Telehealth in Oral Medicine: report of an experience from public health care in a southern Brazilian state

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Abstract: This study aimed to describe the telediagnosis of oral lesions through a telehealth program offered in the State of Paraná, southern Brazil. This report included all oral medicine-related teleconsultations between January 2015 and December 2019. Primary care dentists from the public health services of the state were trained to use the *Telessaúde Brasil Redes platform,* a national telehealth program that provides telediagnostic support through teleconsultations with specialists. Clinical information and images of oral lesions were solicited to each teleconsultation request. An oral medicine specialist evaluated the cases and provided diagnostic hypotheses, management, and referral suggestions. Finally, dentists were invited to evaluate the services. A total of 162 cases were submitted by 44 dentists. The patient's main complaint was described in 98.8% of cases, while the duration/evolution and the type of lesions were 64.81% and 40.12%, respectively. No images were attached to 19 (11.70%) patients. The information sent was sufficient for diagnostic reasoning in 125 (77.16%) requests. The specialist considered 78 cases (48.1%) to be resolved in primary care. Among respondents (45.7%), dentists considered that the teleconsultation "totally attended" their needs in 92% of requests. The description of the telehealth platform usage in oral medicine in Paraná showed the need to improve the participation of primary care dentists and the quality of clinical information provided as barriers to be overcome, aiming for the best usage of the platform.

Keywords: Telemedicine; Diagnosis, Oral; Oral Medicine.

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Introduction

Telehealth, a tool that involves the use of technological resources of communication in the health area, has been increasingly adopted worldwide for its several benefits, such as bringing specialists closer to geographically isolated regions, reduction of travel costs, and access delay. Examples of disciplines with telehealth programs in several countries include radiology, pathology, dermatology, psychiatry, and remote patient monitoring.[1]

Similarly, teledentistry improves oral health care delivery and has notable potential for growth because of its relevance in public services, reducing inequities. The literature reports its use for diverse purposes

in dental specialties such as pediatric dentistry, orthodontics, and oral medicine. Sometimes, as in the case of oral screening examination, teledentistry could be comparable to visual examination.[2-5]

Particularly in oral medicine, previous investigations compared remote diagnosis of oral lesions provided by specialists through digital images sent by e-mail with histopathological results. The authors found that at least one evaluator provided the correct diagnosis in 80% of cases, suggesting that photographs may be an effective alternative for the diagnosis of oral lesions, particularly in areas where specialists are not present.[6,7]

Haron et al.[8] compared clinical oral examination and remote evaluation of images taken with mobile phone cameras regarding the presence and category of lesions, as well as referral decisions. The results achieved moderate to strong concordance between the two modalities. Blomstrand et al., performed telemedicine rounds between a specialist clinic and oral health professionals to discuss oral medicine cases. This approach enabled the dentists to provide treatments without the need to refer to eight of 10 patients.[9]

Other authors reported their experience with the use of "EstomatoNet," a platform for teleconsulting and telediagnosis in southern Brazil, highlighting its great practical feasibility.[10] Moreover, during the coronavirus pandemic, a public teledentistry service similar to what is described in this work was implemented in the state of Santa Catarina.[11] The analysis of an asynchronous dental teleconsultation service of Minas Gerais, in the Brazilian southeast, showed that the most frequent inquiries were related to the Pathology and Oral medicine specialties.[12]

According to the Federal Council of Dentistry, in August 2020, Paraná has 21,130 active dental surgeons and 42 records of professionals specializing in oral medicine in the state. The proportion of specialists in oral medicine per inhabitant is extremely small when considering the state population of 11,433,957 inhabitants (1: 272,237). Moreover, one should consider the disproportionate distribution of professionals massively concentrated in large and richer urban areas, particularly in the capital Curitiba.[13]

This study aimed to analyze the asynchronous telediagnostic service in oral lesions through the *Telessaúde Brasil Redes* telehealth program offered in the State of Paraná.

