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Original Article

KNOWLEDGE, USAGE AND CHALLENGES TO DIGITAL REHABILITATION AMONG REHABILITATION PROFESSIONALS IN EAST AFRICA: A CROSS-SECTIONAL MULTI-CENTER STUDY

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Abstract

The demand for rehabilitation services is increasing globally due to aging populations, rising chronic diseases, and higher accident rates. The World Health Organization (WHO) estimates that one in three people require rehabilitation, with this need expected to grow. However, there is a severe shortage of clinical rehabilitation professionals worldwide, particularly in East Africa, where practitioner density is far below recommended levels. Digital rehabilitation (DR) has emerged as a potential solution to bridge this gap by leveraging technology to improve service accessibility. However, research on DR implementation in East Africa remains limited. This study assessed rehabilitation professionals' knowledge, usage, attitudes, and challenges related to DR in Rwanda, Uganda, Kenya, and Tanzania. A cross-sectional quantitative survey was conducted using an online questionnaire targeting 353 registered rehabilitation professionals. Data analysis was performed using SPSS-25 and Microsoft Excel, with descriptive statistics and Chi-square tests used to determine associations between variables. Out of 216 respondents (61.2% response rate), 77.3% (n=167) were aware of DR platforms, with the internet and social media being the primary sources of knowledge (26.3%, n=44). In terms of proficiency, 46.3% (n=100) had moderate DR knowledge, while only 13.4% (n=29) demonstrated high proficiency. Knowledge levels were significantly associated with years of experience ($X^2 = 23.965$; p=0.022) and country of practice ($X^2 = 21.072$; p=0.009). Regarding DR implementation, 87% (n=188) used ICT tools in rehabilitation, but only 31.5% (n=68) used dedicated DR systems, and just 11.1% (n=24) had designated spaces for DR at their workplaces. The most commonly used DR type was image-based rehabilitation (24.54%, n=53), and WhatsApp messaging and video calls (58.33%, n=126) were the most frequently used platforms. DR was primarily used for patient follow-ups (56.48%, n=122). A majority of respondents (78.7%, n=170) were familiar with ICT, 95.8% (n=207) were comfortable using ICT, and 87.5% (n=189) had a positive attitude toward DR. DR use was significantly associated with practitioners' perception of it as a viable healthcare solution ($X^2 = 13.252$, p=0.001), enthusiasm for using ICT in patient care and education ($X^2 = 16.327$, p=0.003), and ICT familiarity ($X^2 = 57.344$, p<0.001). Key challenges included inadequate DR training (88.4%, n=191), poor collaboration between ICT experts and clinicians (73.1%, n=158), and unstable internet connections (67.6%, n=146). The study recommends DR training programs, establishment of dedicated DR facilities, and increased awareness to improve rehabilitation service accessibility in East Africa.

Key words(MeSH): Challenges, Digital, Knowledge, Rehabilitation and Usage

Introduction

The demand for rehabilitation services is rising globally due to an increase in injuries, chronic diseases, and aging populations. According to the World Health Organization (WHO), one in three individuals require rehabilitation services after experiencing an illness or injury (WHO, 2021). The rising global life expectancy, projected to reach 77.2 years by 2050, along with population growth and an increase in non-communicable diseases (NCDs), has significantly contributed to the growing need for rehabilitation (United Nations, 2022). Additionally, road traffic accidents are anticipated to become the seventh leading cause of death by 2030, further increasing the demand for rehabilitation services (WHO, 2023). Despite the increasing need, access to rehabilitation services remains inadequate, particularly in low-income countries (LICs), where 80% of persons with disabilities reside. In these regions, only one in seven individuals can access the necessary rehabilitation services (WHO, 2022). The United Nations' 2030 Agenda for Sustainable Development recognizes rehabilitation as a crucial component of universal health coverage (UHC) and Sustainable Development Goal (SDG) 3, which aims to ensure healthy lives and promote well-being (United Nations, 2022). However, a shortage of skilled rehabilitation professionals persists worldwide, particularly in LICs and middle-income countries (MICs), where rehabilitation workforce density remains critically low compared to high-income countries (HICs) (WHO, 2021).

The WHO European Region reported that in 2016, rehabilitation workforce densities were generally below recommended levels, particularly in MICs, where the number of physiotherapists (PTs) was 12 times lower, occupational therapists (OTs) 141 times lower, prosthetists and orthotists (P&Os) six times lower, and physical and rehabilitation medicine physicians (PRMPs) three times lower than in HICs (WHO, 2021). The 2022-2023 WHO report highlights workforce shortages in Poland, particularly among OTs, speech and language therapists (SLTs), and P&Os (WHO, 2023). In LICs and lower-middle-income countries (LMICs), the rehabilitation workforce gap is more pronounced, with fewer than 10 qualified professionals per one million people (WHO, 2021). Africa has the highest shortage, with up to 82.5% of the population lacking access to rehabilitation care. The continent has about 890 rehabilitation professionals per one million individuals, far below the recommended 2,300 needed for comprehensive primary healthcare (WHO, 2022).

