM/TR compared with in-person evaluations in terms of patient and care-giver satisfaction.

Despite promising potential, TR had not been widely adopted within routine practice prior to COVID-19. Regardless of a lack of high-quality evidence to confirm efficacy of TR versus standard therapy, the extraordinary circumstances meant that the threshold for providing evidence-based services was lowered. Instead, the lack of inferior outcomes or adverse events within TR compared with usual practice was considered adequate *proof of concept* for adapting our service.

Using TR, we aimed to continue our multidisciplinary team (MDT) neurorehabilitation service to treat patients across the physical, cognitive and emotional domains of neurorehabilitation, whether staff were present on site at DMRC or shielding at home (as COVID-vulnerable), and likewise if patients were admitted on the ward in one of the fewer beds or discharged home early to continue therapy.

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Individuals with unmet nursing or care needs or those awaiting suitable housing remained as inpatients; patients discharged home early were those for whom this was safe.

Methods

Available technology for TR included video, email and telephone contact via personal electronic devices. Using these, we implemented the following new methods of service delivery: provision of TR to patients discharged early to the community, provision of clinical input to the service from staff working from home and methods of reducing physical contact with high-risk inpatients.

This was analysed as a quality improvement project (QIP) for this novel and untried service delivery in the lockdown environment. A local special interest group was established on 08 April 2020 with representatives from all therapy disciplines, and met regularly via videoconference to consider aspects of TR. The plan, do, study, act (PDSA) model was used to iteratively improve and ensure similar quality of care for patients requiring neurorehabilitation during 2020 compared with previous years.⁸ From 2018–2019, we had pre-pandemic data on numbers of patients seen in consultant outpatient clinics and the number of therapy hours per discipline delivered to each inpatient during their rehabilitation. MDT meetings had previously taken place in person, as did consultant ward rounds and all therapy sessions with patients. Following lockdown, MDT meetings moved to virtual meetings, and ward rounds were performed with one consultant and trainee doctor on site with one consultant shielding at home on a video link. Therapy sessions moved to a combination of in-person and TR. The PDSA model of service development was selected as it was well suited to the rapid pace of change associated with the pandemic, and has been used successfully in other specialties during the pandemic.⁹

MDTs completed simultaneous PDSA cycles during April 2020 – May 2020 to provide a representative sample of the work being carried out. Areas studied were outpatient clinics, ward rounds and MDT meetings, remote occupational therapy (OT), physiotherapy (PT), exercise rehabilitation instructor (ERI) and psychology input following up discharged patients, speech and language therapy (SLT) assessment, and treatment of new patients. A quantitative and thematic analysis was conducted to identify clinical outputs, key themes and learning points.¹⁰

Additionally, patient and staff feedback exercises were completed. Questionnaires (available on request) were developed on Google Forms and sent to the therapy team and patients. Staff feedback focused on practical issues (access to equipment etc) as well as preferences for future working. Patients had an aphasia-friendly questionnaire asked at a single timepoint (August 2020, reflecting patients at different points in their rehabilitation journey) and again at discharge. Patient questionnaires focused on comparison with standard treatment and acceptability of TR. Questionnaires included 1–5 Likert scales and free-text options.

Ethics

As this was a service improvement project, ethical approval was not required.

Results

Eight PDSA cycles sampling 68 patient–clinician relationships during lockdown were obtained from OT, SLT, PT, ERI, psychology

and medical specialties. Observations showed that outpatient clinic activity was completely maintained, and MDT and ward rounds were maintained (albeit with reduced inpatient numbers) by direct switch to video link. OT, PT, ERI and psychology successfully continued input remotely for patients at home via video, telephone and email. SLT demonstrated aspects of assessment and treatment could be carried out by video, but with limitations for those patients with significant language difficulties.

Ten out of 14 (71.4%) patients that were contacted provided feedback. Results encompassed sessions from several professional groups using telephone, email and video. Ninety per cent of patients rated their TR experience between 4 and 5 on a Likert scale graded from 1–5 (where 1 was negative and 5 was positive). Eighty per cent of patients rated communication as appropriate (between 4 and 5) and 70% rated the technology as ‘easy to use’ (between 4 and 5). However, only 50% reported it was equivalent to meeting in person. Sixty per cent would have had to travel >100 miles, with 60% favouring TR over in-person follow-up.

Twenty-one out of 25 (84%) staff members responded, with 91% reporting involvement in remote working. Ratings of remote meetings as positive (between 4 and 5) ranged from 53.9% to 59.5% with positive feedback noted regarding increased flexibility of remote working and ability to multitask.

Qualitative themes identified

Seven distinct themes emerged from the PDSA cycles and questionnaires.

