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Respiratory telerehabilitation: user experience and satisfaction with the program

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Abstract

Background The rise of telehealth in geriatric care is an inexorable movement toward adapting to global digitalization trends, in terms of both technology and implementation experiences, with clear gains for health systems and citizens. A literature review shows that the older population, with lower levels of digital literacy, faces specific challenges with this type of service. The aim of this study was to understand the way older people with Chronic Obstructive Pulmonary Disease or long COVID perceive the implementation of telerehabilitation programs to meet their healthcare needs.

Methods A qualitative study was conducted using semi-structured interviews to answer the research question: How do older people perceive telerehabilitation programs? The study participants were 17 people aged ≥ 65 years old who had completed a respiratory telerehabilitation program at a Portuguese hospital. The interviews were submitted to content analysis using WebQDA® qualitative data analysis software.

Results The study participants had an average age of 70.94 ± 7.44 years old. The content of the interviews with these older people points to easy adaptation to the telerehabilitation program. Three categories and their respectives subcategories emerged from the content analysis: (1) access and continuity of care (access, continuity of care, and self-management); (2) presence (communication with the team and maintaining relationships); and (3) experience in the program (comfort, advantages, and difficulties).

Conclusions This study allows for an understanding of how older people perceive participation in telerehabilitation programs, what they value, and the difficulties they experience. It makes it possible to make recommendations for clinic practice and research into this emerging area of health care.

Keywords Telehealth, Geriatric care, Rehabilitation, Respiratory, Continuity of care

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Background

Telerehabilitation (TR) belongs to an emerging segment of telehealth and telemedicine that aims to improve access to quality rehabilitation services and continuity of care and save time and resources in health care, particularly in vulnerable populations and those with disabilities, and where geographical distance makes access to care impossible [1–4].

The restrictions imposed by the COVID-19 pandemic have shown the relevance of telerehabilitation. This approach, which complements respiratory rehabilitation, has emerged as a necessity for vulnerable individuals, especially the elderly population. It was recommended by the World Health Organization in order to create more accessibility and speed in responding to the need for care, ensuring essential rehabilitation services, and challenging rehabilitation centers to find new ways to provide and maintain the necessary care [4]. Telerehabilitation allows individuals to continue their programs in their own environments, minimizing the risk of hospital infection while maintaining the necessary safety standards [4, 5–6].

Telerehabilitation not only allows continuity of care but also overcomes geographical and physical barriers, showing promising results in terms of efficiency and client satisfaction. It allows us to overcome the barriers inherent in the limitation of resources, and to create safe conditions for individuals with mobility issues and multicomorbidities [5–6].

Telerehabilitation interventions in the management of chronic diseases allow clients/patients to receive continuous remote monitoring through telecommunication technologies, enabling earlier identification of the first symptoms and immediate responses to their illnesses [3, 7].

Studies have shown that telerehabilitation can be effective in improving functional capacity, strength, and mobility in the elderly population [8–9], decreasing the time that older people referred for rehabilitation after discharge may face to start treatment [8]. These results reinforce telerehabilitation as a strategy that increase access to rehabilitation, improving clinical outcomes, such as improving gait, muscle strength, balance confidence, avoiding activity restriction, and reduces costs [8–9].

One of the areas of telerehabilitation that has grown the most as a result of the pandemic and long COVID has been respiratory rehabilitation [4, 6]. Respiratory telerehabilitation uses information and communication technologies as a vehicle for prescribing, demonstrating, implementing, and monitoring respiratory rehabilitation programs, as well as speeding up teleconsultations whenever necessary. It is particularly valuable for the elderly population, as it allows continuity of care without the need to travel, which is essential for those with reduced mobility or a high risk of infection [10].

A wide range of technologies is used in respiratory telerehabilitation for older people, including videoconferencing platforms, which allow direct consultations with individuals and indirect interactions such as sending data from individuals to clinical teams. Telemonitoring devices, such as pulse oximeters and pedometers, are often used to monitor blood oxygen saturation, heart rate, and physical activity. Applications can be added to promote adherence to prescribed exercises and allow individuals to report data and receive feedback almost in real time [11].

