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ANÁLISE DA SÉRIE HISTÓRICA DO SERVIÇO DE TELEDIAGNÓSTICO EM ESTOMATOLOGIA DO PROJETO TELESSAÚDERS-UFRGS (ESTOMATONET) E DA SUA EFETIVIDADE PARA O SISTEMA PÚBLICO DE SAÚDE

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Dissertação apresentada ao programa de Pós-graduação em Odontologia da Universidade Federal do Rio Grande do Sul, como requisito final à obtenção do título de Mestre em Odontologia - Área de concentração em Patologia Bucal.

Orientador: Prof. Dr. Vinicius Coelho Carrard
Linha de pesquisa: Câncer bucal

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"É na educação dos filhos que se revelam as virtudes dos pais."
Coelho Neto

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"Dar o exemplo não é a melhor maneira de influenciar os outros. É a única."
Albert Schweitzer

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"O amor é a capacidade de cuidar-se e cuidar. Quem ama não desiste."
Mario Sergio Cortella

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"Eu sou parte de uma equipe. Então, quando venço, não sou eu apenas quem vence. De certa forma termino o trabalho de um grupo enorme de pessoas."
Ayrton Senna

"O futuro depende mais da sua vocação e propósito do que do seu currículo"

Roberto Tranjan

RESUMO

EstomatoNet é um serviço de telediagnóstico para lesões bucais com financiamento público e oferecido de forma gratuita para os profissionais de atenção primária à saúde (PHCP) a partir de uma plataforma de armazenamento em nuvem. Este estudo teve como objetivo relatar a experiência acumulada por este serviço desde o seu lançamento em junho de 2015 até abril de 2020. As características dos pacientes e usuários solicitantes (dentistas e médicos) foram obtidas na plataforma do serviço, bem como informações relativas às lesões e / ou queixas bucais relatadas. Foram também reportadas as hipóteses diagnósticas apresentadas pelos solicitantes, seu grau de satisfação com o serviço e a opinião do teleconsultor em termos de diagnóstico e recomendação de manejo. A sugestão de conduta do teleconsultor foi cruzada com os dados do sistema de regulação do estado, para verificar se realmente houve evitação de encaminhamento. No período, 405 solicitantes utilizaram o serviço, sendo 252 (62,2%) dentistas e 153 (37,8%) médicos. Cerca de 29,2% dos municípios do Rio Grande do Sul realizaram solicitações. A maioria dos pacientes eram mulheres (n = 1103; 55,1%) e 1036 (50,1%) tinham entre 20-59 anos. O tempo médio entre a realização da solicitação e recebimento do laudo de telediagnóstico foi de 4,1 ± 4,3 dias. Quase 97% dos solicitantes ficaram muito satisfeitos ou satisfeitos com o serviço. Em relação às lesões, 393 (19,6%) foram desordens potencialmente malignas e em 155 (7,7%) houve suspeita de malignidade. Os solicitantes apresentaram uma concordância relativamente alta (72,0%) em relação às hipóteses diagnósticas para desordens potencialmente malignas quando comparadas à opinião do teleconsultor. Em 37,3% dos casos, o encaminhamento foi evitado após o aconselhamento pelo serviço da EstomatoNet de manutenção do caso na APS (k = 0,23; p <0,01; 62,2% de concordância). Conclui-se que o uso do telediagnóstico é útil aos profissionais de saúde da atenção primária à saúde no manejo das lesões bucais e reduz o número de encaminhamentos para serviços especializados em Estomatologia.

Palavras-chave: teleodontologia, telessaude, estomatologia, saúde publica

SUMMARY

EstomatoNet is a free telediagnostic service for oral lesions offered to professionals of primary health care (PHCP) by means a cloud-based platform. This study aimed to report the experience of this service since it was launched in June 2015 to April 2020. Patients' and applicants' characteristics were retrieved from the service's cloud-based platform, as well as information related to their oral lesions and/or complaints. The diagnostic hypothesis provided by the applicant, its level of satisfaction, and the opinion of the teleconsultant in terms of diagnosis and management were also reported. The teleconsultant's suggestion was crossed with the data from the state regulation system, to verify if the telediagnosis induced a referral avoidance. A total of 405 PHCP used the service in the period, 252 (62.2%) dentists and 153 (37.8%) physicians. About 29.2% of the Rio Grande do Sul State's municipalities performed the requests. Most patients were women (n=1103; 55.1%) and 1036 (50.1%) were between 20-59 years. The average time for receiving the telediagnosis report was 4.1 ± 4.3 days. Almost 97% of the applicants were very satisfied or satisfied with the service. Regarding the lesions, 393 (19.6%) were potentially malignant disorders and 155 (7.7%) suspected malignancy. The applicants presented a relatively high concordance (72.0%) in relation to diagnostic hypotheses for potentially malignant disorders when compared to the teleconsultant's opinion. In 693 (37.3%) of the cases, the referral was avoided after the counseling by the EstomatoNet service of maintaining the case in the PHC (k = 0.234; p <0.001; 62.2% agreement). It may be concluded that the use of telediagnosis for oral mucosal lesions may improve the support for PHCP in the management of lesions and to reduce referral to specialized services.

Keywords: teledentistry, telehealth, oral medicine, public health

LISTA DE ABREVIATURAS E SÍMBOLOS

SUS   Sistema Único de Saúde

APS   Atenção Primária à Saúde

AB   Atenção Básica

UFRGS   Universidade Federal do Rio Grande do Sul

CEO   Centro de Especialidades Odontológicas

SB   Saúde Bucal

EAD   Educação a distância

PAPS   Profissionais da Atenção Primária a Saúde

TelessaúdeRS-UFRGS   Núcleo técnico científico de telessaúde da

Universidade Federal do Rio Grande do Sul

SUMÁRIO

1. ANTECEDENTES E JUSTIFICATIVA

Entre os princípios organizativos do Sistema Único de Saúde no Brasil (SUS), estão a hierarquização e a descentralização (BRASIL, 1990). A hierarquização organiza o serviço em níveis crescentes de complexidade, garantindo o atendimento na atenção primária e especializada de acordo com a necessidade do indivíduo. Os diferentes níveis de atenção á saúde no SUS são a atenção primária, secundária ou especializada e terciária ou hospitalar. Chama-se de Atenção Primária a Saúde (APS) a unidade porta de entrada para o SUS (STARFIELD, 2002; CAMPOS, 2003), sendo a atenção secundária/especializada, na odontologia, os Centros de Especialidades Odontológicas (CEO). Entre eles estão incluídos o diagnóstico bucal, com ênfase no câncer bucal; periodontia; cirurgia oral menor; endodontia e atendimento a portadores de necessidades especiais (PAIM et al, 2011; BRASIL, 2011). O custo para o sistema de saúde e a complexidade dos procedimentos cresce proporcionalmente ao nível de atenção (MACINKO et al., 2003; BRASIL, 2010).

