

Impact of teleconsultations on the conduct of oral health teams in the Telehealth Brazil Networks Programme

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Abstract: Telehealth has been applied in the Unified Health System (SUS) as a tool for qualifying professionals and improving the healthcare provided to the population served by the system. The aim of the present study was to evaluate the impact of teleconsultations on the qualifications of the clinical approach of the oral health teams involved in primary health care (PHC) in the state of Rio Grande do Sul under the Telehealth Brazil Networks Programme. The sample population of the study was composed of 285 dentists and 132 oral health assistants belonging to the Family Health Teams. A chi-square test was used to investigate possible associations between the absolute number of teleconsultations performed and several independent variables, namely, gender, age, dental specialty, time since graduation, time working in the Family Health Strategy (FHS), employment status, type of training institution, familiarity with information technology, and work satisfaction at the health facility. The level of significance was $p < 0.05$. Use of the oral health teleconsultation service led to a reduction of more than 45% in the number of referrals to other levels of care. However, no significant association was found between the number of teleconsultations and the independent variables analysed. The use of teleconsultations proved to be a powerful tool for professional training, for increasing the effectiveness of PHC, and for improving the oral healthcare provided.

Keywords: Telemedicine; Primary Health Care; Oral Health; Education, Dental.

Introduction

Brazil is a country with a land mass of continental dimensions characterized by socioeconomic and cultural contrasts, heterogeneous distribution of the healthcare infrastructure, and uneven levels of professional training. These factors, which are associated with access difficulties posed by geographical constraints, lead to differences between the different regions of the country in terms of the access to and quality of the healthcare services provided to the population.^{1,2}

The Brazilian healthcare system, known as the Unified Health System (SUS), is public and universally accessible. It is based on providing primary health care (PHC) through the Family Health Strategy (FHS). In



Brazil, where there are approximately 1.2 dentists per 1,000 inhabitants, dentistry was included in the SUS as of 2003 in both PHC and medium- and high-complexity networks.¹ The SUS now has 38,000 FHS teams and 22,000 oral health teams in addition to more than 1,000 Dental Specialty Centres (DSCs). The goal of the reorganization of the healthcare model was to expand access to health services by using a comprehensive and longitudinal approach guided by PHC.^{2,3,4} The backbone of the SUS oral health policy includes professional qualification practices for oral health assistants (OHAs), oral health technicians (OHTs) and dentists within the SUS to ensure access to oral healthcare according to the required lines of care and the health conditions of the population.⁵

The Ministry of Health (MH) published a report on a national epidemiological oral health survey conducted in 2010. It revealed a growing demand for dental care with advancing age as well as marked regional inequalities in terms of disease experience.⁶ This situation favours the use of new information and communication technologies (ICTs) aimed at improving professional qualifications and achieving greater equality in the provision of healthcare services.^{7,8,9}

Experiences in several countries have shown that investments in PHC made with the goal of improving physical resources and professional qualifications lead to a significant improvement in the population's health indicators.^{10,11,12} The constant updating of scientific knowledge requires continued professional education to ensure the quality of care. In this context, telehealth is one of the strategies used for solving clinical questions and for scientific updating.^{13,14} It is also a tool for rationalizing the use of funds applied to healthcare and a triggering agent for governmental healthcare actions because it fosters debate among users and professionals in the search for solutions that can be applied to local realities.¹⁵ In this respect, teledentistry is a field that combines telecommunication technology with dental care and health education.^{16,17}

Different initiatives have been undertaken to guide the telehealth process in the country. The MH initially structured and implemented the Telehealth Brazil Programme to cover nine state centres, including the

state of Rio Grande do Sul (RS). Later, it expanded the programme to include the entire country, at which time it became known as the Telehealth Brazil Networks. The aim of the TelehealthRS centre was to qualify PHC and to support the FHS through distance education and care processes.¹ Among its goals are the development of strategies for clinical training, health education, and training for management, planning and assessment skills designed to qualify the FHS teams. This skill enhancement process is guided by a survey of the training needs of the professionals involved so that the content of the programme can be developed to meet the specific needs of the local health teams.^{2,14,17}

However, the main activity of the TelehealthRS is to provide prompt and effective answers to the questions posed daily by professionals from FHS teams. These questions may be of a clinical nature or related to the work process, patient flow or management. Specifically regarding oral health, the interaction between an FHS dentist and a teleconsultant dentist, who is a specialist in PHC, takes place through teleconsultations. It should be noted that the provision of this service to professionals from oral health teams is one of the activities that constitute teledentistry.^{2,14}

