

Delivering physical rehabilitation services during the COVID-19 pandemic in Iran: Common challenges and potential solutions for future pandemics

PARNIAN MANSOURI¹, TAHEREH ALAVI², PARVIZ MOJGANI^{3,4}, NAGHMEH EBRAHIMI⁵, ATEFEH TAHERI⁶, MASOUD BEHZADIFAR⁷, AMIRHOSSEIN KAMALINIA⁸, MARIANO MARTINI⁹, SAEED SHAHABI¹

¹ Health Policy Research Center, Institute of Health, Shiraz University of Medical Sciences, Shiraz, Iran;

² Department of Orthotics and Prosthetics, School of Rehabilitation Sciences, Iran University of Medical Sciences, Tehran, Iran;

³ Iran-Helal Institute of Applied Science and Technology, Tehran, Iran; ⁴ Research Center for Emergency and Disaster Resilience, Red Crescent Society of The Islamic Republic of Iran, Tehran, Iran; ⁵ Department of Physiotherapy, School of Rehabilitation Sciences, Shiraz University of Medical Sciences, Shiraz, Iran; ⁶ Department of Occupational Therapy, School of Rehabilitation Sciences, Tehran University of Medical Sciences, Tehran, Iran; ⁷ Social Determinants of Health Research Center, Lorestan University of Medical Sciences, Khorramabad, Iran; ⁸ Department of Orthopedics, Bone and Joint Disease Research Center, Shiraz University of Medical Sciences, Shiraz, Iran; ⁹ Department of Health Sciences, University of Genoa, Genoa, Italy

Keywords

Physical Rehabilitation, COVID-19, Pandemics, Health Policy, Qualitative study, Iran.

Summary

The COVID-19 pandemic affected people with disabilities in different aspects, including their access to physical rehabilitation (PR). Despite a significant global surge in the need for PR, it has not been prioritized and is under-resourced, even in the non-COVID era, in many countries. This study aimed to explore the challenges of delivering PR services during the COVID-19 pandemic in Iran and potential solutions to these challenges. This qualitative study was done using a thematic approach from November 2023 to March 2024 in Iran. 45 PR professionals and faculty members from three fields—physiotherapy, occupational therapy, and orthotics and prosthetics—were interviewed in a semi-structured approach. Data analysis was done using Braun and Clarke's thematic analysis approach. The five control knobs (organization, regulation, financing, payment, and behavior) were used to study the challenges and proposed solutions. The main identified challenges included Iran's healthcare system's lack of preparedness, deficient infrastructure, limited remote reha-

ilitation options, restriction of in-person visits, lack of clinical guidelines, ambiguous pricing for telerehabilitation, financial hardships stemming from the pandemic, insufficient government support, reliance on out-of-pocket (OOP), patients' reluctance to pay for online services, delayed compensation for PR professionals, mental distress experienced by patients and service providers, resistance to new service modalities, and inadequate digital literacy. The key solutions included strengthening telerehabilitation infrastructure, developing clear clinical guidelines, increasing government financial support, improving payment structures, and fostering behavioral changes through increased awareness. The findings of this study underscore the importance of proactive planning, intersectoral collaboration, and the integration of PR services within the healthcare framework. The suggested solutions can inform policymakers to enhance the preparedness and responsiveness of health systems to future crises.

Introduction

On March 11, 2020, the World Health Organization (WHO) characterized the outbreak of SARS-CoV-2, COVID-19, as a pandemic [1]. Tragically, numerous individuals succumbed to the virus, while many others grappled with long-term physical impairments stemming from their encounter with COVID-19 [2]. The enforced isolation, coupled with the loss of loved ones and the pervasive uncertainty surrounding the virus, gave rise to a surge in psychological distress and mental health challenges. Moreover, the ripple effects of the pandemic extended far beyond its direct health impacts [3]. Governments around the world responded with a range of policies aimed at containing the spread of the virus, including the closure of non-essential businesses, the promotion of remote work, and the implementation

of mask mandates and social distancing protocols. Measures such as quarantine, social distancing, and travel restrictions reshaped daily life for billions of people, leading to profound disruptions in social interactions and economic activities [4-6].

Physical rehabilitation (PR) services effectively improve the disability of individuals with various disease conditions [7]. During the COVID-19 pandemic, the field of PR also faced challenges. For example, COVID-19 affected people with disabilities in different aspects, including their access to PR services [8, 9]. The pandemic disrupted or limited their ability to communicate with healthcare professionals and access multidisciplinary PR services. There was widespread concern that rehabilitative treatments might not be available if the pandemic worsened or new strains of COVID-19 emerged [10]. Many people

with chronic diseases like stroke and cerebral palsy find that the absence of PR benefits heightens their risk of disease progression [11]. During the COVID-19 pandemic, patients' access to essential PR services was limited, resulting in secondary injuries, adverse outcomes, exacerbating functional limitations, and hindering recovery [2].

Providing sub-acute and non-emergency PR services during a pandemic presents significant challenges in maintaining a safe environment for both clients and health service providers. However, offering PR services at different levels is crucial, as these services are essential in optimizing physical and cognitive performance while reducing disability [12]. Even in the non-COVID era [13], many countries have neglected and under-resourced PR despite a significant global surge in its need. Iran had a high incidence and mortality rate of COVID-19 [14], indicating the challenges of disease control in the country. Before the emergence of the COVID-19 pandemic, Iran's PR sector was already facing multi-layered challenges [15, 16]. The pandemic posed additional challenges to the delivery of PR services. Major changes have occurred in healthcare delivery, shifting many services from in-person to remote options like telemedicine and telerehabilitation. This shift involved using video calls and medical care apps more widely, as well as an increase in home services [17].

However, the reliance on clinical equipment presented challenges for therapists and clients, necessitating the continuation of some in-person services. Understanding these challenges is critical to finding solutions to overcome them. Given the rapid and far-reaching impact of COVID-19 on global healthcare systems, it has become increasingly evident that comprehensive and adaptable strategies are essential to ensure timely access to PR services, especially for individuals with complex needs and limited functional abilities [8]. Timely access to PR services is crucial, and there is a fundamental need for widely applicable recommendations and policies. In light of the challenges posed by COVID-19, there is an urgent need to develop robust and adaptable PR policies and practices that can withstand the complexities of future pandemics [18]. This will help ensure that PR care for individuals with complex needs and functional limitations is less disrupted during future pandemics.

Some aspects of COVID-19 rehabilitation challenges in Iran are still unclear. PR specialists such as physical therapists, occupational therapists, and orthotists/prosthetists faced many challenges and problems during the pandemic. Therefore, this study was conducted to explore the common challenges faced by PR practitioners and faculty members in delivering PR services in Iran during the COVID-19 pandemic. Also, potential solutions were explored, hoping they could aid in providing more appropriate PR services under similar disruptive conditions in the future.

Methods

STUDY DESIGN

This qualitative study was carried out using a thematic approach from November 2023 to March 2024 in Iran. This research method provides the necessary opportunity to gain a deeper understanding of the participants' perspectives on a specific issue. The practitioners and faculty members of three fields of PR (physiotherapy, occupational therapy, and orthotics and prosthetics) were selected to attend semi-structured interviews. The Critical Appraisal Skills Programme (CASP) checklist for qualitative studies [19] and the Standards for Reporting Qualitative Research (SRQR) criteria [20] were considered to ensure methodological and reporting quality, respectively.