A descentralização trata-se do compartilhamento de responsabilidade entre as três esferas do governo. Os estados e municípios são considerados autônomos e soberanos, dentro dos princípios gerais do SUS, na condução de situações de gerenciamento, técnico, administrativo e financeiro (BRASIL, 1993). Com o processo de descentralização do SUS e com o suporte de programas inovadores, a APS/AB tem como objetivos: promover acesso universal coordenando e encaminhando aos níveis de cuidado mais complexos (acesso a especialistas e a cuidados hospitalares) e implementar ações intersetoriais para a promoção de saúde e prevenção de doenças (BRASIL, 1998; STARFIELD, 2002).

Uma vez regido por estes princípios, o sistema de saúde deve gerenciar políticas e ações específicas que objetivem melhorar a qualidade no atendimento em todos os níveis de atenção, sendo o gerenciamento de recursos humanos fundamental. Ainda nesse sentido, está entre os princípios norteadores de ações em saúde bucal o desenvolvimento de produtos e tecnologias para que se tenha expansão das ações dos serviços públicos de saúde bucal em todos os níveis de atenção (BRASIL, 2004).

Respaldada pelas políticas que buscam melhorias na saúde e ampliação do acesso, a telessaúde ganha espaço com a promessa de preencher a grande lacuna da desigualdade no acesso aos serviços de saúde. Utilizando a tecnologia em prol da saúde, essa estratégia busca a expansão das ações e serviços de saúde, qualificação e maior resolubilidade das situações de saúde pelo profissional da APS. Em 2007, no Brasil, foi implementado o Programa Nacional de Telessaúde (BRASIL, 2007). Tendo em vista os benefícios notórios em pouco tempo do Programa, como a redução de deslocamento dos pacientes e possibilidade de economia para o Estado, além da boa adesão dos profissionais de saúde, em 2011 o Programa foi ampliado passando para Programa Nacional Telessaúde Brasil Redes (BRASIL, 2011). O Telessaúde Brasil Redes organiza-se em núcleos que são estruturados a partir de projetos estaduais ligados a secretarias de saúde e Universidades Federais. Atualmente no Brasil existem 44 núcleos de Telessaúde, distribuídos em 23 estados do País (BRASIL, 2020).

O TelessaúdeRS-UFRGS é um núcleo de telessaúde criado pelo Ministério da Saúde em 2005 em parceria Universidade Federal do Rio Grande do Sul e secretaria estadual de saúde (HARZHEIM et al., 2016). Através de

ações de teleconsultoria, teleducação e telediagnóstico o TelessaúdeRS-UFRGS tem como objetivo qualificar o trabalho das equipes de Atenção Primária à Saúde (APS), tornando-os mais resolutivos, fortalecendo os atributos da APS, orientados pelos princípios do SUS e pela melhor e mais atual evidência científica. As teleconsultorias são feitas de forma síncrona através ligações telefônicas gratuitas que podem ser realizadas por dentistas, enfermeiros e médicos para o TelessaúdeRS-UFRGS a partir de Unidades Básicas de Saúde de todo o Brasil. A teleducação é realizada através de cursos EAD, vídeo aulas, perguntas formuladas toda a semana e materiais de apoio clínico, chamados "Telecondutas". O telediagnóstico é realizado através do apoio diagnóstico clínico a partir da emissão de laudo.

Especificamente a ação de telediagnóstico do TelessaúdeRS-UFRGS, atualmente, conta com 4 serviços: EstomatoNet, DermatoNet, RespiraNet e TeleOftalmo (UFRGS, 2017). Para lidar com a dificuldade no diagnóstico e no tratamento de lesões bucais, o TSRS criou o EstomatoNet, um serviço de telediagnóstico em Estomatologia que funciona a partir de uma plataforma disponível na internet. O objetivo desta iniciativa foi criar um canal para suporte aos profissionais de saúde no que diz respeito ao diagnóstico e manejo de lesões bucais, evitando encaminhamentos desnecessários e refletindo na diminuição do tempo de espera para agendamento de consulta em serviço especializado para os casos de alto risco para neoplasia maligna (CARRARD et al., 2018). Para ter acesso ao Programa, os profissionais da atenção primária devem realizar um cadastro gratuito na plataforma do TelessaúdeRS-UFRGS, que depende do fornecimento de profissional de forma a confirmar o seu vínculo com a APS. Posteriormente, a cada solicitação, são requeridas informações para

identificar o paciente portador das lesões bucais, seu estado de saúde geral e dados clínicos da lesão ou das lesões em questão (ANEXO I, II, III).

Em 2016, um levantamento preliminar do serviço EstomatoNet com 259 consultorias realizadas, mostrou uma redução na intenção de encaminhar os pacientes após telediagnóstico (96% para 35%) (CARRARD, et al., 2018). Buscando contribuição para consolidar o serviço de telediagnóstico em Estomatologia (EstomatoNet), que além de permitir apoio com manejo de lesões de boca aos PAPS, também tem potencial de reduzir a fila de espera para atendimento na atenção especializada, este estudo realizou um amplo levantamento das solicitações de telediagnósticas realizadas ao EstomatoNet desde o início da implementação do Programa em 2015.

2. OBJETIVOS

2.1 OBJETIVO GERAL

Avaliar os resultados obtidos pelo serviço de Telediagnóstico em Estomatologia (EstomatoNet) do TelessaúdeRS-UFRGS.

2.2 OBJETIVOS ESPECÍFICOS

- Realizar uma análise descritiva da experiência acumulada pelo serviço EstomatoNet por meio de uma série histórica, detalhando as características das solicitações realizadas desde a sua implantação em junho de 2015 até abril de 2020

- Avaliar, a repercussão da discussão do caso com o EstomatoNet do ponto de vista do apoio clínico oferecido aos dentistas e médicos da APS e do evitamento do encaminhamento (ou não) dos pacientes para a atenção especializada.

3. HIPÓTESE

O EstomatoNet tem potencial para auxiliar no diagnóstico e favorecer a manutenção dos pacientes com lesão bucal na atenção primária do serviço público de saúde, evitando o encaminhamento para a atenção especializada.