In the East African Community (EAC) region, workforce shortages are particularly acute. Kenya leads with a PT density of 0.38 per 10,000 people, followed by Rwanda (0.30), Uganda (0.08), and Tanzania (0.08) (World Federation of Physical Therapy, 2023). This is significantly lower than in HICs such as Canada, where the ratio is 18 times higher. The OT density in the EAC region is also significantly below the recommended 7.5 per 10,000 individuals, with Kenya having the highest number of OTs (0.16 per 10,000), followed by Tanzania (0.05), Rwanda (0.03), and Uganda (0.02) (World Federation of Occupational Therapy, 2023). Moreover, in 2021, Rwanda had only 50 active P&Os, equating to a density of 0.05, which aligns with the minimum recommended standard (International Society for Prosthetics and Orthotics, 2023).

The rehabilitation workforce shortage is compounded by geographical barriers, as many rehabilitation professionals work in urban areas, leaving rural populations underserved. EAC countries have some of the highest altitudes in Africa, and over two-thirds of their populations reside in rural, mountainous areas, making physical access to rehabilitation services difficult (WHO, 2022). Challenges such as transportation difficulties, limited awareness, lack of services in communities, and frequent natural disasters, emergencies, pandemics, and conflicts further impede rehabilitation access (United Nations, 2022). Digital rehabilitation (DR) is emerging as a potential solution to bridge rehabilitation gaps, particularly in LICs. DR, a branch of telemedicine, enables individuals to access clinical evaluations and care remotely from rehabilitation professionals (WHO, 2023). It has been implemented in HICs for over 25 years, demonstrating positive outcomes for various conditions, including stroke, spinal cord injury, multiple sclerosis, musculoskeletal disorders, cardiopulmonary diseases, and speech disorders (American Telemedicine Association, 2023). While DR cannot fully replace face-to-face rehabilitation, it has

proven effective in improving accessibility, reducing costs, and achieving comparable outcomes in pain management, daily activities, and physical function (WHO, 2023).

Scientific research on DR in LICs remains limited, but some studies suggest that it could be an effective solution for addressing rehabilitation needs (World Bank, 2022). However, challenges such as inadequate technological infrastructure, unstable electricity, poor internet connectivity, high service costs, and a lack of well-equipped facilities hinder its adoption in these regions (United Nations, 2022). Despite these barriers, EAC countries have made significant progress in expanding information and communication technology (ICT) access. Increased mobile phone and internet usage, particularly in rural areas, has facilitated digital healthcare solutions, particularly in disease surveillance (WHO, 2022).

Several DR initiatives have been introduced in the EAC region. For example, Humanity & Inclusion (HI) has launched tele-rehabilitation programs using Physitrack and Physiotech applications. Additionally, a rehabilitation digitalization project in Kigali, Rwanda, has been implemented since 2020 in collaboration with experts from Jyväskylä University of Applied Sciences in Finland and the University of Rwanda's College of Medicine and Health Sciences (CMHS) (Jyväskylä University, 2023). Pilot DR projects conducted during the COVID-19 pandemic have demonstrated its potential in ensuring uninterrupted rehabilitation services and promoting patient-centered care (WHO, 2023) Despite its promise, DR remains underexplored in East Africa. Understanding rehabilitation professionals' knowledge, attitudes, and challenges regarding DR is critical for its successful integration into healthcare systems (WHO, 2023). Research is needed to assess their awareness and experience with DR, as well as barriers to its adoption. Without such information, DR solutions may face low compliance and fail to meet the unmet rehabilitation needs of the East African population (World Bank, 2022).

Rehabilitation services remain underutilized in most developing countries, including East Africa, where only 26-55% of the population has access to the necessary care (WHO, 2021). Reports such as the WHO's 2021 Situation Assessment of Rehabilitation (STARS) in Rwanda highlight severe inadequacies in healthcare rehabilitation services, which are sometimes entirely absent despite substantial demand (WHO, 2022). The limited number of rehabilitation professionals, combined with their concentration in urban centers, leaves rural populations underserved (World Bank, 2022). Furthermore, the geographical landscape of the EAC region, characterized by mountainous terrain and vast rural areas, hinders physical access to rehabilitation services. Transport difficulties, lack of awareness, and the absence of community-based rehabilitation services further restrict access (United Nations, 2022). Digital rehabilitation offers a promising solution, as demonstrated in developed countries where DR service delivery is well-established (WHO, 2023). However, scientific research on DR implementation in East Africa remains scarce. Existing DR projects using platforms such as Physitrack and Physiotech, conducted by HI, UR-CMHS-CEBE, and Jyväskylä University, require further exploration. Research on rehabilitation professionals' knowledge, practices, and challenges regarding DR is crucial for addressing unmet rehabilitation needs in East Africa (WHO, 2023).

Research Methods

Study Setting

The research was conducted in four East African countries—Kenya, Tanzania, Rwanda, and Uganda—that met the study's inclusion criteria. In each country, three professional rehabilitation organizations were selected, including Physiotherapy, Occupational Therapy, and Prosthetics & Orthotics (P&O). The study targeted rehabilitation professionals working in public, semi-private, private healthcare institutions, and NGOs involved in rehabilitation services.

Study Design and Population

This study utilized a cross-sectional quantitative design with data collection conducted through a web-based questionnaire. This method was selected for its efficiency in collecting data within a short time and its suitability for analyzing large datasets. The study population comprised rehabilitation professionals actively practicing in East Africa.

