



LITERATURE REVIEW:

Use of Remote Intervention Tools for the Assessment of Oral Alterations in the Context of Oral Cancer Prevention: A Scoping Review

Uso de herramientas de intervención remota para la evaluación de alteraciones orales en el contexto de la prevención del cáncer oral: una revisión de alcance

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ABSTRACT: To map the use of remote digital intervention tools for the identification of oral lesions suspected of malignancy, describing outcomes, user and professional acceptance, and contributions to the early diagnosis of oral cancer. The review followed the PRISMA-ScR guidelines and searches were conducted in PubMed, Scopus, Embase, LILACS, Web of Science, and grey literature, without restrictions on publication date, geography or language. Articles that helped to answer the question “How can remote intervention tools contribute to the evaluation of oral alterations in the context of oral cancer prevention?” were considered eligible for inclusion. Two independent reviewers (MEM and MLR) performed the articles selection and data extraction. A total of 230 records were identified; of these, 18 met the inclusion criteria. Most interventions were asynchronous, were based on mobile applications and digital platforms, and usually focused on communication between professionals. The majority of studies reported good diagnostic accuracy, a reduction in unnecessary referrals, and feasibility in resource-limited settings. According to this review, most remote intervention tools are based on asynchronous interaction among professionals, with diagnostic accuracy as the main outcome. The results are satisfactory and good agreement with in-person clinical examination is observed. When well structured, digital tools represent promising strategies to expand the reach of preventive actions and promote the early diagnosis of oral cancer.

KEYWORDS: Early detection; Oral cancer; Prevention; Remote consultation; Telehealth; Teledentistry.



RESUMEN: El objetivo del presente estudio fue mapear el uso de herramientas digitales de intervención remota para la identificación de lesiones orales con sospecha de malignidad, describiendo los resultados, la aceptación por parte de los usuarios y profesionales, y las contribuciones para el diagnóstico temprano del cáncer oral. La revisión siguió las directrices PRISMA-ScR y las búsquedas se realizaron en PubMed, Scopus, Embase, LILACS, Web of Science y literatura gris, sin restricciones de fecha de publicación, geografía o idioma. Se consideraron elegibles para inclusión los artículos que ayudaron a responder la pregunta: “¿Cómo pueden las herramientas de intervención remota contribuir para la evaluación de alteraciones orales en el contexto de la prevención del cáncer oral?”. Dos revisores independientes (MEM y MLR) realizaron la selección de artículos y la extracción de datos. Se identificaron un total de 230 registros; de estos, 18 cumplieron los criterios de inclusión. La mayoría de las intervenciones fueron asincrónicas, basadas en aplicaciones móviles y plataformas digitales, y generalmente centradas en la comunicación entre profesionales. La mayoría de los estudios informaron buena precisión diagnóstica, reducción de referencias innecesarias y viabilidad en contextos con recursos limitados. De acuerdo con la presente revisión, la mayoría de las herramientas de intervención remota se basan en la interacción asincrónica entre profesionales, siendo la precisión diagnóstica el principal resultado evaluado. Los resultados son satisfactorios y se observa concordancia con el examen clínico presencial. Cuando están bien estructuradas, las herramientas digitales representan estrategias prometedoras para ampliar el alcance de las acciones preventivas y promover el diagnóstico temprano del cáncer oral.

PALABRAS CLAVE: Cáncer oral; Consulta remota; Detección temprana; Prevención; Telesalud; Teleodontología.

INTRODUCTION

Oral cancer is a silent disease that does not present symptoms in its early stages. Consequently, many patients delay seeking medical care. In Brazil, there were 15,100 annual new cases of oral cavity cancer between 2023 and 2025, corresponding to an estimated risk of 6.99 cases per 100,000 inhabitants (1). Approximately 6,192 of these patients died, mainly because of a late diagnosis (1). Despite progress in early detection, survival rates remain considerably low. Thus, oral cancer continues to be a serious public health problem in Brazil. Comparison of the INCA estimates for 2020 and 2023 show little improvement in epidemiological indicators over time (1-2).

With the technological advances and growing availability of remote intervention strategies, healthcare professionals have shown increasing interest in the use of these support tools for health-related issues (3-5). Due to their practicality and ease of

use, these technologies can help avoid unnecessary referrals to specialists, enhance communication with patients, either synchronous or asynchronous, and promote self-care practices.