Teleconsultations can be defined as consultations that are conducted and recorded among healthcare workers, professionals and managers using ICT. Teleconsultations are held to provide answers to questions about clinical procedures, health actions and the work process. They can be synchronous (performed in real time) or asynchronous (performed through offline messages). In addition to these services, telehealth centres offer telediagnostic and tele-education strategies as well as a second formative opinion. The latter is defined as a systematized response to frequent questions that are selected according to the criteria of relevance and appropriateness established by SUS guidelines and is based on the best scientific and clinical evidence available.^{2,16}

The impact of teleconsultations on the effectiveness of PHC and on the population's health must be evaluated in order for improvements to be made in teledentistry services in general. Therefore, the aim of the present study was to evaluate the impact of oral health teleconsultations on the qualifications

of the clinical and professional approach of dentists and OHAs involved in PHC in the state of RS, Brazil.

Methodology

This was a cross-sectional analytical study conducted with a convenience sample. The study sample population consisted of 285 dentists and 132 OHAs and OHTs from Family Health Teams in the state of RS who were members of the TelehealthRS project and who responded to a questionnaire that aimed to monitor and evaluate the teleconsultations. The questionnaire contained personal identification data, professional data and information related to training needs and was administered between December 2007 and October 2012.

The TelehealthRS project is headquartered at the School of Medicine, Federal University of Rio Grande do Sul (UFRGS), and involves the partnership of the UFRGS School of Dentistry, UFRGS School of Nursing, Clinical Hospital of Porto Alegre (CHPA), Health Department of the State of Rio Grande do Sul (HD/RS), and Ministry of Health (MH). Its primary focus is to support FHS teams by providing synchronous and asynchronous teleconsultations, tediagnosis, teleducation and formative second opinions. It is important to note that the strategies developed by the Telehealth centres are in line with Administrative Order no. 2546 issued by the Ministry of Health.²

The municipalities to be included in the study were selected according to national guidelines and evaluated regionally by the Rio Grande do Sul State Health Department and the Bipartite Intermanagers Committee. Municipalities with the following characteristics were included:

- a. Population of less than 100 thousand inhabitants;
- b. Municipal FHS coverage greater than or equal to 70% of the population;
- c. FHS teams with a low turnover of physicians and nurses (up to two replacements per year in the 2005–2007 triennium).

All professionals who participated in the TelehealthRS project were invited to fill out an initial questionnaire that included a personal profile (personal data and familiarity with information technology), a professional profile (undergraduate training,

graduate training, professional experience, time working in PHC, time since graduation, employment status, training institution), questions regarding the workplace and work process (work satisfaction at healthcare facility) and questions related to their technical training needs in all dental specialties. Subsequently, the following services were offered to the members of the oral health team: synchronous and asynchronous teleconsultations, webinars, and distance courses.

In the present study, we evaluated the impacts of synchronous and asynchronous teleconsultations. Teleconsultation can be understood as a case discussion performed by one or more professionals who share the responsibility of caring for a patient or solving a clinical question. It can be performed in a synchronous (real time) or asynchronous manner (“store-and-forward”). The answer provided to the clinical question should emphasize the knowledge related to solving the problem posed. Its goal is to expand the technical skills and autonomy of the professional involved in addressing similar cases.²

In the present study, the requesting professional used the answer produced during the consultation to evaluate the service provided with regard to the following aspects: his/her satisfaction with the consultation, whether the answer was appropriate to the question asked, whether the professional changed his/her clinical approach after the consultation, and whether the professional decided to refer the patient to other health services and/or another level of healthcare.

Accordingly, the following categorical variables associated with the consultation request were used: satisfaction with the consultation, appropriateness of the answer to the question asked, change of conduct after consultation, and need for referral to other health services and/or another healthcare level. In addition, sociodemographic, professional training and work process variables were included in the analysis.

Data on the personal and professional profiles of the requesting professional were expressed according to their absolute and relative frequencies. Associations between the dependent (number of consultations) and the independent variables (gender, age, dental specialty, time since graduation, time working

in the FHS, employment status, type of training institution, familiarity with information technology, and satisfaction with work in the health facility) were evaluated using the chi-squared test. Statistical analyses were performed using SPSS 20.0 software (Statistical Package for the Social Sciences) and adopting a significance level of 5%. Only the data of professionals who completed the project's initial questionnaire were included in the assessment of the associations between the participants' professional and personal profiles, totalling 285 dentists and 132 OHA. Professionals who had made two or more requests were included in the assessment of the impact of teleconsultations on the professional approach of dentists and OHAs, totalling 720 participants.