Methodology

This study had a cross-sectional, exploratory design and followed the recommendations of the Declaration of Helsinki. It was approved under registration number 23279913.6.0000.0102 and the opinion number 521.688 by the Research Ethics Committee of the Department of Health Sciences of the Federal University of Paraná.

The sample consisted of data from all teleconsultations in oral medicine performed consecutively between January 2015 and November 2019 in the State of Paraná through the *Telessaúde Brasil Redes* telehealth program platform. This instrument was regionally managed by the telehealth center linked to a university hospital (Hospital de Clínicas da Universidade Federal do Paraná, UFPR), as a strategy to expand the resolution of the primary care level and promote its integration with specialized care in the state.

To implement teleconsultations, all dentist coordinators from the 22 regional health departments in the state of Paraná were trained to register and use the platform with a commitment to pass on information to dentists from their municipal health networks. The instructions for use were transmitted and reinforced in four videoconferencing activities, lasting approximately 1 h each. Electronic tutorials on the use of the platform were also available for consultation with dentists. The participating dentists were invited to register for individual access to the platform's tools.

To request an asynchronous teleconsultation, the dentist should describe the clinical information and attach photographs of each case in specific fields on the platform. The synchronous mode of teleconsultation can also be requested by appointments. Each requisition was regulated by a professional specially designated for this function and referred to a specialist teleconsultant. The processes received identification codes and had restricted, private, and confidential access to the users' information traffic.

The teleconsultant was an oral medicine specialist, who was linked to the teaching and assistance team

of the specialty at the Federal University of Paraná. This professional answered the teleconsultations with diagnostic hypotheses, conduct, attributions of primary health care (such as clinical monitoring, reduction of local traumatic factors, and, in some cases, incisional and minor excisional surgical procedures), and related scientific references. Furthermore, the specialist made recommendations for the user's itinerary on the health network, which could be a referral for specialized services of secondary or even tertiary health care complexity levels.

At the end of the teleconsulting process, the requesting dentists were invited to evaluate if the service attended their needs by opting between "indifferent," "partially attended," or "totally attended" categories. They were also questioned about their satisfaction level with the service on a scale from "very satisfied" to "very dissatisfied."

This report included all cases involving oral lesions or symptoms related to oral medicine and excluded requests that questioned conduct protocols and consultations unrelated to the oral medicine field. Moreover, only the initial teleconsultations requested for each case were considered, and all those in which the teleconsultant issued a second or complementary opinion were excluded.

The data were tabulated in an Excel spreadsheet (Microsoft Office 2016®), and a descriptive analysis was performed.

Results

The Paraná State *Telessaúde Brasil Redes* platform registered 229 oral medicine teleconsultations from January 2015 to December 2019. Of this total, the first 33 were excluded as they were part of a pilot study, and 34 others fit the exclusion criteria. Thus, 162 cases comprised a valid sample.

The teleconsultations were requested by 44 dentists from 34 (8.5%) of the 399 municipalities in the state of Paraná. As an example, 24 of them are located at least 100 km from the oral medicine outpatient clinic of the Federal University of Paraná, one of the reference public services for the diagnosis and treatment of oral lesions in the state. The municipalities that most requested the service were Quitandinha (30.9%; n = 50),

followed by Telêmaco Borba (9.3%; n = 15) and Rio Negro (8.6%; n = 14), as shown in Figure. Twenty-one dentists (48%) submitted more than one request, with 24 having the highest number of requests made by the same professional.

The median time that the teleconsultant responded to the requisitions was 2.2 days. The mean age of the patients was 35.41 years, with a range from 0 to 94 years. Most of the patients were women (n = 94; 58%), and in seven situations, the applicant did not provide this information to the teleconsultant.

Only asynchronous teleconsultations were requested. In most cases submitted (98.8%), users of the platform described the patients' main complaints. Moreover, 105 requests (64.81%) contained information about the duration/evolution of the lesions; however, the type of lesion was reported in only 65 (40.12%). The photographs were obtained by applicants with smartphone cameras (n = 116; 71.60%) or intraoral cameras (n = 23; 14.20%). In 19 (11.70%) cases, the applicant did not provide any images, and in four (2.46%) cases, the applicants shared other image files, such as radiographs or radiographic reports.