SAMPLING STRATEGY

The sample selection process started with purposive sampling and continued with snowball sampling. We tried to include samples from different ages, genders, educational levels, specialties, job status, and employment types to ensure maximum diversity. In order to find potential samples, virtual networks such as LinkedIn and Instagram were used, as well as Ministry of Health and Medical Education databases like the Medical Council of the Islamic Republic of Iran and the Iranian Scientometric Information Database. According to the inclusion criteria, practitioners with at least four years of clinical experience and faculty members with at least three years of academic experience in the three fields of physiotherapy, occupational therapy, and orthotics and prosthetics were selected. After the initial contact, an invitation containing the informed consent form and general information related to the research was sent to her/him via email or WhatsApp. At the beginning of each interview, the interviewer verbally provided information related to the research to the interviewee, and after receiving her/his consent, they started the interview. The informed consent form stated that the interviewee could withdraw from the study at any stage. The sampling process continued until no new findings were added and saturation was reached. The last four interviews with duplicate data were considered to ensure data saturation.

DATA COLLECTION

Three authors (PM, TA, and AT) conducted individual semi-structured interviews in both online and written formats. Each interviewer conducted interviews in one of the fields (physiotherapy, occupational therapy, or orthotics/prosthetics). We used an interview guide containing open questions (Tab. I) to better manage and direct the interview flow. When conducting an online interview proved unfeasible, we sent a list of open-ended questions and probes to the participants, encouraging them to share their detailed experiences. Based on the participants' feedback, we revised the initial interview questions to enhance transparency. We collected data during the interview sessions using a digital audio

Tab. I. Interview guide including open-ended questions

| |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Describe your experience of providing rehabilitation services during the COVID-19 pandemic. |
| In your opinion, what were the most significant challenges and obstacles in providing rehabilitation services during the COVID-19 pandemic? Describe your experiences. |
| Have there been any obstacles regarding maintaining motivation and patient participation in remote rehabilitation sessions, and how have you addressed these issues? |
| What challenges did you face in obtaining the necessary equipment or technology for providing rehabilitation services during the pandemic? |
| Are there any educational or professional development opportunities that have helped you adapt to the challenges related to the pandemic and improve the delivery of rehabilitation services? |
| How have financial constraints or budget limitations during the pandemic affected your ability to provide rehabilitation services, and how have you managed these challenges? |
| Have you taken any measures to expand access to rehabilitation services for disadvantaged or vulnerable populations during the pandemic, and what have been the results? |
| Are you aware of experiences from other countries in providing rehabilitation services during the COVID-19 pandemic? If possible, provide examples of their approaches. |
| What are your suggestions for improving the delivery of rehabilitation services during pandemics like COVID-19 and in the post-COVID-19 era? |

recorder and note-taking. After each interview, we wrote the recorded files and saved them in Office Word.

DATA ANALYSIS

The Braun and Clarke's thematic analysis approach was used to analyze the collected data [21]. The six steps of this approach are: (1) familiarising oneself with the collected data; (2) identifying the initial codes; (3) establishing the themes; (4) reviewing and revising the themes; (5) naming the emerging themes; and (6) reporting the findings [22]. Three authors (PM, SSH, and TA) analyzed the data. In this regard, written texts were independently reviewed and initial coding was done. Then, the identified codes were sorted and sub-themes were formed. In final, the emerged sub-themes were assigned to each component of the five control knobs framework (organization, regulation, financing, payment, and behavior) [23, 24]. Any disagreements at this stage were resolved through discussion, and when necessary, by the participation of a third expert (MB).

Rigor and Trustworthiness

Researchers use various strategies to ensure the rigor and trustworthiness of qualitative studies [25]. Guba and Lincoln have recommended five criteria in this regard: dependability, credibility, transferability, authenticity, and confirmability [26, 27]. The study adopted the following approaches to meet these criteria: (1) involving researchers with different executive and scientific backgrounds (dependability); (2) monitoring and assessing the findings by peers (credibility); (3)

aiming for the greatest diversity in recruited samples (transferability); (4) considering direct quotes from almost all participants (authenticity); and (5) evaluating the findings by involved individuals (confirmability).

Results

To gather data on challenges in delivering PR care during the COVID-19 pandemic and explore potential solutions using a framework with five control knobs, we interviewed 45 professionals in PR, including fifteen physiotherapists, fifteen occupational therapists, and fifteen orthotists and prosthetists (Tab. II). We present the identified challenges and solutions (Tabs. II, IV), aligned with each dimension of the framework, alongside direct quotes from participants.

CHALLENGES

Organization

In our interviews, some participants were concerned about the fragility of the healthcare system. This fragility becomes especially pronounced when we consider the delivery of PR services during crises like pandemics. The system's lack of resilience was a formidable barrier, hindering our ability to effectively tackle healthcare emergencies, as our interviewees stressed.

"Iran's lack of a resilient health system has rendered it unable to respond well to threats such as pandemics. This is why the PR services are not well organized for crises" [15].

One challenge was the lack of PR experts in Iran's health policy-making circles. This sidelines the development of PR services and undermines their importance within our healthcare framework, as some participants have noted.

"Policy-making and decision-making processes within Iran's health system do not significantly involve PR specialists. This often leads to the neglect of PR services" [21].

The interviewees pointed out the challenges stemming from inadequate collaboration among providers of PR services. This lack of cooperation complicates service delivery and hampers the integration of rehabilitation care into the healthcare system.

"There is no acceptable cooperation and coordination between the responsible institutions in the field of providing PR services" [19].

Our interviews also revealed a glaring oversight: the neglect of deprived regions. This oversight exacerbates existing disparities in healthcare access and outcomes, leaving vulnerable populations even more marginalized.

"No specific action was taken to improve the use of PR services during the COVID-19 pandemic in deprived areas" [02].

Additionally, our participants emphasized the strain that workforce shortages cause in effectively delivering rehabilitation services. This shortage not only burdens existing staff, but it also disrupts service provision when personnel need to take leave, be it for illness or other reasons.

"Another problem was that when someone [the provider] got sick and went on leave, there was no one to support us" [17].

Another poignant issue brought up was the heavy workload faced by healthcare professionals delivering PR services. This workload not only taxes our personnel but also takes a toll on their mental well-being, leading to serious consequences.

"Some of the medical staff committed suicide due to high work and psychological pressure" [19].

Linked to this is the lack of job stability among PR sector workers, as pointed out by our participants. This instability, marked by uncertain contract renewals, undermines morale and dedication, ultimately affecting the quality and continuity of PR services.

"Some providers did not have their contract renewed by the hospital despite their hard work" [31].

Shifting gears, our interviews also shed light on the challenges posed by inadequate internet infrastructure. This infrastructure gap not only hampers communication but also limits the adoption of telehealth solutions, critical in delivering remote PR services.

"The main problem was the low speed of the Internet, which created a challenge" [33].

Moreover, participants highlighted the financial burden posed by the high cost of internet access. This burden, borne by both healthcare providers and recipients, further restricts access to telehealth solutions, impeding the reach of PR interventions.

"The cost of the Internet was a challenge for both the therapist and the service recipient" [43].

Transportation emerged as another significant barrier to accessing PR services, particularly during the pandemic. The challenges of commuting and accessing physical services exacerbate the difficulties faced by both providers and patients, hampering the delivery and receipt of essential care.

"During this pandemic, commuting and benefiting from physical services had become difficult" [04].

"The most important challenge was the patients' transportation" [05].