Information technology

Adequate IT infrastructure is pivotal to effective remote working. Due to the speed of change required, early activity relied on ‘bring your own device’ (BYOD) and generic videoconferencing platforms. Negative staff feedback included recurrent IT issues: poor quality connections, lack of training in online platforms, difficulty logging on and Wi-Fi failure. Constant screen time was fatiguing for clinicians, and staff working from home shouldered a significantly increased administrative burden. To develop sustainability, security and consistency in TR, considerable investment in infrastructure has since been made with distribution of laptops, upgrade of internet bandwidth at DMRC and rollout of dedicated clinical and collaborative software (Attend Anywhere and MS Teams).¹¹

Consultation environment

The therapy environment was abruptly altered, providing new opportunities and challenges related to working from and seeing patients in a home environment. It was perceived as more relaxed and informal but with more potential distractions. Household members were inevitably more involved, sometimes this was helpful but sometimes therapists found this obstructive to treatment sessions. PDSA iteration allowed us to develop support literature for patients and families. Clinicians felt obliged to create a ‘professional’ video consulting space in their own homes, which was challenging in some scenarios. Video clinics allowed the outpatient service to continue uninterrupted throughout lockdown and eliminated the need for patients to travel long distances to appointments. Routinely including therapists into consultant outpatient clinics was a positive change, helping with assessment and decision making. Compared with telephone clinics, our experience confirms that video assists non-verbal

communication and provides clinicians with collateral information that might not be forthcoming in a hospital environment (ie we have seen people by video in their own homes, with family and pets, in the workplace, and playing guitar to demonstrate a return of dexterity), gaining additional personal context.

Access to clinical notes and record keeping

Access to contemporaneous medical records while working remotely was vital. DMRC benefits from a shared electronic health record with Defence Primary Care, the Defence Medical Information Capability Programme (DMICP).^{12,13} Following hardware investment, electronic patient records are now available to all staff working remotely.

Clinical considerations

Early PDSA cycles demonstrated that treatment goals and boundaries needed to be clearly defined, a formal review process established and TR patients included in the bed planner. This allowed us to maintain oversight when adding remote patients to an established inpatient service, avoiding an 'out of sight, out of mind' bias.

Consent

Consent for TR was obtained from almost all patients. Clinic 'did not attend' rates were comparable with baseline.

Patient and staff feedback

Qualitative patient feedback highlighted technical difficulties with the internet and software platforms. Patients expressed surprise at how beneficial TR was and rated it entirely acceptable; it is not clear if TR would be so acceptable outside of the pandemic context.

The staff survey produced negative feedback related to platform use, screen fatigue and poor sound quality during group meetings. New training requirements for managing online meetings, altered group dynamics and challenges with timekeeping were raised. Staff reported remote patient sessions as helpful for providing additional context, but persistent technological difficulties generated an additional work burden. Importantly, staff highlighted a need to adapt expectations regarding potential remote therapy outcomes. Overall, staff wanted to keep aspects of remote working (meetings, administrative tasks and ability to dial in external agencies) but identified additional training and hardware as key to providing a high-quality service alongside usual practice.

Feasibility

A considerable variety of remote clinical work was possible; for example, video consultations were a successful substitute for almost all neurorehabilitation outpatient clinics. Modified remote vestibular assessment and treatment was successful. TR has potential in vocational rehabilitation, supporting people returning to the work environment. Our vocational OTs used TR to offer signposting, support patients in exploring alternative career ideas and suggest ways of incorporating compensatory strategies in the workplace. Some aspects could not be accommodated with TR, such as workplace assessments and facilitation of work experience, so it was not a substitute for

all aspects of vocational OT. A hybrid model with on-site staff, plus staff dialling in, worked well for MDT meetings and ward rounds. In an example of remote supervision of junior staff, a trainee doctor could see a patient in person while simultaneously demonstrating their examination findings and obtaining advice from a consultant via video link. Nevertheless, rehabilitation remains a 'hands-on' specialty and we identified limitations of TR and the need to assess patients in person. We re-admitted three TR patients due to lack of progression or for a physical intervention (eg botulinum toxin injections) but, overall, no significant adverse events occurred.

Discussion

Prior to the COVID-19 pandemic, TM was under-adopted with purported barriers to implementation including difficulty with fitting TM into routine practice, organisational resistance to change, problems with building and sustaining TM in addition to existing services, concerns about acceptability by patients, and risk of missing clinical signs.⁵ Furthermore, the lack of a comprehensive evidence base has been highlighted. Undoubtedly, the global pandemic has hugely accelerated remote working across all sectors, including healthcare.

