Original Article

Physiotherapists' Perceptions and Challenges in Adopting Telerehabilitation in Rwanda: A Cross-Sectional Study

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Abstract

Background
Digital health is increasingly recognized as a way to deliver healthcare services worldwide, including telephysiotherapy. In 2020, physiotherapists (PTs) were encouraged to adopt digital practices, but their attitudes and preparedness significantly influence telerehabilitation uptake.

Objective
This study evaluated Rwandan PTs perceptions of telerehabilitation and identified barriers to its adoption.

Methodology
Cross-sectional quantitative survey was conducted using a digital questionnaire distributed to 292 Rwandan PTs. The survey covered demographics, views on telerehabilitation, readiness to adopt it, and perceived obstacles.
Descriptive statistics were used to summarize participant demographics and responses. Furthermore, a logistic regression analysis was conducted to identify factors influencing the adoption of telerehabilitation, with adoption as the dependent variable.

Results
Hundred and sixty-eight participants completed the survey form (response rate = 57.5%). Findings showed that 86.9% of PTs acknowledged the internet's importance in rehabilitation, and 72.2% were interested in integrating telerehabilitation into their services. Logistic regression results revealed that a significant gender gap exists, with male PTs less likely to adopt telerehabilitation, while the use of accessible technologies like WhatsApp video, desktops, and phone calls were strong predictors of adoption. Main barriers identified were lack of training (71.14%) and high cost of telerehabilitation tools (55.35%).

Conclusion
Overall, Rwandan PTs demonstrate a positive attitude toward telerehabilitation but its adoption is hindered by a significant gender gap, with male practitioners being less likely to adopt it. The use of accessible technologies like WhatsApp and desktops strongly predicts adoption. To ensure successful integration, strategies must address key barriers such as limited training and high equipment costs by leveraging existing platforms and specifically targeting male practitioners.

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Introduction

Telerehabilitation involves utilizing information and communication technologies for the delivery of rehabilitation services to individuals regardless of their geographical location.[1] Services provided by the use of telerehabilitation may include activities such as assessment, monitoring, intervention, supervision, education, counselling and other various components. [2]
The World Confederation for Physical Therapy and the International Network of Physiotherapy Regulatory Authorities have actively encouraged physiotherapists (PTs) to advocate for remote physiotherapy, aiming to enhance the accessibility of rehabilitation services and guiding principles for physiotherapists (PTs) engaging in digital practice were laid down in 2020.[3] However, the level of adoption of telerehabilitation may differ from country to country or from one PT to another due to different reasons (i.e., resistance to the changes, difference in perception, etc.).

Previous studies have explored the views and acceptance of remote rehabilitation among healthcare professionals.[4–11] and they have largely demonstrated that healthcare professionals held positive views and expressed high levels of satisfaction.[5, 7, 11–13] This satisfaction was attributed to several advantages offered by remote rehabilitation, including increased flexibility in working hours and locations, alleviation of physical constraints associated with traditional clinical settings, cost-effective care delivery, and reduced patient commuting times. Additionally, the comfort level of PTs with the use of remote rehabilitation for assessments and care delivery played a significant role in technology adoption.[14, 15]

Nevertheless, the need for physical contact between PTs and patients is perceived as a major obstacle to the widespread adoption of remote rehabilitation.[15] Despite advancements in remote rehabilitation systems, no satisfactory substitute for hands-on practice has been identified. Other impediments to integrating remote rehabilitation include limited technology related (i.e., internet connection, computer proficiency), practical (i.e., difficulty positioning the camera), patient related (i.e., health status, age of the patient, lack of a smart phone/ computer and the difficulties of accessing the internet for the beneficiaries), practitioner related (i.e., lack of technical skills), and organizational (i.e., lack of access to technology).[16,17] Concerns related to patient privacy and safety also hinder the widespread adoption of remote rehabilitation.[14] In addition, legal and regulatory constraints have made many PTs hesitant to provide online consultations.[18] To address these issues, previous research has called for the development of pragmatic policies by governments to promote the use of remote rehabilitation services.[15]

People with physical disabilities in Rwanda face challenges in accessing rehabilitation services, primarily due to transportation costs. Moreover, the shortage of PTs and limited rehabilitation facilities further exacerbate the problem, making it difficult to meet the needs of a substantial number of patients requiring rehabilitation services. Therefore, this situation needs effective strategies to find possible solutions. To tackle the shortage of healthcare providers, Rwanda has adopted digital healthcare among other strategies but, no documented telerehabilitation services are offered in Rwanda.