Building on these advantages, remote digital intervention tools in oral cancer prevention encompass mobile applications, web-based platforms, and telehealth modalities designed to support screening, documentation, and communication across care settings. Many initiatives rely on asynchronous workflows, enabling the capture and secure sharing of clinical information (e.g., photographs and brief histories) for subsequent review, which can strengthen coordination among healthcare professionals. Synchronous approaches, such as teleconsultations, also allow patients to show lesions via videoconferencing, facilitating preliminary assessment and real-time guidance. In addition, teleconsulting platforms have been developed to support dentists and other providers in the diagnosis and management of orofacial

lesions through interaction between specialists and primary care clinicians (6). Within this broader landscape, there is an app-based approach described in the literature, applied to support screening and to enhance communication and health data recording in health and education contexts (7-9).

Considering the significant increase in publications on this topic, especially after the COVID-19 pandemic (10), and the lack of a comprehensive synthesis describing how these tools have been used specifically for the identification of oral lesions suspected of malignancy, this scoping review was conducted to analyze the available evidence on remote intervention strategies for the assessment of oral alterations, with emphasis on the early detection of oral cancer.

The study aimed to describe the main outcomes observed, assess the acceptance of these tools by the population and healthcare professionals, and analyze their contribution to improving the early diagnosis of oral cancer. Given the heterogeneity of available studies, including differences in technological platforms, clinical workflows, target populations, and measured outcomes, a scoping review is particularly suitable to map the current evidence and identify gaps in the use of remote intervention tools for oral cancer prevention. Such synthesis is clinically relevant because it may guide dentists, oral medicine specialists, primary care professionals, and policymakers in understanding how telehealth and teledentistry can support early detection, referral prioritization, and broader access to oral lesion assessment.

This review also sought to identify the regions with the largest number of studies addressing technology-mediated interventions, as well as the most common study designs.

MATERIALS AND METHODS

This scoping review was conducted in accordance with the Joanna Briggs Institute (JBI) methodology for scoping reviews (11) and was reported following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR) checklist (12). We included articles published from the first description of the use of remote interventions in the healthcare field, with no language restrictions. Searches were performed in PubMed, LILACS, Scopus, Embase, and Web of Science, as well as in the grey literature such as Google Scholar. The key question of this study was: "How can remote intervention tools contribute to the evaluation of oral alterations in the context of oral cancer prevention?". Articles were selected following the PCC framework: Population – adults; Concept – remote intervention tools; Context – early detection of oral cancer. Clinical studies that met the criteria established by the PCC model were included, such as observational studies, intervention studies, reviews, and letters to the editor. Studies that did not address oral cancer or did not describe the type of remote intervention were excluded.

The search strategy was developed using Boolean operators to combine MeSH and DeCS descriptors, in addition to the use of additional keywords to increase the sensitivity of the search. The protocol was registered on the Open Science Framework platform (available at: <https://osf.io/d5k2g/>). Table 1 shows the search strategy used for the different databases. The searches performed in the selected databases, as well as in the grey literature (Google Scholar), resulted in the identification of 230 records. To answer the research question, two researchers (MEM and MLR) independently performed study selection.

The search results were exported to EndNote reference management software (version 20, Clarivate Analytics) for organization and removal of duplicates. The resulting records were then uploaded to the Rayyan web application to facilitate independent screening by the reviewers. Any disagreements were resolved by consensus, and

when necessary, a third reviewer (ACFM) was consulted. Finally, the most relevant information was extracted from the selected articles and the data were summarized, enabling a critical evaluation of the existing literature. These data served as the basis for the preparation of this scoping review.

Table 1. Database, search strategy, and search date.

