saúde
EM DEBATE

ORIGINAL ARTICLE

Older adults' oral health follow-up in primary care: A teledentistry feasibility exploratory study

Acompanhamento da saúde bucal de idosos na atenção primária com uso da teleodontologia: estudo exploratório de viabilidade

Ana Raquel Rabelo Vieira[1], Maria Inês Meurer[2], Gabriel Schmitt da Cruz[1], Manoela de Leon Nobrega Reses[3], Eduardo Dickie de Castilhos[4], Ana Lúcia Schaefer Ferreira de Mello[1]

DOI: 10.1590/2358-28982025E19901I

ABSTRACT Teledentistry can help answer the rising demand for oral health in homebound older adults. This study aims to analyze the feasibility of teledentistry in monitoring the oral health of homebound older adults in primary care, focusing on acceptance, barriers, and system quality. It is a cross-sectional and exploratory implementation study with a quantitative approach conducted in Primary Health Care services in Southern Brazil. Twenty older individuals/their caregivers, and five dentists were intentionally selected. A dentist assessed older adults through an online telehealth system via video call. The AdEQUATE questionnaire collected data from older adults/caregivers and dentists. Data was analyzed using descriptive statistics. Twenty older adults received the video calls. Most were women aged 80 years or older; 50% received home care; 90% had no prior home dental care. Older adults generally found teledentistry a comfortable, convenient, safe, and trustworthy care option. However, some dentists expressed skepticism about its diagnostic accuracy and infrequent use. This highlights the importance of addressing dentists' concerns in integrating teledentistry into public health services. The study also identified challenges, including limited equipment and technical issues. Despite this, teledentistry has proven to be a viable option for timely care, particularly for those unable to attend health facilities.

KEYWORDS Teledentistry. Primary Health Care. Homebound persons. Frail elderly. Oral health.

RESUMO *A teleodontologia pode ajudar nas respostas às crescentes demandas de saúde bucal dos idosos restritos ao domicílio. Este estudo objetivou analisar a viabilidade da teleodontologia no monitoramento da saúde bucal de idosos domiciliados, na atenção primária, com enfoque na aceitação, barreiras e qualidade do sistema. Trata-se de um estudo transversal e exploratório, de implementação, com abordagem quantitativa, realizado na Atenção Primária à Saúde no sul do Brasil. Vinte idosos/seus cuidadores e cinco dentistas foram selecionados intencionalmente. Os dentistas interagiram com os idosos por meio de videochamada em um sistema online de telessaúde. O questionário AdEQUATE foi aplicado para coletar dados de idosos/cuidadores e dentistas. Os dados foram analisados usando estatística descritiva. Vinte idosos foram atendidos por chamadas de vídeo. De forma geral, os idosos consideraram a teleodontologia uma opção confortável, conveniente, segura e confiável. No entanto, alguns dentistas expressaram ceticismo em relação à precisão diagnóstica e relataram uso esporádico da ferramenta, revelando a importância de abordar tais preocupações para integração da teleodontologia aos serviços públicos. Identificaram-se desafios, como a falta de equipamentos e problemas técnicos. Apesar disso, a teleodontologia parece ser uma opção viável para atendimento, especialmente para aqueles que não conseguem se deslocar até as unidades de saúde.*

PALAVRAS-CHAVE *Teleodontologia. Atenção Primária à Saúde. Pacientes domiciliares. Idoso fragilizado. Saúde bucal.*

[1] Universidade Federal de Santa Catarina (UFSC), Programa de Pós-Graduação em Odontologia (PPGO) – Florianópolis (SC), Brasil.
alfm2709@gmail.com

[2] Universidade Federal de Santa Catarina (UFSC), Departamento de Patologia (PTL) – Florianópolis (SC), Brasil.

[3] Universidade Federal de Santa Catarina (UFSC), Departamento de Odontologia (ODT) – Florianópolis (SC), Brasil.

[4] Universidade Federal de Pelotas (UFPel), Programa de Pós-Graduação em Odontologia (PPGO) – Pelotas (RS), Brasil.

This article is published in Open Access under the Creative Commons Attribution license, which allows use, distribution, and reproduction in any medium, without restrictions, as long as the original work is correctly cited.

Introduction

Population aging and increased health problems are often associated with more significant healthcare needs and barriers to accessing health services[1,2]. Oral health conditions can also be affected over the years, and older adults with lower socioeconomic conditions tend to have more significant oral healthcare needs[3,4]. Teledentistry is one of the efforts capable of responding to the rising demands of older adults who have difficulties leaving their homes and accessing health services[5].

Teledentistry can be defined as the use of information and communication technologies to facilitate contact between dentists or between dentists and patients when they are physically separated[6-9]. Several aspects of teledentistry have been studied, including its impact on health promotion and the prevention of oral diseases[10], its use as a hospital diagnostic tool[11], and its application in long-term care institutions for older adults[12]. Additionally, researchers investigated the knowledge and practices[13], and dentists' perceptions about teledentistry[14].

In the Brazilian Unified Health System (SUS), teledentistry can serve as a tool for Primary Health Care (PHC) professionals to obtain specialized support, diagnostic assistance, and continuing education[15]. The COVID-19 pandemic has expanded the possibilities for teledentistry, including remote monitoring between appointments and screening to determine the best time for an in-person appointment[16]. Furthermore, current Brazilian legislation authorizes the use of telehealth, and by extension teledentistry, as a professional practice. It is up to the professional and the patient to decide whether to use it[17].

However, there is a lack of information about teledentistry technologies used with older adults, especially those who do not live in long-term care institutions[5,14] checking their acceptance[18], the barriers to their use[9], the potential for diagnosis[12], and health promotion and prevention of oral diseases[10].

So, this study analyzed the feasibility of using teledentistry to monitor the oral healthcare of older adults in Brazilian public PHC from the perspective of older adults or their caregivers and dentists. It investigated the feasibility by characterizing the experience of using teledentistry as a remote interaction modality in oral health care and evaluating the quality of the telehealth system.