In this modality, it is always possible to adapt a respiratory telerehabilitation program to an individual's capacity, creating flexibility in its execution, ranging from a daily program to once or twice a week, according to the individual's needs. These programs have proven to be safe and feasible, with an adherence rate of over 70% and a low incidence of adverse events, showing their effectiveness and acceptance by the elderly population [4, 5, 10].

Similarly, there is increasing evidence of the importance and effectiveness of corrected, monitored, and supervised breathing exercises in the elderly population, such as a study on the correction of thoracic kyphosis using respiratory telerehabilitation [12].

The effective implementation of respiratory telerehabilitation in the older population faces several significant barriers. The first and perhaps most obvious is the lack of familiarity with technology on the part of older people. They have often not grown up with digital technology, which can make the adoption of new telerehabilitation tools confusing or intimidating. The second barrier is related to data privacy and security. Ensuring that personal data is protected while using digital platforms should be a concern for both users and care providers. The third and equally important barrier is the need for adequate training so that healthcare professionals will be familiar with telerehabilitation technologies to ensure effective support for the elderly [5, 13].

Although home-based pulmonary rehabilitation and telerehabilitation centered on individuals in their own environments, using videoconferencing or telephone monitoring, can be strategies that lead to increased motivation and adherence to established rehabilitation programs, practical issues such as the need for Wi-Fi access in older people's homes and the provision of their own Internet-enabled equipment or devices can be challenges to the effective implementation of the programs [14–15].

The results of a study that aimed to understand the barriers to telemedicine in community-dwelling older adults to improve the access to and experience of virtual visits observes that the major barriers include difficulty with technology or using the video visit platform,

hearing difficulty, language barriers, and lack of desire to see providers virtually [16]. These difficulties may lead to programme abandonment or non-adherence to the proposed rehabilitation programme.

According to the Portuguese Society of Pneumology, in Portugal, chronic respiratory diseases affect 800,000 citizens (8% of the population), with more impact in people with 40 and more age, but only 0.5% of patients with an indication for respiratory rehabilitation have access to programmes, which is clearly insufficient, especially considering the numerous benefits for the patient and their family [4, 6, 8].

In Portugal, telerehabilitation began to develop and be introduced in public hospitals during the pandemic period and, no study has been carried out about these experience from the perspective of older people about the application of this type of program. Therefore, the aim of our study was to understand how older people with Chronic Obstructive Pulmonary Disease (COPD) or long COVID perceive the implementation of telerehabilitation programs to meet their healthcare needs.

Method

Study design

An exploratory qualitative study design was chosen to answer the research question: "How do older people perceive telerehabilitation programs?" This type of study makes possible to understand people's beliefs, experiences, attitudes, behaviors, and interactions, bringing to science an understanding of the experience and involvement of the participants in the studies [17–18].

The current state of e-health programs and the state of the art on the subject determined the choice of an exploratory approach to increase understanding of the advantages, difficulties, and results obtained with a telemonitoring and telerehabilitation program, enabling an understanding, from the users' perspective, of this type of healthcare service and its potential to increase, or not, adherence to rehabilitation programs that have to be maintained over time.

Study setting and participants

The study took place in a hospital center in the Lisbon region of Portugal, which has an e-health service offering various types of e-health interventions. This service has been in operation since April 2021.

The inclusion criteria were: age ≥ 65 years, both genders, who had completed the respiratory telerehabilitation program, with a diagnosis of COPD or long COVID-19, and who agreed to participate in the study. No exclusion criteria were predefined.

This programme had the duration of 12 weeks, with 2 to 3 sessions per week. The intervention includes: stretching, aerobic and anaerobic training, education about adherence to therapeutic regime, inhalation therapy and healthy lifestyle. The platform enables telemonitorisation and video call, which allows for telerehabilitation via video feedback. Its use depended on the patient's consent to teleconsult and telerehabilitation and they needed to have a tablet or mobile phone (which was lent by the hospital).

The person in charge of the respiratory rehabilitation programme identified the participants who met the inclusion criteria and arranged an online one-to-one meeting to explain the objectives of the study and clarify any doubts.