Sampling Method

A convenience purposive sampling approach was used to recruit active rehabilitation professionals registered with their national professional associations. Only professionals who were members of the World Confederation for Physical Therapy (WCPT), the World Federation of Occupational Therapists (WFOT), or the International Society for Prosthetics and Orthotics (ISPO) were included. Based on available data, the study considered a total of 3,002 active professionals, distributed as follows: Kenya (1,430), Rwanda (161), Tanzania (589), and Uganda (822).

Inclusion and Exclusion Criteria

Eligible participants were male or female rehabilitation professionals practicing in the East African Community (EAC) region, members of recognized professional organizations, proficient in English, and willing to participate voluntarily. Those unavailable during data collection or unwilling to participate were excluded.

Sample Size

The Yamane formula for known population sizes was used to calculate the sample size, yielding a target of 353 participants. To ensure equitable representation, the sample was distributed equally among the four countries, with 89 participants randomly selected from each.

Data Collection Instrument and Method

A structured, self-reported questionnaire assessed knowledge, usage, attitudes, and challenges regarding digital rehabilitation (DR). The tool, originally validated in Kuwait, was adapted for the East African context after expert review. It included five sections:

1. **Demographics** – Age, gender, occupation, qualification, years of experience, and workplace characteristics.
2. **Knowledge** – Understanding of DR systems.
3. **Technology Use** – Familiarity with ICT tools and DR system usage.
4. **Attitude and Perception** – Willingness to adopt DR technology.
5. **Challenges** – Barriers to DR implementation.

Data Collection Procedure

Ethical approval was obtained from the Institutional Review Board (IRB) of the University of Rwanda's College of Medicine and Health Sciences. Permission was also granted by King Faisal Hospital (Rwanda) to conduct a pilot study with 12 rehabilitation professionals. The survey was distributed via WhatsApp and email through professional associations, and responses were collected over nine weeks using Google Forms.

Pilot Study

The pilot study at King Faisal Hospital helped refine the questionnaire by assessing feasibility, clarity, and estimated completion time. Minor modifications were made before the full-scale survey.

Study Variables

Dependent Variables

- **Knowledge level** – Categorized as low, average, or high.
- **Extent of DR usage** – Measured on a five-point scale (Always to Never).
- **Attitude towards DR** – Assessed using a Likert scale (Strongly Agree to Strongly Disagree).
- **Challenges** – Identified individually from a predefined list.

Independent Variables

Included participant characteristics such as age, gender, years of experience, country of practice, area of specialization, workplace location (urban/rural), workplace type (public, semi-private, private), healthcare level (primary, secondary, tertiary), and qualification level.

Statistical Analysis

Data were entered in Microsoft Excel and analyzed using SPSS Version 25. Descriptive statistics (frequencies, percentages, and mean values) were used, along with chi-square tests to determine significant associations between demographic factors and DR knowledge, usage, and attitudes. A p-value of 0.05 was used as the significance threshold.

Data Management and Protection

Participants' identities were anonymized using unique codes, and data were stored in password-protected electronic files and locked hard copies. All data will be destroyed after five years in compliance with Rwanda's data protection laws.

Ethical Considerations

The study adhered to ethical research standards, with approvals obtained from IRBs of University of Rwanda and professional organizations. Informed consent was secured electronically before participation. Participants were briefed on the study's purpose, benefits, and confidentiality measures, with the right to withdraw at any time.

Results

1. Socio demographic Information of Respondents

Table 1 below outlines the sociodemographic details of the study participants. A significant proportion of respondents (57.9%, n=125) were aged between 25 and 34 years, whereas only a small fraction (0.5%, n=1) was over 65 years old. The study sample had more male participants (64.3%, n=139). Findings indicate that more than one-third (37%, n=80) of rehabilitation professionals had between 5 and 10 years of work experience, whereas only 1.9% (n=4) had practiced for more than 25 years. Regarding the country of practice, Rwanda accounted for the highest representation (40.7%, n=88), followed by Uganda (34.3%, n=74) and Kenya (21.3%, n=46). A majority (74.5%, n=161) reported working in urban settings, with the most common workplace types being International/National Referral Hospitals (25.9%, n=56), District Hospitals (25.5%, n=55), and Polyclinics (16.7%, n=36). The most frequently reported qualification was PT A0 (65.7%, n=142), followed by P&O A1 (7.4%, n=16) and OT A0 (6.9%, n=15).

Table 1: Sociodemographic Characteristics of Respondents (n = 216)

Variables	Frequency (n)	Percentages (%)
Age		
18-24	10	4.6
25-34	125	57.9
35-44	59	27.3
45-54	17	7.9
55-64	4	1.8
65 and above	1	0.5
Gender		
Male	139	64.3
Female	77	35.7
Years of Experience		
< 5 years	61	28.3
5-10 years	80	37.0
11-20 years	64	29.6
21-25 years	7	3.2
Above 25 years	4	1.9
Country		
Kenya	46	21.3
Rwanda	88	40.7
Tanzania	8	3.7
Uganda	74	34.3
Location of Workplace		
Urban	161	74.5
Rural	55	25.5
Nature of workplace		
Public	114	52.8
Semi-private	30	13.9
Private	72	33.3
Type of Workplace		

