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Changes in physiotherapy services and use of technology for people with multiple sclerosis during the COVID-19 pandemic

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Highlights

- COVID-19 pandemic impacted physiotherapy services for PwMS
- changes relate to number, duration and perceived efficacy of sessions
- to maintain activity levels websites and recorded videos were used
- physiotherapists did not increase the use of remote technologies
- guidelines and training in the use of technology are warranted.

Highlights

- Accessibility and efficacy of physiotherapy services to people with MS was reduced during the pandemic.
- Physiotherapists advised people with MS on web applications and television exercise programs to maintain physical activity levels during the pandemic.
- There was no increase in the use of telerehabilitation or virtual reality technology during the pandemic.
- Main concern in therapists' use of remote technology was lack of physical assessment.

Declaration of Conflicting Interests

The authors declare that there is no conflict of interest.

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Abstract

Background The COVID-19 pandemic has led to reorganization or reduction of neurorehabilitation services for people with multiple sclerosis (PwMS). The aim of this study was to explore the changes in the organizational framework and technology usage in physiotherapy services for PwMS during the COVID-19 pandemic.

Methods This international cross-sectional survey study was designed, developed, and disseminated by RIMS European Network for Best Practice and Research in Multiple Sclerosis Rehabilitation. Physiotherapists from nine countries (Australia, Belgium, Czech Republic, Ireland, Israel, Italy, Norway, Spain, Turkey) who provided physiotherapy services to PwMS, were invited to complete an online survey to compare physiotherapy delivery to PwMS pre and during the pandemic period.

Results The survey was completed by 215 physiotherapists. Accessibility, the average number, length and perceived efficacy of physiotherapy sessions provided to PwMS were significantly reduced during the COVID-19 pandemic ($p=0.001$). Physiotherapists increased the advice of mobile apps, recorded videos for rehabilitation and exercise websites during the pandemic ($p<0.001$) while the use of telerehabilitation and virtual reality technology did not change.

Conclusion There was of a reduction in the number, duration and perceived efficacy of rehabilitation sessions for people with multiple sclerosis during the COVID-19 pandemic while use of remote technologies for physiotherapy did not change. To ensure the continuity of physiotherapy for PwMS with complex healthcare needs also during pandemics, the provision of guidelines and training in telehealth technologies in professional education becomes crucial.

Keywords:

Telerehabilitation, Teleneurology, Physiotherapy service, Continuity of care

1. Introduction

Since March 2020 the COVID-19 pandemic impacted most domains of healthcare systems globally.¹ Critical rehabilitation services for people with chronic diseases were vastly reduced or ceased completely in response to urgent public safety needs.² In some countries, there was up to an 80% reduction in rehabilitation services during the first months of the pandemic, including services for people with Multiple Sclerosis (PwMS).^{3,4} Rehabilitation, a vital harmony in maintaining and/or reducing progression of the disease, had to be reorganized or proposed in alternative technological forms to enable PwMS to continue with their most important therapy goals during the pandemic.^{5,6}

Physiotherapy, along with regular exercise and physical activity, is known to be an important rehabilitation approach for the management of motor and non-motor symptoms of PwMS with a potential effect on the course of the disease.^{7,8,9} Physiotherapy of PwMS is historically carried out in-person and sometimes consists of close contact between the patient and the therapist, especially for more disabled PwMS.^{10,11} Consequently, the risk of infection during the COVID-19 pandemic and related safety measures demanded a particularly challenging reorganizational task in physiotherapy services for PwMS. Prior studies indicate that PwMS experienced barriers to use of physiotherapy also previous to the pandemic, including lack of physical activity and exercise opportunities, lack of disability-aware physical facilities, or minimal contact with knowledgeable healthcare providers.^{12,13,14,15} However, less is known about changes and restrictions on delivery of physiotherapy services, both in-person and in remote digital forms, and physiotherapists' personal attitudes to these changes during the pandemic.¹⁶