Database	Search strategy	Date
PubMed	("Mouth Neoplasms"[MeSH Terms] OR "Mouth Diseases"[MeSH Terms]) AND ("Early Detection of Cancer [MeSH Terms] OR "Primary Prevention"[MeSH Terms] OR "Preventive Health Services"[MeSH Terms]) AND ("Remote Consultation"[MeSH Terms] OR "Telemedicine"[MeSH Terms] OR "Telecommunications"[MeSH Terms] OR "Teledentistry"[All Fields])	04/03/2025
Scopus	("Mouth Neoplasms" OR "Mouth Diseases") AND ("Early Detection of Cancer" OR "Primary Prevention" OR "Preventive Health Services") AND ("Remote Consultation" OR "Telemedicine" OR "Telecommunications" OR "Teledentistry")	04/03/2025
LILACS	MH:("Neoplasias Bucais" OR "Doenças da Boca") AND ("Detecção Precoce de Câncer" OR "Prevenção Primária" OR "Serviços Preventivos de Saúde") AND ("Consulta Remota" OR "Telemedicina" OR "Teleodontologia" OR "Telecomunicações")	04/03/2025
Web of Science	("Mouth Neoplasms" OR "Mouth Diseases") AND ("Early Detection of Cancer" OR "Primary Prevention" OR "Preventive Health Services") AND ("Remote Consultation" OR "Telemedicine" OR "Telecommunications" OR "Teledentistry")	04/03/2025
Embase	('mouth tumor'/exp OR 'mouth disease'/exp) AND ('early cancer diagnosis'/exp OR 'primary prevention'/exp OR 'preventive health service'/exp) AND ('teleconsultation' OR 'telemedicine' OR 'telecommunication' OR 'teledentistry')	04/04/2025
Google Scholar	("mouth neoplasms" OR "mouth diseases") AND ("early detection" OR "primary prevention" OR "preventive health services") AND ("telemedicine" OR "teledentistry")	04/04/2025

RESULTS

Considering the active search period up to April 2025, the database search strategy retrieved 230 records. After the automatic removal of duplicates in EndNote, 112 studies remained. These records were then imported into Rayyan, where a new manual screening excluded 80 articles. Although retrieved by the search strategy, these articles did not fit the scope of the study and were therefore marked as not eligible. First, application of the eligibility criteria to the titles and abstracts resulted in the selection of 32 studies. After full-text reading, 18 articles fully met the criteria and

were included in this review. Figure 1 shows the flowchart of the article selection process.

Analysis of the geographical distribution of the articles revealed a predominance of studies conducted in India. The authors of these studies mainly analyzed regions with limited resources and limited access to healthcare services (13-18).

Regarding the types of intervention, there was a predominance of asynchronous tools (store-and-forward) such as mobile applications, digital image upload platforms, and telediagnosis systems. Only one study evaluated synchro-

nous teleconsultations (videoconferencing). Most of the applications promoted interaction among healthcare providers in order to avoid unnecessary referrals, while only five addressed direct interaction between professionals and patients. The selected articles are presented in Table 2 and Supplementary Table 1.

The professionals responsible for patient screening included dentists, physicians, primary healthcare nurses, and community health workers. The clinical images of the lesions were evaluated by stomatology, oral pathology, or oral oncology specialists. Only one study employed artificial intelligence for automatic image analysis; however, analysis performed by oral oncologists, which is the gold standard, remained the main evaluation method (19).

Regarding the main outcomes, most studies assessed diagnostic accuracy considering sensitivity, specificity, and agreement with in-person clinical examination. Other studies investigated the feasibility of implementing telehealth tools

and their ability to reduce unnecessary referrals (9, 17, 20-21). These studies showed that collecting information during screening—such as habit history, clinical data, and lesion images—enhanced diagnostic accuracy and permitted the exclusion of cases that did not require in-person evaluation (17, 20, 22). Furthermore, this procedure contributed to reducing the burden on healthcare services and to cost savings for the system (6, 22).

Few studies explored in depth the acceptance of these tools by the population and professionals, or barriers related to infrastructure, image quality, and technological difficulties. When reported, the findings indicated good acceptance among professionals (5, 13-14, 20, 23). Among patients, low adherence was observed in situations that required invasive procedures such as biopsies, with only 4% of the cohort screened by community health workers agreeing to undergo the procedure (15). Nevertheless, other studies reported active patient collaboration during the screening and monitoring stages (17, 21, 24).