The present study was derived from the study titled "Evaluation of the impact of a TelehealthRS intervention on the characteristics of primary healthcare services / Family Health Strategy in Rio Grande do Sul," a project that was approved by the Research Ethics Committee of the Clinical Hospital of Porto Alegre on January 18, 2008.

Results

Table 1 shows that there was a predominance of female professionals in both professional categories (97% among OHAs and 57% among dentists). Most dentists did not hold a specialist degree in public health, had graduated up to 3 years prior (29.2%), and had been working in the FHS for less than 1 year (34.1%). Thirty percent of the OHAs worked in the FHS for periods ranging from 2 to 3 years. Almost half of the professionals in both categories were statutory civil servants and reported that they were satisfied with their work at their healthcare facility (89.5% of dentists and 94.7% of OHAs). It should be noted that only those professionals who completed the study's initial questionnaire were considered in this analysis. Regarding the details of the issues analysed in the teleconsultations, the main topics of the requested teleconsultations are presented in Table 2.

A great discrepancy was noted between the professional categories with regard to their familiarity with information technology: 68.4% of the dentists reported having a high level of IT knowledge, while

Table 1. Description of the study sample.

Characteristics	Dentist (n = 285)	OHA/OHT (n = 132)
	n (%)	n (%)
Gender		
Male	128 (44.9)	4 (3)
Female	157 (55.1)	128 (97)
Specialty		
Public health	43 (27.2)	NA
Other	115 (72.8)	NA
Age		
Up to 27 years	74 (26.4)	40 (31)
28–31 years	72 (25.7)	16 (12.4)
32–38 years	66 (23.6)	25 (19.4)
39+ years	68 (24.3)	48 (37.2)
Time since graduation		
Up to 3 years	83 (29.3)	NA
4–6 years	65 (22.9)	
8–13 years	60 (23.2)	
14+ years	70 (24.6)	
Time working in the FHS		
Up to 1 year	92 (34.0)	24 (19.7)
2–3 years	69 (25.5)	37 (30.3)
3–5 years	49 (18.1)	23 (18.9)
6+ years	60 (22.4)	38 (31.1)
Employment status		
Statutory civil servant	128 (46.0)	59 (45.0)
CLT	64 (23.0)	33 (25.2)
Cooperative	5 (1.8)	3 (2.3)
Temporary contract	62 (22.3)	28 (21.3)
Other	19 (6.9)	8 (6.2)
Type of training institution		
Public	158 (55.4)	59 (54.1)
Private	127 (44.6)	50 (45.9)
Familiarity with information technology		
Low	31 (10.9)	60 (45.4)
Intermediate	59 (20.7)	36 (27.3)
High	195 (68.4)	36 (27.3)
Satisfaction with work at healthcare facility		
Satisfied	250 (89.4)	125 (94.7)
Dissatisfied	29 (10.6)	7 (5.3)

FHS: Family health strategy; CLT: employment status according to the Brazilian consolidation of labour laws.

only 27.3% of the OHAs reported having this level of knowledge.

No statistically significant correlation was observed between the descriptive variables of the study sample and the number of requested

Table 2. Description of main topics of the teleconsultations requested.

a) Stomatology
b) Oral health for specific populations (diabetic pregnant women, hypertensive women)
c) Caries prevention
d) Fluoridation
e) Oral surgery
f) Oral health promotion
g) Oral health management

Table 3. Associations between the number of consultations performed only by dentists and the variables presented in Table 1.

Variables	Number of consultations (mean)	p-value
Gender		
Male	68.750	0.953
Female	51.613	
Public health specialist		
Yes	66.875	0.052
No	47.317	
Age		
Up to 27 years	54.722	0.672
28–31 years	78.148	
32–38 years	55.000	
39+ years	50.476	
Time since graduation		
Up to 3 years	74.878	0.513
4–6 years	42.400	
8–13 years	54.783	
14+ years	54.500	
Time working in the FHS		
Up to 1 year	72.273	0.779
2–3 years	47.931	
3–5 years	50.000	
6+ years	55.294	
Employment status		
Statutory and CLT	68.133	0.061
Other	38.710	
Type of training institution		
Public	65.806	0.708
Private	50.417	
Familiarity with information technology		
Low	45.556	0.711
Intermediate	60.000	
High	60.357	
Satisfaction with work at healthcare facility		
Dissatisfied	54.286	0.37
Satisfied	60.106	

consultations. However, there was a tendency towards an association between the number of consultations and the professional holding a specialist degree in public health ($p = 0.052$; Table 3).