We previously reported on changes in content of physiotherapy practice for PwMS in European countries, Australia, Israel, and Turkey, during the pandemic and established that overall physical activities were diminished during the pandemic, and that there was an increase in use of relaxation techniques and fatigue management programs.^{Error! Bookmark not defined.11} Further, diminished use of hands-on physiotherapy techniques and an increase in use of verbal instructions were reported. A continuation of physiotherapy services for PwMS during the COVID-19 pandemic may have been possible through flexibilities in the organizational framework and through the adjunction of remote forms of physiotherapy provision.¹⁷

Information on how the pandemic impacted physiotherapy services is crucial for developing services in the wake of future crises. Particularly when the population in question is one with MS, a health condition requiring lifelong rehabilitation services.¹⁸ The aims of this study were to explore the changes in the organizational framework of physiotherapy services for PwMS during the COVID-19 pandemic, including the use of telerehabilitation and technology. In addition, we investigated the attitude of physiotherapists to pandemic restrictions and the impact on their work conditions.

2. Methods

The Special Interest Group for Mobility (SIG Mobility) of the European Network for Best Practice and Research in MS Rehabilitation (RIMS) [www.eurims.org] developed, designed, and disseminated this cross-sectional survey during the period of December 2020 to July 2021. All project phases followed the Checklist for Reporting Results of Internet E-Surveys (CHERRIES).¹⁹

An online survey was developed for physiotherapists, using input from RIMS-SIG Mobility members, and distributed in nine countries (Australia, Belgium, The Czech Republic, Ireland, Israel, Italy, Norway, Spain, and

Turkey). For more information on development of the survey see Kahraman et al. 2022.¹¹ We gathered data regarding the pandemic's impact on physiotherapy services for PwMS and the use of technologies in physiotherapy practice. The pre-pandemic period was considered as the year 2019, and the pandemic-era as the year 2020. Ethical approvals, informed consent and privacy statements were adapted to local situations.

The final online survey included 50 questions with a mixture of multiple-choice questions, Likert scale and open-ended responses and took approximately 20 minutes to complete. Further information on the content of questions is available in Appendix X. From May to July 2021, the online survey was disseminated to a convenience sample of physiotherapists who provide services to PwMS through websites, databases, social media channels of local rehabilitation centers and networks, local MS professional societies, and the international network of RIMS. Survey completion was anonymous and voluntary, and no incentives were offered.

2.1. Statistical analysis

Descriptive statistics summarized the distribution of therapists' responses for age, gender, professional experience, type of workplace, and type of treatment (in/outpatient). The responses to questions regarding the organizational framework, use of technologies, physiotherapy accessibility and perceived effectiveness of physiotherapy before and during the pandemic were analyzed in the present study.

Data are expressed as absolute scores and percentage distribution based on the total responses. Median (Q1-Q3) values were presented for the continuous data. The Wilcoxon signed-rank test and McNemar's test were used to assess the differences before and during the COVID-19 pandemic for continuous and categorical data, respectively. The significance level was set as $p < 0.05$ for all analyses. Data analysis was performed using the IBM SPSS version 27.0 (IBM Corp, Armonk, New York, USA).

3. Results

Two hundred and fifteen physiotherapists from nine countries (Australia, Belgium, The Czech Republic, Ireland, Israel, Italy, Norway, Spain, and Turkey) completed the survey (Table 1). Seventy eight percent were female and the majority were between 31 and 50 years of age (59%). Ninety percent of them had more than 3 years of working experience (Table 1). They worked in four types of settings: acute hospitals (16%), rehabilitation hospitals (39%), community centers (19%), and private practice (25%), mostly with outpatients (74%).

Before the COVID-19 pandemic, 42% worked primarily with PwMS (>50% of their time), which remained stable during the pandemic period (41%). In terms of the patient-therapist relationship, most physiotherapists (92%) reported involving the patient in the goal setting process for the content of their physiotherapy treatment and this remained similar before and during the pandemic ($\chi^2 = 0.00$, $p > 0.999$).