Diagnostic hypotheses were established for 77.16% of the requests (n = 125). In the others, the teleconsultant decided that there was insufficient clinical or complementary information for diagnostic reasoning. The number of cases (n = 78; 48.1%) considered likely to be resolved in primary care was also the number of requests in which the teleconsultant suggested referral to the specialist. In six (3.7%) cases, this information was not provided. Furthermore, the teleconsultant considered that there was no suspicion of malignancy in 158 patients (97.5%). Table 1 presents the main groups of suggested diagnostic hypotheses, and Table 2 shows the main treatments proposed by the teleconsultant.

According to the service evaluation on the platform, the dentists considered that the teleconsultation "totally attended" their needs in 68 (42%) cases and that it "partially attended" in six (3.7%) cases. The question was not answered in 88 (54.3%) cases. Moreover, dentists declared themselves "very satisfied" with the service in 59 (36.4%) cases, "satisfied" in 17 (10,5%), and "indifferent" in one (0.6%) case. In 85 cases (52.5%), dentists were absent. Therefore, the service was
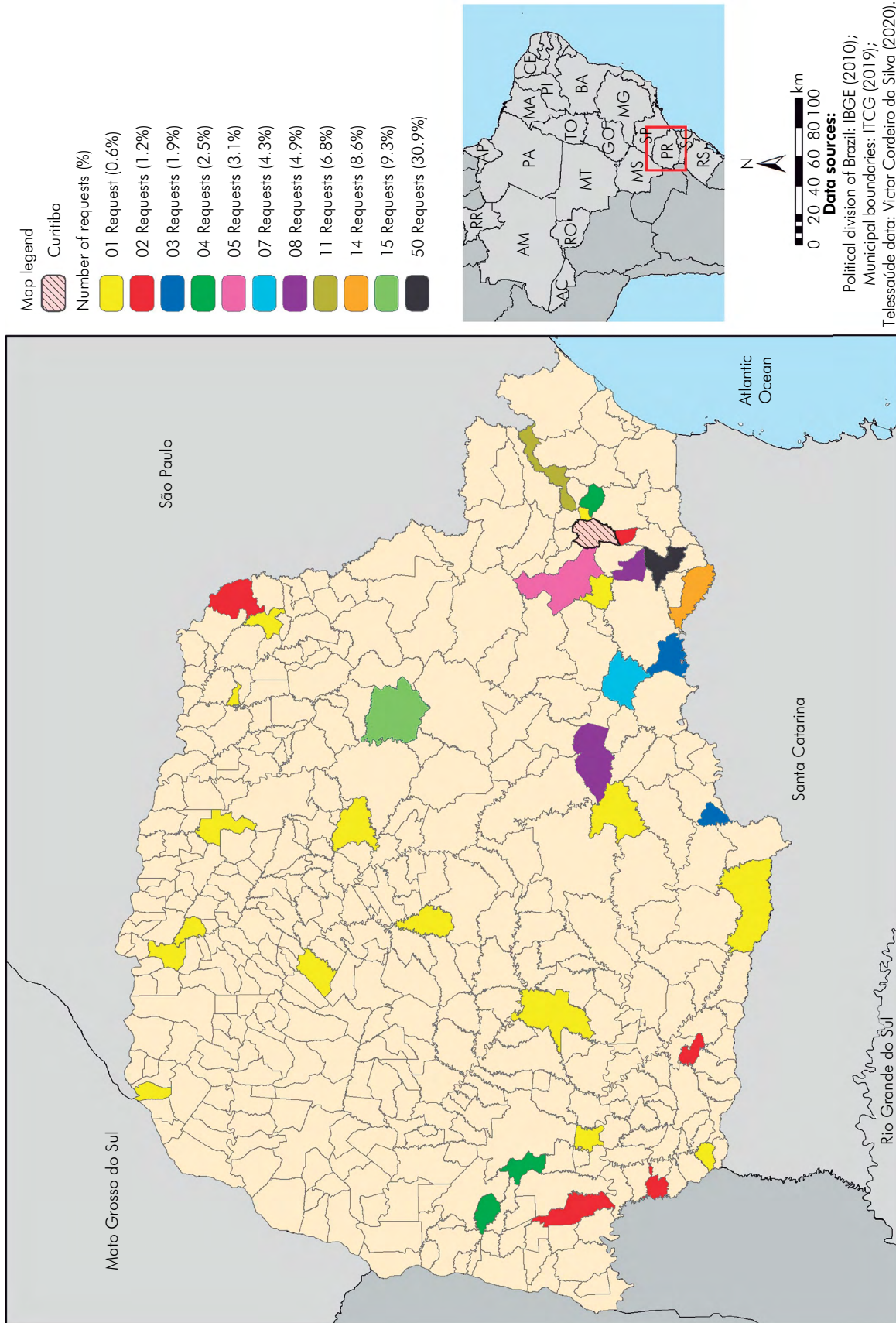
Figure. Map of the state of Paraná, with the municipalities highlighted according to the number of requests made by their professionals. It should be noted that most of the cases evaluated are located at great distances from the capital, Curitiba.