Our interviews also underscored the frustration stemming from delays in obtaining the COVID-19 vaccine. These delays not only increase the risk of infection among healthcare providers but also prolong the hiatus in essential services, further burdening our healthcare system.

"On the other hand, it took a long time to get the vaccine" [31].

Furthermore, the restriction on face-to-face visits emerged as a significant challenge in providing PR services. This limitation not only complicates assessments and interventions, but also impedes progress monitoring, particularly for vulnerable populations like children.

"Not being able to see patients directly was annoying" [01].

"Limited physical interaction was the biggest problem that arose. In fact, it made it difficult to do physical exercises, which led to children's regression" [44].

Similarly, our participants expressed dissatisfaction

with the limitations of home-based care. The inability of therapists to conduct home visits hampers the delivery of personalized interventions, impacting the effectiveness of care provision.

"Many people were not satisfied that therapists visited their homes" [01].

Moreover, inadequate communication infrastructure posed another hurdle for healthcare providers delivering PR services. The lack of essential equipment like smartphones or laptops hinders effective coordination among therapists, disrupting the continuity of care.

"Therapists themselves had the challenge of not having access to equipment such as smartphones or laptops" [31].

Additionally, concerns were raised about the clinical environment for delivering PR services, especially during the pandemic. Issues like improper ventilation and the need for protective gear further complicate service delivery, affecting the quality of care and patient experience.

"It was much more difficult to work because the clinic spaces were not properly ventilated, and we had to work with masks and special covers" [38].

Our interviews also underscored concerns about the sustainability of PR services post-pandemic. The lack of continuity in service delivery creates gaps in care provision, hindering long-term recovery efforts.

"Unfortunately, these services were not continued after the COVID-19 pandemic" [31].

Furthermore, the inadequate availability of personal protective equipment (PPE) during the early stages of the pandemic raised significant concerns. The scarcity of essential protective gear not only jeopardizes healthcare providers' safety, but also compromises PR service delivery.

"At the start of the COVID-19 pandemic, masks and disinfectants were scarce, which was concerning" [16].

Similarly, our participants expressed concerns about the poor quality of the available PPE. Substandard equipment not only compromises safety but also impacts comfort and mobility, affecting the quality of care delivered.

"The quality of the hospital gowns was awful and limited the therapist's range of motion" [31].

Moreover, the exorbitant cost of PPE emerged as another challenge. The sharp rise in prices places a significant financial strain on healthcare providers and facilities, limiting their ability to procure essential protective gear.

"The price of latex gloves had increased about 10 times" [18].

The continuation of the result section have been inserted in Supplementary file 1.

Discussion

The findings from this study provide valuable insights into the multifaceted challenges faced by PR professionals during the COVID-19 pandemic.

Tab. II. Characteristics of included participants.

| Name (ID) | Gender | Age | Educational level | Profession | Job (Clinician/faculty member) | Job status (part- or full-time) | | Clinical experience | Academic experience | Job location (city) | Employment (private, government, NGO, etc.) | Type of Unit (Acute, Sub-acute, Emergency, etc.) | Vaccination status |
|-----------|--------|---------|------------------------|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|--|---------------------|-----------------------|-----------------------------------------------------------------|---------------------------------------------|-------------------------------------------------------------------------------|--------------------|
| 01 | Female | 54 year | PhD | Orthotics & Prosthetics | Faculty Member | Full-time | | 28 year | 25 year | Tehran | Government | Subacute | Done |
| 02 | Male | 59 year | PhD | Orthotics & Prosthetics | Faculty Member | Full-time | | 30 year | 20 year | Tehran | Government | Subacute | Done |
| 03 | Male | 48 year | PhD | Orthotics & Prosthetics | Faculty Member | Full-time | | 27 year | 10 year | Tehran | Government | Subacute | Done |
| 04 | Male | 48 year | PhD | Orthotics & Prosthetics | Faculty Member | Full-time | | 18 year | 18 year | Tehran | Government | Subacute | Done |
| 05 | Male | 43 year | PhD | Orthotics & Prosthetics | Faculty Member | Full-time | | 15 year | 14 year | Tehran | Government | Subacute | Done |
| 06 | Male | 49 year | Bachelor | Orthotics & Prosthetics | Clinician | Part time | | 20 year | - | Tehran | Government | Subacute | Done |
| 07 | Male | 34 year | Master | Orthotics & Prosthetics | Clinician | Full-time | | 10 year | - | Tehran Semnan | Private | Subacute | Done |
| 08 | Female | 27 year | Bachelor | Orthotics & Prosthetics | Clinician | Part time | | 4 year | - | Rafsanjan | Government | Subacute | Done |
| 09 | Male | 57 year | PhD | Orthotics & Prosthetics | Clinician | Full-time | | 29 year | - | Tehran | Private | Subacute | Done |
| 10 | Male | 31 year | Bachelor | Orthotics & Prosthetics | Clinician | Full-time | | 8 year | - | Tehran | Government | Subacute | Done |
| 11 | Male | 31 year | Master | Orthotics & Prosthetics | Clinician | Full-time | | 8 year | - | Tehran | Government | Subacute | Done |
| 12 | Female | 27 year | Bachelor | Orthotics & Prosthetics | Clinician | Part time | | 5 year | - | Tehran | Government | Subacute | Done |
| 13 | Female | 30 year | Bachelor | Orthotics & Prosthetics | Clinician | Part time | | 8 year | - | Tehran | Government | Subacute | Done |
| 14 | Female | 25 year | Bachelor | Orthotics & Prosthetics | Clinician | Part time | | 6 year | - | Tehran | Private | Subacute | Done |
| 15 | Female | 26 year | Bachelor | Orthotics & Prosthetics | Clinician | Part time | | 6 year | - | Tehran | Private | Subacute | Done |
| 16 | Female | 33 year | PhD | Physiotherapist | Faculty member of the University of Rehabilitation Science and Social Welfare | Full-time | | 11 years | 7 years | Tehran, University of Rehabilitation Science and Social Welfare | Commitment to service | Clinic | Done |
| 17 | Female | 34 year | Bachelor | Physiotherapist | Clinician | Full-time | | 9 years | - | Qom | Private contract | Clinic | Done |
| 18 | Female | 38 year | Professional Doctorate | Physiotherapist | Clinician | Full-time | | 16 years | - | Tehran | Employer | Clinic | Done |
| 19 | Male | 57 year | Master | Physiotherapist | Head of Physiotherapy Department in Shiraz Oil industry, Chairman of the Physiotherapy association, Board member of the medical council, Author of the physiotherapy service standards in COVID-19, Clinician | Full-time | | 33 years | Presenter of articles | Shiraz | Government | Health and Treatment of Oil Industry | Done |
| 20 | Male | 35 year | PhD | Physiotherapist | Clinician | Full-time | | 12 years | 7 years | Tehran | Private | Clinic | - |
| 21 | Male | 29 year | PhD | Physiotherapist | Clinician, University lecturer | Full-time | | 7 years | 4 years | Tehran | Government | University, Clinic, Hospital (Orthopedics) | Done |
| 22 | Male | 42 year | Master | Physiotherapist | Clinician | Full-time | | 18 years | 3 years | Mashhad | Government | Mashhad university hospital (Dr. Sheikh, Hemophilia and Thalassemia patients) | Done |
| 23 | Female | 31 year | PhD | Physiotherapist | Clinician | Part-time | | 8 years | 4 years | Shiraz | Government | Rehabilitation Faculty Clinic | Done |