The median number of physiotherapy sessions provided per week to PwMS was significantly decreased during the pandemic, as well as the total number and duration of sessions ($p < 0.001$) (Table 2). According to physiotherapists, accessibility and effectiveness of physiotherapy provided for PwMS were also significantly decreased during the COVID-19 pandemic, both in hospital and community rehabilitation settings ($p < 0.001$) (Table 2). Most respondents (96%) agreed with the COVID-19-related alteration to practice set in their

workplace, including the use of personal protective equipment (PPE) in face-to-face sessions and data security in online physiotherapy sessions.

Half (51%) of physiotherapists reported that face-to-face sessions with PwMS were not possible during the first wave of COVID-19, while about 20% reported a cessation of face-to-face sessions in subsequent pandemic waves. Nevertheless, a quarter (24%) continued providing their normal face-to-face sessions, regardless of the pandemic. In terms of duration of face-to-face physiotherapy services, overall, this was reduced for approximately two months (IQR) (0-3). Also, physiotherapists working primarily in clinical research reported a two-month cessation of face-to-face research activities (0-5). Regarding the effect of the pandemic on educational practice (e.g., undergraduate students' placement in clinical practice and courses for professional development), there was a break of face-to-face educational practices of, respectively, 5 months (2-11.5) and 8 months (5-12).

Around 40% of physiotherapists did not report any changes during the pandemic while 22% reduced their working hours, 6% increased working hours, 19% were redeployed, while 9% were temporarily shifted to a tele-rehabilitation service working remotely. Only 3% reported being unemployed due to the COVID-19 pandemic. The income of approximately 50% of respondents was also affected.

The use of wearable devices, e.g. FitBit, smart watches, pedometers, did not change during the COVID-19 pandemic (34% versus 37%, respectively) (Figure 1). In contrast, there was a significant increase in, physiotherapists advising PwMS to use apps, exercise classes on TV, exercise recorded videos for physiotherapy and exercise websites ($p < 0.001$).

Approximately 20% of the participants' physiotherapy services shifted from face-to-face physiotherapy work with patients to remote telerehabilitation during the COVID-19 pandemic (Figure 2). Most of the physiotherapists using telerehabilitation experienced difficulties and challenges in its use (85%). The main challenges faced in the use of telerehabilitation during the COVID-19 pandemic were: limited possibility to perform assessment (54%), lack of equipment (43%), and not being able to facilitate proprioceptive cues (35%).

Regarding the use of Virtual Reality (VR) technology before and during the pandemic, about half of the participants (54.4%) never or rarely used it at all. Of those that used these technological platforms as part of their physiotherapy services pre-pandemic, 10.5% increased the usage during the pandemic, 20.6% reported no change in usage, 9.6% reported a decrease in use and 9% were not able to use VR technology anymore during the pandemic. VR technology for physiotherapy, when used, was mainly in face-to-face format (80%), some physiotherapists used a combination of face-to-face format and remote format (17.1%) and a small percentage used it only in the remote format (3.3%).

4. Discussion

This multinational survey study explored the changes in physiotherapy services and use of technology for PwMS during the COVID-19 pandemic. The main findings are set against the backdrop of global reorganization of physiotherapy services for PwMS [Error! Bookmark not defined.11](#), with our study identifying a reduction in the accessibility and effectiveness of physiotherapy practice as perceived by physiotherapists. Interestingly, while there was an overall increase in the use of mobile apps, websites and recorded videos, there was no increase in the use of telerehabilitation or VR technology.