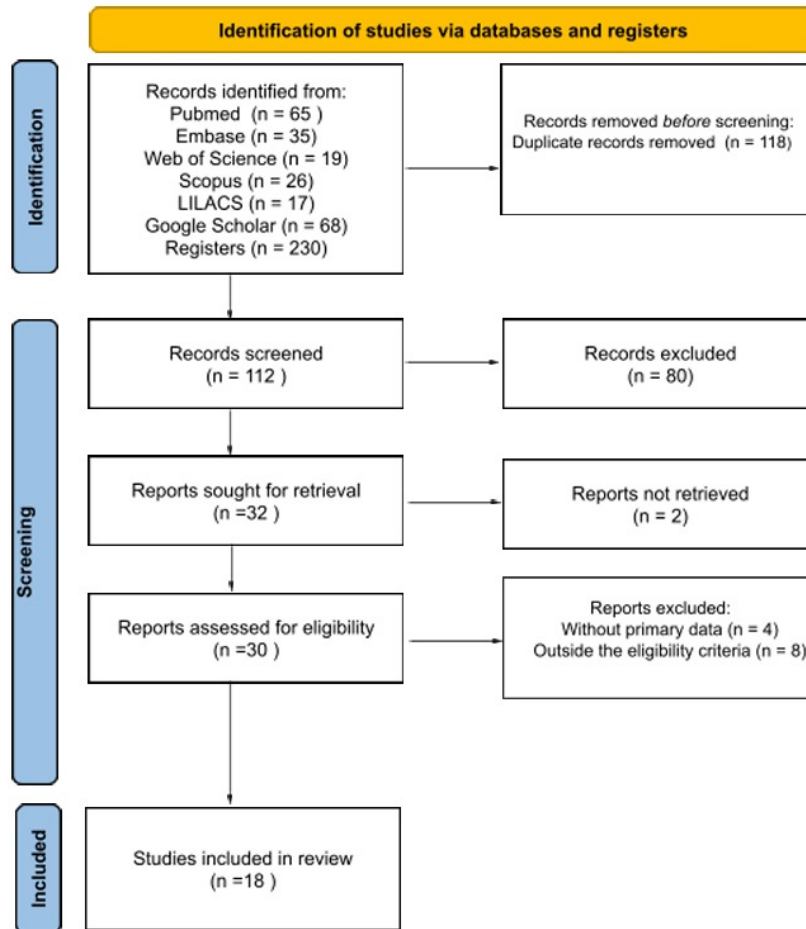


Figure 1. PRISMA flowchart showing the study selection process.

Table 2. Articles selected for this review.

Authors (year)	Country	Type (synchronous/ asynchronous)	Does the application promote interaction with the patient or professional?	Type of study	Does the study address acceptance by the population or professionals?
Birur <i>et al.</i> (2015)	India	Asynchronous	Professional interacts with patient	Cohort study	Yes
Haron <i>et al.</i> (2017)	Malaysia	Asynchronous	Professional interacts with professional	Cross-sectional study	Yes (professionals)
Birur <i>et al.</i> (2018)	India	Asynchronous + synchronous in some cases	Professional interacts with professional	Multicenter observational screening study	Yes
Bhatt <i>et al.</i> (2018)	India	Asynchronous	Professional interacts with patient	Non-randomized clinical trial	Yes
Carrard <i>et al.</i> (2018)	Brazil	Asynchronous	Professional interacts with professional	Exploratory cross-sectional study	No
Birur <i>et al.</i> (2019)	India	Asynchronous	Professional interacts with professional	Cross-sectional study	No
Flores <i>et al.</i> (2019)	Brazil	Asynchronous	Professionals interact with patients	Systematic review	No
Vinayagamoorthy <i>et al.</i> (2019)	India	Asynchronous	Professional interacts with professional	Cross-sectional study	No
Haron <i>et al.</i> (2020)	India	Asynchronous	Professional interacts with professional	Cross-sectional study	Yes
Song <i>et al.</i> (2021)	India	Synchronous – (immediate device result)	Professional interacts with professional	Methodological validation study	No
Birur <i>et al.</i> (2022)	India	Asynchronous	Professional interacts with patient	Prospective multicenter observational diagnostic accuracy study	No
Roxo-Gonçalves <i>et al.</i> (2022)	Brazil	Asynchronous	Professional interacts with professional	Cross-sectional study	Yes (professionals)
Keerthi <i>et al.</i> (2023)	India	Asynchronous	Professional interacts with professional	Cross-sectional diagnostic accuracy study	No
Nguyen <i>et al.</i> (2023)	USA	Synchronous	Professional interacts with patient	Comparative cohort pilot study	No
Haron <i>et al.</i> (2023)	Malaysia	Asynchronous	Professional interacts with professional	Cross-sectional observational study	No
Carrard <i>et al.</i> (2024)	Brazil	Asynchronous	Professional interacts with professional	Experience report	Yes (professionals)
Khanma <i>et al.</i> (2025)	India	Asynchronous	Professional interacts with professional	Prospective community-based diagnostic accuracy screening study	No
Martins <i>et al.</i> (2025)	Brazil	Asynchronous	Professional interacts with professional	Letter to the Editor	No