3. ARTIGO CIENTÍFICO (a ser submetido para o Journal of Dental Research, Qualis 2013-2016: A1, fator de impacto: 5.07)

EstomatoNet service: 5-year experience of a single center on oral lesions telediagnosis offered to health professionals from the primary healthcare

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Abstract

EstomatoNet is an online service driven to support diagnosis and decision making for oral lesions by primary health care professionals (PHCP). This study aimed to report the experience of this service since it was launched in June 2015 to April 2020. Patients and applicants' characteristics were retrieved from the service's cloud-based platform, as well as information related to their oral lesions and/or complaints. The diagnostic hypothesis provided by the applicant, its level of satisfaction, and the opinion of the teleconsultant in terms of diagnosis and management were also reported. The teleconsultant's suggestion was crossed with the data from the state regulation system, to verify if there was really avoidance of forwarding. A total of 405 PHCP used the service in the period, 252 (62.2%) dentists and 153 (37.8%) physicians. About 29.2% of the Rio Grande do Sul State's municipalities performed the requests. Most patients were women (n=1103; 55.1%) and 1036 (50.1%) were between 20-59 years. The average time for receiving the telediagnosis report was 4.1 ± 4.3 days. Almost 97% of the applicants were very satisfied or satisfied with the service. Regarding the lesions, 393 (19.6%) were potentially malignant disorders and 155 (7.7%) suspected malignancy. The applicants presented a relatively high concordance (72.0%) in relation to diagnostic hypotheses for potentially malignant disorders when compared to the teleconsultant's opinion. In 693 (37.3%) of the cases, the referral was avoided after the counseling by the EstomatoNet service of maintaining the case in the PHC (k = 0.234; p <0.001; 62.2% agreement). It may be concluded that the use of telediagnosis for oral mucosal lesions may improve the support for PHCP in the management of lesions and to reduce referral to specialized services.

Keywords: teledentistry, telehealth, oral medicine, public health

Introduction

Oral health was inserted in the Brazilian public health system in 2004, through the National Oral Health Policy. Since then, specific financing lines have been created for the insertion of dental professionals in primary, secondary, and tertiary care (Costa et al., 2004). Among the guiding principles of actions in oral health at the National Oral Health Policy are the development of products and technologies to expand the actions of public oral health services at all levels of care (Costa et al., 2004). Secondary care in dentistry is constituted by the Dental Specialty Centers (CEO). These include oral medicine; periodontics; minor oral surgery; endodontics and care for people with special needs (Paim et al, 2011; Brasil, 2011).

Oral medicine is the dentistry specialty responsible for the diagnosis and management of diseases that manifest in the mouth. Among them, oral cancer represents a public health issue, showing a high mortality rate over the last decades (Bray et al. 2018). The main risk factors associated with the development of oral cancer are tobacco smoking, alcohol consumption, human papillomavirus (HPV) infection and chronic exposure to the sun (for lip cancer) (Sankaranarayanan et al. 1998). However, in addition to controlling risk factors, the high mortality rate from this disease is directly related to late diagnosis and the delay in starting treatment (McLeod et al. 2005; Graboyes et al. 2019)

One of the important causes associated with late diagnosis and treatment is the fact that primary health care professionals (PHCP), more specifically dentists, have difficulty in identifying, diagnosing and treating oral lesions (Jokinen et al. 2001; Ergun et al. 2009; Hassona et al. 2016). The outcomes in

response to this difficulty are variables such as: a identification of the lesion in advanced stages, the unsuccessful attempt at conservative treatment for malignant neoplasia, the referral of lesions that can be resolved in primary health care (PHC), inflating specialized attention and making it difficult for cases that really need to arrive as soon as possible (Thomas et al. 2020).

To mitigate this issue, the Ministry of Health in partnership with the Federal University of Rio Grande do Sul created the TelessaúdeRS-UFRGS Project (Harzheim et al. 2016). One of the objectives of this project is to bring the specialist closer to the PHCP, in order to incorporate the PHC skills for greater resolution. These actions, through the support of technology information, also serve as driving agents to ensure the responsibility of the PHC professional, also provided as a guideline for oral health professionals.

EstomatoNet is a service created by TelessaúdeRS-UFRGS to support the diagnosis and decision making of oral lesions (Carrard et al. 2018). Through a cloud-based platform, PHCP may send information about a patient (clinical data and photos) to perform a discussion with a teleconsultant, specialist in oral medicine. In 2016, a preliminary survey of the EstomatoNet service showed that the telediagnosis appears to contribute to health care for oral lesions in the context of public health services (Carrard et al. 2018).

The present study aims to consolidate the contribution of EstomatoNet, reporting the gathered experience along the recent years based on a broad survey of the telediagnostic requests. Moreover, the impact of the service on the applicant in terms of treating or referring the patient to a specialist will be presented and discussed.

Methods

This cross-sectional study evaluated the characteristics of teleconsultations carried out by the EstomatoNet. The sample universe consisted of all requests made by PHCP from State of Rio Grande do Sul to the service between June 2015 and April 2020.

Data related to the teleconsultation were obtained from the TelessaúdeRS-UFRGS platform database. That information included sociodemographic data from patients and applicants (age, sex, and location of the request), professional category, number of requests made by the same applicant and distance traveled (km) by the patient in cases of referral to specialized care. The diagnostic hypothesis was collected from the applicant and the specialist teleconsultant. The management recommended by the teleconsultant were also recorded. Finally, the level of satisfaction and the final decision of the applicant after receiving the EstomatoNet report (maintain/manage the case in the PHC or refer it to oral medicine specialist) were obtained. Due to the large number of diagnostic hypotheses provided between applicants and teleconsultants, the teleconsultations were separated into clusters, considering their diagnostic category. The present study protocol was evaluated by, and approved for, the local Ethics and Research Committee (CEP/HCPA 2018-0158).

EstomatoNet Service

EstomatoNet is a telediagnosis service supported on a cloud-based platform created to provide support on oral lesions diagnosis and decision making. The service is available for PHCP working in the Rio Grande do Sul State. To access the service, PHCP must perform a free register on the National Telehealth

platform. This register required some sociodemographic information such as national register of individuals (CPF), national register of health (CNS), profession, date of birth, municipality, and place of work.

Telediagnosis request workflow

To request a telediagnosis, the professional fills out an online form informing patient data (age, sex, national health card number), his/her chief complaint and medical history (comorbidities and medications for continuous use), as well as habits such as alcohol drinking and tobacco smoking. The request form also includes oral health information (use of prostheses) and the description of oral lesion(s) that motivated the request to EstomatoNet, lesion time duration, clinical characteristics, eventual complementary exams, and diagnostic hypothesis. At the end of the form, the professional must add smartphone photo(s) of the observed lesions.