Understanding the perspectives of healthcare professionals on the implementation of telerehabilitation is crucial before its adoption.[7] However, there is limited literature available on PTs' views and readiness to utilize remote rehabilitation in low-income countries, including Rwanda. Given these barriers, this study aimed to assess physiotherapists' perceptions on the use of telerehabilitation and to identify the obstacles affecting its adoption in Rwanda.

Methods

Study design and settings

A cross-sectional study was conducted, encompassing the entire Rwandan territory. The study's objectives were achieved through the implementation of a quantitative approach.

Study population and sample size

The study targeted all 292 licensed PTs registered with the Rwanda Allied Health Professional Council, legally authorized to provide rehabilitation services in Rwanda, and they were in the Rwanda Physiotherapy Community Organization's WhatsApp platform. The questionnaire included instructions for only licensed PTs to participate, requiring them to confirm their license status by ticking a box and providing their license numbers for verification. Among 292 licensed PTs, only 168 PTs completed the online questionnaire form.

Data collection procedure

The survey employed a validated and reliable structured questionnaire previously used in studies assessing PTs' views and readiness to adopt telerehabilitation amid the COVID-19 pandemic in Kuwait and India.[7,13] Following a review of the initial questionnaire by five senior PTs, some questions were adapted to suit the physiotherapy profession and for easy readability. The modifications made are as follows: In general, the neutral option was added to the Likert scale. In the sociodemographic section, “prefer not to say on gender and field of work, highest level of education and workplace (i.e., public versus private) were added, while years of experience started from less than 5 years instead of 10 years. Furthermore, nationality was removed.In section 2, related to technological background information, the following additions were made, including electronic devices used for telerehabilitation and delivery mode used for telerehabilitation. For section 3 related to perceptions about telerehabilitation the following changes were made: wording for physical problems changed to physical impairment (Q15), medical care services changed to physiotherapy services (Q16), for Q20 (question No 20) the words “hospital” was replaced by “work place” and the word “healthcare” was changed to rehabilitation. In Q31, querying about barriers to the use of telerehabilitation, an option for others/ please specify was added. Finally, the survey comprised 31 items distributed across five sections. The first section gathered demographic information, including age, gender, workplace type, and years of experience. Section 2 gathered information about prior use of information communication tool in general and for telerehabilitation. Section 3 gauged PTs' perception on telerehabilitation system. Section 4 collected data on comfort with the use of technology while Section 5 evaluated willingness about the use of telerehabilitation and perceived obstacles to its adoption.

An online approach was adopted by using a Google Docs-based web survey to collect data. The online survey was chosen for its convenience for easily reaching a large number of PTs through a shared link. Collaboration with the president and legal representative of the Rwanda Physiotherapy Organization (RPTO) facilitated the distribution of the questionnaire link, which was shared within a WhatsApp group of all PTs in Rwanda. In addition, reminder messages emphasizing the importance of the study were sent three times a week, with data collection taking place over one month. Respondents were assured of confidentiality and anonymity of their identity and responses. On average, it took about 15 minutes for each participant to finish the survey.

Data analysis

Information was gathered within a Microsoft Excel spreadsheet and subsequently transferred to SPSS version 20. SPSS served as the tool for data storage, querying for monitoring, and formatting for statistical analysis.Initial data analysis involved descriptive statistics to summarize the characteristics of the study population and their responses.

This included calculating frequencies and percentages for all demographic variables and responses to the survey items related to technology use, perceptions of telerehabilitation, and perceived barriers. To identify factors influencing the adoption of telerehabilitation, a logistic regression analysis was performed. The dependent variable was the adoption of telerehabilitation (coded as a binary outcome), while the independent variables included a range of factors such as gender, age, education, and the use of specific communication technologies (e.g., WhatsApp video, desktops, and phone calls).

Both a crude (unadjusted) logistic regression and a reduced adjusted logistic regression were conducted. The crude analysis examined the unadjusted association between each independent variable and the odds of adopting telerehabilitation. Subsequently, an adjusted model was built to determine the independent effect of a select number of variables that were found to be most influential or theoretically relevant, while controlling for other factors. This approach provided a more robust understanding of the relationships between the predictors and the outcome.