Table 1. The teleconsultant's diagnostic hypotheses and their frequencies in relation to the total number of cases.

Diagnostic hypotheses	n (%)
Non-neoplastic proliferative processes	26 (16.04)
Vascular lesions	16 (9.87)
Oral potentially malignant disorders	13 (8.02)
Benign tumors	12 (7.4)
Autoimmune diseases	8 (4.93)
Salivary gland lesions	10 (6.17)
Traumatic lesions	7 (4.32)
Carcinomas	6 (3.7)
Fungal infections	2 (1.23)
Others	25 (15.43)
Not discriminated	37 (22.83)
Total	162 (100)

Table 2. Categories of treatments suggested by the teleconsultant and their frequencies.

Treatments suggested by the teleconsultant	n (%)
Excisional biopsy	44 (27.16)
Clinical follow-up/ removal of traumatic factor	33 (20.37)
Incisional biopsy	21 (12.96)
Referral for specialty service	10 (6.17)
Drug prescription	8 (4.93)
Others	21 (12.96)
Not discriminated	25 (15.43)
Total	162 (100)

predominantly well evaluated among the respondents, resulting in 92% of "totally attended" needs and 98% "satisfied" or "very satisfied."

Discussion

The present study aimed to report the experience of a remote diagnostic support service carried out in oral medicine, the first dedicated to primary health strategy in the state of Paraná, and to discuss the profile of the cases remotely evaluated. In Brazil, telehealth tools are used in medicine and oral health to provide specialized support for primary health care professionals in public services. This practice is regulated and implemented in Brazilian public health through secure platforms that enable sharing patients' information between the professionals.[14] In this context, telemedicine, and teledentistry may favor the suitable patients' itinerary in the health network.

The teleconsultant considered that referral to a specialized service was unnecessary in half of the cases evaluated. The role of teleconsultations in reducing the number of referrals occurred considering that, according to the teleconsultant, most of the requests involved demands compatible with the attributions of primary health care, such as clinical monitoring, reduction of local traumatic factors, and, in some cases, incisional and minor excisional surgical procedures. Likewise, Carrard et al. (2018) observed a reduction from 96.9% to 35.1% of the dentist's intention to refer the patients to a consultation in person with a specialist, after teleconsultations through the EstomatoNet platform.[10] This information, when analyzed in relation to the patients' perspective regarding time and distance of travel if referred, transportation, cost of time from work and sometimes overnight accommodations, suggests savings provided by teledentistry interventions.[15]

EstomatoNet showed the potential to increase primary care resolvability with support for decision-making and management of oral lesions. As biopsies and laboratory test requisitions are compatible with the primary care scope, teleconsultation strategies could avoid unnecessary referrals to specialized services and enable the rational use of governmental resources.[10] However, the teleconsultant's support or second opinion does not exempt the requester from the final decision. Aiming for better care, primary care professionals should consider referral in case of unpreparedness to perform the suggested procedures.