Material and methods

Study design

A cross-sectional, quantitative, exploratory implementation research[19-21] was conducted to assess the feasibility[22] of monitoring the oral health of older adults using teledentistry in public primary healthcare services. The online Santa Catarina Telemedicine and Telehealth System (STT) platform was used. The intervention and data collection took place between November 2022 and March 2023.

The study was conducted in Florianópolis, the capital of Santa Catarina state in southern Brazil. In 2022, the city had an estimated population of 516,524, comprising 88,256 residents aged 60 or older and 12,493 residents aged 80 or older[23,24].

This study adheres to the Brazilian national legislation on human research ethics[25]. The research project was submitted to the Human Research Ethics Committee of the Universidade Federal de Santa Catarina and approved in September 2022 under opinion No. 5,631,295 (certificate number CAAE 60543822.3.0000.0121). The participants' verbal informed consent was collected through audio recording. The study adhered to the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology)[26] guidelines to ensure transparency and quality in reporting observational studies.

Population

The study population consisted of homebound older adults aged 60 or over and their caregivers, followed by primary care teams. We considered homebound an older adult restricted to their home with a disability (physical, mental, emotional, and/or other) that resulted in limitations in moving outside the house[27]. Their respective caregivers were included for older adults who were unable to answer the questionnaires for any reason. Dentists linked to primary care and who carried out teleconsultations were also included.

The sample was intentionally and conveniently defined in accordance with the team's research capacity during data collection. The study included five dentists linked to PHC and 20 homebound older adults followed up by PHC. For older adults who could not understand and/or answer the research questions, their caregivers, who had to be over 18 years old, were included.

Procedures

Dentists were invited to engage in the research through an online meeting previously arranged with the municipal oral health coordination. Once accepted, each dentist identified homebound older adults in their geographical area of coverage assistance, which was already included in the eligibility profile for home care at the PHC. The dentists initiated contact for research purposes. The research team then contacted the older adults/caregivers who were interested in participating.

After being informed about all the procedures, the older adult/caregiver who agreed to participate in the study received a link to access the platform through the WhatsApp LLC® (Meta, Inc.) app.

Data collection

A closed questionnaire was used to characterize the dentist's experience with teledentistry consultation and the evaluation of the telehealth system. The first block of questions covered sociodemographic characteristics. The second block of questions was adapted from the AdEQUATE questionnaire[28], based on the ISO/IEC 25010 standard, which assesses the STT platform quality using a 4-point Likert scale. It encompassed effectiveness/efficiency, reliability, safety, functional adequacy, satisfaction, usability, efficiency, and compatibility dimensions. The selected questions followed other instruments in evaluating software quality[29,30]. The third block addressed aspects of the teledentistry dentist's experience.

Likewise, a closed questionnaire with 23 questions was used to characterize the experiences of older adults and their caregivers about the teledentistry consultation. The first block of questions covered sociodemographic characteristics. The second block referred to the evaluation of the STT platform, which was also adapted from the AdEQUATE[28], and included some items from the satisfaction and usability dimensions. To characterize aspects related to the experience of older adults and their caregivers regarding teledentistry consultation, the third block of questions was asked, based on studies by Mariño et al. (2014), Murthy et al. (2021), and Torul, Kahveci, and Kahveci (2021)[31-33].

The parameters (target population, healthcare level, location, approaches, professional duties, flows, implementation indicators, and content validation by experts) were elaborated in accordance with the Brazilian Health Ministry's 'Guide for developing clinical protocols and therapeutic guidelines'[34].

Two video calls were held with each older adult/caregiver. In the first call, a teledentistry assistant was present; in the second, data collection was conducted with different dentists. The older adult or the caregiver accessed the STT platform via personal data login. Before concluding the video call, a new video call was scheduled within 48 hours between the older adult/caregiver and the researcher.

Data collection with dentists was done using a closed 38-question questionnaire sent via a Google Forms® app link to their email at the end of the intervention period. The questionnaire was completed online, and informed consent was collected through a digital or printed signature, which was then sent to the researcher. The leading researcher collected the older adults' experiences and evaluations in a new video call in the same virtual room used for teledentistry consultations within 48 hours after the intervention. Questions were asked, and a 23-question online questionnaire was completed based on the responses of the older adult or caregiver, following the instruction guide.

Data analysis

Data were analyzed using descriptive statistics, obtaining absolute and relative frequencies for the participants' profiles using Excel® and IBM® SPSS® software (IBM Corp. Released 2020. IBM SPSS Statistics for Windows, Version 27.0. Armonk, NY: IBM Corp). The responses 'Totally agree' and 'I agree' were considered positive, representing high-quality levels[28].

Results

Twenty older adults received remote teledentistry consultations via video call in the PHC. The majority were women, predominantly over 80 years old. 90% have never received dental home care.

The older adults themselves answered half of the questionnaires. Half of the older adults had already received home care, and 75% had received a telehealth consultation via video call from a health professional. However, 90% had never received dental home care from a dentist, and none had received oral health care via teledentistry.

Table 1 presents the results of the STT evaluation by the older adults/caregivers. Considering the Satisfaction dimension, the majority reported an improvement in the quality of the service received and, therefore, they would incorporate its use frequently. Everyone found the valuable system in their care, felt confident using it, and would recommend it to their peers. Only 5% of the older adults felt uncomfortable using the STT platform.