Overall, physiotherapists conformed and agreed with COVID-19-related restrictions, and the pandemic caused only slight variations in their income and working conditions, in line with findings from other healthcare professions providing MS care.^{20,21} We also confirmed previous findings of a reduction in clinical research and in physiotherapy-student clinical education during the pandemic.^{22,23} The latter is of particular concern since clinical education is an important part in ensuring the integrity of the future workforce and research indicates that allied health student placement is tied to a neutral or positive impact on patient outcomes and clinical time.²⁴

Accessibility of both inpatient and outpatient physiotherapy services to PwMS was diminished during the pandemic by about 30-40% in the participating countries. An Italian study of over 9000 PwMS reported an approximate 80% reduction of outpatient care services in spring 2020⁴ which is a somewhat larger reduction than that observed in the present multinational study. This difference in findings may be due to the early prevalence of the COVID-19 pandemic in Italy compared to the rest of the world. Further, inpatient services may have been less impacted than outpatient services. Our findings demonstrate, however, a stronger impact of the pandemic on accessibility than those reported by an American and a Spanish study that reported an approximate 15% disruption of rehabilitation services.^{25,26}

4.1. Use of Technology

Physiotherapists advised PwMS on web applications and television exercise programs to maintain physical activity levels during the pandemic as evidenced by our results. Nonetheless, use of other technological solutions, telerehabilitation through video calls, and other more specialized approaches, such as VR and gaming technology, did not change in response to the pandemic situation. This despite evidence that facilitating remote training can help PwMS maintain motor and non-motor wellbeing.^{27,28,29,30} Our findings are similar to other studies that reported only a small portion of physiotherapy sessions changing to telerehabilitation format during the pandemic.^{31,32,33,34,35}

Many factors, tied to human and technological issues, may be contributing to the low usage of remote rehabilitation even during an epidemic situation such as that lived during the Covid-19 pandemic. One of them may have been the lack of available technology, both in terms of availability of the hardware and of the technological support, especially in the beginning of the pandemic.³⁶

A main concern expressed by our respondents in the use of telerehabilitation or virtual reality approaches were limitations in remote physical assessment. A survey performed in Ireland, disclosed that Irish physiotherapists, while identifying many positive aspects to application of telehealth in rehabilitation during the Covid-19, considered the limited scope for physical assessment as a major disadvantage, concordant with considerations of our respondents.³⁷ Regarding this problem of online physical assessment, more accurate quantitative information through remote technology is becoming available with, for example, studies reporting on use of haptic cues with virtual objects³⁸ Further, the use of patient reported outcome measures is being increasingly advocated and can be applied both in face to face and in remote situations.^{39,29} It's important that these remote assessments be developed and validated through collaborations between technical and clinical professionals and that the effectiveness and validity of them be ascertained through clinical trials involving persons with neurological disorders.

The low usage of telerehabilitation may also partly be attributed to both therapist and patient reluctance, as previous research on the views of remote technology for healthcare purposes evidenced patients' concern for the reduced contact with healthcare professionals and physiotherapists preference for face to face rehabilitation, at least in non-pandemic situations.^{40,10,11} Rehabilitation through VR technology was, in

fact, most often carried out in face to face situation, both prior to and during the pandemic, as documented in one of our recent study.¹¹ One solution to this concern might be the application of a blended approach, where possible, with patients coming into the clinic for baseline and post rehabilitation assessment while carrying out rehabilitation sessions through remote technology or with part of the sessions carried out in presence and part of them through remote modes.^{29,41}

Physiotherapy face to face remains an essential primary rehabilitation service provided to PwMS and the personal contact with health professionals in any type of rehabilitation, also through remote technology, is an important part of health care services provided. Nonetheless, the option of remote physiotherapeutic opportunities is essential in order to increase the overall availability of rehabilitation for PwMS in continuity of care and to reduce the risk of Covid-19 contact transmission for frail persons. Remote alternatives are important also in view of WHO's Preparedness plan to support countries in future disaster management.^{35,42,43} Two recent studies from Scandinavia, suggest that physiotherapists have a positive perception and willingness to increase their skill in the use of remote telehealth technologies.^{17,33} This is important since collaboration of physiotherapists is vital for further development and effective use of these therapeutic strategies.⁴²

In the above context, more emphasis is indicated on available user-friendly technology allowing for more accurate motor and non-motor assessment, technological assistance, as well as, education in the use of online technologies and training opportunities for physiotherapists and physiotherapist students.⁴⁴ Along with these aspects reimbursement policies for remote technological rehabilitation may need to be reorganized in various countries.