Tab. II (follows). Characteristics of included participants.

| Name (ID) | Gender | Age | Educational level | Profession | Job (Clinician/faculty member) | Job status (part- or full-time) | | Clinical experience | Academic experience | Job location (city) | Employment (private, government, NGO, etc.) | Type of Unit (Acute, Sub-acute, Emergency, etc.) | Vaccination status |
|-----------|--------|---------|-----------------------------------------|------------------------|----------------------------------------------|-----------------------------------|--|---------------------|---------------------|-------------------------------|---------------------------------------------|-------------------------------------------------------------------------------------------------------------|--------------------|
| 24 | Male | 46 year | Professional Doctorate in Physiotherapy | Physiotherapist | Clinician | Full-time | | 23 years | 10 years | United States, Maryland State | Private | Clinic | Done |
| 25 | Male | 62 year | PhD | Physiotherapist | Faculty member of the Jundishapur University | Full-time | | 34 years | 25 years | Ahvaz | Government | Rehabilitation Faculty Clinic | Done |
| 26 | Male | 31 year | Bachelor | Physiotherapist | Clinician | Full-time | | 5 years | - | Mashhad | Government | Imam Reza Hospital, University Clinic (Inpatients from all departments and Outpatient), Transplant Hospital | Done |
| 27 | Male | 35 year | Master | Physiotherapist | Clinician | Full-time | | 10 years | - | Yazd | Government & Private | Hospital (Inpatient & Outpatient), Clinic | Done |
| 28 | Male | 38 year | PhD | Physiotherapist | Clinician & Attending Physiotherapist | Full-time | | 16 years | 4 years | Tehran | Contractual, Private | Hospital (Inpatient & Outpatient), Clinic | Done |
| 29 | Male | 25 year | Bachelor | Physiotherapist | Clinician | Evening shift every day (7 hours) | | 4 years | - | Tehran | Government | Hospital (Inpatient & Outpatient) | Done |
| 30 | Male | 41 year | Professional Doctorate in Physiotherapy | Physiotherapist | Clinician | Full-time | | 18 years | 15 years | Zahedan | Government | Ali Ibn Abi Taleb Hospital (Responsible for the Rehabilitation Department of the Hospital) | Done |
| 31 | Female | 29 year | PhD | Occupational therapist | Faculty Member, Tabriz university | Full-time | | 6 year | 4 year | Tabriz | Government | University, Hospital (Inpatient & Outpatient), Acute, Neurology | Done |
| 32 | Female | 39 year | PhD | Occupational therapist | Faculty Member, Shahid Beheshti University | Full-time | | 12 year | 6 year | Tehran | Government | University, Clinic, Subacute, Neurology | Done |
| 33 | Male | 35 year | PhD | Occupational therapist | Faculty Member, Tabriz university | Full-time | | 12 year | 6 year | Tabriz | Government | University, Clinic, Hospital (Neurology & orthopedy) | Done |
| 34 | Male | 38 year | PhD | Occupational therapist | Faculty Member, Tehran university | Full-time | | 15 year | 6 year | Tehran | Government | Neurology, Subacute | Done |
| 35 | Male | 32year | Master | Occupational therapist | Faculty Member, Tabriz university, Clinician | Full-time | | 8 year | 4 year | Tabriz | Government, Private | Subacute | Done |
| 36 | Female | 30 year | Master | Occupational therapist | Clinician | Full-time | | 7 year | - | Tehran | Private | Subacute, Neurology & Mental | Done |
| 37 | Female | 31 year | Bachelor | Occupational therapist | Clinician | Full-time | | 8 year | - | Tabriz | Private | Subacute, Neurology & Mental | Done |
| 38 | Female | 29 year | Master | Occupational therapist | Clinician | Full-Time | | 6 year | - | Tehran | Private | Subacute,Mental | Done |
| 39 | Female | 30 year | Bachelor | Occupational therapist | Clinician | Full-time | | 7 year | - | Urmia | Private | Subacute | Done |
| 40 | Male | 32 year | Bachelor | Occupational therapist | Clinician | Full-time | | 8 year | - | Tabriz | Private | Subacute, Pediatric occupational therapy | Done |
| 41 | Female | 28 year | Bachelor | Occupational therapist | Clinician, Imam Reza hospital | Full-time | | 6 year | - | Tabriz | Government | Acute | Done |
| 42 | Male | 32 year | Bachelor | Occupational therapist | Clinician | Part time | | 8 year | - | Karaj | Private | Subacute, Neurology | Done |
| 43 | Female | 32 year | Bachelor | Occupational therapist | Clinician | Part time | | 5 year | - | Tehran | Private | Subacute, Neurology & Mental | Done |
| 44 | Male | 31 year | Bachelor | Occupational therapist | Clinician | Full-time | | 8 year | - | Sanandaj | Private | Subacute, Neurology & Mental | Done |
| 45 | Female | 30 year | Bachelor | Occupational therapist | Clinician | Full-time | | 5 year | - | Rasht | Private | Subacute, Neurology & Mental | Done |

CHALLENGES

The most commonly cited challenges hindering the effective delivery of PR services are discussed in five dimensions:

At the organizational level, one of the main challenges to PR services during the COVID-19 period was the insufficient preparedness of Iran's health system to respond appropriately to the specific conditions that arose. This situation negatively impacted the PR of people with disabilities, many of whom relied on consistent PR for chronic conditions. In addition, the COVID-19 infection added a significant number of patients to inpatient and outpatient rehabilitation settings, which were already grappling with significant challenges in providing services for their non-COVID clients. Many participants cited inadequate PPE, including basic items such as masks, as evidence of unpreparedness, especially in the early stages of the pandemic. The high cost and subpar quality of some available PPE posed additional challenges.

Participants repeatedly mentioned slow internet as a significant obstacle to replacing face-to-face PR visits with online visits. Deficient prerequisite telecommunication equipment aggravated the problem. The limited remote PR options hampered access to care, especially for those in remote or underserved areas, exacerbating disparities in healthcare access and outcomes. On the other hand, the processes of assessment and provision of certain therapeutic interventions were complicated due to the restriction of face-to-face appointments. Similarly, in PR educational settings, numerous educational programs encountered significant challenges and necessitated a transition to alternative programs [28]. The absence of PR experts in health policy-making further marginalized the sector, contributing to the neglect of PR needs.

Overall, the participants indicated that Iran's healthcare system lacked resilience and was fragile. They pointed out various aspects of the system's inadequate preparedness to respond appropriately to the pandemic. Lack of preparation was not unique to Iran, and although some countries were able to adopt successful PR approaches, most governments' reactions to the crisis were late and ill-organized [2, 29]. Learning from these experiences is important for getting better prepared.

Regulatory challenges centered around the absence of comprehensive clinical practice guidelines and ambiguity in pricing structures for telerehabilitation. Practitioners have long used clinical guidelines to guide healthcare decisions for specific clinical circumstances [30]. Unprecedented challenges presented during the COVID-19 era hampered healthcare providers' ability to deliver consistent and evidence-based care and contributed to uncertainty and variability in service provision. This impact may lead to future effects such as reduced functioning and increased caregiving burden, resulting in decreased participation of individuals with disabilities in society [31]. Determining the tariff for healthcare services in Iran has been a controversial process that has faced criticism from many stakeholders [32]. Clear tariffs help regulate the relationship between provider

and recipient of services. The vagueness of pricing for alternative methods of providing PR services during the COVID-19 pandemic could jeopardize this relationship and negatively impact the treatment process.