Table 1. Older adults/caregivers' evaluation of the STT platform for teledentistry (n = 20). Florianópolis, 2023

Dimension/Item	Tot. agree n(%)	I agree n(%)	Disagree n(%)	Tot. disagree n(%)	IDK/NSA n(%)
Satisfaction					
The system improves the service quality	5(25)	12(60)	1(5)	1(5)	1(5)
I find the system useful in my care	10(50)	10(50)	--	--	--
I would recommend this system to my acquaintances	14(70)	6(30)	--	--	--
I think I will use this system frequently	5(25)	13(65)	1(5)	--	1(5)
The system provides good service	9(45)	10(50)	1(5)	--	--
I felt very confident using the system	8(40)	12(60)	--	--	--
I feel comfortable using the system	10(50)	9(45)	--	--	1(5)

Table 1. Older adults/caregivers' evaluation of the STT platform for teledentistry (n = 20). Florianópolis, 2023

Dimension/Item	Tot. agree n(%)	I agree n(%)	Disagree n(%)	Tot. disagree n(%)	IDK/NSA n(%)
Usability					
I think the system is easy to use	8(40)	7(35)	3(15)	1(5)	1(5)
I think I could use the system by myself	5(25)	4(20)	2(10)	8(40)	1(5)
The terms used in the text are understandable	10(50)	10(50)	--	--	--
I can use the system with my special needs	4(20)	3(15)	1(5)	--	12(60)

Source: Own elaboration.

STT = Santa Catarina Telemedicine and Telehealth System. IDK = I don't know how to answer. NSA = Not applicable.

Regarding the Usability dimension, half of the older adults indicated that they could not use the system without assistance from others, and 20% found it difficult to use. Despite this, everyone considered the terms in the text understandable, and most thought they could use the system even when they had special needs.

Table 2 presents the STT evaluation carried out by dentists. All participants positively evaluated the security dimension of the system, as well as Reliability, as it was stated that the system is always operational and accessible when necessary. Regarding Satisfaction, although everyone considers that the system provides a good service, the majority feel comfortable and confident during its use and understand that its use improves the quality of the work performed; two of them would not use it frequently and assessed that its use does not increase productivity.

Table 2. Dentists' evaluation of STT platform for teledentistry (n = 5). Florianópolis, 2023

Dimension/Item	Tot. agree n(%)	I agree n(%)	Disagree n(%)	Tot. disagree n(%)	IDK/NSA n(%)
Efficiency					
I can successfully complete tasks in the system	1(20)	3(60)	1(20)	--	--
Reliability					
The system is always operational and accessible	2(40)	3(60)	--	--	--
In case of interruption or failure, the system recovers adequately	1(20)	--	1(20)	--	3(60)
Security					
I am sure that the system data is only available to authorized people	2(40)	3(60)	--	--	--
I am sure that all actions on the system that I did were attributed to my user	1(20)	4(80)	--	--	--
I am sure that I did everything associated with my user	2(40)	3(60)	--	--	--
Functional suitability					
The system's features make it easier to complete my tasks	1(20)	2(40)	2(40)	--	--

Table 2. Dentists' evaluation of STT platform for teledentistry (n = 5). Florianópolis, 2023

Dimension/Item	Tot. agree n(%)	I agree n(%)	Disagree n(%)	Tot. disagree n(%)	IDK/NSA n(%)
The system has all the features I would expect	2(40)	2(40)	1(20)	--	--
Satisfaction					
Using the system improves my work quality	--	4(80)	1(20)	--	--
Using the system increases my productivity	--	3(60)	2(40)	--	--
I think I will use this system frequently	--	3(60)	2(40)	--	--
The system provides good service	1(20)	4(80)	--	--	--
I felt very confident using the system	--	4(80)	1(20)	--	--
I feel comfortable using the system	--	4(80)	1(20)	--	--
Usability					
I think the various system functions are well integrated	--	4(80)	1(20)	--	--
I needed to learn a few things before I could start using the system	2(40)	2(40)	1(20)	--	--
I imagine most people would learn to use this system quickly	1(20)	2(40)	2(40)	--	--
I think the system is simple to use	--	4(80)	1(20)	--	--
I think the system is easy to use	--	3(60)	2(40)	--	--
I think I could use the system by myself	--	3(60)	2(40)	--	--
The system interface is pleasant	--	2(40)	3(60)	--	--
All relevant information is shown on the screen	1(20)	4(80)	--	--	--
I can use the system with my special needs	--	--	--	--	5(100)
Efficiency					
The system responds quickly	2(40)	2(40)	1(20)	--	--
Compatibility					
The system performs its functionalities efficiently while sharing the environment and resources with other products	--	4(80)	1(20)	--	--
The system allows the exchange of information with other systems	--	1(20)	--	--	4(80)

Source: Own elaboration.

STT = Santa Catarina Telemedicine and Telehealth System. IDK = I don't know how to answer. NSA = Not applicable.

Regarding Usability, dentists assessed that all relevant information is shown on the screen; four of them considered that the system's functions are well-integrated, that the system is simple to use, and that they needed to learn a few things before starting to use the system. Furthermore, dentists showed proportionally divergent opinions in statements about the system being easy to use, believing that most people would learn to use the system quickly and be able to use it independently, as well as finding the system's interface pleasant. There were no respondents with special needs.

The majority judged that the system responds quickly, which is a characteristic of efficiency, and that it executes its functionalities efficiently while sharing the environment and resources with other products, raising a question about compatibility. They were unable to answer whether the system allows the

exchange of information with other systems when necessary.

Table 3 presents the responses about the experience of older adults/caregivers with video call teledentistry consultation. Most considered the teledentistry consultation time sufficient. Likewise, most were able to express themselves considerably well and felt equally involved in the decisions made, both when compared to face-to-face assistance.

Table 3. Experience of older adults/caregivers about teledentistry consultation via video call (n = 20). Florianópolis, 2023

Item	Tot. agree n(%)	I agree n(%)	Disagree n(%)	Tot. disagree n(%)	IDK/NSA n(%)
Sufficient call time to exchange necessary information with the dentist	12(60)	7(35)	1(5)	--	--
I was able to express myself sufficiently during the video call	15(75)	3(15)	2(10)	--	--
I felt involved in the decisions made with my dentist	13(65)	6(30)	1(5)	--	--

Source: Own elaboration.
IDK = I don't know how to answer. NSA = Not applicable.