After the first round of counseling in relation to each case, the applicant may perform a subsequent request to re-discuss the same clinical case. This is valuable in those cases that have been submitted to drug therapy or required complementary exams. Another situation refers to those cases in which a follow up or a feedback is requested by the teleconsultant. In this study, the main discussions and re-discussions will be presented separately. In those cases of rediscussion, the data generated by the last teleconsultation carried out will be kept in the general analysis.

Teleconsultant workflow

After receiving a request, a general dentist of the EstomatoNet team performs a screen to evaluate the quality of informed data. When not suitable, the request is returned to the applicant for improvement. If the information and photos are suitable, the request is sent to the teleconsultant. Then, teleconsultant evaluates the information, provides a case description and a diagnostic hypothesis (or possible differential diagnosis) and recommends complementary tests or treatment (Table 1). This step ends with the sending of the telediagnosis report to the applicant (Appendix Figure 1).

[Insert Table 1 here]

Applicant feedback

After receiving the telediagnosis report, the applicants are invited to inform their final decision (maintain and manage the case at PHC or refer it to a specialist). Moreover, a level of satisfaction form is available (very satisfied, satisfied, indifferent, unsatisfied, very unsatisfied).

Workflow for patient referral to Oral Medicine specialized center

The workflow for referring the patients from the PHC to specialized care follows the National Policy for Systems Regulation (Brasil, 2008). Regulation of Access to Assistance is the proposed dimension that addresses the organization of the network to provide, in accordance with the individual's need and according

to priorities, specialized or hospital care (Brasil, 2008). In Rio Grande do Sul, regulation may follow two ways: through a single online system (GERCON), responsible for municipalities without oral medicine specialized reference; or through the municipality's health department for those municipalities that have a local reference.

Since one of the EstomatoNet's purposes is to avoid unnecessary referral to specialists available in distant municipalities, information about applicant decision making was retrieved. To obtain accurate information about applicant decisions, the present EstomatoNet case series was matched with the list of all patients who were scheduled to the references centers (Hospital de Clínicas de Porto Alegre - HCPA and Hospital São Lucas of the Pontifical Catholic University of Rio Grande do Sul - PUCRS) by means the referral system (GERCON). This analysis excluded requests from cities that have a local reference for Oral Medicine specialized services, a situation that does not require long travels for the patients, nor excessive costs for the government.

Statistical analysis
The data used in the present study were retrieved from the TelessaúdeRS-UFRGS and from the GERCON system's platform databases. All analyzes were performed in Excel and PASW Windows v18.0 (SPSS, Inc., Chicago, IL). Descriptive analyzes of all variables were performed. Continuous variables were assessed by Mann-Whitney non-parametric tests. Kappa analysis was used to assess the level of agreement between the expert's recommendation and the final decision to refer the PHC professional (Cohen 1960).

Results

Applicants

During the analyzed period, 2148 new consultations were requested on EstomatoNet. A total of 146 (6.8%) requests have been canceled. The reasons were: lack of information (n=131, 89.7%), out of the scope of the service (n=13, 8.9%) and improper clinical photos (n=2, 1.4%). The final sample comprised 2002 consultations. Among them, 193 required posterior-discussions. In the evaluated period, 405 PHCP used the service. Of these, 252 (62.2%) were dentists and 153 (37.8%) physicians. Most applicants were women (n=275, 67.9%). The applicant's age ranged from 23 to 64 years (33.6 ± 8.4), with no difference in the average age between physicians and dentists (p=0.44, Mann Whitney test). The greatest number of times that the same applicant made a request was 94 (5.0 ± 9.7). Table 2 shows the relationship between the distribution of requests according to gender, age, and the applicant's professional category.

[Insert Table 2 here]

Request's source

A total of 145 (29.2%) out of the 497 municipalities of Rio Grande do Sul State performed at least one request on EstomatoNet. The highest number of requests made by a municipality was 407 (20.3%). Another 6 municipalities performed more than 100 telediagnosis requests. The median request per municipality was 3.0, ranging from 1 to 407 requests.

As for the distance from the municipalities to the reference centers, the 16 municipalities with local reference had a median of 0km and a maximum distance of 101km. The 129 municipalities with reference in the Rio Grande do Sul State's Capital (Porto Alegre) have a median of 159 km, with the longest distance being 590 km. Of these, 70.0% were more than 100km far from the specialized service and 29.3% were more than 300km.

Telediagnosis requests characteristics

Most patients were women, 1103 (55.1%). The age ranged from 1 to 96 years (52.7 ± 19.0 years). The characteristics about patients and consultations are shown in Table 3.

[Insert Table 3 here]

The average time between sending the request and receiving the report was 4.1 ± 4.3 days. In most teleconsultations, the response occurred in less than 96 hours. As for the level of satisfaction of the applicants, a total of 1030 (51.4%) teleconsultants evaluated the service, with 96.5% responding that they were very satisfied or satisfied.

Among the requests, in 591 (29.5%) applicants did not provide any hypothesis and 1411 (70.5%) provided at least one diagnostic hypothesis. Between applicants and teleconsultants, 140 hypotheses were provided, clustered in 20 different groups (Appendix Figure 2). As for the most common hypothesis diagnosed by the teleconsultant, 393 (19.6%) lesions were a potentially malignant disorder, 299 (14.9%) non-neoplastic proliferative processes, 260 (13.0%) soft tissue benign tumors, 171 (8.5%) pathology of the salivary glands, 155 (7.7%) suspected as malignancy and 136 (6.8%) oral mucosal lesions to physical/chemical factors. The most common lesions in each cluster can be seen in Figure 1. The diagnostic hypotheses most correct by the applicants were the potentially malignant disorders 283 (72.0%), followed by pathology of the salivary glands 114 (66.7%). The distribution of lesions into clusters and concordance between teleconsultant and applicants can be seen in

Figure 2. In 73.1% of the cases, the patient did not have received any previous treatment.

[Insert Figure 1 here]

[Insert Figure 2 here]

In 308 (15.4%) clinical cases, there was disagreement regarding the number of lesions reported by the teleconsultant and by the applicant. Of these, in 303 (98.4%) cases the teleconsultant perceived more lesions than those described by the applicant. In some cases (n=5, 1.6%) the reason for that discrepancy was that the applicant interpreted multiple manifestations of the same disease as being different diseases. Those cases included lichen planus, osteonecrosis and actinic cheilitis (Appendix Figure 3).