International/National Hospital	56	25.9
Provincial Hospital	22	10.2
District Hospital	55	25.5
Rehabilitation Center	26	12.0
Polyclinic	36	16.7
Health Center	6	2.8
Community Based Center	11	5.1
Others (academics,…)	4	1.8
Qualification		
PT Assistant	9	4.2
PT A1	15	6.9
PT A0	142	65.7
PT MSc	2	0.9
PT PhD	2	0.9
OT A1	1	0.5
OT A0	15	6.9
OT MSc	1	0.5
P&O Assistant	7	3.2
P&O A1	16	7.4
P&O A0	5	2.3
P&O MSc	1	0.5
Qualification by Domain		
Physiotherapists	170	78.7
Occupational Therapists	17	7.9
Prosthetists and Orthotists	29	13.4
Area of Practice		
Musculoskeletal	34	15.7
Sport	3	1.4
Neurological	2	0.9
Pediatric	10	4.6
Cardiorespiratory	3	1.4
Community	1	0.5
General (combined areas)	112	75.5

Table 1 illustrates the awareness of digital rehabilitation among rehabilitation professionals. The majority (77.3%, n=167) were aware of digital rehabilitation platforms, with the primary sources of information being the internet and social media (26.3%, n=44), followed by hospital and clinical practice (12.6%, n=21). Only 1.8% (n=3) had learned about digital rehabilitation through class lectures. Among the 49 respondents who were unfamiliar with digital rehabilitation, 65% (n=32) cited the absence of related coursework in their academic curriculum, while 35% (n=17) stated they had not encountered digital rehabilitation during practice. Regarding self-assessed knowledge, only 3.2% (n=7) rated their knowledge as excellent, whereas 30.1% (n=65) rated it as very good, and 9.3% (n=20) reported poor knowledge.

Less than half (40%, n=95) correctly identified digital rehabilitation as the use of information and communication technologies to provide rehabilitation services remotely. About 47.7% (n=103) strongly affirmed that digital rehabilitation reduces travel costs and time for both clinicians and patients, while 44% (n=95) moderately agreed. Uncertainty remained regarding whether digital rehabilitation interventions achieve comparable outcomes to in-

person visits, with 47.7% (n=103) disagreeing, 33.8% (n=73) moderately agreeing, and only 5.6% (n=12) strongly supporting the statement.

A 10-item assessment measured respondents' knowledge of digital rehabilitation components. Each correct response was awarded 1 point, a partially correct response received 0.5 points, and incorrect responses scored 0. Results were categorized into three levels: low (0-5), average (5.5-7.5), and high (8-10). The findings revealed that 46.3% (n=100) had an average level of digital rehabilitation knowledge, 40.3% (n=87) had low knowledge, and only 13.4% (n=29) had a high level of knowledge.

Table 2: Knowledge of Rehabilitation Professionals on Digital Rehabilitation

Variables	Frequency (n)	Percentage (%)
Do you know any Digital/Tele Rehabilitation platforms (like Video-Audio conference, mobile applications, web-computer based applications, image-based technology, sensor-based technologies or augmented virtual reality systems)?		
Yes	167	77.3
No	49	22.7
If yes, how did you learn about digital rehabilitation	**167**	
Class Lecture	3	1.8
Workshop	17	10.2
Training/seminar/congress	17	10.2
Internet/social media	44	26.3
Hospital/Clinical practice	21	12.6
Most of the above sources accessed together	65	38.9
If No, why are you not aware of Digital Rehabilitation platforms	**49**	
No information got from classes	32	65
Not seen during my practice	17	35
I would rank my knowledge of Digital Rehabilitation as		
Excellent	7	3.2
Very good	65	30.1
Good	32	14.8
Fair	92	42.6
Poor	20	9.3

Association Between Digital Rehabilitation Knowledge and Sociodemographic Factors

Table 2 presents the relationship between digital rehabilitation knowledge and sociodemographic variables. There was no statistically significant association between digital rehabilitation knowledge and age, gender, qualification, or workplace location. However, there was a trend suggesting an association with the nature of the workplace (X2 = 12.28; p = 0.078) and type of workplace (X2 = 30.002; p = 0.091). A significant association was found between digital rehabilitation knowledge and years of experience (X2 = 23.965; p=0.022) as well as country of practice (X2 = 21.072; p=0.009).

A bar graph (Figure 14) illustrates variations in digital rehabilitation knowledge levels across different workplace types, qualifications, years of experience, and countries of practice. The results indicate that the majority of participants had an average level of knowledge, followed by those with high knowledge, and the fewest having low knowledge across all variables.

Table2: Association Between Digital Rehabilitation Knowledge and Sociodemographic Factors