No number of participants was defined a priori, thirty-two participants met the defined criteria and were approached about study participation. The content of the interviews was saturated on the 13th, and four more were carried out to confirm the findings and saturation. No new categories or subcategories emerged. The analysis showed that, apart from the fact that no new facts emerged, the concepts and links between them were clear and no additional data was required [19].

Data collection

Data was collected between October and November 2023. Semi-structured interviews were conducted. First, the records of the potential participants were consulted to ensure that they met the eligibility criteria. Second, the researcher contacted the elderly people to ascertain whether they were willing to participate. Informed consent was then obtained from the participants.

The interviews were scheduled after the telerehabilitation sessions, using the platform where the rehabilitation sessions take place, online.

The semi-structured interview script was developed by the research team, guided by the research question, and included the following questions:

1. Could you tell me a little about your experience with this type of remote rehabilitation care?
2. In your opinion, what are the advantages of remote rehabilitation?
3. In your opinion, what are the main difficulties for patients?
4. Considering the possibility of having rehabilitation care in person or at a distance, which do you prefer and why?
5. During the sessions, what do you think is important to help you carry out the exercises?
6. If we were to create a group of patients to help others with telerehabilitation programs, what do you think this group should say to the new patients joining the project?

The interviews lasted between 15 and 25 min, they were recorded (audio) and transcribed.

Data analysis

The transcribed interviews were analyzed by two researchers independently using WebQDA® qualitative data analysis software (QDAS). The content analysis of the findings followed three stages: data organization, categorization, and interpretation.

In the categorization process, the central ideas were identified from the word(s) or expression(s), forming the nuclei of meaning, then the 'speeches' that best represented the central ideas of these nuclei were selected. The thorough reading of the entries made it possible to draw up a descriptive and analytical summary of each nucleus of meaning, in order to subsequently identify and interpret the categories [19].

To guarantee the quality of the study, the researchers followed the procedures defined by Nowell et al. relating to credibility, transferability, reliability, and confirmability [20]. The rigor of the study was guaranteed by strictly following the study protocol. The findings were analyzed by two researchers. Constant comparison of the findings and the codes assigned ensured objectivity and stability in the coding. The analysis carried out was validated in a systematic manner by the research team to ensure the comprehensiveness, relevance, homogeneity, representativeness, and exclusiveness of the categories [18].

The questions were addressed as recommended by Colorafi and Evans [18] to ensure their relative neutrality and reasonable freedom from researcher bias with the following procedures: describing the study's methods and procedures in explicit detail; sharing the sequence of data collection, analysis and presentation methods to create an audit trail; reporting personal assumptions and potential bias; and retaining study data and making it available to collaborators for evaluation.

Ethical considerations

The project was authorized by the Ethics Committee of the Central Lisbon University Hospital Center (Opinion No. 1209/2022 of 18/03/2022). All the participants gave their free and informed e-consent to participate in the study. The data obtained was kept confidential, with each participant being assigned a letter (P) and a number (1, 2, 3,…).

The data from the interviews was stored by the main researcher in a secure manner, so that it could not be accessed by others.

Results

The participants in this study were 17 older people (10 men and 7 women) who had completed a respiratory telerehabilitation program at a Portuguese hospital; their average age was 70.94 ± 7.44 years, with a minimum of 65 years and a maximum of 94 years.

The content analysis revealed the following categories with subcategories: 'Access and continuity of care'; 'Presence'; and 'Experience in the program' (Fig. 1).

The first category, and the one with the greatest expressiveness in terms of recording units, was 'Access and continuity of care.' The subcategories were 'access,' 'continuity