Regarding the dentist's experience with teledentistry consultations via video call, everyone considered it sufficient time and understood that they were successful. Furthermore, they could express themselves in the same way as they would in a face-to-face setting. They would recommend a teledentistry consultation to another colleague to use with a homebound older adult (*table 4*).

Table 4. Experience of dentists with teledentistry consultation via video call (n = 5). Florianópolis, 2023

Item	Tot. agree n(%)	I agree n(%)	Disagree n(%)	Tot. disagree n(%)	IDK/NSA n(%)
Sufficient call time for information exchange	2(40)	3(60)	--	--	--
Expressed myself sufficiently during the teledentistry consultation	2(40)	3(60)	--	--	--
I managed to be resolute about demands/ patient's oral health needs	1(20)	4(80)	--	--	--
I was able to refer a patient more quickly to the referral service	2(40)	2(40)	--	--	1(20)
I would recommend a teledentistry consultation to another colleague	2(40)	3(60)	--	--	--

Source: Own elaboration.
IDK = I don't know how to answer. NSA = Not applicable.

Discussion

This study sought to improve access to oral health services for older adults in PHC by incorporating new information and communication technologies, specifically teledentistry. We committed to enhancing an intervention with digital security, which expands the list of actions carried out by public health services on a scientific basis. Pragmatically, we shared new processes and resources with healthcare professionals and managers to expand access to and qualification of the service, promoting the health and well-being of older adults and their caregivers. The research examined the experiences of older adults, their caregivers, and dentists with teledentistry consultation through the STT platform.

The results demonstrated that a healthcare professional had already seen most older adults via video call. They felt comfortable and involved in the decisions, such as in-person care, and recommended its use to other older adults in similar conditions. This information reinforces the importance of health care being person-centered[2,14,35]. Besides the professional's scientific knowledge, aspects such as empathy, the ability to communicate with others, and the perception of their emotions and needs also affect the patient's satisfaction[35]. The care received in the comfort of their home can also impact satisfaction with teledentistry consultation, especially for older adults who are sometimes unable to attend health units. This timely access that teledentistry can provide[35,36] also proves to be a safe and viable alternative when distancing is recommended, as occurred in the COVID-19 pandemic[14,36-42].

The findings indicated that almost half of the older adult participants had already received home care from a healthcare professional, one of the forms of health care[3]. However, most had never received dental home care, corroborating the evidence that oral health is not prioritized in home care[43,44]. Having some degree of cognitive impairment and living alone are barriers for older adults to receive home care with a focus on oral health[3]. This lack of dental home oral health appears to be associated with organizational and structural issues[36,45], such as the lack of mobile equipment to perform specific procedures, the dentist's work overload[46], and a lack of training[43]. Other professionals or family members often carry out daily procedures to maintain oral health, with little knowledge[47], which could be improved through teledentistry, with adequate guidance from a dentist[4,5,7,14,48,49]. The teledentistry consultations focused on improving oral hygiene habits, such as tooth brushing, flossing, and cleaning mucous membranes, as well as daily and weekly hygiene of removable dentures[49,50]. This aimed to expand the knowledge of older adults and their caregivers, and contribute to self-care and well-being[2,36].

As observed in this study, dentists can exchange health information with older adults and their caregivers and indicate referrals when needed using teledentistry[51]. However, there are reports about dentists who do not feel confident in diagnosing and drawing up a treatment plan via teledentistry consultations without the possibility of an in-person appointment[52]. Some dentists do not consider teledentistry capable of providing enough elements for a more accurate diagnosis[53], or simply because they do not believe in its usefulness[54] or efficiency in patient care. Several reasons can be raised for these findings, such as oral images provided by patients with inappropriate quality and the lack of experience using this technology[55]. Despite this, teledentistry consultations can be used for other purposes, such as instructions, educational actions, screening, follow-up, and referral as a complementary form of care[56-60]. Furthermore, regarding older adults, home care is an alternative that warrants study for these purposes[45,46,61].

In public health services, the literature has reported teledentistry as a tool for professional education and training, oral health

surveillance, remote patient care, and interprofessional communication[15]. Within the Brazilian SUS, teledentistry can strengthen universal oral health coverage by expanding access to dental care, especially in remote and underserved areas and populations[62]. Additionally, it facilitates collaboration between general practitioners and specialists, thereby improving case discussions and referral systems[63]. Integrating electronic patients' records across different levels of oral health care enhances coordination and continuity of care. Considering the PHC teams, teledentistry tools can improve oral health literacy, reduce consultation waiting times, and promote oral health equity. Within the country's digital transformation strategy, the interoperability of systems and secure data exchange can optimize the coordination of primary health services[64].

Investments in digital infrastructure, professional training, and interoperability are essential to maximize the impact of telehealth. By embedding teledentistry into public health policies, Brazil is advancing toward a more equitable, efficient, and connected oral healthcare system[16,65-67]. Ref The initiative that integrates telehealth into primary care provides a strategic framework for implementing teledentistry, through remote professional second opinions, teleconsultations, and telediagnosis[68].

This research utilized a secure and official platform that meets Brazil's general personal data protection legislation. It is known that standard message apps have the potential to delete information and lack access control to the user's account, among other features that can expose patient data[61]. Otherwise, the STT platform seeks to capture personal data while preserving that data privacy through good security practices. The STT center provides a freely accessible page that details information such as the user's rights and duties, collection of personal data, use, purposes, processing, sharing, storage, elimination, and protection of this data[67]. Older adults, their caregivers, and dentists considered the system an excellent service. Furthermore, dentists felt that the system was secure and accessible to authorized personnel. In other words, when logging in with a health professional's login and password, patient data will be available to that professional, and the procedures are also maintained in their medical records. Another study involving the same system showed reasonable satisfaction rates among telehealth professionals[28]. Using a system that meets the standards of current Brazilian legislation in this research, in addition to providing timely oral health care to older adults with more incredible difficulty accessing the service[36,38] allowed for preserving the privacy of participants' data[61].