Tesfalul et al.[16] evaluated the agreement between a clinician and a remote specialist regarding the diagnostic hypotheses and management plans for complicated oral lesions. As a result, despite a great agreement in the elaboration of diagnostic hypotheses (91.3%), there was a great disagreement in the management plans proposed by both (64.0%). Most of the disagreement was related to the referral need proposed by clinicians for cases in which the specialist recommended procedures such as biopsies and drug prescriptions but considered the referral unnecessary.[16]

In contrast, there are entities such as squamous cell carcinoma and potentially malignant oral disorders in which early diagnosis and referral are of universally recognized importance for decreasing morbidity

and mortality. The participation of health care professionals, such as physicians and specialist dentists other than oral medicine specialists, is significant for oral lesion screening. Clinical referral guidelines and remote communication with oral medicine specialists are strategies that may help those professionals in accelerating diagnoses and immediate referral.[17,18] Considering that the service presented in our study counted only dentists' requests, the inclusion of other health professionals as requesters of teleconsultations would possibly favor the service's operation.

In this study, most of the dentists that evaluated the platform considered that the teleconsultant's response "totally attended" to the needs presented in the requests and declared themselves "satisfied" or "very satisfied." Similarly, positive indicators reached values of 98% satisfaction with the "EstomatoNet" service in the state of Rio Grande do Sul in Brazil.[10] The majority of dental teleconsulting users that evaluated the Telehealth Brazil Networks in Minas Gerais were "satisfied" with "completely" responded issues. However, this feedback had high non-response rates (57.2% for satisfaction and 70% for resolution). The researchers suggested that the professionals' evaluation must be encouraged as it contributes to a better understanding of the effects of the system.[12]

Some barriers to be overcome in the teleconsultation request were identified primarily regarding the absence of elementary information in the patient's history, such as age, sex, and time of evolution. Other important information such as habits and medications in use were also not frequently presented, although the platform encourages the applicant to provide such information. Once this kind of information can help to distinguish diseases, its absence may impair the teleconsultant's diagnostic reasoning, as occurred in almost 25% of the requests. Strategies in the system to improve the response rates could be considered, such as the response models' suggestions or required fields.[19]

Regarding the clinical images of the cases, no images were provided for more than 10% of the requests. Moreover, the teleconsultant considered most of the submitted low-quality images, although they were mainly obtained through smartphones. The quality of clinical information provided by the applicant could improve if a guide instrument was proposed for the description of the intraoral examination findings[19] and intraoral photography instructions.[10] Since no systematic effort was made in the present study to standardize or train dentists to image acquisition, it could be suggested as a strategy to overcome the barriers exposed. In addition, an argument to encourage dentists to attach images of the oral lesions to the teleconsultation requests is that these cases tend to be prioritized by the teleconsultant, especially in malignancy suspicion, when compared with those containing a reference letter only.[20]

One of the limitations of our study is the relatively small number of professionals who sent requests. Strategies to increase participation should be considered, such as disclosure broadening and reiterating, directed not only to dentists but also to other health professionals. Moreover, this study limited the analysis of the requests for teleconsultations to report the adhesion and use of the platform. Therefore, broader considerations of its costs and other barriers to expanded implementation of public services were not estimated. Similarly, its impact on patient health outcomes was not assessed. It is suggested the execution of longitudinal studies to monitor the evolution of clinical outcomes and the possible benefit of teleconsulting in the treatment of oral lesions.

Conclusion

The *Telessaúde Brasil Redes* telehealth platform in the specialty of oral medicine in the state of Paraná was well evaluated by users who rated the service; however, had a low proportion of dentists from primary health care requiring teleconsultations. Furthermore, there is a need to improve the quality of clinical information provided in the request, whether written or photographic. It is recommended to standardize teleconsultation criteria and identify the most common barriers in its use, as well as the best practices to circumvent them.

Acknowledgments

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