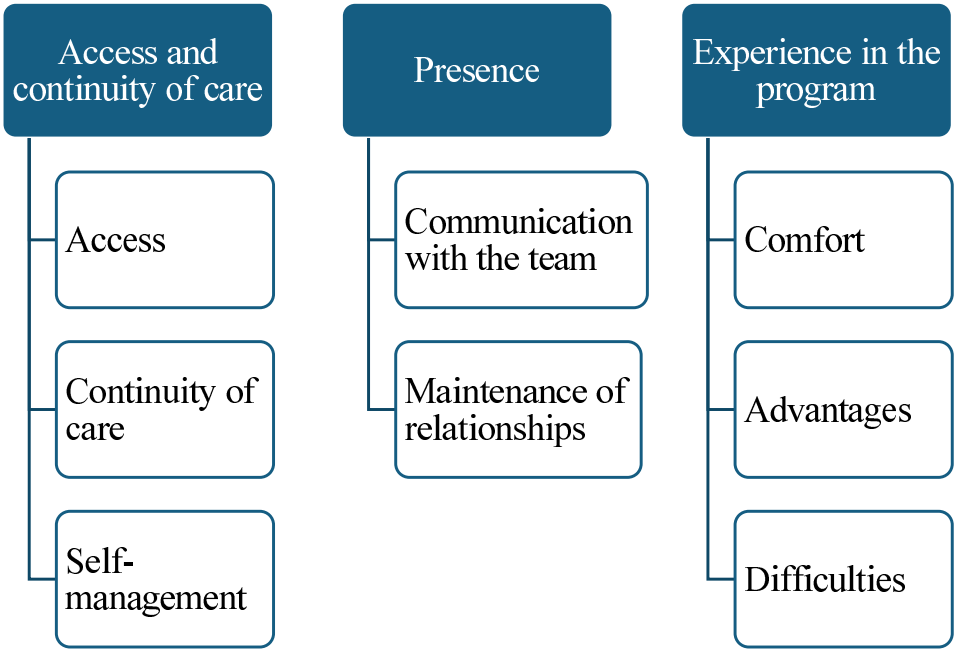

Fig. 1 Categories emerging from content analysis. Lisbon. 2024

of care,' and 'self-management.' It is clear from the participants' discourse that their inclusion in the program made it possible to get quick and safe access to a rehabilitation program, which follows on from a program started in the hospital. If they had opted for inpatient care, waiting in the community for this service could have caused them to miss out on a rehabilitation program, either because of difficulties in accessing it or because of the discontinuity of care, which is often the cause of emergency room visits and readmissions due to a lack of support in the community. As these participants pointed out:

> *It was extremely interesting and extremely beneficial. (…) I think it's a method that should be used in other types of consultation. (P1)*
> *The program is a successful route for issues for which we used to have to come to the hospital. (P8)*

Continuity of care, maintaining the program started at the hospital, is a particular concern for older people, who point out that visiting different services, information provided by different professionals, distance, and travel time to access health care are factors that lead to interruption or difficulties in adhering to the programs. They say that this type of health care provision, in addition to offering access and continuity of care, facilitates self-management:

> *Not having to go to hospital. For those who can't travel, rehabilitation at home is ideal. And since it's possible, why not continue. (P1)*
> *Helped to perform breathing exercises and monitor them. (P13)*
> *I felt better doing the breathing exercises and being monitored at the hospital. (P10)*
> *We adapt easily when we are given support on a daily basis. (P2)*

As evidenced from the content analysis, ease of access, the possibility of being at home with the family, monitoring, and frequent and easy contact with professionals are factors that contribute to maintaining the program, which leads some participants to recommend

> *"that this is a path that should be followed and invested in" (P9)*

The 'Presence' category includes the subcategories 'communication with the team' and 'maintenance of relationships.'

Communication plays a key role in health care, and the participants are aware of this, both because of the therapeutic relationship that is established, because it facilitates the creation of bonds of trust, and because of its instrumental role in training for the rehabilitation program, educating about healthy lifestyle habits and behavioral change.

The participants' discourse reflects their need for additional information, clarification of doubts, support for their decision-making, emotional support needs, and the ease with which they can get in touch with professionals with a phone call or a click. As this participant says:

> *I think it was important because I was able to talk to the professionals. Psychologically, I'm not well and this allowed me to do that. (P16)*

Keeping in touch with the same people in the team helps maintain the relationship, and

> *'above all, to be supported and monitored on a daily basis. (P12)*

This maintenance of the relationship extends to telemonitoring, which makes it possible for clients/patients to

> *'always be close to what is happening' (P8)*

and to know that, on the other side, the team is getting feedback on a set of signs and symptoms that allow them to get in touch and take action in a timely manner, and that conveys a sense of security and confidence:

> *I say very well, because I've always been well treated and valued. (P13)*

It is implicit in the content of the interviews that the older people see health technologies as an enabler of effective communication processes, maintaining relationships and real-time monitoring and intervention, which gives them a sense of presence, even without the presence of professionals, and which is reflected in expressions such as

> *'help from the professionals' (P6, P7, P8) and 'everyone was very helpful' (P10, P12)*

This feeling is fostered by availability, frequent contact, and feedback on the monitoring data, which allows them to '*feel close.*' (P16).