DISCUSSION

The results of this scoping review show that remote interventions aimed at the prevention and early detection of oral cancer comprise a broad range of approaches, varying in modality (synchronous or asynchronous), target audience (professionals or patients), and evaluated outcomes. The predominance of asynchronous tools, mainly mobile applications and digital platforms for image uploads, confirms the feasibility of these technologies in resource-limited settings (6, 11, 13, 17, 20).

The findings of this review reinforce the clinical relevance of telehealth and teledentistry as supportive strategies for oral cancer prevention and early detection. Remote consultation tools can facilitate the preliminary assessment of oral lesions, improve communication between primary care professionals and specialists, and support referral prioritization. This is particularly important because oral cancer is frequently diagnosed at advanced stages, and delays in referral may compromise prognosis. In this context, remote digital tools should not be interpreted as replacements for face-to-face clinical examination or biopsy when indicated, but rather as complementary strategies capable of improving access, accelerating decision-making, and strengthening the organization of care pathways.

Most of the studies were conducted in India, generally in rural regions with limited access to specialized services (13-18), highlighting the potential of teledentistry to expand oral screening coverage. In Latin America, Brazilian initiatives such as EstomatoNet and Tele Estomato must be highlighted; these tools support primary care dentists, increase local problem-solving capacity, and reduce unnecessary referrals (5-6, 22, 26).

The main contribution of this scoping review is to provide an organized overview of how remote digital intervention tools have been applied to the assessment of oral alterations in the context of oral cancer prevention. By mapping the type of technologies used, the interaction models adopted, the clinical outcomes evaluated, and the settings in which these tools were implemented, this review helps clarify the current role of telehealth and teledentistry in supporting early detection and referral decision-making. This synthesis may be useful for clinicians, researchers, and health service managers interested in incorporating remote strategies into oral cancer prevention pathways.

The digital tools promote two different types of interaction: some promote a direct connection between professionals and patients (13, 23-24, 26-27), while others focus exclusively on the communication among professionals (6, 17-18, 20-21). Applications involving direct patient participation favor community empowerment, the field work of community health agents, as well as patient engagement in lesion monitoring; however, barriers related to the use of these applications include low adherence to confirmatory tests and logistical difficulties (15, 24, 27). On the other hand, applications designed for professional-to-professional support improve diagnostic accuracy, increase agreement with in-person examinations, and optimize resource allocation, increasing service efficiency (17, 20, 22, 28).

Another important aspect is the potential cost reduction associated with teledentistry. Telediagnosis has proven capable of reducing unnecessary referrals and optimizing the use of resources, thereby preventing overload of referral centers and minimizing travel (14). Nguyen *et al.* (24) emphasize that the use of intelligent screening systems makes healthcare delivery more efficient

and sustainable. In Brazil, Flores *et al.* (4) reported that about 60% of the cases evaluated with EstomatoNet could be resolved at the primary care level, reducing the demand for specialized services. Similarly, Carrard *et al.* (5) and Martins *et al.* (25) highlight that integrating these platforms into the public health network improves cost-effectiveness and increases operational efficiency.

Recent reviews further highlight the growing role of digital health in oral cancer care, although with aims and scopes that differ from the present work. Dos Santos *et al.* (29) synthesized evidence on digital strategies for diagnosing oral squamous cell carcinoma, offering a complementary perspective on digital workflows for diagnostic support. Vijayan *et al.* (30) evaluated mobile health interventions primarily in terms of quality-of-life outcomes among patients with oral cancer, broadening the focus beyond diagnostic performance to patient-centered endpoints. In a service-delivery perspective, dos Santos *et al.* (31) mapped teleconsultation actions aimed at reducing in-person referrals for oral lesions, reinforcing the potential of remote assessment to support triage and streamline care pathways. Although these studies were not eligible for inclusion in our scoping review due to differences in research questions and eligibility criteria, they align with the overall trend observed here: remote digital tools, particularly those enabling asynchronous exchange and specialist support, can strengthen early detection pathways and improve coordination across levels of care.