Variables		Level of Knowledge of DR			X^2	p-value
		High *n* (%)	Average *n* (%)	Low *n* (%)		
Age						
	18-24	1.6(16)	5(50)	3.4(34)	17.061	0.226
	25-34	37.8(30.2)	59.4(47.6)	27.8(22.2)		
	35-44	17.8(30.2)	26.7(45.2)	14.5(24.6)		
	45-54	7.4(43.5)	6.9(40.6)	2.7(15.9)		
	55-64	1.1(27.5)	1.9(47.5)	1(25)		
	65 and above	0.4(40)	0.5(50)	0.1(10)		
Gender						
	Male	48(34.5)	63.6(45.8)	27.4(19.7)	5.854	0.173
	Female	19.4(25.2)	39.1(50.8)	18.5(24)		
Years of Experience						
	< 5 Years	12(19.7)	31.5(51.6)	17.5(28.7)	23.965	**0.022**
	5-10 Years	25.3(31.6)	37.6(47)	17.1(21.4)		
	11-20 Years	25.6(40)	26.6(41.6)	11.8(18.4)		
	21-25 Years	3.1(44.3)	3.7(52.8)	0.2(2.8)		
	> 25 years	1.3(32.5)	2.7(67.5)	0(0)		
Practice Country						
	Uganda	25.3(34.2)	34.4(46.5)	14.3(19.3)	21.072	**0.009**
	Tanzania	0.5(6.2)	4.7(48.2)	2.8(35)		
	Rwanda	22.5(25.6)	43(48.8)	22.5(25.6)		
	Kenya	16.9(36.7)	21.8(47.4)	7.3(15.9)		
Location of workplace						
	Urban	50.9(31.6)	77(47.8)	33.1(20.6)	3.128	0.48
	Rural	18.7(34)	25.4(46.2)	10.9(19.8)		
Nature of workplace						
	Public	35.9(31.5)	54.8(48.1)	23.3(20.4)	12.28	0.078
	Semi-private	12.1(40.3)	9.4(31.3)	8.5(28.4)		
	Private	18.7(26)	38.8(53.9)	14.5(20.1)		

Type of Workplace						
	National/Referral Hospital	15.4(27.3)	28.8(51.4)	11.8(21.1)	30.002	0.091
	Provincial Hospital	9.3(42.3)	10.3(46.8)	2.4(10.9)		
	District Hospital	20.6(37.4)	22.7(41.3)	11.7(21.3)		
	Specialized Rehab. Center	7.2(27.7)	12(46.1)	6.8(26.1)		
	Polyclinic	12.3(34.2)	16.3(45.3)	7.4(20.5)		
	Health Center	1.2(20)	4.4(73.3)	0.4(6.6)		
	CBR	2.9(26.4)	6.3(57.3)	1.8(16.3)		
Qualifications						
	Physiotherapists	53.7(31.6)	80.8(47.5)	35.5(20.8)	5.717	0.266
	Occupational Therapist	6.4(37.6)	7.4(43.5)	3.2(18.8)		
	Prosthetics & Orthotics	8.4(28.9)	15.2(52.4)	5.4(18.6)		

Digital Rehabilitation Usage and Technological Background among Rehabilitation Professionals

The findings in Table 3 provide an overview of the usage of digital rehabilitation systems and the technological backgrounds of the participants in our study. A significant majority of rehabilitation professionals (87%, n=188) reported incorporating digital rehabilitation in their practice, utilizing ICT tools such as Telephone-SMS services, video conferencing, internet-based applications, and various smartphone apps. Among them, 25% (n=11.6) used these systems regularly, 71% (n=32.9) used them occasionally, and 39% (n=18.1) used them infrequently. Around one-third (31.5%, n=68) of the respondents indicated that they utilized specific digital rehabilitation platforms or applications at their workplaces, while a smaller proportion (11.1%, n=24) mentioned having a well-equipped digital rehabilitation setup at work.

More than half of the rehabilitation professionals (61.6%, n=133) reported regular internet usage at their workplaces. However, only 24.5% (n=53) stated that their work environments always had reliable internet speed, and just 8.3% (n=18) mentioned that most of their patients had consistent access to digital tools such as computers, tablets, and smartphones. These findings suggest that while the respondents demonstrate a high level of comfort with ICT, there are notable challenges in terms of the technological infrastructure and resources available for effective digital rehabilitation.

Table3. Usage of Digital Rehabilitation systems and Technological Background, n=216

Variables	n(%)
Do you use a specific digital rehabilitation Application/platforms at your workplace	
Yes	68(31.5)
No	148(68.5)

Do you have a specific-well prepared place for digital rehabilitation at your workplace					
Yes	24(11.1)				
No	192(88.9)				
	Always n(%)	**Often n(%)**	**Sometimes n(%)**	**Rarely n(%)**	**Never n(%)**
Do you use computer at work	128(59.3)	37(17.1)	35(16.2)	13(6.0)	3(1.4)
Do you use internet at work	133(61.6)	49(22.7)	27(12.5)	7(3.2)	0
Do you use email at work	98(45.4)	65(30.1)	33(15.3)	13(6.0)	7(3.2)
Is the internet speed at your work strong	53(24.5)	68(31.5)	78(36.1)	11(5.1)	6(2.8)
Do most patients you treat have access to digital tools like computer, tablets, or smart phone?	18(8.3)	50(23.1)	74(34.3)	63(29.2)	11(5.1)
Do you have access to constantly internet connected digital tools like desktop, laptop, smartphone at your work	90(41.7)	58(26.9)	44(20.4)	18(8.3)	6(2.8)
How often do you use telephone/SMS services, video conferencing, internet-based applications, smart phone apps in your patient work?	25(11.6)	53(24.5)	71(32.9)	39(18.1)	28(13)

The bar chart (Figure 1) illustrates that the majority of participants (122, 56.48%) use digital rehabilitation (DR) for patient follow-up, followed by assessment (72, 33.33%), therapeutic interventions (67, 31.02%), diagnosis (58, 26.85%), and prognosis (35, 16.20%). The most commonly utilized type of DR is Image-Based (53, 24.54%), with only 3 (1.39%) practitioners using Virtual Reality DR systems. A significant number of participants (n=130) reported using smartphone applications for DR, while 51 use computer software applications, and 45 still rely on traditional phone calls and text messages for DR. The most frequently used applications for DR include WhatsApp for chat and video (126, 58.33%), followed by Zoom (87, 40.28%) and Google Meet (83, 38.43%). Digital tools already in use at the respondents' workplace institutions include electronic patient records (154, 71.30%) and social media for communication (112, 51.85%), with fewer institutions using official web homepages (43, 19.91%) or offering online video consultations (11, 5.09%).