Ethical clearance

The survey obtained ethical approval from the Institutional Review Board (IRB) at the University of Rwanda (ref: CMHS/IRB/489/2022). Authorization was granted through a letter (Reference: President/11/04/01/2023) from the President of the Rwanda Physiotherapy Organization (RPTO) to distribute the web link containing the questionnaire on the Rwanda Physiotherapist Community WhatsApp platform. Online informed consent was obtained from participants through a consent form that addressed key aspects, including the study's title, purpose, participant selection, voluntary participation, procedures, duration, potential risks and benefits, confidentiality, disclosure of results, and contact details for inquiries about participants' rights. Participants had the opportunity to agree or refuse to participate after reviewing the consent form.

Results

Demographic information of participants

Out of the distributed forms, 168 were completed, resulting in a response rate of 57.5%. The demographic details of the participants are presented in Table 1. The findings indicated that a significant proportion 72.02% (121/168) of the respondents were male. Additionally, Most of PTs 55.4% (93/168) were working in public hospitals and the majority 58.9% (99/168) of PTs were under 35-years. In addition, 36.9% (62/168) of the respondents had less than five years of practice and 36.9% of the PTs had between six and five years of practice.

Table 1. Participants demographic

Variable	n(%)
Gender	
Female	47 (28)
Male	121 (72)
Age (in years)	
Less than 35	99 (58.9)
35-50	64 (38.1)
51-60	3 (1.8)
Above 60	1 (0.6)
Missing	1 (0.6)
Nature of workplace	
Public	93 (55.4)
Private	75 (44.6)
Years of experience (in years)	
Less than 5	62 (36.9)
10-Jun	62 (36.9)
30-Nov	39 (23.2)
More than 20	4 (2.4)
Missing	1 (0.6)

Prior use of information and communication tool and experience with telerehabilitation

Most of PTs stated that at work, every time they used a computer, the internet and email, while slightly over a third reported that they never used any telerehabilitation techniques in their workplace (Figure 1A).

Regarding the device used, the majority reported using a smartphone as an electronic device for telerehabilitation (Figure 1B). Over the half of the respondents reported that they used phone calls as delivery mode for telerehabilitation; 25% of the respondents used WhatsApp video; 4.8% of the respondents used Google Meet, and only 3% of respondents used Zoom Cloud Meetings as delivery mode for telerehabilitation (Figure 1C).

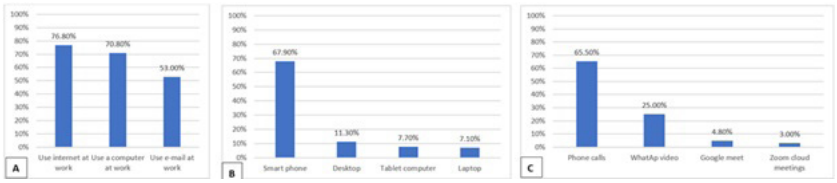

Figure 1. Proportion of participants with prior experience with the use of ICT. A: technology tool used by respondents; B: Type of ICT device used for providing telerehabilitation; C: Delivery mode for telerehabilitation.

Perceptions of PTs on telerehabilitation

The results of perceptions of PTs on the use of the remote rehabilitation system are summarized in Figure 2 below. The findings indicated that 86.9% of PTs expressed agreement or strong agreement regarding the potential role of information and communication technology, including the use of the internet in rehabilitation. However, a significant proportion (34.5%) of respondents indicated that information and communication technology applications were not accessible in their workplace.