A total of 680 dentists and 40 OHAs requested two or more teleconsultations from the TelehealthRS project regardless of whether they answered the initial study questionnaire. This cut-off point (two or more requests) was established to exclude dentists who used the teleconsultation service only at the time of the training provided by the TelehealthRS project staff (Table 4). It was observed that 94.4% of the dental consultation requests were made by

Table 4. Description of the impact of teleconsultations on the professional approach of dentists and oral health assistants who requested two or more consultations.

Variables	n	%
Profession (n = 720)		
Dentist	680	94.4
Oral health assistant	40	5.6
Type of request		
Asynchronous	629	87.4
Synchronous	91	12.6
Request status		
Answered	678	94.2
Videoconference required	21	2.9
Specification of question required	9	1.3
Scheduled for videoconference	1	0.1
Unanswered request due to absent requesting professional	10	1.4
Question unrelated to programme scope	1	0.1
Satisfaction questionnaire completed by the requesting professional		
Yes	136	21.3
No	501	78.7
Overall satisfaction		
Dissatisfied	11	8.1
Satisfied	124	91.9
Answered the question		
Yes	103	77.4
Partially	30	22.6
Prevented the need for referral		
No	53	54.6
Yes	44	45.4
Changed clinical approach		
No	29	35.8
Yes	52	64.2

dentists, 74.9% of which were text consultations, *i.e.*, asynchronous ones.

Of the professionals, 91.9% reported being satisfied with the response provided during the teleconsultation. In 76.9% of the cases, the requesting professional reported having his/her response needs fully met. A change in the clinical approach of the professional occurred in 64.2% of the cases, and a reduction in the number of referrals to other levels of care occurred in approximately 45% of the cases.

Discussion

Telehealth can be seen as an experience that aims to qualify healthcare and, at the same time, rationalize the use of available physical and human resources to improve health care effectiveness and reduce costs.¹⁸ Thus, the telehealth proposal reinforces the care model adopted in the FHS, which seeks to strengthen the links between the patient, family and health professionals and to value the professionals involved in PHC.¹ Brazil has more than 200 million inhabitants covered by a national public health system with universal access, and this system includes oral health as a care line under a care network structured according to different levels of care.¹⁹ The inclusion of dentistry in the SUS, combined with the implementation of the national Telehealth programme,² allowed this study to provide a unique contribution to the literature.

Evidence suggests that the use of teledentistry in PHC can be beneficial in remote areas where access to specialists is limited.^{16,20,21} Implementation of the National Oral Health Policy has increased the population's access to oral health services at the three levels of care through the deployment of the FHS oral health teams, introduction of centres of dental specialties, and hospital dentistry. Nevertheless, the dental care provided by SUS is still heterogeneous.²² In this context, teledentistry services can represent a powerful tool for equalizing the supply and quality of services.²

A randomized clinical trial conducted in the United Kingdom evaluated the validity of a teledentistry system for screening patients with orthodontic needs. Referral rates, consultation absenteeism, and reduction in the number of inappropriate referrals

were evaluated as secondary objectives. The data showed that the teledentistry system was effective regarding the screening of patients with orthodontic needs and reduced the number of unnecessary referrals to reference centres.²³

A similar impact was found in the present study, which found that the use of asynchronous oral health teleconsultations services was able to reduce the number of referrals for secondary and tertiary care by more than 45%. These data suggest an increase in the effectiveness of PHC mediated by the use of telehealth, which seems to have contributed to qualifying FHS professionals to provide comprehensive care for patients. Similar data were found by Castro Filho,¹³ who observed that the use of telehealth reduced the number of referrals to medical specialties by 50%.