4.2. Limitations

We are aware that the present study is not free from limitations. Firstly, the results cannot be generalized to all physiotherapy services of the participating countries since this was an online survey that did not recruit all representative physiotherapists. Secondly, the survey does not give the precise reasons for the changes in physiotherapy delivery, though this was implied to be due to the pandemic restrictions.

Moreover, due to the pattern of the COVID-19 pandemic, characterized by a series of waves at different time points between countries, concurrently, with different governmental restrictions changing frequently, we did not match the therapist's response with the exact restriction per country. Yet another limitation of our study may be nonparticipation bias. Since data collection was carried out anonymously, it was not possible to understand if responders differed from non-responders. Finally, even though a panel of experts had formulated the online questionnaire, it would have been beneficial to utilize widespread, standardized, and validated scales. However, no such scales existed at the beginning of the study, and the time frame was too short for a comprehensive developmental process of questionnaires.

5. Conclusions

The Covid-19-pandemic impacted upon physiotherapy services for PwMS in Europe, Australia, Turkey and Israel in terms of a reduction in the number, duration and perceived efficacy of rehabilitation sessions. Physiotherapists advised PwMS on the use of websites and recorded videos to maintain activity levels during the pandemic while there was no increase in the use of remote physiotherapeutic technologies. To optimize the potential of telerehabilitation and VR technology in providing additional access to

physiotherapy and continuity of care for PwMS, availability of the technology hardware with validated motor and nonmotor assessment, along with guidelines and training in its use, are warranted.

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Table 1. Demographics of the study sample (n=215)

	Total (n=215) 100%	Australia (n=7) 3%	Belgium (n=9) 4%	Czech Republic (n=65) 30%	Ireland (n=14) 7%	Israel (n=10) 5%	Italy (n=30) 14%	Norway (n=30) 14%	Spain (n=32) 15%	Turkey (n=18) 8%
Age, years										
20-30	50 (23.4)	1 (14.3)	4 (44.4)	10 (15.4)	0 (0.0)	3 (30.33)	7 (23.3)	7 (23.3)	8 (25.0)	10 (55.6)
31-40	64 (29.9)	3 (42.9)	1 (11.1)	23 (35.4)	4 (28.6)	4 (44.4)	14 (46.7)	4 (13.3)	7 (21.9)	4 (22.2)
41-50	63 (29.4)	2 (28.6)	2 (22.2)	21 (32.3)	6 (42.9)	2 (22.2)	3 (10.0)	12 (40.0)	11 (34.4)	4 (22.2)
51-60	29 (13.6)	1 (14.3)	1 (11.1)	10 (15.4)	3 (21.4)	0 (0.0)	6 (20.0)	3 (10.0)	5 (15.6)	0 (0.0)
Over 60	8 (3.7)	0 (0.0)	1 (11.1)	1 (1.5)	1 (7.1)	0 (0.0)	0 (0.0)	4 (13.3)	1 (3.1)	0 (0.0)
Gender										
Male	48 (22.3)	1 (14.3)	2 (22.2)	12 (18.5)	2 (14.3)	2 (20.0)	10 (33.3)	11 (36.7)	5 (15.6)	3 (16.7)
Female	167 (77.7)	6 (85.7)	7 (77.8)	53 (81.5)	12 (85.7)	8 (80.0)	20 (66.7)	19 (63.3)	27 (84.4)	15 (83.3)
Professional experience, years										
0-2	22 (10.2)	0 (0.0)	1 (11.1)	7 (10.8)	0 (0.0)	3 (30.0)	2 (6.7)	2 (6.7)	3 (9.4)	4 (22.2)
3-10	58 (27.0)	2 (28.6)	3 (33.3)	18 (27.7)	1 (7.1)	4 (40.0)	10 (33.3)	6 (20.0)	5 (15.6)	9 (50.0)
11-20	69 (32.1)	5 (71.4)	1 (11.1)	24 (36.9)	6 (42.9)	0 (0.0)	10 (33.3)	11 (36.7)	11 (34.4)	1 (5.6)
Over 20	66 (30.7)	0 (0.0)	4 (44.4)	16 (24.6)	7 (50.0)	3 (30.0)	8 (26.7)	11 (36.7)	13 (40.6)	4 (22.2)
Type of center										
Acute hospital / center	34 (16.0)	0 (0.0)	0 (0.0)	20 (32.3)	4 (28.6)	0 (0.0)	1 (3.3)	1 (3.3)	0 (0.0)	8 (44.4)
Rehabilitation hospital / center	82 (38.7)	0 (0.0)	7 (77.8)	17 (27.4)	0 (0.0)	10 (100)	11 (36.7)	15 (50.0)	17 (53.1)	5 (27.8)
Community center / services	40 (18.9)	1 (14.3)	0 (0.0)	3 (4.8)	5 (35.7)	0 (0.0)	8 (26.7)	6 (20.0)	14 (43.8)	3 (16.7)
Private clinic / practice	53 (25.0)	4 (57.1)	2 (22.2)	22 (35.5)	4 (28.6)	0 (0.0)	10 (33.3)	8 (26.7)	1 (3.1)	2 (11.1)
Other	3 (1.4)	2 (28.6)	0 (0.0)	0 (0.0)	1 (7.1)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Type of treatment										
Inpatients	43 (20.7)	-	2 (22.2)	24 (36.9)	2 (14.3)	0 (0.0)	6 (20.0)	0 (0.0)	6 (18.8)	3 (16.7)
Outpatients	153 (73.6)	-	7 (77.8)	36 (55.4)	11 (78.6)	10 (100)	23 (76.7)	30 (100.0)	22 (68.8)	14 (77.8)
Both	12 (5.8)	-	0 (0.0)	5 (7.7)	1 (7.1)	0 (0.0)	1 (3.3)	0 (0.0)	4 (12.5)	1 (5.6)