Some limitations should be acknowledged. First, the included studies were heterogeneous in design, population, intervention type, and reported outcomes, which limits direct comparison among studies. Second, most evidence was concentrated in specific geographic contexts, particularly India and Brazil, and many studies were conducted in low-resource or university-based settings,

limiting the generalizability of the findings. Third, several studies had small samples or short follow-up periods, and few assessed long-term clinical impact, patient adherence, cost-effectiveness, or implementation barriers in depth. Finally, as this was a scoping review, the methodological quality of the included studies was not formally assessed, which should be considered when interpreting the findings.

Future research should prioritize prospective studies with larger and more diverse populations, standardized measures of diagnostic accuracy and clinical impact, and longer follow-up periods. Further studies are also needed to evaluate patient adherence, professional acceptance, cost-effectiveness, data security, image quality requirements, and integration of remote consultation tools into primary healthcare networks. In addition, the role of artificial intelligence as an adjunct to specialist assessment deserves further investigation, particularly regarding accuracy, equity, transparency, and feasibility in real-world clinical settings.

CONCLUSION

This scoping review mapped the use of remote digital intervention tools for the assessment of oral alterations in the context of oral cancer prevention. The evidence indicates that these tools are mainly based on asynchronous telehealth and teledentistry models, particularly mobile applications, digital image sharing, and remote specialist consultation. Most studies reported satisfactory diagnostic accuracy, agreement with in-person clinical examination, feasibility in low-resource settings, and potential to reduce unnecessary referrals. These findings suggest that remote intervention tools may support oral cancer prevention strategies by expanding access to preliminary assessment, facilitating referral decision-making, and contributing to earlier identification of suspicious oral lesions.

AUTHOR CONTRIBUTIONS STATEMENT: Conceptualization and design: A.C.F.M. and A.G.L.; Literature review: M.E.M. and M.L.R.; Methodology and validation: M.E.M., M.L.R. and A.G.L.; Formal analysis: M.E.M. and M.L.R.; Investigation and data collection: M.E.M. and M.L.R.; Resources: A.C.F.M. and A.G.L.; Data analysis and interpretation: M.E.M. and M.L.R.; Writing-original draft preparation: M.E.M. and M.L.R.; Writing-review & editing: M.E.M., M.L.R., A.C.F.M. and A.G.L.; Supervision: A.C.F.M. and A.G.L.

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SUPPLEMENTARY

Table 1. Additional information on the included studies.