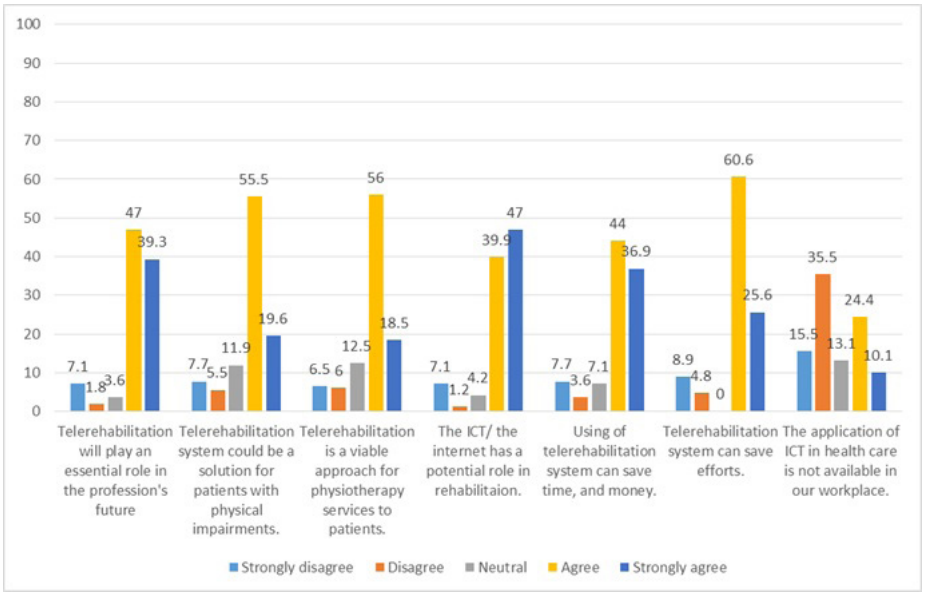

Figure 2. Physiotherapists' perception of the use of the telerehabilitation system

Readiness to practice telerehabilitation

The results of PTs' willingness to use the remote rehabilitation system are shown in Figure 3 below. They show that most of the participants (85.1%) expressed willingness to watch live physiotherapy sessions as they occur.

In addition, 81.6% of respondents indicated their willingness to utilize telerehabilitation systems for consulting advice from their colleagues practicing in other hospitals.

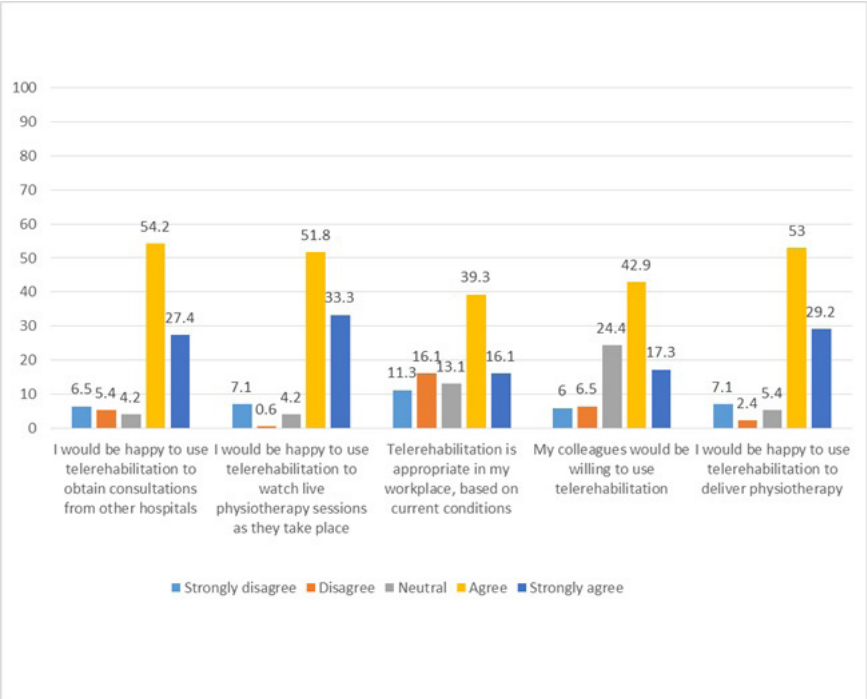

Figure 3. Readiness of the physiotherapists to use the telerehabilitation system for providing physiotherapy services

Obstacles to the use of telerehabilitation systems

Table 2. Obstacles to the practice of telerehabilitation

Obstacles	n (%)
Inadequate training to engage in telerehabilitation	120 (71.42)
Elevated expenses associated with equipment	93 (55.35)
Absence of linkage between information and communication technology experts and clinicians	78 (46.42)
Unavailability of user-friendly software	74 (44.04)
Safeguarding patient privacy and ensuring the confidentiality of their data	55 (32.73)
Perception of an augmented workload	39 (23.21)
Inadequacy of telerehabilitation infrastructure	32 (19.04)
Insufficient recognition of clinical utility	29 (17.26)
Unfavorable attitudes among involved staff	23 (13.69)
Limited awareness regarding telerehabilitation	10 (5.95)
Resistance to change from both physiotherapists and patients	8 (4.76)
Absence of a tariff structure for telerehabilitation	5 (2.97)

The participants identified several barriers to the adoption of telerehabilitation, including a lack of adequate training for practicing telerehabilitation (reported by 120 out of 168 participants) and the high cost of equipment (93 out of 168 participants). Table 2

Factors influencing the adoption of telerehabilitation

The logistic regression analysis aimed to identify factors influencing the adoption of telerehabilitation (the dependent variable) among physiotherapists as it shown in Table 3. The Table includes the odds ratio and 95% confidence interval for each variable, with the reference category indicated with "(ref)".