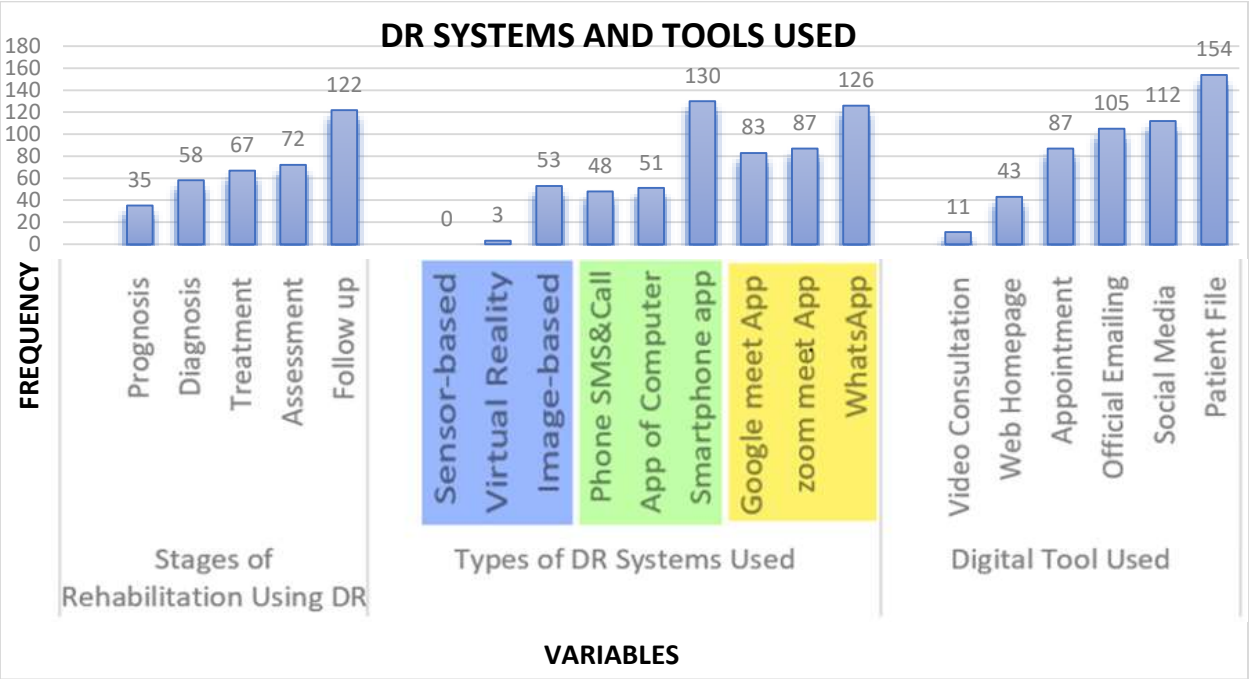

Figure1. Bar chart showing Digital tools and DR Systems used by Respondents, n=216

Challenges in implementing digital rehabilitation

Figure 2 below highlights the challenges rehabilitation professionals encounter when using digital rehabilitation (DR). The most frequently cited issue was the absence of adequate training for DR, reported by 191 practitioners (88.4%), followed by the lack of collaboration between ICT experts and clinicians (73.1%, n=158), unreliable internet coverage (67.6%, n=146), non-user-friendly software (67.1%, n=145), and the high cost of equipment (64.4%, n=139). The least common challenges included the perceived lack of clinical usefulness, mentioned by 63 practitioners (29.2%), negative staff attitudes (36.6%, n=79), and the perceived increase in workload (37%, n=80).