Although the research employed a system not typically used by older adults, everyone found the terms understandable. These participants also found the system helpful in providing care, but half felt that they were unable to use it without assistance. This understanding on their part may be related to conditions expected with advanced age, cognitive impairment[9,37,69], physical impairment[37], and cultural resistance[9]. Older adults appear to be in favor of using technological resources and recognize their benefits. Still, as they age, they may feel that they lack the necessary skills to utilize them, and it is possible that their level of education also has an impact. Therefore, by observing the types of limitations that influence their acceptance or use of technology, adaptations and support can be provided to improve accessibility[70].

For the dentists, divergent opinions occurred regarding the system used to increase productivity, and not everyone would use it frequently. Such resistance, combined with the low adherence of dentists observed in this study, may be associated with factors such as problems during connection[14,16,18], human and infrastructure resources[71], little skill in using information and communication technologies[16,57,58,71], a lack of institutional incentive[72], insecurity[57], and even a lack of

interest[59]. At the beginning of this study, it was challenging for dentists to find devices in their work environments that were adequately equipped to facilitate video calls (audiovisual resources). Furthermore, there were problems related to the internet network for patients and dentists during teledentistry consultations. It is possible that these interruptions during teledentistry consultations made them take longer compared to face-to-face consultations, reducing productivity. Likewise, it is likely that the knowledge and skills that favor more significant use of this resource, resulting from institutional incentives to practice using information and communication technologies through courses and technical support, can improve its effectiveness[16].

Implementing telehealth services faces challenges related to access inequalities, making it essential to maintain a strong relationship between the healthcare system, teams, and users. However, both modalities are complementary and interdependent in promoting equitable access to healthcare[60]. In addition to improving access, teledentistry offers the potential to reduce costs[7], provided that there is a balance between the necessary investments in equipment acquisition and maintenance[9,72], as well as the quality of internet infrastructure on both sides[18]. This cost reduction can maximize teledentistry's potential and foster equity, especially among vulnerable populations, such as the age group addressed in this study[36,69]. Furthermore, when carried out synchronously, both sides involved must also require availability at the same time[49], making it another challenge to reconcile the professional's agenda with the routine of an older adult. Training and awareness can contribute to greater acceptance[16].

Despite being an exploratory study, this research has some limitations, including the small number of participants and the short intervention period, which compromise more in-depth analyses. Also, only older adults who were monitored by primary care health services and those treated by the geriatric medical specialty were included. Those older adults who were not registered or lived in areas not covered by dental primary health teams were excluded.

Considering the participants' satisfaction with teledentistry, the professionals' recommendation to their colleagues, the various possibilities that can be addressed, and the potential to promote access to health services, we recommend further studies with a more significant number of older adults and caregivers to understand the difficulties in using this technology and what strategies can be implemented to improve its use. Likewise, we must have a deep understanding of the reasons for the low adherence of PHC dentists, aiming to scientifically contribute to decisions regarding the organization of the work process and the allocation of public resources.

Conclusions

The research showed that older adults and caregivers considered teledentistry consultation equally appropriate compared to in-person care regarding call time and their involvement in decisions made with the health professional. They recommended its use to peers. Additionally, they considered the system helpful, but most did not feel capable of using it without help.

Through teledentistry consultations, dentists can exchange the necessary information with older adults and their caregivers, resolving what was previously presented as a remote demand. Dentists consider the system safe, but not everyone views its use as a means to increase productivity, so they do not use it frequently.

Collaborators

Vieira ARR (0000-0003-3982-7550)* contributed to the study design, data collection and analysis, and critical revision of the

manuscript. Meurer MI (0000-0002-5933-895X)* contributed to the study design, data analysis, and critical revision of the manuscript. Cruz GS (0000-0001-8785-5455)*, Reses MLN (0000-0002-3581-8772)*, and Castilho ED (0000-0002-7072-6558)* contributed to data analysis and critical revision of the manuscript. Mello ALSF (0000-0001-9591-7361)* contributed to the study design, data analysis, manuscript drafting, critical revision, and supervision. All authors approved the final version of the manuscript. ■

References

1. World Health Organization. Ageing and health. WHO [Internet]. 2024 Oct 1 [accessed 2021 Dec 10]. Available from: https://www.who.int/news-room/fact--sheets/detail/ageing-and-health

2. World Health Organization. Ageing and Health Unit. WHO [Internet]. [date unknown] [accessed 2021 Dec 11]. Available from: https://www.who.int/teams/maternal-newborn-child-adolescent-health-and-ageing/ageing-and-health/universal-health-coverage

3. Ishimaru M, Shigeishi H, Yamashita Y, et al. Domiciliary dental care among homebound older adults: A nested case-control study in Japan. Geriatr Gerontol Int. 2019;19(7):679-83. DOI: https://doi.org/10.1111/ggi.13676

4. Peres MA, Macpherson LMD, Weyant RJ, et al. Oral diseases: a global public health challenge. Lancet. 2019;394(10194):249-60. DOI: https://doi.org/10.1016/S0140-6736(19)31146-8

5. Aquilanti L, Cazzolla S, Montemurro N, et al. Dental care access and the elderly: What is the role of teledentistry? A systematic review. Int J Environ Res Public Health. 2020;17(23):1-13. DOI: https://doi.org/10.3390/ijerph17239053

6. Chen JW, Hobdell MH, Dunn K, et al. Teledentistry and its use in dental education. J Am Dent Assoc. 2003;134(3):342-6. DOI: https://doi.org/10.14219/jada.archive.2003.0164

7. World Dental Federation. Evidence-based use of teledentistry in oral health services. Geneva: FDI; 2021.

8. Jampani ND, Nutalapati R, Dontula BSB, et al. Applications of teledentistry: A literature review and update. J Int Soc Prev Community Dent. 2011;1(2):37-44. DOI: https://doi.org/10.4103/2231-0762.97695