Table 3. Logistic Regression Results

Variable and Response Option	Crude Odds Ratio (95% CI)	Adjusted Odds Ratio (95% CI)
Gender		
Female (ref)		
Male	0.49 (0.25–0.98) *	0.34 (0.14–0.86) *
Nature of Work		
Public (ref)		
Private	1.58 (0.86–2.92)	
Years of Experience		
Less than 5 (ref)		
6-10	1.14 (0.32–4.08)	
11-20	1.13 (0.31–4.06)	
>20	1.72 (0.28–10.55)	
Used computer at work		
Never (ref)		
Often	0.98 (0.72–1.34)	
Used internet at work		
Never (ref)		
Often	0.87 (0.61–1.24)	
Used email at work		
Never (ref)		
Often	0.78 (0.57–1.06)	
Use Smartphone		
No (ref)		
Yes	1.30 (0.68–2.50)	
Use Laptop		
No (ref)		
Yes	2.39 (0.69–8.28)	
Desktop		
No (ref)		
Yes	4.98 (1.58–15.72) **	5.31 (1.32–21.44) *
Use Tablet		
No (ref)		
Yes	1.34 (0.43–4.19)	
Use WhatsApp video		
No (ref)		
Yes	3.39 (1.61–7.14) **	6.93 (2.47–19.50) **
Use Phone Calls		
No (ref)		
Yes	2.20 (1.14–4.25) *	5.34 (2.01–14.14) **
Telerehabilitation is a solution for patients with physical impairment		
Neutral) (ref)		
Agree	1.60 (0.33–7.72)	
Strongly Agree	3.81 (0.68–21.42)	

- A single asterisk (*) indicates a p-value < 0.05.
- A double asterisk (**) indicates a p-value < 0.01.

The results from both the crude and adjusted models provided a comprehensive view of these relationships.

The crude analysis showed that being a male physiotherapist was associated with a statistically significant 51% lower odds of adopting telerehabilitation compared to their female counterparts. The use of specific technologies like desktops, WhatsApp video, and phone calls were all found to be strongly and significantly associated with higher odds of adoption.

The adjusted analysis provided a more robust and reliable picture by controlling for confounding factors. This model confirmed and strengthened the findings from the crude analysis. Specifically, being male remained a significant negative predictor, independently associated with 66% lower odds of adoption compared to females. The strong positive association with technology use was also confirmed, with the use of WhatsApp video showing an impressive adjusted odds ratio of 6.93, meaning its use is independently associated with a nearly seven-fold increase in the odds of adoption. Similarly, using a desktop and phone calls were also found to be independently associated with a more than five-fold increase in the odds of adoption.

The most significant and consistent predictors of telerehabilitation adoption were gender and the use of accessible communication technologies.

Discussion

The primary aim of the study was to assess physiotherapists' perceptions for telerehabilitation and to identify the obstacles affecting its adoption. The present study results showed that the PTs had positive views about the practice of digital physiotherapy, regardless of the lack of adequate preparation for physiotherapy practice, which was reported as the main barrier to the practice of remote rehabilitation. The findings of the current study are similar to those from the previous study conducted among PTs in India, Kuwait and Greece.[6, 7,13]

Regarding the perception of PTs on the use of telerehabilitation, the current study showed that 86.9% of physiotherapists agreed that ICT/Internet plays a significant role in rehabilitation. This study is comparable with the other studies conducted in India and Kuwait where the percentages of the respondents were even higher, i.e. 92.3% and 96% respectively.[7,13]

In addition, the present study results revealed that most PTs (80.6%) reported that remote rehabilitation can save effort, time and money. Similar findings were reported in Kuwait, where 83.3% of physical therapists indicated that telerehabilitation can save effort, time, and money.[7] Other studies have also highlighted the benefits of telerehabilitation, which include providing a profitable means to provide care and reduction in the travel time to attend clinics.[6,7] All of the findings of the above-mentioned studies show that the use of telerehabilitation can plays a remarkable role in provision of rehabilitation services to the individuals in need. Therefore, telerehabilitation services should be put to high consideration as a means of providing rehabilitation interventions.