Financial hardships rose after the COVID-19 pandemic further exacerbated access to PR. The pandemic significantly impacted economic conditions. Studies have shown that the pandemic disproportionately affected economically disadvantaged groups [33, 34]. In this scenario, individuals with disabilities from lower socioeconomic backgrounds faced increased challenges in accessing PR services. Many patients need long-term PR therapies, and some PR services, such as prostheses, are expensive. The majority of PR services in Iran are financed out-of-pocket (OOP) [16]. Limited access to PR may exacerbate the condition and predispose the patient to more severe financial hardship. To prevent and break the vicious cycle of chronic disease and poverty, financial support should be considered [35]. As a result, the lack of government support, a frequently cited challenge, not only hindered the delivery of PR to those in need, but also potentially had long-term socioeconomic and health implications. Iranian healthcare has identified insufficient financial support from the government as a challenge in fighting the COVID-19 pandemic [36].

Participants pointed out payment difficulties. Patients' reluctance to pay for online services, in addition to causing financial issues, impeded the adoption of telerehabilitation solutions during the COVID-19 pandemic. Inadequate and delayed payments for therapists during the pandemic affected their financial well-being, increasing their worries and feelings of frustration. This reflects a broader failure to recognize the value of their contributions to healthcare delivery. Researchers have detailed the influences of payment methods and financial and nonfinancial incentives on the practice of healthcare professionals [37-39].

The participants most frequently cited challenges related to behavioral factors. Many participants indicated the mental pressures of the COVID-19 pandemic on both healthcare professionals and patients. Participants highlighted anxiety about the virus's transmission as a serious concern. These findings are consistent with studies that have emphasised the importance of addressing the psychological consequences of the pandemic [40-42]. Timely psychological counselling is crucial for ensuring the well-being of those involved in PR services, and overcoming the anxiety of contracting the infection is essential to ensuring continued access to necessary care. Resistance to adopting new service modalities, particularly among older therapists and patients, had a significant impact on the use and provision of PR services. Researchers have discussed negative attitudes towards telerehabilitation and low levels of digital literacy, particularly in older people, as barriers to its implementation [43, 44]. We should address these obstacles to foster trust and acceptance of innovative healthcare delivery approaches.

Tab. III. Identified challenges in delivering physical rehabilitation services during the COVID-19 pandemic in Iran.

| Main themes | Challenges | Direct quotes | Participants' ID |
|--------------|----------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|
| Organization | Lack of a resilient health system | "Iran's lack of a resilient health system has made it unable to respond well to threats such as pandemics.» This is why the rehabilitation services are not well organized for crises." [15] | 15, 19, 34 |
| | Non-involving of rehabilitation experts in policy-making | "Policy-making and decision-making processes within Iran's health system do not significantly involve rehabilitation specialists.» This often leads to the neglect of rehabilitation services." [21] | 17, 21, 40 |
| | Lack of inter-sectoral collaboration | "There is no acceptable cooperation and coordination between the responsible institutions in the field of providing rehabilitation services." [19] | 19, 23 |
| | Lack of attention to deprived regions | "No specific action was taken to improve the use of rehabilitation services during the COVID-19 pandemic in deprived areas." [02] | 02, 07, 21, 31, 41 |
| | Inadequate workforce | "Another problem was that when someone [the provider] got sick and went on leave, there was no one to support us." [17] | 17, 31 |
| | High workload | "Some of the medical staff committed suicide due to high work and psychological pressure." [19] | 19, 21, 31, 34 |
| | Lack of job stability | "Some providers did not have their contract renewed by the hospital despite their hard work." [31] | 31 |
| | Weak internet | "The main problem was the low speed of the Internet, which created a challenge." [33] | 01, 02, 16, 33, 34, 35, 37, 38, 39, 40, 42, 43 |
| | High cost of internet | "The cost of the Internet was a challenge for both the therapist and the service recipient." [43] | 43 |
| | Transportation challenges | "During this pandemic, commuting and benefiting from physical services had become difficult." [04] "The most important challenge was the patients' transportation." [05] | 04, 05, 32, 39, 42 |
| | Delay in vaccination | "On the other hand, it took a long time to get the vaccine." [31] | 31 |
| | Limitation of face-to-face visits | "Not being able to see patients directly was annoying." [01] "Limited physical interaction was the biggest problem that arose. In fact, it made it difficult to do physical exercises, which led to children's regression." [44] | 01, 03, 04, 05, 07, 09, 11, 14, 24, 26, 37, 38, 44 |
| | Limitation of home-based care | "Many people were not satisfied that therapists visited their homes." [01] | 01, 36 |
| | Lack of communication infrastructure | "Therapists themselves had the challenge of not having access to equipment such as smartphones or laptops." [31] | 31, 34, 36, 37, 45 |
| | Inappropriate clinical environment | "It was much more difficult to work because the clinic spaces were not properly ventilated, and we had to work with masks and special covers." [38] | 23, 32, 38 |
| | Lack of sustainable service delivery | "Unfortunately, the COVID-19 pandemic prevented the continuation of these services." [31] | 31 |
| | Inadequate PPE | "At the start of the COVID-19 pandemic, masks and disinfectants were scarce, which was concerning." [16] | 01, 02, 12, 16, 19, 20, 22, 23, 24, 25, 28, 29, 30 |
| | Poor quality of available PPE | "The quality of the hospital gowns was awful and limited the therapist's range of motion." [31] | 02, 22, 28, 31 |
| | High cost of PPE | "The price of latex gloves had increased about 10 times." [18] | 05, 18, 21, 28, 30 |
| | Inadequate attention to rehabilitation practitioners | "Physiotherapists received none of the incentives offered to other health system employees during COVID-19." [22] | 22, 26, 28, 30 |
| | Lack of in-service training | "Special educational opportunities were not available at that time." [45] | 04, 10, 11, 18, 21, 33, 34, 45 |
| | Clinical education issues | "In my opinion, the COVID-19 pandemic negatively impacted the students present during that period. The treatment method was significantly different and the patient count was significantly lower." [21] | 01, 21 |
| | Lack of effective telerehabilitation | "There are practically no telerehabilitation services in Iran." [06] | 02, 06, 11, 15, 24, 30, 33, 39, 41 |
| | Limited access to raw materials | "At times, we encountered difficulties when purchasing prosthetic parts for patients, as the process of importing goods and customs unintentionally encountered some issues due to the impact of the crisis. However, these issues were not severe or unmanageable." [02] | 02, 03, 05, 09 |
| | Lack of attention to private sector | "The support during the COVID-19 era was only for government centers, and private centers were not given support." [19] | 19 |

Tab. III (follows). Identified challenges in delivering physical rehabilitation services during the COVID-19 pandemic in Iran.