In the category 'Experience with the program,' the older people highlight the comfort, advantages, and disadvantages associated with it.

Comfort emerges essentially as a result of the remote intervention on a physical level, safety, and emotional support, as can be seen in these excerpts from the interviews:

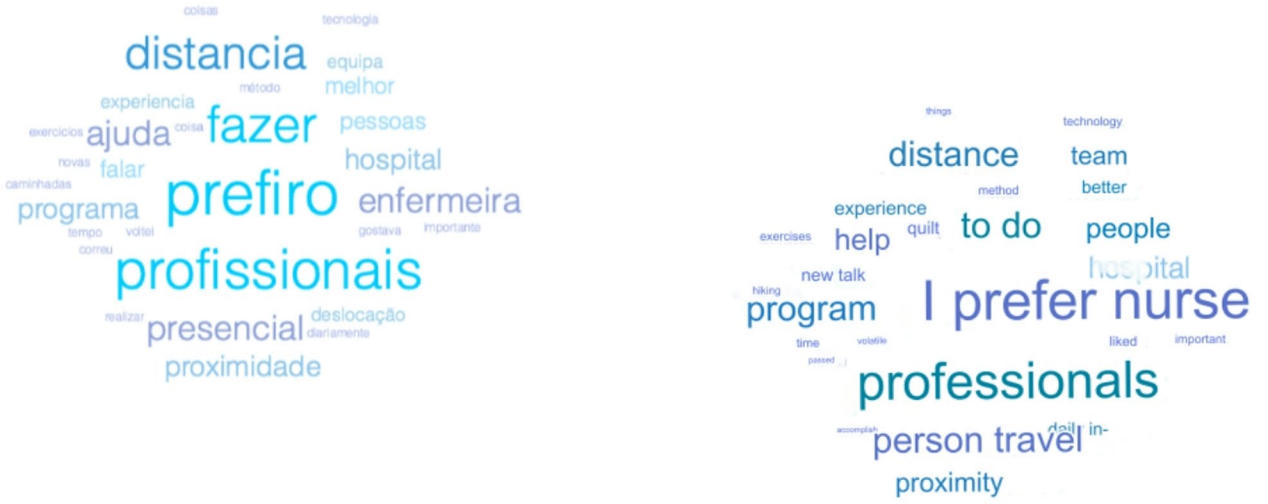

Fig. 2 Word cloud, WebQDA®. Lisbon, 2024

Avoided travel and associated costs, as well as better health safety due to avoided contamination' (P15)
Extremely beneficial. Comfortable, we do rehabilitation at home when it's convenient. (P3)
Not having to go to hospital. For those who can't travel, I think doing rehabilitation at home is ideal. (P2)
I prefer video consultation, because I don't have to travel and it's more comfortable and accessible (...) It's also important not to get tired, everything I do is difficult, there's nothing I do that doesn't make me feel tired. (P1)

Older people report other advantages, such as avoiding costs associated with travel and parking, and better time management. They also associate the success of the program with this modality:

Thanks to the program I'm out of the house again and taking walks. (P8)
I'm a fan and I've passed the word on. It's very good because of the cell phone and the exercises. (P8)

Regarding the subcategory 'difficulties', it is present in the content of 5 interviews. Twelve participants did not mention any difficulties, or even considered that there were none (P1,2,3,4,5,7,9,12,13,14,15,16). P12 noted that they did not have any difficulties, but that '*a person who doesn't have computer skills will experience difficulties*,' which is reinforced by the following excerpt from this participant's speech:

It was very complicated because I didn't have my children around to help me with the new technology. (P11)

It should be noted that the oldest participant – 94 years old, when asked about what type of care they prefer, replied that:

I prefer this kind of program, I think that it has a lot od advantages, gives more freedmon, the only problem may be in th patients with critical conditions. (P9)

The word cloud of the interviews' entries highlights the words 'prefer,' 'professionals,' 'do,' 'distance,' and 'help' (Fig. 2).