In the current study, the respondents expressed positive willingness to use telerehabilitation modalities where 72.9% of physical therapists expressed the willingness to adopt remote rehabilitation. This percentage is lower compared to surveys from India and Kuwait; where 77.12% and 90.06% of physical therapists were willing to use telerehabilitation respectively.[7,13] However, only 42.1% of Greek physical therapists intended to continue working remotely after the COVID-19 pandemic.[19] On the contrary, a study conducted during the COVID-19 pandemic to assess the perceived feasibility and willingness to use

telerehabilitation among rehabilitation professionals and patients with musculoskeletal problems in Belgium and France revealed that both PTs and patients were not in favor of it where they found that only 1% of physiotherapists were open to using telerehabilitation, while 50% believed that they will never use it.[4] In a Swiss study, most PTs (43.8%) said they had no intention of working remotely in the future.[9] On the other hand, Swedish PTs working with older adults or patients with neurological conditions generally had a positive attitude towards the use of remote rehabilitation and were open to learning more about it. As there are contrasting numbers in the willingness of the use of telerehabilitation, future research should explore the perspectives of PTs working in different rehabilitation settings but also with considering different fields of physical therapy practice.[11]

In the current survey, 82.3% of physical therapists expressed a willingness to use telerehabilitation to deliver physiotherapy. Furthermore, 60.2% of PTs reported that they expect their colleagues would be willing to adopt remote rehabilitation. This study is in accordance with the study carried out in Kuwait and India where 89% and 71.2% of PTs were open to using it for delivering care respectively. Moreover, 83.3% of PTs in Kuwait believed their colleagues would be open to using telerehabilitation, similarly, in India, 78.8% of the respondents expressed the same expectation.[7,13] Whereas only 30% of PTs believe that telerehabilitation would be beneficial for their patients' treatment in Belgium and France.[4] In general, there is a net difference in proportion of willingness of PTs believing in the beneficial impact of telepathology depending on geographical location. Therefore, continued advocacy and documented proof of benefit of telerehabilitation are needed. Still, it may be important to consider the use of telerehabilitation whenever possible to provide patients with additional choices and PTs with additional resources to support them in their practice.[13]

Our logistic regression analysis provided further insights into the factors influencing the adoption of telerehabilitation. The findings consistently revealed a significant gender gap, with male physiotherapists having a lower likelihood of adopting remote services compared to their female counterparts. Conversely, the use of accessible and familiar technologies such as desktops, WhatsApp video, and phone calls were found to be strong positive predictors of adoption. This suggests that the readiness to adopt telerehabilitation is not only a matter of perception but is also strongly tied to current technology use and gender.

Given that divergence in opinion about utility of the use of telerehabilitation, it is important to identify the barriers that prevent people from using remote rehabilitation so that they can be addressed. In the current survey, the primary barrier preventing the majority of physical therapists (71.42%) from implementing remote rehabilitation in their workplace was the lack of appropriate training. These study findings are comparable with those from India and Kuwait where inadequate training was also identified as the main obstacle, with the significant percentage of 54.2% of PTs in India and 38% in Kuwait.[7,13] Likewise, in Saudi Arabia, the main difficulties in using remote rehabilitation in physiotherapy clinics were technological problems and staff skills where it was 11% of other reported barrier.[20] Hence, to prepare PTs to deliver remote rehabilitation safely and efficiently, massive open online courses and other readily available training resources need to be created.[21] and ongoing training should be provided to ensure the best use of remote rehabilitation systems and to overcome barriers such as staff resistance.[7]

The price of remote rehabilitation equipment was a notable barrier identified by 55.53% of PTs in the present study. This finding is higher compared to the results reported in Kuwait and Indian where 26.7% and 11.9% of the PTs respectively, reported that there was high cost of equipment.[7,13]