9. Tan SHX, Lee CKJ, Yong CW, et al. Scoping review: facilitators and barriers in the adoption of teledentistry among older adults. Gerodontology. 2021;38(4):351-65. DOI: https://doi.org/10.1111/ger.12588

10. Fernández CE, Hsu CL, Weiner L, et al. Teledentistry and mHealth for Promotion and Prevention of Oral Health: A Systematic Review and Meta-analysis. J Dent Res. 2021;100(9):914-27. DOI: https://doi.org/10.1177/00220345211003828

11. Giraudeau N, Camman P, Pourreyron L, et al. The contribution of teledentistry in detecting tooth erosion in patients with eating disorders. Digit Health. 2021;7:20552076211019250. DOI: https://doi.org/10.1177/20552076211019250

12. Queyroux A, Laurier C, Levy S, et al. Accuracy of teledentistry for diagnosing dental pathology using direct examination as a gold standard: Results of the Tel-e-dent study of older adults living in nursing homes. J Am Med Dir Assoc. 2017;18(6):528-32. DOI: https://doi.org/10.1016/j.jamda.2016.12.082

*Orcid (Open Researcher and Contributor ID).

13. George PP, Papachristou K, Tan BK, et al. Knowledge, awareness, and attitude among practicing orthodontists on teledentistry during COVID pandemic in Kerala: A cross-sectional survey. J Pharm Bioallied Sci. 2021;13(5):846-50. DOI: https://doi.org/10.4103/jpbs.JPBS

14. Menhadji P, Patel R, Asimakopoulou K, et al. Patients' and dentists' perceptions of tele-dentistry at the time of COVID-19. A questionnaire-based study. Journal Dent. 2021;113:103782. DOI: https://doi.org/10.1016/j.jdent.2021.103782

15. Costa CB, Peralta FDS, Ferreira de Mello ALS. How has teledentistry been applied in public dental health services? An integrative review. Telemed J E Health. 2020;26(7):945-54. DOI: https://doi.org/10.1089/tmj.2019.0122

16. Costa CB, Peralta FS, Maeyama MA, et al. Teledentistry system in dental health public services: A mixed-methods intervention study. Int J Med Inform. 2021;153:104533. DOI: https://doi.org/10.1016/j.ijmedinf.2021.104533

17. Presidência da República (BR). Lei nº 14.510, de 27 de dezembro de 2022. Autoriza e disciplina a prática da telessaúde em todo o território nacional, 2022. Diário Oficial da União, Brasília, DF. 2022 dez 27; Seção I:1.

18. Byrne E, Watkinson S. Patient and clinician satisfaction with video consultations during the COVID-19 pandemic: an opportunity for a new way of working. J Orthod. 2021;48(1):64-73. DOI: https://doi.org/10.1177/1465312520973677

19. Peters DH, Adam T, Alonge O, et al. Republished research: Implementation research: What and how to do it. BMJ. 2013. DOI: https://doi.org/10.1136/bmj.f6753

20. Peters DH, Tran NT, Adam T. Implementation research in health: a practical guide. Geneva: Alliance for Health Policy and Systems Research, World Health Organization; 2013. 67 p.

21. Theobald S, Brandes N, Gyapong M, et al. Implementation research: new imperatives and opportunities in global health. Lancet (London, England). 2018;392(10160):2214-28. DOI: https://doi.org/10.1016/S0140-6736(18)32205-0

22. Bowen DJ, Kreuter M, Spring B, et al. How we design feasibility studies. Am J Prev Med. 2009;36(5):452-7. DOI: https://doi.org/10.1016/j.amepre.2009.02.002

23. Instituto Brasileiro de Geografia e Estatística. Florianópolis: Panorama [Internet]. [Rio de Janeiro]: IBGE; 2022 [accessed 2022 Mar 29]. Available from: https://cidades.ibge.gov.br/brasil/sc/florianopolis/panorama.

24. Ministério da Saúde (BR). DATASUS [Internet]. População residente por faixa etária segundo capital 2022. Mnistério da Saúde: DATASUS; 2022 [accessed 2022 Mar 29]. Available from: http://tabnet.datasus.gov.br/cgi/tabcgi.exe?popsvs/cnv/popbr.def.

25. Conselho Nacional de Saúde (BR). Resolução nº 466, de 12 dezembro de 2012. Aprova as diretrizes e normas regulamentadoras de pesquisas envolvendo seres humanos. Diário Oficial da União, Brasília, DF. 2013 jun 13; Edição 112; Seção I:59-62.

26. von Elm E, Altman DG, Egger M, et al. Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. BMJ. 2007;335(7624):806-8. DOI: https://doi.org/10.1136/bmj.39335.541782.AD

27. Schirghuber J, Schrems B. Homebound: A concept analysis. Nurs Forum. 2021;56(3):742-51. DOI: https://doi.org/10.1111/nuf.12586

28. Alves JM. The adequate model: software quality evaluation model for telemedicine and telehealth systems [dissertation]. Florianópolis: Universidade Federal de Santa Catarina; 2017.