The rapid move in delivering TR came with minimal training or guidance for implementation but our service evaluation demonstrated that, for patients who were discharged home early, TR continuation of PT, ERI, OT (including vocational OT), psychology, and SLT was viable, eased transition to the community and was acceptable by patients. Staff working from home continued clinical input via video into MDT meetings, attending virtual clinics and working remotely with patients in the community.

In rehabilitation medicine, video lends itself particularly well to scenarios when the clinician is making a triaging decision about onwards management or need for inpatient input.¹ Adaptations to consultation style are necessary for video work, including agreeing a back-up plan early in the call and using exaggerated body language; various updated recommendations are now available.^{14–17} A hybrid model, with some staff on the unit being joined by others on video link was useful. Given the scarcity of specialist rehabilitation services in the UK, there is potential for TR to allow centralised specialists to support community-based clinicians.^{18,19}

It is interesting that satisfaction for TR was generally higher in patients than in staff, as reflected in the literature.²⁰ It seems the increased benefits for patients (reduced travel time and increased convenience) are not shared by staff who experience an increase in workload that is not fully offset by the convenience of flexible working.

There have been calls for research into 'techno-stress'; to our knowledge, there is no research highlighting the impact on staff from increased friction, increased screen fatigue, and changes to workload and patterns as part of this adapted way of working.²¹ In our experience, this was a significant source of stress and should influence any future adaptation to service delivery.

Intra-team dynamics were impacted by remote working: reduced team interaction, loss of physical meetings and informal 'corridor chats' affected communication and team morale. Furthermore, general COVID-19-related anxiety and fatigue, use of personal

protective equipment, and loss of holidays, extracurricular activities and socialising placed staff wellbeing under considerable strain. However, many of these issues appear linked to the wider pandemic, rather than TR.

Service development

Various bodies have recently published resources to support clinicians involved in remote working, but these were not available at the start of lockdown.^{15–17,22} The literature suggests that in setting up a TR service, considerations should include selecting the best ways of communicating, listening to patient preferences, and supporting with maintaining motivation and familiarity with technology usage, which we believe we have achieved.²³

Following this experience, our preferred model involves admitting patients for face-to-face assessment initially, setting up TR and then continuing at home. We identified another role for TR in waiting list management: to deliver pre-admission education or signposting to information. Our group developed resources to send out to patients on the waiting list with the simultaneous benefit of providing information while demonstrating that they were 'not forgotten'.

Suggestions for establishing a TR service based on our own experience are given in Table 1.

Future directions

Issues around technology available for rehabilitation have been noted previously, one study from 2010 recommended that technologically advanced TR systems are essential to providing a good-quality service.²⁴ A decade later, our experience has demonstrated that much is now possible with commercial-off-the-shelf technology using standard smartphones, tablets and/or personal computers. With major change comes learning opportunities; we are now moving forwards with robust systems and processes for TR and anticipate that the successful aspects will be incorporated into long-term future practice.

Limitations to study

This is a small quality improvement project from one department within a military rehabilitation unit. Our population is under 55 years old, previously employed, relatively highly functioning and familiar with video-communication. These findings may not be transferrable to a civilian neurorehabilitation service. However, it is recognised that descriptive studies about TR usage and implementation may help to set the stage for future outcomes research and could assist with establishment of TR in other settings.² ■

Table 1. Practical suggestions for establishing a telerehabilitation service

Select TR patients carefully	Design a checklist applicable to the patient group with the purpose of establishing suitability for TR.
Set ground rules	Consider a staff and patient contract, agreed and signed at the start, outlining mutual expectations.
Agree on the communication platform to be used	Conduct trial runs until the patient feels comfortable. Consider creating 'how to' guides.
Consider the therapy environment	Support the patient to set up their home environment for TR.
Advise household members	Provide written information for other household members on how they can support the patient at home.
Assess available technology resources	If using BYOD: > usage should be in line with organisational policy > mandate the use of new accounts / bar use of existing personal accounts to protect staff and patient data.
Have a back-up plan and safety net	Agree a plan for IT failure. Collate emergency contact, GP and crisis team details in advance and store in an easily accessible place. Formulate a psychological risk management plan with appropriate safety-netting.
Consider professional obligations of team members	Ensure staff working remotely have access to clinical records.
Decide on review processes	Agree on outcome measures appropriate to the service. Agree an exit strategy for the end of therapy.
Allow extra time	Accommodate difficulties or delays with IT and administrative time. Encourage regular screen breaks.
Maintain oversight	Keep track of TR patients (eg via 'virtual' bed planning). Ensure regular MDT review and lead clinician oversight.

BYOD = bring your own device; GP = general practitioner; MDT = multidisciplinary team; TR = telerehabilitation.

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