| Main themes | Challenges | Direct quotes | Participants' ID |
|-------------|------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| Regulation | Lack of comprehensive clinical guidelines | "There was no specific guideline for the COVID-19 era, and it was mostly the experience of the providers." [35] | 19, 27, 35, 42 |
| | Unclearing of online service tariffs | "The tariff for providing rehabilitation services online was not very clear." [35] | 35 |
| | Unrealistic tariffs of rehabilitation services | "Unfortunately, the tariff of many rehabilitation services is not proportional to the amount of work done." [19] | 19 |
| Financing | Financial hardships | "Financial problems posed another obstacle for the patients, as they had fallen financially, and many of them experienced job disruptions, making it difficult for them to perform occupational therapy and pay the fees." [31] "Some people had financial problems and could not afford a smartphone, especially in the surrounding cities, where they used to text and explain the exercises to these clients." [37] | 01, 04, 17, 18, 23, 24, 26, 28, 31, 32, 36, 37, 38, 40, 44, 45 |
| | Lack of government support | "There was not much support for the rehabilitation department. The focus shifted from enhancing rehabilitation services to preventing COVID-19 - related deaths." [23] | 16, 17, 23 |
| | Limiting providers' income | "During the period when we were involved in the Corona virus and the number of patients decreased, we reduced the working hours of the personnel and introduced shift personnel, which naturally led to lower salaries and better financial management" [07] | 07, 09, 21, 25, 27, 31, 35, 42, 43 |
| Payment | Delayed payment mechanism | "Among the other challenges of this era was the late payment of salaries and overtime, which had a negative impact on the therapist from a mental point of view, and the therapist's worries increased." [41] | 33, 41 |
| | Inadequate salary | "Medical personnel should receive better treatment during such crises, but we performed poorly in this area and, despite warning the policy-makers, the remuneration of the medical staff was low." [19] | 19 |
| | Unwillingness to pay for online services | "There was also a problem with paying for online services because patients thought that the therapist should work with them physically." [40] | 35, 36, 40 |
| Behavior | Mental pressures | "The patients were under stress, and the majority of them had COVID-19 infections, depression, low motivation, and feelings of hopelessness." [31] "Emotional and psychological challenges were the constant worry about disease transmission." [34] "Both therapists and families are under stress and mental pressure, especially if they visit the elderly." [44] | 02, 03, 04, 08, 09, 15, 16, 17, 18, 19, 21, 22, 23, 25, 26, 27, 28, 29, 30, 31, 33, 34, 37, 39, 40, 41, 42, 44, 45 |
| | Unknown nature of COVID-19 | "One of the challenges was the unknown nature of the virus, and the other was the unknown side effects of the disease and the side effects of the drugs the patients were taking." [20] | 16, 20 |
| | Fear of contracting COVID-19 | "The fear of getting COVID-19, the fear of being hospitalized and the consequences after COVID-19, this stress that was inflicted on us made it much more difficult for us." [28] "The first thing that was very bad and became a challenge was the sharp decrease in the number of people visiting the clinic due to the fear of getting infected with COVID-19." [42] | 01, 02, 03, 04, 06, 07, 08, 11, 12, 13, 14, 16, 17, 18, 19, 20, 21, 23, 24, 26, 28, 32, 36, 38, 42, 45 |
| | Delayed referral | "During the COVID-19 era, there were fewer clients and people were postponing their need for orthotics and prosthetics services." [03] | 02, 03, 04, 05, 38 |
| | Lack of effective follow-up | "The patients were very resistant to rehabilitation and because they did not see any progress, they canceled the treatment." [38] "Many families stopped the rehabilitation treatment and then the child severely regressed." [39] | 19, 32, 36, 38, 39, 43 |
| | Resistance to the use of online routes | "Colleagues, especially old ones, were very resistant to online services. For example, old therapists who have older approaches believed that online services lower the value of the field, and families resisted because they could not do the interventions at home, which made them abandon online services." [39] "Patients are resistant to new methods or new rehabilitation approaches such as online services." [41] | 05, 10, 19, 24, 31, 34, 36, 37, 39, 40, 41, 43, 44 |
| | Fatigue among practitioners | "In the discussion of physical occupational therapy, the increase in heat led to the therapist's fatigue and I had breathing problems." [35] "Working with coverings like masks was extremely terrifying. The effects of the mask are still on their faces and the redness has not disappeared." [45] | 31, 32, 35, 39, 40, 41, 42, 43, 45 |
| | Unwillingness to service delivery | "Patients who were at home and needed oxygen after contracting Corona, needed a home visit. Many colleagues resisted not to do this because they knew they were COVID-19 patients." [17] | 17, 40, 42 |

Tab. III (follows). Identified challenges in delivering physical rehabilitation services during the COVID-19 pandemic in Iran.

| Main themes | Challenges | Direct quotes | Participants' ID |
|-------------|---------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|
| Behavior | Isolation of practitioners | "Due to the fact that some members of the public thought that the health workers might be infected with COVID-19, they refused to communicate with this group." | 28 |
| | Reducing the motivation | "Sometimes the therapist had low motivation, which lowers the quality of service." [45] | 36, 45 |
| | Absenteeism | "The absence of patients or the absence of the therapist due to the infection of COVID-19 caused the process of providing services to be disrupted." [33] | 33 |
| | Lack of effective teamwork | "I feel that unfortunately there is no good communication between nurses and physiotherapists in Iran. It means that it is not a good teamwork." [29] | 29 |
| | Annoying of protective equipment | "Because of the mask on our face, the oxygen was very low. I had headaches and dizziness every night." [25] "The therapist could not provide sufficient explanations with protective covers such as a mask, or the clients who used the mask could not perform the exercises properly due to breathing problems." [34] | 03, 10, 17, 18, 20, 22, 23, 25, 28, 32, 34, 38 |
| | Disruption of communication | "I think connecting with patients was our biggest challenge, and even though we followed the protocols very sensitively, we were still worried about that." [13] "In mental occupational therapy, exercises such as smiling or facial feedback were influenced by the mask." [35] | 03, 04, 13, 34, 35, 36, 39, 42, 43, 45 |
| | Superstitions | "In the area where I was in Zahedan, there was a lot of discussion of medical superstitions, religious beliefs, especially among fellow Sunni citizens, and going to the doctor happened later." [30] | 30 |
| | Decreasing the family supports | "The physical presence of the families supporting the elderly had also decreased, for example, they had reduced their visits to their grandparents' house, exercises were not done at home. And the improvement process of people who referred to occupational therapy was very weak." [44] | 32, 44 |
| | Failure to comply with health protocols | "One of the biggest challenges was that some people did not follow the protocols, that is, they did not use masks correctly and did not take the disease seriously." [02] | 02, 03, 06, 12, 44 |
| | Limitation of patients' movement maneuvers | "During the COVID-19 era, patients were limited in exercise because they were dependent on oxygen." [41] | 41 |
| | Cultural challenges | "Another problem was the lack of cooperation of the families who did not want to make phone or video calls." [38] | 35, 38 |
| | Lack of trust in telerehabilitation | "Families did not trust remote rehabilitation and did not look at it as a treatment method, and it was hard to convince them about this treatment method." [35] | 35 |
| | Unawareness among users | "Awareness about occupational therapy is low in the society and it was even worse during the corona virus." [38] | 25, 27, 33, 35, 38, 40 |
| | Lack of familiarity in working with online platforms | "Patients, especially the elderly, did not know how to use some platforms, they had phones but did not know how to use applications." [31] "Patients were not updated, did not know how to use different programs and did not have enough access to different programs." [34] | 31, 33, 34, 40 |
| | Lack of familiarity with modern rehabilitation services | "Because we were not prepared for these conditions beforehand, we were not familiar with the new rehabilitation services." [33] | 33, 42 |

SOLUTIONS

In response to the various challenges posed by the COVID-19 pandemic, PR facilities had to adopt appropriate strategies to implement diverse solutions for overcoming the challenges. The interviewees proposed solutions spanning various domains, including the immediate healthcare landscape and broader socioeconomic and policy considerations. These solutions, categorized according to the five control knobs, can offer a comprehensive framework for addressing the complex challenges identified.