29. Maramba I, Chatterjee A, Newman C. Methods of usability testing in the development of eHealth applications: A scoping review. Int J Med Inform. 2019;126:95-104. DOI: https://doi.org/10.1016/j.ijmedinf.2019.03.018

30. Hajesmaeel-Gohari S, Khordastan F, Fatehi F, et al. The most used questionnaires for evaluating satisfaction, usability, acceptance, and quality outcomes of mobile health. BMC Med Inform Decis Mak. 2022;22(1):22. DOI: https://doi.org/10.1186/s12911-022-01764-2

31. Mariño R, Hopcraft M, Tonmukayakul U, et al. Teleconsultation/telediagnosis using teledentistry technology: A pilot feasibility study. Int J Adv Life Sci. 2014;6(3-4):291-9

32. Murthy V, Herbert C, Bains D, et al. Patient experience of virtual consultations in Oral Medicine during the COVID-19 pandemic. Oral Dis. 2022;28(Suppl 2):2400-5. DOI: https://doi.org/10.1111/odi.14006

33. Torul D, Kahveci K, Kahveci C. Is tele-dentistry an effective approach for patient follow-up in maxillofacial surgery. J Maxillofac Oral Surg. 2021;22(3):1-7. DOI: https://doi.org/10.1007/s12663-021-01596-z

34. Ministério da Saúde (BR), Secretaria de Ciência, Tecnologia e Insumos Estratégicos, Departamento de Gestão e Incorporação de Tecnologias em Saúde. Guia de elaboração de protocolos clínicos e diretrizes terapêuticas: delimitação do escopo. 2nd ed. Brasília, DF: MS; 2019. 28 p.

35. Mason AN. The most important telemedicine patient satisfaction dimension: patient-centered care. Telemed J E Health. 2022;28(8):1206-14. DOI: http://dx.doi.org/10.1089/tmj.2021.0322

36. Medeiros KKAS, Pinto Júnior EP, Bousquat A, et al. O desafio da integralidade no cuidado ao idoso, no âmbito da Atenção Primária à Saúde. Saúde debate. 2017;41(Spe 3):288-95. DOI: https://doi.org/10.1590/0103-11042017S322

37. Ben-Omran MO, Livinski AA, Kopycka-Kedzierawski DT, et al. The use of teledentistry in facilitating oral health for older adults: A scoping review. J Am Dent Assoc. 2021;152(12):998-1011.e17. DOI: https://doi.org/10.1016/j.adaj.2021.06.005

38. Organização Pan-Americana da Saúde. Década do envelhecimento saudável nas Américas (2021-2030): As quatro áreas de ação da década. OMS [Internet]. 2021 [accessed 2022 Feb 22]; Início. Available from: https://www.paho.org/pt/decada-do-envelhecimento-saudavel-nas-americas-2021-2030/quatro-areas--acao-da-decada.

39. Guo S, Chen Y, Mallineni SK, et al. Feasibility of oral health evaluation by intraoral digital photography: a pilot study. J Int Med Res. 2021;49(2):300060520982841. DOI: https://doi.org/10.1177/0300060520982841

40. Muniz IAF, Campos DES, Shinkai RSA, et al. Case report of oral mucosa garlic burn during COVID-19 pandemic outbreak and role of teledentistry to manage oral health in an older adult woman. Spec Care Dentist. 2021;41(5):639-43. DOI: https://doi.org/10.1111/scd.12605

41. Rollings L, Castle-Burrows C. Domiciliary dentistry – remote consultation and risk assessment tool. Br Dent J. 2021;231(12):741-6. DOI: http://dx.doi.org/10.1038/s41415-021-3724-2

42. Venegas B, Rueda S, Flores M, et al. Prevention of oral cancer through the implementation of a teledentistry platform for the elderly. J Oral Res. 2022;1(1):1-8. DOI: http://dx.doi.org/10.17126/joralres.2022.027

43. Cunha Junior AP, Santos MBF, Santos JFF, et al. Dentists' perceptions and barriers to provide oral care for dependent elderly at home, long-term care institutions or hospitals. Braz J Oral Sci. 2018;17:1-11. DOI: http://dx.doi.org/10.20396/bjos.v17i0.8654155

44. Salmi R, Narhi T, Suominen A, et al. Oral health-related quality of life among home-dwelling older people with and without domiciliary care. Gerodontology. 2023;40(3):340-7. DOI: http://dx.doi.org/10.1111/ger.12659

45. Kerr E, Watson S, McMullan J, et al. General dentists' attitudes and perceived barriers in providing domiciliary dental care to older adults in long-term care facilities or their homes in Northern Ireland: A descriptive qualitative study. Gerodontology. 2022;39(3):257-65. DOI: http://dx.doi.org/10.1111/ger.12565

46. Nomura Y, Okada A, Kakuta E, et al. Workforce and contents of home dental care in Japanese insurance system. Int J Dent. 2020;2020:1-6. DOI: http://dx.doi.org/10.1155/2020/7316796

47. Salmi R, Tolvanen M, Suhonen R, et al. Knowledge, perceived skills and activities of nursing staff to support oral home care among older domiciliary care clients. Scand J Caring Sci. 2018;32(4):1342-7. DOI: http://dx.doi.org/10.1111/scs.12579

48. Croonquist CG, Dalum J, Skott P, et al. Effects of domiciliary professional oral care for care-dependent elderly in nursing homes - oral hygiene, gingival bleeding, root caries and nursing staff's oral health knowledge and attitudes. Clin Interv Aging. 2020;15:1305-15. DOI: http://dx.doi.org/10.2147/cia.s236460

49. Gurgel-Juarez N, Torres-Pereira C, Haddad AE, et al. Accuracy and effectiveness of teledentistry: a systematic review of systematic reviews. Evid Based Dent. 2022:1-8. DOI: http://dx.doi.org/10.1038/s41432-022-0257-8

50. Nunez MDRR, Raulino ML, Castro RG, et al. Dental plaque control strategies for the elderly population: A scoping review. Int J Dent Hyg. 2021;20(1):167-81. DOI: http://dx.doi.org/10.1111/idh.12497

51. Sanzana-Luengo C, Díaz L, Abarza L, et al. Teledentistry protocol for the elderly in the context of the COVID-19 pandemic through a web platform/mobile app: approach from the general dentist. J Oral Res. 2022;1(1):1-8. DOI: http://dx.doi.org/10.17126/joralres.2022.026

52. Migas K, Kozlowski R, Sierocka A, et al. Evaluation of tele-dentistry and face-to-face appointments during the provision of dental services in Poland. J Pers Med. 2022;12(10). DOI: http://dx.doi.org/10.3390/jpm12101640