Analysis of impact of the EstomatoNet counseling on the patients' referral to specialists

The request performed by municipalities that had local reference to specialized service (n=16, 11.0%) was excluded from the analysis, remaining 1839 cases. There was a 62.2% of agreement between the consultant recommendation and the applicant's decision making in relation to refer the patient to specialized service or maintain it in the PHC (sensitivity 55.5%, specificity 67.8%, Kappa coefficient=0.23; $p < 0.01$). In 17.7% (n=328) of cases, the teleconsultant recommended the management at PHC, but the applicant preferred to refer the patient. On the other hand, 372 patients were not referred

to specialized service, although the referral had been suggested by the teleconsultant. These results are detailed in Appendix Table 1. After case discussion with EstomatoNet, the referral was avoided in 693 (37.3%) cases. The sensitivity.

Discussion

This study presents a 5-year experience of a telediagnostic service on oral mucosal lesions offered to PHCP, accounting for 2002 cases. The present findings showed that offering support on diagnosis and decision making for PHC dentists and physicians may reduce the number of referrals to oral medicine specialists. The results support that this initiative can reduce referral queues, favoring early diagnosis of oral mucosal lesions and improving the healthcare quality. To the best of our knowledge, this is the largest telediagnostic service in oral medicine described in the literature.

Despite the implementation of the National Oral Health Policy (Costa et al. 2004), the coverage of dental services in the public health system in Brazil remains insufficient (less than 50%) (DATASUS, 2020). In part, the inequalities of access to health services are explained by the large territorial extension of the country and states and the regional inequalities to access health services. In this sense, teledentistry has been considered a promising tool to break physical barriers to obtain oral health care especially in remote areas (Leão and Porter, 1999; Torres-Pereira et al., 2013; Petruzzi and De Benedittis, 2016; Fonseca et al., 2016; Haron et al., 2017; Bavaresco et al., 2020). In the Rio Grande do Sul State, 29.2% of the municipalities have already used EstomatoNet at least once. Among these municipalities, 70% has no local reference and are more than

100km from the Oral Medicine service. This finding is in line with other studies, which suggest that municipalities more distant from specialty centers tend to use this kind of tool frequently (Marcolino et al. 2014; Tella et al. 2019). This information supports that teledentistry use may promote cost-minimization in the context of the health systems (Estai et al. 2018; Estai et al. 2018; Birur et al., 2018).

Regarding patients' profile, it was shown a predominance of adults and elders (91.9%), with an average of 52.7 years. The high prevalence of oral lesions in those age groups was expected, as it has been observed in previous epidemiological studies (Ali et al. 2013; Rivera et al. 2017; El Toum et al. 2018; Carrard et al. 2018). In addition, most patients were female (67.9%), that may be explained by their higher motivation to seek health services than men (Couto et al. 2010). This assumption is reinforced by the prevalence of oral lesions in the general population, that is similar for both genders (Ali et al. 2013; Kansky et al. 2018).

Despite the advantages of teledentistry already mentioned in this study, some limitations should be highlighted. The fact that the specialist does not access the patient data directly, requires a complete and careful clinical examination by the PHC professional. However, since the training on Oral Medicine during and after the undergraduate course is limited, the professionals may not be strict enough in relation to some procedures pertaining to diagnostic process, leading to flaws in data collection (Loeppky and Sigal 2006; Papadiochou et al. 2020). This statement is supported by the requests canceled due to lack of clinical information and by those cases in which multiple manifestations of the same disease were interpreted as different diseases. The

low number of requests in which a diagnostic hypothesis was provided by the applicant (29.5%) also reinforces that those professionals are not confident do deal with oral lesions (Jokinen et al. 2001; Ergun et al. 2009; Hassona et al. 2016). Therefore, the implementation of continuing education courses could be a strategy to improve the diagnostic abilities and self-efficacy of PHCP in relation to oral diagnosis (Braun et al. 2020; Silverman and Vendrel, 2010).

There was a predilection for women and dentists among the applicants, corroborating the results found in preliminary experience of the service described previously (Carrard et al. 2018). In this sense, it should be emphasized that there has been a predominance of women in dentistry in Brazil since the 90s. Moreover, it is estimated that 65% of dental students who complete the dentistry graduation are women (Morita et al. 2010; Haddad, 2006). The fact that dentists request more than physicians corroborates a previous study by Morgan et al. 2001 (Morgan et al. 2001), which showed that although 80% of physicians in a hospital service recognize the importance of oral examination, only 20% did so. Although most physicians are aware of the importance of oral examination, many of them are reluctant or feel not well prepared to perform it (Morgan et al. 2001; Alshathri et al. 2020). Considering that the same professional used the service on average 5 times and that the level of satisfaction in relation to the service was high (96.5% of the applicants very satisfied or satisfied), the service appears to meet the expectations of the applicants.

In assessing the effective referral avoidance, it is noted that of the 1856 patients analyzed, 791 (42.6%) were enrolled in the referral system (GERCON). In 62.2% of the cases, there was an agreement between the teleconsultant's recommendation and the applicant's decision making. Of these, 693 cases

(37.3%) represent the decision to maintain the case in the primary health care, avoiding referral to the specialist. The promising impact of the service in question on oral care for patients with oral lesions had been demonstrated in a previous study (Carrard et al, 2018). The fact that 463 (24.9%) of the cases referred the patient even with the suggestion not to refer is probably related to the limited training and low self-efficacy of the health professionals in handling these cases in PHC (Hertrampf et al. 2013; Shimpi et al. 2018; Gobbo et al. 2020). On the other hand, some patients had the recommendation for referral, but were not referred by the PHCP. This could be explained by the loss of contact with the patients or for their reluctance to travel to reach a specialized center in a distant municipality. Other possible reason could be the resolution of the case at local educational institutions or in private sector.

Conclusion

It may be concluded that teledentistry is a beneficial tool to support PHCP in the management of oral lesions, avoiding unnecessary referrals to specialized services. The engagement of more municipalities on using this kind of service is a promising alternative to contribute to oral cancer control.

Author Contributions

M. Roxo-Gonçalves: Contributed to conception, design, data acquisition and interpretation, drafted and critically revised the manuscript.

V. C. Carrard: Contributed to conception, design, data interpretation, performed all statistical analyses, drafted, and critically revised the manuscript.

Acknowledgments

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Tables

Table 1 - Criteria for EstomatoNet teleconsultant recommendations

Management in the primary health care	Referral to face-to-face consultation with Oral Medicine specialist
-Normal variations of the mouth	- Complex surgical managements (extensive mucosal or intraosseous lesions)
- Clinical conditions that may be treated by means medicines	
- Conditions that require complementary tests	-Suspected of potentially malignant disorders
- Situation in which the "wait-and-see" policy is recommended	- Suspected of malignant lesions
- Simple surgical management (incisional or excisional biopsy)	- Cases in which the provided information does not support a diagnostic hypothesis, requiring a face-to-face consultation

Table 2. Demographic characteristics of the applicants.