Furthermore, the use of asynchronous strategies can be a cost-effective model of health intervention, as previously described by Elbert et al.²⁴ Asynchronous consultations can take place at a time that is convenient for the professional, a feature that may increase the use of this tool. The rules established by the Ministry of Health for the Telehealth programme provide that the requesting professional's question, once received, must be answered within 72 hours. This ensures fluency in the teleconsultation process. Accordingly, the programme has already benefited more than 15,000 health professionals in the country.^{2,25}

Another positive aspect associated with asynchronous consultations is a reduction in the embarrassment that some patients with mental disorders may feel during the discussion of their case, as demonstrated by Petcu et al.²⁶ In the present study, we observed that the majority of requests involved asynchronous consultations (87.4%) and the minority involved synchronous ones (12.6%).

A study conducted by Estai et al.²⁷ showed that the use of telehealth services can reduce costs and improve the care provided by professionals, especially in areas without access to health services. McLaren and Kopycka-Kedzierawski²⁸ evaluated the diagnostic accuracy of video consultations in 251 paediatric cases of patients residing in rural areas based on the outcomes of referrals made by the professionals involved. The authors concluded that consultations that used video resources were effective in predicting

the best oral health therapeutic option, especially in the most severe cases. From a cost-effectiveness standpoint, actions that can reduce the aggravation of the oral health status of patients within the system are promising alternatives. Economic evaluations were not performed in the present study; however, it is estimated that a reduced number of referrals, coupled with a sizeable rate of change in the clinical approach observed as a result of the teleconsultations, may have played a key role in healthcare effectiveness, patient flow between care levels, and optimizing the use of public resources.

When considering the use of telehealth by OHAs and OHTs, the limited use of this tool by these professionals is an issue. Daniel and Kumar²⁹ reported positive results obtained by technical-level professionals regarding the identification of dental caries in children aged 4 to 7 years using clinical photographs. In this context, the frequent use of teledentistry by these professionals should be encouraged. Considering the composition of oral health teams in the SUS, which have at least one professional at a technical level,²² an extended provision of activities specifically addressing this demographic might contribute substantially to the improvement of oral health promotion and prevention strategies.

Another important point that should be noted is the change in the clinical approach reported by approximately 64% of the requesting professionals. According to Campos et al.,³⁰ the Telehealth strategy is a powerful vehicle of permanent education for the FHS. As such, it contributes decisively to discussion about the needs perceived and experienced by professionals and communities while taking into account local specificities.

According to Wen and Tan,³¹ when Telehealth is combined with strategies that qualify healthcare networks, it is no longer just a technological resource supporting the performance of distance activities but rather a resource for widening the scope of action of the care provided. Teledentistry plays an important role in reorganizing oral healthcare networks by qualifying the referrals and the oral healthcare provided at the PHC level.

Possible obstacles to the use of teledentistry are related to professionals' familiarity with technology as well as the availability of equipment and technological

inputs. This factor is particularly notable because of the significant percentage (45%) of professionals at the technical level who declared that they had a low level of familiarity with the use of information and communication technological resources. Another possible impediment to extending the use of these tools involves the need to provide healthcare workers with a time period allocated by management for case discussion.

Furthermore, the number of professionals who expressed their opinion about the service provided was very limited considering that only 21.4% of the requesting professionals answered the satisfaction questionnaire. Although the number of professionals who were satisfied with the service reached 91.9% – a value similar to that reported by Marcolino et al.³² – there are still biases related to the evaluation of telehealth services that should be studied more closely.

A low rate of utilization of teledentistry services provided to the oral health teams connected to the TelehealthRS project was observed. Haddad et al.⁷ note that it is still necessary to overcome barriers in the work process, in the incorporation of permanent education, and in the management of services to increase the use of telehealth and professionals' demand for teleconsultation services. Similar obstacles to the use of teledentistry have been reported in the literature with regard to issues of technical reliability, diagnostic accuracy, and the cost-benefit ratio of implementing teledentistry centres.²⁷

It is important to note that the results of the present study may be related to the characteristics of the TelehealthRS project, which includes services that cover PHC specificities. In telehealth centres that have services available to the secondary or tertiary levels of health care or have different population characteristics, the impact of teleconsultations may achieve results different from those presented in the present study. Thus, comparison of teleconsultation effectiveness in different teledentistry applications should be performed.

Conclusion

The use of teledentistry has proven to be a powerful tool for professional training, for increasing the

effectiveness of PHC, and for qualifying the oral healthcare provided. However, it is necessary to train oral health professionals in the use of digital media and modifying the work process in combination with increasing management support since the difficulty in managing the available resources observed in this study may limit access to this tool and, as a result, lessen its impact on the quality of care provided and on oral health indicators.

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