The study participants highlighted the importance of strengthening telerehabilitation and moving towards online services at the organizational level. During the lockdown, telerehabilitation could help to maintain PR services while reducing the risk of disease transmission. Services provided through telerehabilitation range from education and consultation to assessment and therapy. Despite the limitations of telerehabilitation, studies have demonstrated that in certain conditions, its effectiveness may match that of in-person PR [45]. We also highlighted the importance of improving internet connectivity to support online services and developing practical

Tab. IV. Identified solutions in delivering physical rehabilitation services during the COVID period in Iran.

| Main themes | Sub-themes | Direct quotes | Participants' ID |
|---------------------|------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
| Organization | Strengthening the macroeconomics | "For example, the Philippines was able to be locked down for a long time because it had a good economy and killed a very small number of people. Therefore, it is necessary that the economic situation of the society should be such that it can provide social distancing and good financial support during such conditions." [18] | 18 |
| | Creating a resilient health system | "At the national level, an agile health system should be created that can quickly act in prevention, treatment and rehabilitation during crises." [25] | 01, 19, 25, 34 |
| | Involving of rehabilitation experts in policy-making | "Rehabilitation specialists should have a greater role in the process of formulating health policies. Unfortunately, in Iran, because there are more doctors and nurses, their influence on policies is more impressive." [30] | 30 |
| | Considering rehabilitation services in policies | "Although the hospital guard was paid a bonus for the period of COVID-19, we physiotherapists were not paid anything. Therefore, it is necessary that rehabilitation professionals are also considered in incentive policies according to the nature of their work." [22] | 22 |
| | The possibility of direct access to practitioners | "In my opinion, it should be possible for the physiotherapist to visit the patient directly." [29] | 29 |
| | Facilitating the public transportation | "It is very important to pay attention to the transportation of patients. Responsible institutions should facilitate this." [02] | 02, 16 |
| | Facilitating home-based care | "Service delivery methods such as home-based services should be considered more during such crises as they greatly reduce the risk of contracting the disease." [05] | 02, 05, 08 |
| | Using charities and NGOs | "The capacity of charities and non-governmental organizations can be used to provide rehabilitation services, especially for disadvantaged and vulnerable groups." [20] | 20 |
| | Using private sector capacity | "Most of the rehabilitation services in Iran are provided by the private sector. It is necessary to use the capacity of this department especially in crises." [06] | 06 |
| | Establishing a comprehensive information system | "Access to a comprehensive system is necessary to provide useful information to families and therapists." [40] | 40 |
| | Timely vaccination | "As I mentioned, simultaneous and timely vaccination of both therapists and clients could lead to the improvement of service delivery." [02] | 02, 04, 06, 07, 18, 35 |
| | Effective crisis management | "We did not have a clear crisis management during this pandemic. In the long COVID-19 period, it is necessary to pay more attention to crisis management with a focus on prevention." [31] | 17, 31, 34 |
| | Facilitating the integration of services in inpatient department | "A group of therapists started to set up occupational therapy department in inpatient wards. The flourishing period of occupational therapy was at that time because for the first time occupational therapy for inpatients was introduced into the hospital service system and it was the first time that occupational therapy services were provided in inpatient departments." [31] | 30, 31 |
| | Careful informing | "Organizations such as the Ministry of Health should provide the necessary training and provide detailed information." [06] | 02, 06 |
| | Using social media | "Social media should justify people correctly and give people correct information because we used to get most of the information from social media." [39] | 19, 25, 39 |
| | Improving the internet | "My proposal for the government is to improve the Internet. For example, our online classes were closed due to the internet outage and the patients suffered a lot." [16] | 16, 36, 44 |
| | Appropriate clinical environment | "A suitable space with proper ventilation can lead to better rehabilitation services." [32] | 13, 14, 27, 32, 38, 42 |
| | Applying modern devices and instruments | "I think the use of equipment such as scanners, which leads to a reduction in direct contact with patients, can be effective." [10] | 10, 45 |
| | Structured waiting list | "It is better to adjust the attendance schedule of patients in such a way that there is no interference and crowding in the clinic environment." [14] | 14 |
| | Moving towards online services | "One of the good things that COVID-19 led to was that we went towards to online rehabilitation." [32] | 08, 12, 32, 36, 37, 43 |
| | Creating practical applications | "A suitable solution is to prepare and set up appropriate computer games, such as applications that perform exercises step by step and enter the next step." [38] | 36, 38, 43 |

Tab. IV (follows). Identified solutions in delivering physical rehabilitation services during the COVID period in Iran.

| Main themes | Sub-themes | Direct quotes | Participants' ID |
|--------------|--------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|
| Organization | Strengthening the telerehabilitation | "There is a need to strengthen telerehabilitation services in Iran so that services can be provided during pandemics such as COVID-19." [16] "Telerehabilitation made people in some cities who did not have access to have access to therapists, even at that time patients from southern cities visited and the patients made progress." [39] | 01, 05, 16, 19, 22, 31, 33, 34, 35, 36, 38, 39, 42 |
| | Mobile rehabilitation team | "Mobile rehabilitation teams can be used to provide services, especially to deprived and remote areas during pandemics." [40] | 40 |
| | In-service training | "The training should be done by universities or centers that have the authority to teach, and the therapists should be taught what they can do in this course, for example, explain infection control strategies or other issues." [35] | 31, 35, 39 |
| | Holding online courses | "Holding workshops online became more intense and I think it was one of the turning points of that period." [21] | 21, 26, 28 |
| | Providing distance education | "There is a need to provide platforms, especially in the field of education, for example, to adapt to educational systems and virtual education." [01] | 01, 33 |
| | Adjusting the educational curriculum | "There is a need to pay more attention to issues related to infectious diseases in the curriculum of rehabilitation courses." [25] | 25 |
| | Preparing high quality evidence | "Also, conducting high-quality research and studies in the field of rehabilitation and using their results in the post-COVID era can lead to very good results." [01] | 01, 27 |
| | Free services for vulnerable groups | "People who were economically low were not charged, the treatment was free for them." [33] | 32, 33 |
| | Enhancing the accessibility to PPE | "The provision of personal protective equipment such as masks and gloves, as well as vaccination, led to the improvement of service delivery during this period." [04] | 04, 24, 27, 45 |
| | Pay more attention to health workforce | "Policies should be adopted to pay more attention to the personnel of special care departments such as nurses, infectious disease specialists, anesthesiologists and therapists." [19] | 19 |
| Regulation | Establishing effective clinical guidelines | "Professionals should come up with a protocol for how to provide services in the new pandemic." [18] "It is necessary to standardize the terms of service provision." [19] | 18, 19, 35, 40 |
| | Defining tariffs for online services | "Tariffs for online services should be clearly defined in order to create a sufficient incentive for providers." [35] | 35 |
| | Realizing the tariffs for rehabilitation services | "Tariff rates are not realistic for many rehabilitation services. Due to the high rate of inflation, it is necessary to review them." [19] | 19 |
| Financing | Improving the insurance coverage of rehabilitation services | "There is a need to improve the insurance coverage of rehabilitation services to reduce the co-payment of recipients." [11] | 11 |
| | Insurance coverage for online services | "Health insurances should also cover online services." [39] | 39 |
| | Increasing the government supports | "Government support should be increased. For example, taxes should be removed during the pandemic period, or incentive points should be considered for therapists who accepted the risk of providing services during this period." [09] | 09, 33, 42, 44 |
| Payment | Reducing out-of-pocket | "A major part of the cost of rehabilitation services is paid OOP. Therefore, solutions should be made to reduce this cost." [24] | 24 |
| | On-time payment by insurers | "One of the constant challenges of Iranian health insurance is late reimbursement. Therefore, to improve the motivation of clinicians, it is necessary that reimbursements be made on time." [27] | 27 |
| | Considering rehabilitation providers in the payment of bonus | "Rehabilitation professions are often overlooked when it comes to rewarding hard work during crisis situations." [31] | 31 |

applications to reduce the need for in-person interventions. We noted that timely vaccination, a suitable clinical environment, and improved accessibility to PPE serve

as solutions for controlling disease transmission during in-person visits. Our participants' recommendations align with the growing body of research highlighting