	Total (n=405)	Requests Median (Min-Max)	p*
Sex			
Female	275	2.0 (1-94)	<0.001
Male	130	1.0(1-47)	
Age			
≤ 35 years	190	1.0 (1-94)	0.051
>35 years	185	2.0 (1-80)	
Missing	30		
Professional category			
Dentist	252	3.0 (1-94)	<0.001
Physician	153	1.0 (1-17)	

*Mann-Whitney, **dichotomized by the median

Table 3. Characteristics about patients and teleconsultations (n=2002)

| Variable	n (%)
Gender (%)	
Female	1103 (55.1)
Male	899 (44.9)
Age (years)	
Mean (SD)	52.7 (19.0)
Min-Max	1-96
Age group	
Child/Teenager (Up to 19 years)	161 (8.1)
Adult (20-59 years)	1036 (50.1)
Elder (≥60 years)	805 (41.8)
Time duration, n (%)	
Up to 1 week	89 (6.1)
2-4 weeks	246 (17.0)
1-3 months	288 (19.9)
3-6 months	177 (12.2)
>6 months	649 (44.8)
Unknown/Did not answer (n=553)	
Diagnostic agreement, n (%)	
No	925 (46.2)
Yes	1077 (53.8)
Referral recommendation by the teleconsultant, n (%)	
No	1116 (55.7)
Yes	886 (44.3)
Level of satisfaction, n (%)	
Very satisfied	720 (69.9)
Satisfied	274 (26.6)
Indifferent	8(0.8)
Unsatisfied	7(0.7)
Very unsatisfied	21(2.0)
Not informed (n= 972)	
Municipalities with regional reference grouped by distance, n (%)	
≤100km	36 (27.9)
101-200km	42 (32.6)
201-300km	18 (14.0)
>301	33 (25.5)

Figures
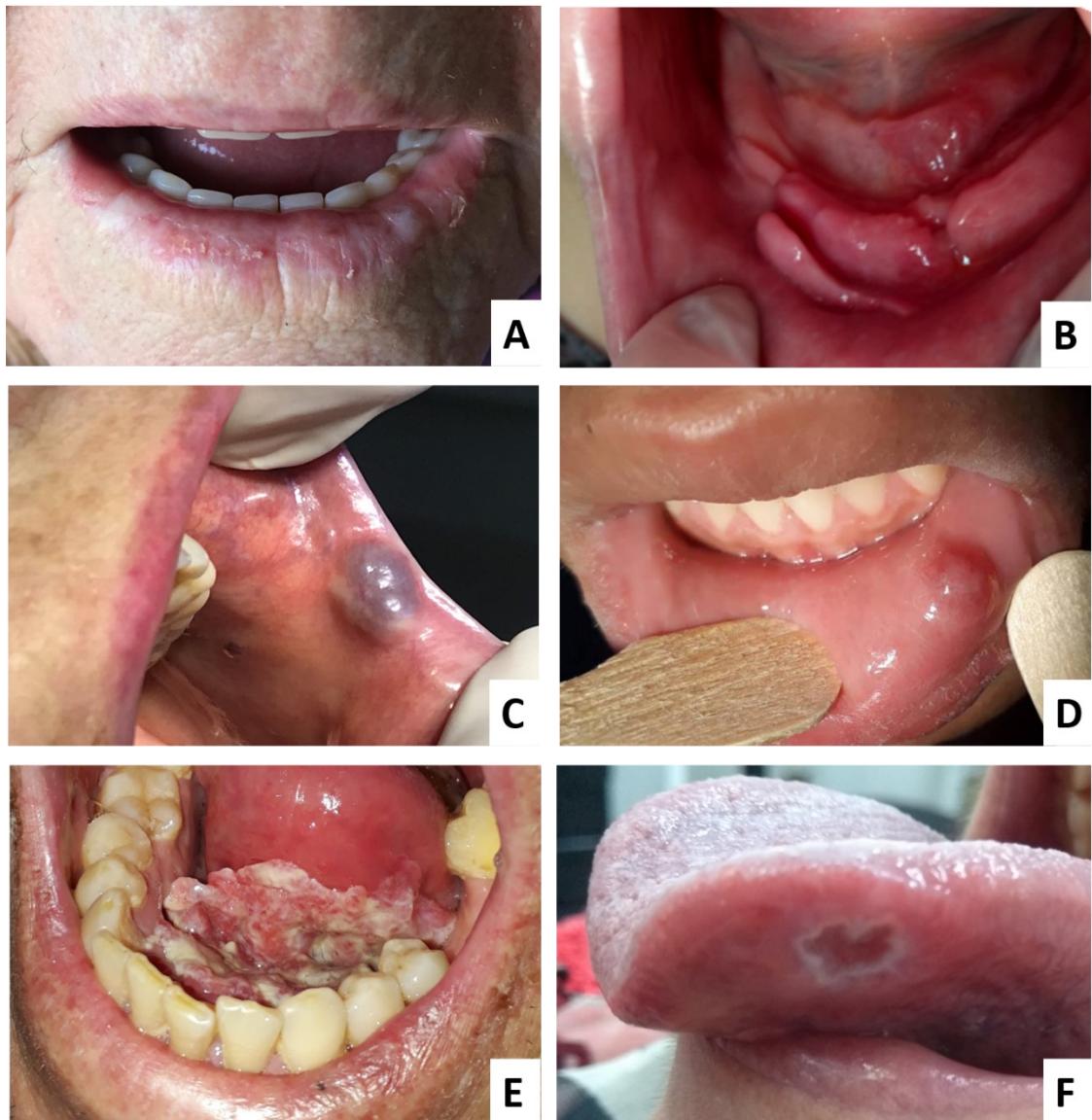
Figure 1. The most common lesions in frequent clusters. Actinic Cheilitis (A); Inflammatory hyperplasia (B); Hemangioma (C); Mucocele (D); Squamous cell carcinoma (E); Traumatic ulcer (F).
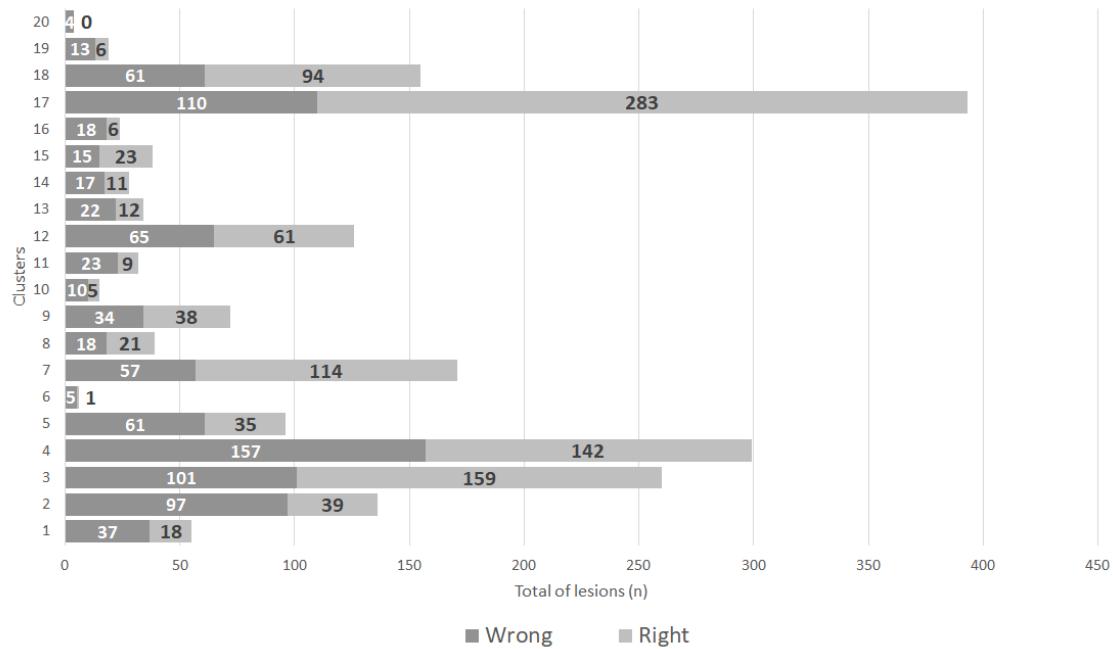
Figure 2. The concordance between teleconsultant and applicants in each cluster
(1) variations of the normality; (2) oral mucosal lesions caused by physical/chemical factors; (3) soft tissue benign tumors; (4) non-neoplastic proliferative processes (5) tongue disorders; (6) cheilitis; (7) pathology of the salivary glands; (8) pigmented lesions; (9) white lesions; (10) bone pathology; (11) orofacial pain; (12) infectious diseases; (13) autoimmune diseases; (14) dental pathology; (15) odontogenic cysts and tumours; (16) non-odontogenic cysts; (17) potentially malignant disorders; (18) malignant neoplasm; (19) oral manifestation of systemic disorders; (20) miscelaneous