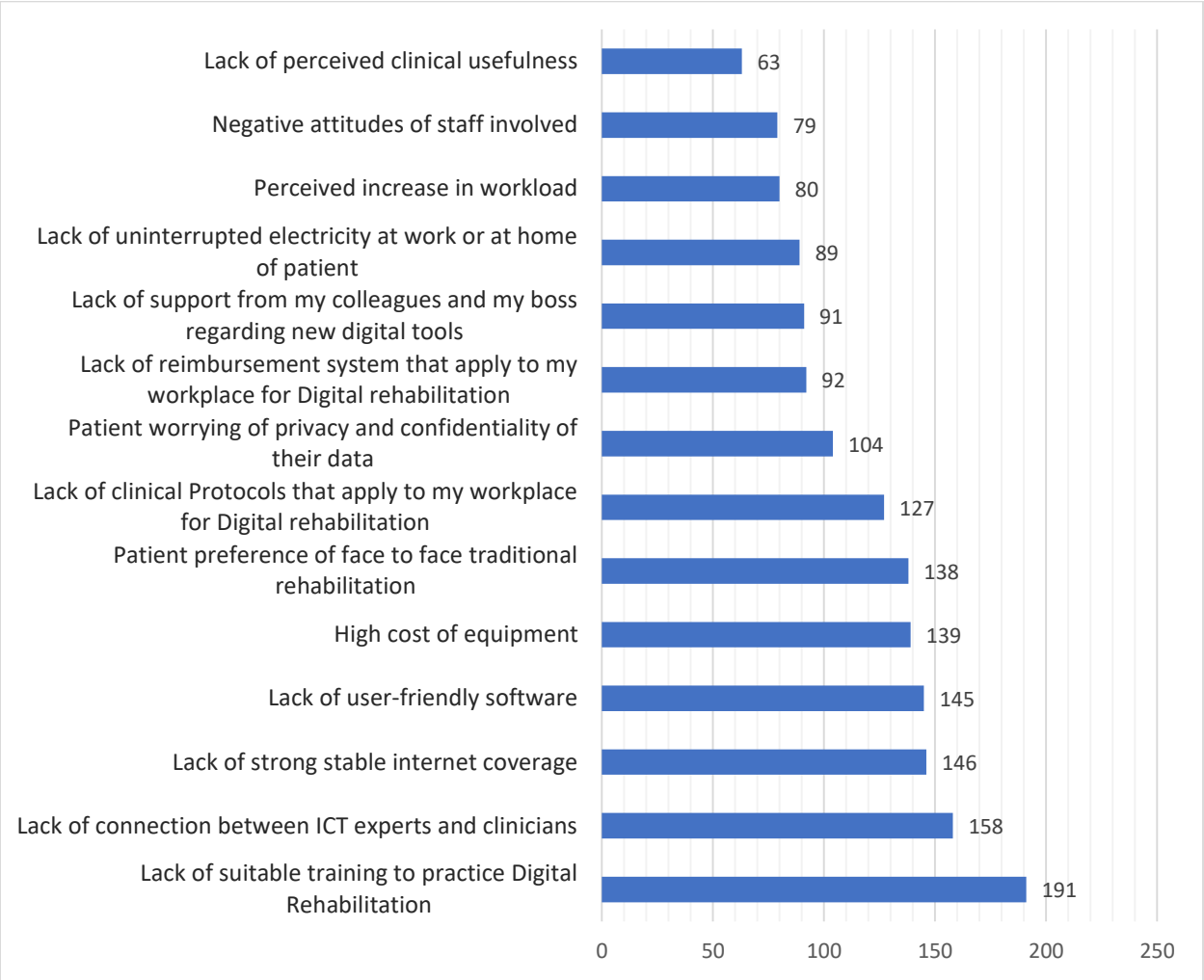

Figure2. Challenge faced by rehabilitation professionals to the use of digital rehabilitation, n=216.

Discussion

The increasing recognition of digital rehabilitation as a vital component of modern healthcare is evident from its growing application in clinical settings. This study found that 77.3% of rehabilitation professionals were aware of digital rehabilitation, with social media and internet-based sources serving as the primary channels of information. However, formal educational exposure to digital rehabilitation remains minimal, with only 1.8% of participants acquiring knowledge through classroom instruction. These findings align with previous research indicating that digital health is inadequately covered in many healthcare training programs, limiting professionals' ability to integrate technology effectively into their practice (Nzeyimana et al., 2022). To bridge this gap,

academic curricula should incorporate digital rehabilitation competencies to enhance preparedness among rehabilitation professionals.

The results also reveal a disparity in digital rehabilitation knowledge among participants. While 46.3% exhibited an average understanding, 40.3% had limited knowledge, and only 13.4% demonstrated a high level of expertise. The study found a significant correlation between digital rehabilitation knowledge and factors such as years of experience and country of practice. Professionals with more extensive experience exhibited greater familiarity with digital rehabilitation, suggesting that prolonged exposure contributes to proficiency. Regional variations in knowledge may be attributed to differences in technological advancements and investment in digital health infrastructure (Habumugisha & Mugiraneza, 2023). These findings highlight the need for targeted training initiatives to ensure equitable access to digital rehabilitation knowledge across different regions and experience levels.

Despite the high awareness levels, actual implementation of digital rehabilitation remains inconsistent. The study found that 87% of rehabilitation professionals utilized digital rehabilitation in some form, primarily for patient follow-up (56.48%), assessment (33.33%), and therapeutic interventions (31.02%). However, digital rehabilitation use for diagnosis (26.85%) and prognosis (16.20%) was significantly lower. This pattern suggests that while digital tools are valued for basic clinical support and communication, they have not been fully integrated into more complex aspects of rehabilitation care. Similar trends have been observed in previous studies, which found that digital rehabilitation often serves as a supplementary rather than a primary tool, particularly in low-resource environments where technological barriers persist (Mutesi et al., 2023).

The types of digital rehabilitation systems used by professionals further illustrate this trend. Image-based digital rehabilitation was the most commonly employed system (24.54%), whereas only 1.39% of respondents reported using virtual reality (VR)-based rehabilitation. The limited adoption of VR-based rehabilitation may be due to its high costs and the technical expertise required for implementation. Prior research has demonstrated that VR applications can enhance patient engagement and improve motor recovery outcomes (Rugira et al., 2024). However, financial and infrastructural constraints in East Africa continue to limit widespread implementation. Expanding access to cost-effective and user-friendly digital rehabilitation tools could improve adoption rates and enhance the effectiveness of rehabilitation services.