The content of the interviews with these older people points to easy adaptation to the telerehabilitation program, with an appreciation of access and continuity of care, responsibility for self-management of the rehabilitation program, and control of symptoms. They value the follow-up and are supported by the 'presence' of the professionals (feedback on monitoring and attendance at telerehabilitation sessions) and the maintenance of the relationship with them.

Discussion

This study made it possible to better understand the way older people perceive participation in telerehabilitation programs. After analyzing the data, three themes emerged: 'Access and continuity of care,' 'Presence,' and 'Experience in the program.'

The participants in this study believe that telerehabilitation improves accessibility and continuity of care, stating that it facilitates access to the service, continuity of care, and self-management of their illness. These findings are corroborated by previous studies [1-,6,10]. Telerehabilitation is considered an opportunity to improve access to rehabilitation services, especially for people who live

far from urban centers. COVID-19 pandemic has accelerated the use of ehealth interventions [4, 21].

Studies on the use of telerehabilitation have shown that it can be an effective and affordable alternative to increase access to services and reduce inequality [2], and to help maintain continuity of care by allowing patients to access rehabilitation services from home [4, 8, 22].

Another study that synthesized primary studies found that many participants considered telerehabilitation to be a suitable alternative model for providing cardiac rehabilitation, as it was convenient, flexible, and easy to access [23].

Regarding adherence to telerehabilitation, there is some evidence of the use of this technology to improve self-care through self-efficacy in older people undergoing long-term care and living at home [6, 22, 24]. However, it has been found that telerehabilitation interventions targeting self-care have been implemented through actions that promote healthy lifestyles, improving self-care and self-management to strengthen self-efficacy [25]. Some authors have suggested that adherence can be influenced by functional decline, health condition, sequelae, lack of knowledge/apprehension about using technology, gender, and socioeconomic variables [4, 26]. These issues should be taken into account when planning and implementing interventions, as they can influence acceptance, adherence, and completion of telerehabilitation interventions [26].

The second theme that emerged was 'Presence', whose subcategories were 'communication with the team' and 'maintenance of relationships.' Although the patients were physically distant from the team, this technology allows them to get closer due to the presence that was perceived by the quality of communication and the relational bond between patients and health professionals. Since it emphasizes communication, telerehabilitation promotes patient- and caregiver-centered care [27].

Interventions using two-way, synchronous, and live videoconferencing show results similar to conventional face-to-face interventions [28], improving the patient-healthcare professional relationship [29] and maintaining the bonds of trust and attachment in the relationship [4, 29]. A study involving frail older people found that the elderly reported a perception of better care, and a positive relationship with health professionals, with possible implications for the sustainability of the service in long-term follow-up and a reduction in drop-out rates [30].

The third theme refers to the experience in the telerehabilitation program, in which the participants highlighted the comfort they felt in feeling safe, with emotional support, and the fact that there were fewer costs associated with the intervention and travel. These findings are corroborated by other studies [31–32]. People who participated in telerehabilitation programs felt comfortable in many ways and safe, especially in the context of the COVID-19 pandemic [31–32].

The participants in our study reported that there were advantages to participating in this type of program, namely due to lower costs, better time management, and improvements in health (functionality). Other studies observe a reduction in travel and time spent, with a consequent reduction in associated costs [27].

A meta-analysis [33] that aimed to (1) summarize current components of community-based, nurse-led telerehabilitation programs using the chronic care model; (2) evaluate the effectiveness of nurse-led telerehabilitation programs compared with traditional face-to-face rehabilitation programs; and (3) compare the effects of telerehabilitation on patients with different chronic diseases, concludes that participation in telerehabilitation programs led to a significant improvement in the quality of life and self-care capacity of patients with various chronic diseases, compared with traditional face-to-face rehabilitation groups [33].