53. Soegyanto AI, Wimardhani YS, Maharani DA, et al. Indonesian dentists' perception of the use of teledentistry. Int Dent J. 2022;72(5):674-81. DOI: http://dx.doi.org/10.1016/j.identj.2022.04.001

54. Zhou MX, Johnson EF, Arce K, et al. Teledentistry in the management of a non-Hodgkin's lymphoma manifesting as a gingival swelling: A case report. Spec Care Dentist. 2022;42(1):86-90. DOI: https://doi.org/10.1111/scd.12638

55. Raucci-Neto W, Souza Pereira M, Cerqueira NM, et al. Knowledge, perception, and experience of dentists about teledentistry. Int Dent J. 2022;72(4):456-62. DOI: http://dx.doi.org/10.1016/j.identj.2021.07.007

56. Conselho Federal de Odontologia (BR). Resolução nº 26, de 4 de junho de 2020. Dispõe sobre o exercício da Odontologia a distância, mediado por tecnologias, e dá outras providências [Internet]. Diário Oficial da União, Brasília, DF. 2020 jun 5 [accessed 2020 Jun 4]. Edição 107; Seção I:61-2. Available from: https://sistemas.cfo.org.br/visualizar/atos/RESOLU%c3%87%c3%83O/SEC/2020/226

57. Lin GSS, Koh SH, Ter KZ, et al. Awareness, knowledge, attitude, and practice of teledentistry among dental practitioners during COVID-19: a systematic review and meta-analysis. Medicina (Kaunas). 2022;58(1). DOI: http://dx.doi.org/10.3390/medicina58010130

58. Martínez HLH, Artmann E, Cruz SCS, et al. A telemedicina no combate à Covid-19: velhos e novos desafios no acesso à saúde no município de Vitória/ES, Brasil. Saúde debate [Internet]. 2022 [acesso em 2025 out 7];46(134):648-64. Disponível em: https://www.saudeemdebate.org.br/sed/article/view/6787

59. Cheuk R, Adeniyi A, Farmer J, et al. Teledentistry use during the COVID-19 pandemic: perceptions and practices of Ontario dentists. BMC Oral Health. 2023;23(1):72. DOI: http://dx.doi.org/10.1186/s12903-023-02772-y

60. Bhatia R, Gilliam E, Aliberti G, et al. Older adults' perspectives on primary care telemedicine during the COVID-19 pandemic. J Am Geriatr Soc. 2022;70(12):3480-92. DOI: http://dx.doi.org/10.1111/jgs.18035

61. Masoni M, Guelfi MR. WhatsApp and other messaging apps in medicine: opportunities and risks. Intern Emerg Med. 2020;15(2):171-3. DOI: http://dx.doi.org/10.1007/s11739-020-02292-5

62. Haddad AE, Rendeiro M, Correia ADMS, et al. Experiência da Rede Brasileira de Teleodontologia. J Br TeleS. 2013;2(2). DOI: https://doi.org/10.12957/jbrastele.2013.8133

63. Brito TDLV, Baptista RS, Lima Lopes PR, et al. Collaboration between medical professionals: Special Interest Groups in the Brazilian Telemedicine University Network (RUTE). Telemed J E Health. 2019;25(10):902-10. DOI: http://dx.doi.org/10.1089/tmj.2018.0075

64. Ministério da Saúde (BR), Departamento de Informática do SUS. Estratégia de Saúde Digital para o Brasil 2020-2028. Brasília, DF: MS; 2020. 128 p.

65. Oliveira Júnior AJ, Mialhe FL. Saúde digital e a odontologia no Brasil no âmbito do Sistema Único de Saúde. Rev Eletrônica Acervo Saúde. 2022;15(6). DOI https://doi.org/10.25248/reas.e10510.2022

66. Braga RD, Panel of Specialists in Oral H, Lucena FN, et al. Oral e-Health: definition of essential attributes of oral health for the information record in primary care. Stud Health Technol Inform. 2019;264:1431-2. DOI: https://doi.org/10.3233/SHTI190469

67. Meurer MI, Von Wangenheim A, Zimmermann C, et al. Launching a public statewide tele(oral)medicine service in Brazil during COVID-19 pandemic. Oral Dis. 2022;28(Suppl 1):947-9. DOI: https://doi.org/10.1111/odi.13528

68. Ministério da Saúde (BR). Portaria nº 2.546, de 27 de outubro de 2011. Redefine e amplia o Programa Telessaúde Brasil, que passa a ser denominado Programa Nacional Telessaúde Brasil Redes (Telessaúde Brasil Redes). Diário Oficial da União, Brasília, DF. 2011 out 28; Edição 208; Seção I:50-2.

69. Siqueira Silva I, Araujo AJ, Lopes RH, et al. Digital home care interventions and quality of primary care for older adults: a scoping review. BMC Geriatr. 2024;24(1):507. DOI: https://doi.org/10.1186/s12877-024-05120-z

70. Ha J, Park HK. Factors affecting the acceptability of technology in health care among older Korean adults with multiple chronic conditions: a cross-sectional study adopting the senior technology acceptance model. Clin Interv Aging. 2020;15:1873-81. DOI: https://doi.org/10.2147/CIA.S268606

71. Estai M, Kruger E, Tennant M, et al. Challenges in the uptake of telemedicine in dentistry. Rural Remote Health. 2016;16(4):3915.

72. Fahim A, Saleem Z, Malik KA, et al. Exploring challenges and mitigation strategies towards practicing Teledentistry. BMC Oral Health. 2022;22(1):658. DOI: https://doi.org/10.1186/s12903-022-02685-2

Received on 10/21/2024
Approved on 05/21/2025
Conflict of interest: Non-existent
Data availability: Research data are available on request, condition justified in the manuscript

Financial support: Non-existent

Editor in charge: Paulo Victor Rodrigues de Carvalho