EstomatoNet service: 5-year experience of a single center on oral lesions telediagnosis offered to health professionals

from the primary healthcare

Michelle Roxo-Gonçalves, Vinicius C Carrard

Supplementary File

Appendix - Figure 1: EstomatoNet workflow

Professional at primary care
-Dentist
-Physician

General dental consultant
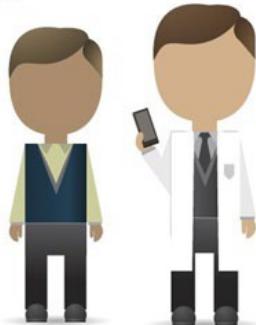
Request for consultation in oral medicine through cloud-based platform

- Basic information: signs, symptoms, and duration
-Photograph obtained by smartphone

Poor
Lack of information
Low-quality images

Return for improvement

Preliminary analysis of data quality

Report posted in cloud-based platform within 72 hr

Specialized dental teleconsultant

Acceptable

Recommendation for complementary examination, if necessary

Definitions:
-Final diagnosis or main hypotheses
-Additional tests, if necessary
-Management
-Define need for referral or collaborative treatment at primary care level

EstomatoNet

Carrard et al., 2018

Appendix - Figure 2: The hypotheses clustered into 20 different groups.

(1) Normal variations of oral mucosa	2) Injury by chemical / physical factors	(3) Benign soft tissue tumor	(4) Non-neoplasic proliferative lesions	(5) Tongue disorders
- Varicosities - Cicatricial fibrosis - Torus - Fordyce granules - Leucoedema - Another variations	- Mouth dryness by mouth breathing - Mucosal burn - Allergic reaction - Traumatic injury - Foreign body reaction - Hemorrhage bullous angina - Traumatic Ulcer - Lichenoid Reaction - Clot - Sinus buccal communication	- Lipoma - Angioma - Hemangioma / vascular injury - Papilloma - Fibroma - Angolipoma - HPV lesion - Lymphangioma - Granular Cell Tumor - Keratoacanthoma -Other	- Pyogenic granuloma - Inflammatory hyperplasia - Peripheral giant cell lesion - Inflammatory papillary hyperplasia - Gingival hyperplasia - Peripheral ossifying fibroma	- Hairy tongue - Rhomboid glossitis - Geographic tongue - Fissured tongue - Ankyloglossia - Saburrous tongue - Atrophic glossitis - Papillary atrophy - Transient lingual papillitis
(6) Cheilitis	(7) Salivary gland diseases	(8) Pigmented lesion	(9) White lesions	(10) Bone Pathology
- Angular cheilitis - Exfoliative cheilitis - Granulomatous cheilitis	- Sialodenitis - Mucocele - Necrotizing sialometaplasia - Ranula - Pleomorphic adenoma - Sialolithiasis - Xerostomia - Sialodenosis - Mucous retention cyst -Other	- Nevus - Melanocytic macule - Amalgama tattoo - Smoker's melanosis - Pigmentation for medication - Post-inflammatory pigmentation - Physiological pigmentation - Racial melanosis - Melanoacanthoma - Other pigmentation disorder	- Frictional keratosis - Nicotinic stomatitis - Chronic bitting	- Osteonecrosis/Osteoradionecrosis - Osteomielitis - Osseous dysplasia - Fracture - Idiopatic sclerosis - Osteitis - Central lesion of giant cells - Osteoma - Osteoblastoma - Bone sequestration
(11) Orofacial pain	(12) Infectious diseases	(13) Autoimmune diseases	(14) Dental pathology	(15) Cyst and odontogenic tumor
-Trigeminal neuralgia -Temporomandibular joint disorder -Burning mouth syndrome	- Paracococioidomicosis - Scarlet fever - Herpes Zoster - Hairy leukoplakia - Candidiasis - Syphilis - Pharyngitis/amigdalitis - Recurrent herpes - Tuberculosis - Impetigo - Necrotizing ulcerative gingivitis - Common wart	- Pemphigus vulgaris - Mucous membrane pemphigoid - Lupus erythematosus - Recurrent aphthous stomatitis - Others	- Dental trauma - Root rest - Odontogenic pain - Periapical abscess - Anomaly in tooth development - Dental resorption - Periodontal disease - tooth decay - Other	- Odontoma - Odontogenic Tumor - Ameloblastoma - Odontogenic cysts