A systematic review that included 15 studies to determine the effectiveness and safety of telerehabilitation, specifically, for people with chronic respiratory disease, concludes that primary pulmonary rehabilitation, was probably little or no difference between telerehabilitation and in-person pulmonary rehabilitation for exercise capacity and for quality of life measured [34]. The authors didn't observed any adverse events effects of telerehabilitation [33–34].

As disadvantages, participants mentioned difficulties in using information and communication technologies. In contrast, the barriers mentioned in other studies, especially before the COVID-19 pandemic, focused mainly on the complexity and costs of implementation, lack of knowledge and awareness, lack of urgency to change, lack of perceived benefits, resistance to change, medical-legal liability concerns, inadequate involvement in planning, privacy concerns, difficulties in carrying out physical tests, and lack of information and communication technology infrastructure [2].

The planning and implementation of telerehabilitation interventions can help to reduce health costs. When using synchronous sessions, it is possible to maintain relationships of trust, and improve communication and adherence to programs, with repercussions on the sustainability of intervention programs. Telerehabilitation intervention associated with multidisciplinary patient-centered management, with an educational approach, is in line with chronic care models for continuity of care [35].

Implications for health practice and policies

One of the pillars of evidence-based practice refers to patients' preferences and values. Understand the way

older people perceive the implementation of telerehabilitation programs to meet their healthcare needs was important to recommend and support the implementation of this programs to this population.

The results allows the recommendation to ensure continuity of the respiratory rehabilitation using ehealth interventions. The design ot this program should include information not only about exerceise and lifestyle, but also about the plataform, the clarification of doubts, support in patient and family decision-making, and emotional support needs.

For health policies, it is recommended to invest in the training of health teams participating in ehealth programmes so that they are able to focus care on the patient and their family, tailoring intervention to individual needs, to ensure adherence to the programmes.

The results, although limited to the context, point to the acceptance of these programmes by older people, which is indicative of the opportunity to increase this type of offer in health services in Portugal.

Limitations

This study has limitations associated with the method. The choice of a qualitative study carried out in a specific context limits the transferability of the findings.

The adoption of semi-structured interviews allows for some flexibility and increases the richness and depth of the findings, but also increases the difficulty of conducting the interviews. The appointment of a researcher with experience in conducting semi-structured interviews and developing qualitative studies may have been important in minimizing this risk of bias.

Conclusions

This study made it possible to understand the way older people perceive participation in telerehabilitation programs. Three themes emerged from the interviews: 'Access and continuity of care,' 'Presence,' and 'Experience in the program.' Telerehabilitation allows access to healthcare and continuity of care, contributing to self-management of disease conditions in older people. This modality permits presence in care, through effective communication and the maintenance of trusting relationships. The use of telerehabilitation was perceived as comfortable, safe, has economic advantages due to travel and is easy to use. Taking into account the advantages and benefits of this resource, its use in the older people is recommended, especially in ongoing care.

More research is needed to study the effectiveness and usability of telerehabilitation for older people. Based on the results obtained, it is recommended that a study be carried out to assess the digital literacy of the Portuguese elderly population and that future studies on tele-rehabilitation assess the rate of adherence to the rehabilitation programme, factors that facilitate and hinder understanding of the exercises (prescribed and demonstrated by videoconference).

Supplementary Information

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Supplementary Material 1

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Author contributions

N.R., M.J.C.D., L.S, J.O, M.T.R, C.L.B. and M.A.H. contributed to define aims, methods and research.N.R. conducted the interviews.C.L.B., L.S and N.R. performed data analysis.N.R, M.J.C.D, L.S, J.O, M.T.R., C.L.B and M.A.H, wrote the main manuscript. All authors reviewed the manuscript.

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Data availability

Data is provided within the manuscript and supplementary information file.

Declarations

Ethics approval and consent to participate

The study was conducted according to the guidelines of the Declaration of Helsinki and was approved by the ethics committee of the the Ethics Committee of the Central University Hospital Center of Lisbon (CHULC) (Resolution no. 1209/2022 of March 18, 2022). The study was authorized by the institutions.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

Conflict of interest

There are no conflicts of interest related to this article.

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