Authors (year)	Tool/remote intervention	Main results
Birur <i>et al.</i> (2015)	Oncogrid (mHealth via Sana app + OpenMRS)	Adherence issues observed → only 4% of patients screened by FHW agreed to undergo biopsy when indicated, while 57% of those screened by dentists complied.
Haron <i>et al.</i> (2017)	Teledentistry via cell phone cameras (5–13 MP) for early detection of oral cancer	Moderate to high agreement between clinical examination and image analysis ($\kappa=0.64-1.00$). >70% sensitivity and 100% specificity. Better performance with higher-resolution cameras.
Birur <i>et al.</i> (2018)	Mobile app for screening and referral (Sana, Poi Mapper, Emocha, Experteez); mHealth used by front-line health providers (FHW/ASHA) and general dentists	42,754 individuals screened; OPMD prevalence 0.8–62% across cohorts; 516 biopsies performed; cost <US\$1.00 per person; large-scale feasibility demonstrated despite adherence and connectivity challenges.
Bhatt <i>et al.</i> (2018)	Mobile health app for remote oral cancer surveillance - SIM app	8,516 screened for oral cancer, 5% (n=490) tested positive but only 151 (30.8%) returned for follow-up. However, mHealth was highly accepted by healthcare professionals.
Carrard <i>et al.</i> (2018)	EstomatoNet (telediagnosis platform via TelessaúdeRS), clinical data + photos are sent by PHC physicians and dentists to oral medicine specialists	259 cases evaluated; most common diagnoses: actinic cheilitis (15.8%), SCC (8.5%), inflammatory hyperplasia (8.1%); specialists recommended referral in 42.9% of cases, biopsy in 23.6%, and follow-up in 16.2%; initial referral intention dropped from 96.9% → 35.1% after platform use.
Birur <i>et al.</i> (2019)	Mobile app (Poi Mapper + OpenMRS) used by CHWs for screening, with remote review by oral medicine specialists	3,445 individuals screened; CHWs identified 11.8% with lesions vs. 11.4% by local specialists; almost perfect agreement CHW × local specialist ($\kappa=0.92$) and substantial agreement CHW × remote ($\kappa=0.62$); 84.7% sensitivity, 97.6% specificity; cost and feasibility demonstrated.
Flores <i>et al.</i> (2019)	SENSEM app (data collection, AI for oral cancer prediction)	Enables remote information collection, supports prediction of potentially malignant lesions, promotes screening and population adherence.
Vinayagamoorthy <i>et al.</i> (2019)	Free messaging app (WhatsApp) for sharing oral cavity images	High sensitivity (98.5–99%), moderate specificity (52–72%). Substantial agreement with clinical examination ($\kappa=0.68$). Demonstrated to be an effective, low-cost screening tool.
Haron <i>et al.</i> (2020)	Mobile app for image capture and teledentistry consultations	Feasibility demonstrated for remote screening, improving referral of suspected oral cancer cases.
Song <i>et al.</i> (2021)	Smartphone app + AI (MobileNet, works offline)	Tool showed good classification performance in low-resource settings; feasible for point-of-care screening without internet.
Birur <i>et al.</i> (2022)	Portable PoC device with smartphone camera + intraoral probe (WLI and AFI) integrated with CNNs (MobileNet on phone and VGG19-BDL on cloud)	5,025 participants screened (32,128 images); telediagnosis achieved 95% sensitivity and 84% specificity; mobile CNN 82% sensitivity, cloud CNN 87% sensitivity.
Roxo-Gonçalves <i>et al.</i> (2022)	Cloud-based platform (EstomatoNet) for telediagnosis in oral medicine	2,002 teleconsultations; 19.6% potentially malignant lesions; 7.7% suspicious malignancies; 37.3% of referrals avoided; 96.5% of users satisfied.
Keerthi <i>et al.</i> (2023)	Smartphone + mHealth app (store-and-forward) + secure server + histopathology	822 images analyzed; substantial agreement among remote specialists ($\kappa=0.682$). Remote experts' sensitivity/specificity ranged from 79–95.8% / 60–83.3%. On-site specialist achieved 94.8% sensitivity and 83.3% specificity. Showed feasibility in low-resource settings.
Nguyen <i>et al.</i> (2023)	Telehealth (videoconsultation) vs. in-person referral	Higher adherence to referral observed with telehealth compared to in-person referral; increased compliance in low-resource settings.
Haron <i>et al.</i> (2023)	MeMoSA® – teleconsultation app (image upload + clinical history)	High accuracy for remote screening and referral of suspicious lesions; telemedicine proved feasible as a complement to clinical examination – 355 participants.
Carrard <i>et al.</i> (2024)	EstomatoNet/TelessaúdeRS-UFRGS (telediagnosis support for PHC oral lesions), integrated with the Red May campaign for education and awareness	>4,000 requests analyzed; platform use increased in recent years; educational campaigns (Red May) positively impacted adherence; ~40% of cases still required in-person evaluation; high image quality achieved with modern smartphones.
Khanna <i>et al.</i> (2025)	Smartphone + mHealth app (AI for oral image analysis) – specialists confirm diagnosis remotely	High diagnostic accuracy: 85.6% sensitivity, 84.5% specificity. AI performed comparably to specialists in screening for potentially malignant lesions.
Martins <i>et al.</i> (2025)	Tele Estomato, mobile platform using Google Glide tool for telediagnosis in oral medicine	Implemented in 14 Brazilian states, with over 2,000 registered dentists and >1,500 submitted cases. Mean specialist response time: 2.46 days, demonstrating efficient communication and agility in remote diagnosis.