Table 2. Organization, accessibility to physiotherapy and perceived effectiveness of physiotherapy before and during the COVID-19 pandemic (n=215)

	Before pandemic	During pandemic	
	(median, IQR)	(median, IQR)	p
Length of session (minutes)	45 (45-60)	45 (40-60)	< 0.001
Number of sessions per week	2 (1.5-3.3)	2 (1-3)	< 0.001
Total number of sessions	15 (10-29.3)	12 (8-21)	< 0.001
Accessibility of physiotherapy in hospital setting*	8 (6-9)	5 (3-7.8)	< 0.001
Accessibility of physiotherapy in community setting*	7 (5-9)	5 (3-7)	< 0.001
Perceived effectiveness of physiotherapy (all settings)**	8 (7-9)	7 (5-9)	< 0.001

IQR: interquartile range

*Likert scale: 0 is not accessible, 10 is accessible for all; **0 is no effect, 10 is high effect

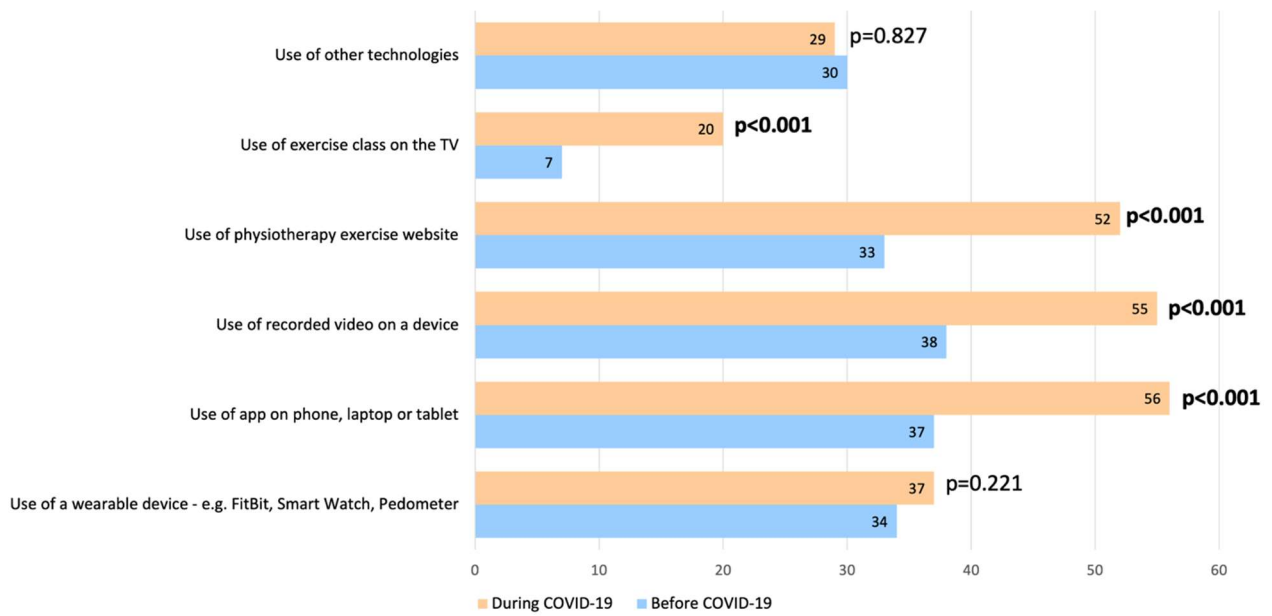


Figure 1 Use of technologies for physiotherapy prior to and during the COVID-19 pandemic. Values are presented as percentages

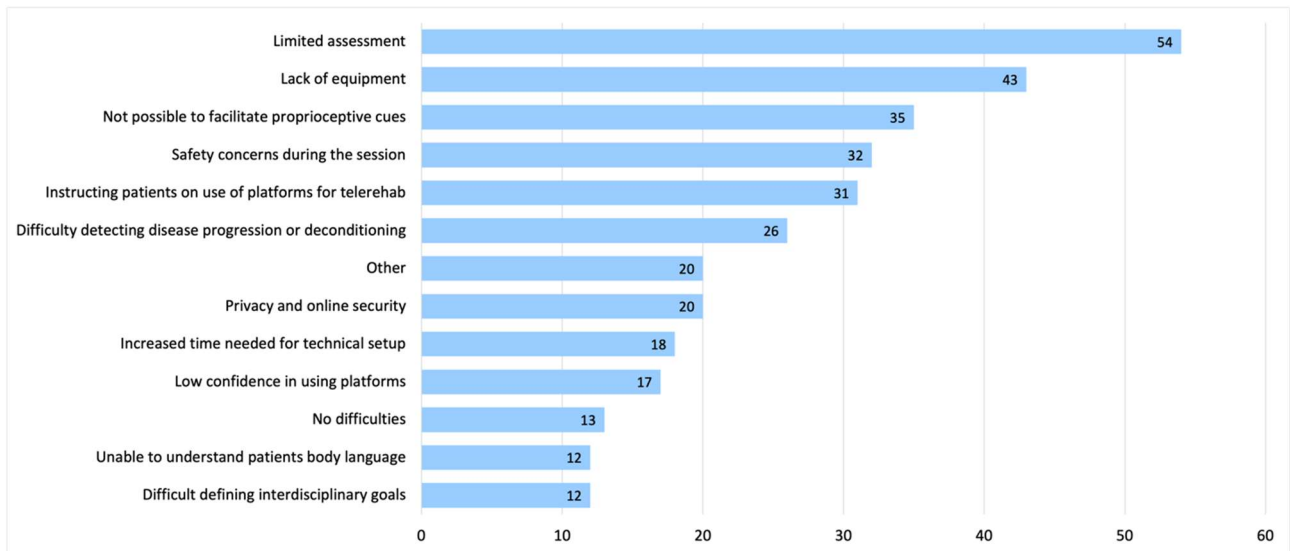


Figure 2 Challenges reported by physiotherapists in the use of telerehabilitation during the COVID-19 pandemic. Values are presented as percentages of physiotherapists expressing the item as a challenge.