(16) Non-dental cysts	(17) Potentially malignant disorders	(18) Malignant neoplasms	(19) Oral manifestation of systemic diseases	(20) Others
- Unclear infection disease				
- Development cyst - Lymphoepitelial cyst	-Actinic cheilitis - Leukoplakia - Lichen planus - Eritroplakia - Proliferative verrucous leukoplakia - Others	- Lymphoma - Melanoma - Sarcoma de Kaposi - Squamous cell carcinoma - Others	- Uremic stomatitis - Peutz–Jeghers syndrome - Thrombocytopenic purpura - Kawazaki's disease - Telangiectasia - Mucosite - Erythema multiforme - Vitamin deficiency - Sjogren syndrome - HIV-related oral manifestations - Behçet's disease - Addison's disease	-Perioral dermatitis -Reactive lymph node -Caseum

Appendix - Figure 3: multiple lesions associated to lichen planus interpreted by the applicant as being different diseases.

Appendix - Table 1: Agreement between the teleconsultant's recommendation and the applicant's decision making in relation to referral the patient to specialized service.

Referral system (GERCON)	EstomatoNet, n (%)		Total
	Yes	**No**	
Yes	463 (24.9)	328 (17.7)	835 (45.0)
No	372 (20.0)	693 (37.3)	1021 (55.0)
Total	791 (42.6)	1065 (57.4)	1856 (100.0)

k=0.23; p<0.01; concordance: 62.2%

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Carrard VC, Roxo Gonçalves M, Rodriguez Strey J, Pilz C, Martins M, Martins MD, Schmitz CA, Dal Moro RG, D'Ávila OP, Rados D, et al. 2018. Telediagnosis of oral lesions in primary care: The EstomatoNet Program. Oral Dis. 24(6):1012–1019.

5. CONSIDERAÇÕES FINAIS

A odontologia no Brasil vem passando por importantes mudanças nas últimas duas décadas, a partir de políticas que buscam ampliar o acesso da população aos cuidados em saúde bucal. Ainda assim, a cobertura populacional é baixa e a busca pelo equilíbrio entre demanda e oferta é contínua e palco de inúmeras discussões. Nos últimos anos, nota-se um aumento importante nos estudos que envolvem Teleodontologia. Vê-se nessa ferramenta um potencial de "alcançar" populações rurais e/ou sem cobertura de saúde bucal. Além disso, a Teleodontologia tem a capacidade de aproximar os profissionais da atenção básica dos especialistas, promovendo educação permanente e o aumento a resolubilidade dos casos na APS.

Entre as especialidades da odontologia, a estomatologia é uma área de especial interesse, uma vez que os dentistas demostram insegurança em identificar, diagnosticar e tratar lesões de boca. Ainda como agravante, temos o fato de que o câncer de boca, uma das lesões malignas mais prevalentes no Brasil e no mundo, muitas vezes é ignorado ou subestimado pelos dentistas.

Este estudo, apresentou uma análise dos 2002 telediagnósticos em lesões bucais realizados pelo EstomatoNet nos 5 anos desde a sua implementação. Com base neste estudo, é possível afirmar que o telediagnóstico em estomatologia é efetivo na redução do encaminhamento para o serviço especializado através do suporte aos profissionais da APS no diagnóstico e manejo de lesões bucais. Sendo assim, políticas que busquem a ampliação dos serviços de teleodontologia podem obter resultados importantes na identificação e tratamento precoce de lesões bucais através da redução das filas de espera para atendimento especializado.

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ANEXO I – Solicitação de telediagnóstico / EstomatoNet (Tela 1)

ANEXO II – Solicitação de telediagnóstico / EstomatoNet (Tela 2)

← **Voltar**   Caixa Entrada > Nova Solicitação

🔍 Nova Solicitação | *Aguardando envio*

[← Voltar] [✔ Enviar] [⬇ Salvar rascunho]

Paciente   **Solicitação**   Anexos (0)

Exame *

[Teledx - Estomato - 2   ▾]

Anexe o material coletado antes de enviar a solicitação.

Nos casos em que a coleta do exame é realizada pelo profissional solicitante, é imprescindível que o(a) paciente concorde com a coleta por meio de um Termo de Consentimento Livre e Esclarecido – TCLE.
O TCLE deve ser lido pelo profissional para o paciente, que deve concordar com todos os termos informados.

☐ Declaro que li o Termo de Consentimento Livre e Esclarecido ao paciente acima identificado, o qual concordou com a realização do exame *   [Ver TCLE]

Convênio *

[Secretaria Estadual de Saúde - RS   ▾]

Solicitante *

[STE#237747; Profissão: CIRURGIAO(A)-DENTISTA; Especialidade: ESTRATEGIA DE SAUDE DA FAMILIA; Instituição: Prefeitura de P... ▾]

Prezado(a) Colega, para solicitar um telediagnóstico ao Estomatonet, antes de enviar seu pedido fotografe a lesão com seu smartphone, segundo tutorial disponível no link: http://www.ufrgs.br/telessauders/nossos-servicos/apoio-a-regulacao. Se for o caso, fotografe radiografias.

ATENÇÃO: Em situações que o paciente apresenta lesões com aspectos diferentes, recomenda-se a realização de solicitações separadas.

ANEXO III – Solicitação de telediagnóstico / EstomatoNet (Tela 3)

1. Queixa principal do paciente: *

[   ]

2. Tempo de evolução: *

[   ]

3. Realizou algum tratamento? *

[----------   ▼]

Sem sim, informe qual (is):

[   ]

4. O paciente apresenta comorbidades? *

[----------   ▼]

Sem sim, informe qual (is):

[   ]

5. Paciente é tabagista? *

[----------   ▼]

6. Paciente consome bebidas alcoólicas pelo menos 1 vez por semana? *

[----------   ▼]

7. Faz uso de prótese dentária removível? *

[----------   ▼]

8. Possui resultado de exames complementares? *

[----------   ▼]

Se sim, informe qual exame(s) e respectivo(s) resultado(s):

[   ]

9. Acrescente sua impressão diagnóstica e outra informação relevante:

[   ]

[← Voltar] [✔ Enviar] [↧ Salvar rascunho]