More to that, some PTs reported that they did not have information and communication technology (ICT) applications in their workplace. This result is consistent with the findings from previous research, where PTs stated that inadequate and underdeveloped infrastructure was perceived as a challenge to not using remote rehabilitation.[15,22] Furthermore, in the present study, 44.04% of PTs identified the lack of user-friendly software as a barrier. This is higher than the findings from a survey in India, where 34.7% of PTs reported technological readiness issues, including the absence of networks, equipment, and accessible software, as obstacles. In Kuwait, 38.4% of PTs similarly cited the lack of user-friendly software as a limitation to using telerehabilitation.[7,13] But in Brazil, the most frequently cited barriers were internet access, availability, and adequate telecommunication devices. [23] Technical difficulties, unreliable internet connections, and a lack of feedback were obstacles to the use of telerehabilitation in Canada.[24] To address this issue, the telerehabilitation equipment should be available and affordable to accelerate the use of telerehabilitation. Additionally, it was suggested that remote rehabilitation could be implemented in environments with limited resources by repurposing current technology, such as smartphones and other telecommunications tools.[7]

In the current study, 46.42% of PTs frequently pointed out the lack of collaboration between information and communication technology specialists and clinicians as a notable obstacle. This findings was low compared to the results from survey in Indian where 52.5% of PTs noted the same barrier but it was 40% of PTs in Kuwait.[7,13] A multidisciplinary approach to remote rehabilitation is therefore essential.[25] To reach an agreement, information and communication technology specialists need to be consulted and PTs need to communicate their needs.[26] This partnership may improve the effectiveness and delivery of the therapy offered through remote rehabilitation, and health informatics specialists should be involved to manage this process.[13]

The present study results show that client confidentiality and the concealment of their information were also among the notable concerns where PTs (32.75%) identified this issue as barriers to the practice of telerehabilitation. This percentage is low compared to the findings from Kuwait where 38% of PTs highlighted that maintaining client confidentiality and safeguarding their information posed a significant barrier to the adoption of remote rehabilitation.[7] In addition, the provision of telemedicine services may threaten patient safety and privacy, according to previous studies that have identified these concerns.[14] Some managers also raised concerns about staff confidentiality, including the refusal of almost female PTs to identify themselves during audio-visual interviews in the company of male carers to address privacy concerns. [7] Previous studies have suggested that guidelines should be developed, and these include high quality security applications that can be uploaded to smartphone devices to make them suitable for half the work related to the facility; suggest a range of trusted smartphone applications that can be used for medical practice; and maintain the legal right for patients and clinicians alike.[13]

Even if some PTs are still hesitating to adopt telerehabilitation due to different causes, advocacy, availability of affordable telerehabilitation equipment, proof of benefit, international guidelines and motivational strategies for both patients and health care providers are key components for integration of telerehabilitation into routine healthcare services.

Limitation of the study

This survey was unique in that it included PTs from different settings in Rwanda. It achieved a high response rate and included professionals from both public and private health care settings.

As a result, the findings may have wider relevance beyond the study sample. However, the study had limitations as it relied solely on quantitative data without allowing participants to freely express their thoughts, thus preventing the exploration of unknown facets of the issue. In addition –as computer literacy has been reported as a barrier to telerehabilitation— some physiotherapists may not have completed the survey because of their limited computer literacy. This would skew the overall results of this study. Furthermore, some aspects related to prior use of telerehabilitation (i.e., Have PTs ever communicated with patients or colleagues by telephone or by email regarding diagnosis or management? In which case PTs have been involved in telerehabilitation? Etc.) were not included in the survey questionnaire; therefore, the study did not capture that information.

Conclusion

In Rwanda, physiotherapists have positive perceptions about the use of remote rehabilitation and are willing to use it while providing physiotherapy services, but its adoption is hindered by a significant gender gap, with males being less likely to use it. The use of accessible technologies like WhatsApp and desktops strongly predicts adoption. To overcome barriers such as limited training, and increased costs related to telerehabilitation equipment, strategies should leverage existing platforms and specifically target male practitioners to ensure successful integration into the healthcare system.

Author's contribution

Conceptualization, EK. and JCNk, Data collection, EK and JCN, Formal analysis, EK, FM and JCN; Methodology, EK, FM and JCN; Supervision, DT and NS; Writing-original draft, DT, EK, FM and JCN; Writing-review & editing, DT, EK, FM and JCN. All authors have read and agreed to the published version of the manuscript.

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Declaration of conflict of interest

The authors affirm that there are no conflicts of interest associated with this research or the authorship of the article.

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