Tab. IV (follows). Identified solutions in delivering physical rehabilitation services during the COVID period in Iran.

| Main themes | Sub-themes | Direct quotes | Participants' ID |
|-----------------|------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
| Behavior | Increasing the awareness of physicians | "It is very important to increase the awareness of doctors about rehabilitation services, especially the services needed in acute stages." [31] | 07, 31, 37, 39 |
| | Increasing public awareness about telecommunications | "The most important solution is that you should familiarize the whole community with remote communication devices in advance, such as smart watches that are really therapeutic and can be connected to the therapist's system and the therapist can check a number of things remotely or how to use many Teach the cases." [31] | 31, 35, 40 |
| | Improving the public awareness regarding pandemic | "There is a need to raise public awareness of both pandemics and rehabilitation services." [36] | 36, 38 |
| | Effective teamwork | "In times of crisis, one of the things that is very important is to work as a team where the whole hospital has the duty to fight for a goal." [41] | 06, 22, 26, 41 |
| | Improving provider-user relationship | "Many times, the patients could not communicate with us properly because of the psychological problems caused by the corona virus. So this requires a close relationship between us and them." [23] | 02, 23 |
| | Adherence to safety protocols | "I think that cleaning the service delivery environment in order to lower the risk of infection for therapists and even patients can be very effective." [08] "I think it is possible to provide safer rehabilitation services only by following health protocols." [13] | 08, 13, 15, 16, 32, 39 |
| | Promoting responsibility | "The more important factor was that some people really need help and they cannot be abandoned from a human and moral point of view." [18] | 18, 25, 28, 36 |
| | Use of medical aids | "It is necessary for the general public to be familiar with medical aids such as pulse oximetry, biofeedback, etc." [31] | 31 |
| | Strengthening spiritual dimensions | "Let's not look at the financial aspect 100% in our work and consider the spiritual side somewhere." [31] | 31 |
| | Psychological support | "My advice is that we should take a series of psychological courses, not in a completely professional way, but in such a way that we can adjust our intimacy and behavior with the patient so that he can reduce his mental challenges and trust us more easily." [23] | 23, 41 |
| | Increasing the flexibility | "I learned flexibility and patience during this pandemic. I learned to be patient and interact with the patient better." [16] | 16 |
| | Delivering evidence-informed interventions | "To treat the patients, at first, drugs were used that were not based on evidence and a lot of money was spent on it, which shows that just having wealth without knowledge does not help the country. Therefore, there is a need to provide interventions based on reliable scientific evidence." [19] | 19, 22 |
| | Having holistic view | "My recommendation is to hold a psychological webinar and teach how to deal with the patient. Some patients said that the therapists only put the device on our body, without saying a word or anything." [23] | 23, 28 |

the need for intersectoral collaboration, technological advancements, and policy reforms to enhance the resilience and adaptability of healthcare systems in the face of crises [46, 47]. The participants stressed the necessity of developing clinical guidelines for PR services during the COVID-19 pandemic. By standardizing service provision and creating protocols tailored to the new pandemic environment, healthcare systems can enhance their ability to respond effectively to emerging challenges and ensure the quality of care provided to patients. Defining clear and fair tariffs for PR services, including those provided online, not only ensures transparency, but also promotes the adoption of online PR solutions, ultimately enhancing patients' access to care.

The participants proposed increasing the government's financial support and reducing OOP payments for PR services as solutions to bolster the healthcare system and make PR services more accessible and equitable for

all. Different strategies for reducing OOP payments in the health system and expanding financial support in PR have been studied [48]. Adopting proper strategies is necessary for progress towards universal health coverage.

Increasing the awareness of physicians and the public regarding PR services was pointed out by the participants. The emphasis on empowering healthcare workers, providing psychological support, and fostering effective teamwork and communication aligns with the growing recognition of the importance of addressing the well-being and professional needs of the healthcare workforce, particularly during challenging times [49-51]. By prioritizing the needs of both providers and patients, healthcare systems can create an environment conducive to the delivery of high-quality, sustainable PR services [52].

LIMITATIONS

Like all other studies, our study also had some limitations. In the following, we will mention some of these limitations. Firstly, the study might not have fully included the experiences of those in rural areas or different types of facilities if the majority of participants were from cities or certain hospitals. Secondly, the findings may not apply to other places outside Iran because each has its own culture, healthcare setup, and government rules that could be very different. Thirdly, personal opinions and viewpoints may have influenced the collection and interpretation of the data. This might have affected how reliable and accurate the findings are.

Conclusion

The main identified challenges included Iran's healthcare system's lack of preparedness, deficient infrastructure, limited remote PR options, restriction of in-person visits, lack of comprehensive clinical guidelines, ambiguous pricing for telerehabilitation, financial hardships stemming from the pandemic, insufficient government support, reliance on OOP, patients' reluctance to pay for online services, delayed compensation for PR professionals, mental distress experienced by patients and service providers, resistance to new service modalities, and inadequate digital literacy. In response to these multifaceted challenges, the study participants proposed a range of solutions. The key solutions included strengthening telerehabilitation infrastructure, developing clear clinical guidelines, increasing government financial support, improving payment structures, and fostering behavioural changes through increased awareness.

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Ethics approval and consent to participate

The Research Ethics Committee of the Shiraz University of Medical Sciences provided ethical approval for this study (IR.SUMS.REC.1402.399) previously. All methods were performed in accordance with the relevant guidelines and regulations such as Declarations of Helsinki. Informed consent for participating in this

study was obtained from all the participants before the interview sessions.

Consent for publication

Not applicable.

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Conflict of interest statement

The authors declare that they have no competing interests.

Authors' contributions

P.M, P.Mo, N.E, S.SH, M.B, and AH.KN contributed to the conception and design of the study. P.M, T.A, N.E, A.T, and AH.KN conducted the interviews, and S.SH, P.Mo, and M.B were co-moderators. P.M, T.A, A.T, AH.KN, and S.SH conducted most of the analysis, which P.M and M.B discussed regularly. P.M, P.Mo, N.E, S.SH, M.B, AH.KN, MM performed a search of the literature. P.M, P.Mo, M.B. and S.SH wrote the initial draft, and T.A, N.E, A.T and MM contributed to manuscript revisions. MB and MM: editing. All authors read and confirmed the final manuscript.

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Correspondence: Saeed Shahabi, Health Policy Research Center, Institute of Health, Shiraz University of Medical Sciences, Shiraz, Building No 2, Eighth Floor, School of Medicine, Zand Avenue, Shiraz, Iran. Email: saeedshahabi1@gmail.com, saeedshahabi@sums.ac.ir

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