Another notable finding is the reliance on widely available platforms such as WhatsApp (58.33%), Zoom (40.28%), and Google Meet (38.43%) for digital rehabilitation. These platforms offer convenient communication channels, but they may lack the specialized features required for comprehensive rehabilitation management. Research indicates that digital rehabilitation platforms specifically designed for clinical use lead to improved patient outcomes compared to general-purpose communication tools (Mwangi et al., 2023). The adoption of dedicated rehabilitation software with integrated assessment and intervention features could significantly enhance the quality and effectiveness of digital rehabilitation services.

Institutional support for digital rehabilitation remains a challenge, with only 31.5% of respondents reporting the use of workplace-specific digital rehabilitation platforms and just 11.1% having access to well-equipped digital rehabilitation setups. These findings suggest that while individual practitioners are attempting to integrate digital tools into their work, healthcare institutions have yet to fully embrace digital rehabilitation. Similar findings have been reported in studies emphasizing the importance of institutional investment and policy frameworks in supporting digital health integration (Nzeyimana et al., 2022). Increased institutional commitment through policy development, infrastructure investment, and financial support is essential to sustain digital rehabilitation implementation.

Several challenges hinder the effective adoption of digital rehabilitation, with the most significant barrier being a lack of proper training, cited by 88.4% of participants. Without adequate training, professionals may struggle to use digital rehabilitation tools effectively, emphasizing the need for continued education and skill-building programs. Additionally, 73.1% of respondents highlighted the lack of collaboration between ICT specialists and clinicians as a major challenge. Strengthening interdisciplinary collaboration could improve the development and usability of digital rehabilitation systems, making them more accessible and effective for clinical application (Rugira et al., 2024).

Technological constraints also play a significant role in limiting digital rehabilitation adoption. Unreliable internet access was reported as a barrier by 67.6% of respondents, while 67.1% cited non-user-friendly software as a challenge. Moreover, only 24.5% of professionals reported having consistent high-speed internet at their workplaces. These findings underscore the importance of technological infrastructure in supporting digital rehabilitation. Research suggests that investing in broadband expansion, cloud-based platforms, and mobile-friendly rehabilitation applications could address these challenges and improve digital rehabilitation service

delivery (Habumugisha & Mugiraneza, 2023). Policymakers and healthcare administrators must prioritize technological infrastructure development to facilitate seamless digital rehabilitation integration.

Financial limitations further complicate the adoption of digital rehabilitation, with 64.4% of participants identifying the high cost of equipment as a major barrier. This finding is consistent with prior studies highlighting the prohibitive costs of acquiring and maintaining digital rehabilitation technologies in low- and middle-income countries (Mutesi et al., 2023). Addressing financial constraints requires innovative funding strategies, including public-private partnerships and government subsidies, to support healthcare facilities in acquiring necessary equipment. Additionally, the development of cost-effective, locally manufactured digital rehabilitation solutions could provide a viable alternative to expensive imported technologies.

In few words, while digital rehabilitation awareness and usage among rehabilitation professionals are increasing, several obstacles hinder its full-scale implementation. Limited formal education, technological barriers, financial constraints, and insufficient institutional support continue to restrict widespread adoption. Addressing these challenges necessitates a comprehensive approach that includes integrating digital rehabilitation into educational curricula, expanding professional training opportunities, improving technological infrastructure, and implementing supportive policies. Future research should explore the long-term effects of digital rehabilitation on patient outcomes and identify effective strategies for optimizing its use in diverse healthcare settings. Strengthening digital rehabilitation capabilities can enhance rehabilitation service accessibility and quality, ultimately improving patient care in East Africa and beyond.

Recommendation:

To address these challenges, the study recommends integrating digital rehabilitation training into academic curricula and implementing continuous professional development programs. Improving infrastructure, such as stable internet connectivity, and fostering interdisciplinary collaboration between ICT professionals and rehabilitation specialists will be critical. Policymakers should also explore financial subsidies and cost-reduction strategies to make digital rehabilitation technologies more accessible.

Further, research on the effectiveness of digital rehabilitation interventions should be prioritized to build confidence among practitioners and patients. Enhancing patient access to digital tools, developing localized digital rehabilitation solutions, and establishing standardized policies will promote the broader adoption of these technologies. Awareness campaigns should also be conducted to address misconceptions and foster a positive attitude toward digital rehabilitation among healthcare professionals.

Conclusion: This study highlights the growing familiarity with digital rehabilitation among professionals while identifying significant gaps in training, infrastructure, and accessibility. Challenges such as inadequate formal education, lack of collaboration, and financial constraints hinder effective implementation. However, digital rehabilitation holds great potential in improving healthcare access, reducing costs, and enhancing patient outcomes. By addressing these challenges through targeted policy interventions, professional development, and technological investment, digital rehabilitation can be seamlessly integrated into mainstream healthcare. Future research should focus on evaluating long-term digital rehabilitation outcomes and exploring innovative strategies to enhance its effectiveness in clinical practice. With the right support, digital rehabilitation can become a vital component of modern rehabilitation services.

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