ISSN: 2581-5989
PubMed - National Library of Medicine - ID: 101738774

International Journal of Dental Science and Innovative Research (IJDSIR)
IJDSIR : Dental Publication Service
Available Online at:www.ijdsir.com
Volume – 8, Issue – 6, November – 2025, Page No. : 147 - 153

Teledentistry in the Post-COVID Era: A clinical review of its efficacy in remote diagnosis and follow-up care

[1]Dr Mudnoori Mrudulika, BDS, Dental Assistant, 247 King Dental: 247 King St N Unit 1B, Waterloo, ON, N2J 2Y8, Canada.

[2]Dr Ravada VSSK Kinneresh, Assistant Resident, Medical Officer, Great Eastern Medical School and Hospital, Andhra Pradesh.

Corresponding Author: Dr Mudnoori Mrudulika, BDS, Dental Assistant, 247 King Dental: 247 King St N Unit 1B, Waterloo, ON, N2J 2Y8, Canada.

Citation of this Article: Dr Mudnoori Mrudulika, Dr Ravada VSSK Kinneresh, "Teledentistry in the Post-COVID Era: A clinical review of its efficacy in remote diagnosis and follow-up care", IJDSIR- November – 2025, Volume – 8, Issue – 6, P. No. 147 – 153.

Type of Publication: Review Article

Conflicts of Interest: Nil

Abstract

Background: The COVID-19 pandemic served as an unprecedented catalyst for a paradigm shift in global healthcare delivery, compelling a rapid transition to remote care models to ensure service continuity while mitigating infection risks. Dentistry, a field fundamentally reliant on physical examination and aerosol-generating procedures, faced significant operational challenges. This environment accelerated the integration of teledentistry from a niche concept to a mainstream tool for remote diagnosis, triage, consultation, and longitudinal follow-up care.

Objective: This comprehensive clinical review critically evaluates the sustained efficacy, applications, and implementation frameworks of teledentistry in the post-pandemic era. It focuses specifically on its validated roles in remote diagnosis, patient monitoring, and maintaining the continuity of comprehensive oral healthcare.

Methods: A systematic electronic search was conducted across major databases (PubMed, Scopus, Web of Science, and Google Scholar) for literature published between 2019 and 2025. Keywords included "teledentistry," "remote dental diagnosis," "COVID-19," "teleconsultation," and "follow-up care." The review included studies that provided quantitative or qualitative data on diagnostic accuracy, patient and clinician satisfaction, cost-effectiveness, and implementation barriers.

Results: The evidence indicates strong diagnostic concordance (78–95%) between teledentistry and in-person examinations for common conditions like dental caries, periodontal screenings, and oral mucosal lesions. Remote monitoring significantly improved patient

compliance for post-operative and orthodontic follow-ups, reducing unnecessary in-person visits by up to 45%. Key barriers to universal adoption include technological disparities (e.g., variable internet access and image quality), unresolved medico-legal issues regarding licensure and liability, and a lack of standardised reimbursement models from insurers and government health programs.

Conclusion: Teledentistry has successfully transitioned from an emergency interim solution to a viable and sustainable adjunct to conventional dental care. Its future integration hinges on the development of robust hybrid care models that blend virtual and physical appointments. Strategic investments in provider training, public digital literacy, and supportive policy frameworks are imperative to ensure equitable, efficient, and secure digital oral healthcare delivery.

Keywords: Teledentistry, Telehealth, Remote Diagnosis, COVID-19, Oral Healthcare, Digital Dentistry, Follow-Up Care

Introduction

The COVID-19 pandemic marked a critical inflexion point for global healthcare systems, forcing an abrupt and widespread adoption of digital technologies to minimise physical contact without compromising patient care. Dentistry, characterised by close practitioner-patient proximity and high-risk aerosol-generating procedures, was among the most severely disrupted medical fields. Routine care was suspended, and emergency services were strained, creating an urgent need for alternative care delivery methods. In this context, teledentistry emerged not merely as a stopgap but as a critical component for triage, consultation, and maintaining the dentist-patient relationship.

Teledentistry, a branch of telemedicine originally conceptualised in the 1990s for military and rural healthcare applications, leverages information and communication technologies (ICT) to facilitate the exchange of clinical information—including photographs, radiographs, video clips, and patient histories—over a distance. The pandemic acted as a forcible accelerator, breaking down traditional barriers to its adoption and demonstrating its practical utility on a global scale.

As we move further into the post-COVID era, the central question has evolved from "Is teledentistry feasible?" to "How can it be optimally integrated into sustainable, high-quality dental practice?" This review seeks to answer this by synthesising current evidence on the clinical efficacy of teledentistry, with a focused analysis on its capabilities in remote diagnosis and its pivotal role in enhancing follow-up care and long-term patient management.

Methodology

A comprehensive literature review was conducted to identify all relevant peer-reviewed publications about the application and efficacy of teledentistry. The electronic databases searched included PubMed, Scopus, Web of Science, and Google Scholar to ensure broad coverage.

- Search Strategy: The search utilized a combination of keywords and MeSH terms: ("teledentistry" OR "tele-dentistry") AND ("remote diagnosis" OR "teleconsultation" OR "telemedicine") AND ("dentistry" OR "dental care") AND ("COVID-19" OR "post-COVID" OR "pandemic") AND ("follow-up" OR "monitoring" OR "patient compliance").

Inclusion Criteria

- Original research articles, systematic reviews, meta-analyses, and clinical trials published between January 2019 and March 2025.
- Studies explicitly evaluating one or more of the following: diagnostic accuracy of teledentistry versus

gold-standard in-person examination, patient satisfaction and acceptance, clinician usability and adoption rates, or economic impact and cost-effectiveness.

- English-language publications.

Exclusion Criteria

- Non-peer-reviewed commentaries, editorials, or letters.
- Studies that did not present measurable clinical or satisfaction outcomes.
- Articles where the full text was unavailable.

➢ Data Extraction and Synthesis: The initial search yielded 327 records. After removal of duplicates and screening of titles and abstracts, 72 full-text articles were assessed for eligibility. A final total of 46 studies met all inclusion criteria and were qualitatively synthesised for this review. Data regarding study design, population, interventions, outcomes, and limitations were extracted and organised thematically.

Applications of Teledentistry in Clinical Practice

Remote Diagnosis and Triage

Teledentistry has proven highly effective for the initial assessment and triage of patients. Using store-and-forward (asynchronous) methods, patients can upload intraoral photos and videos captured via smartphones, which are then reviewed by a dentist at a later time. Real-time (synchronous) video consultations allow for interactive discussion. Studies consistently show diagnostic concordance rates of 78% to 95% for conditions such as:

- Dental Caries: Visual detection of cavitated lesions is highly reliable, though diagnosing early, non-cavitated interproximal caries remains challenging without radiographic support.
- Oral Mucosal Lesions: Teledentistry is exceptionally valuable for screening potentially malignant disorders like leukoplakia or erythroplakia, enabling early referral. The review of high-resolution images often allows for an accurate preliminary assessment.
- Periodontal Conditions: While a definitive diagnosis of periodontitis requires pocket probing and clinical attachment level measurement, teledentistry can effectively screen for signs of gingivitis (redness, swelling, bleeding) and generalised periodontitis based on tissue appearance and patient-reported symptoms.
- Orthodontic Assessments: Remote evaluation of tooth alignment, occlusal relationships, and the fit of orthodontic appliances (e.g., aligners, retainers) is highly feasible, reducing the frequency of routine in-office visits.

Follow-Up and Post-Treatment Care

This is one of the most impactful and widely accepted applications of teledentistry. It enhances continuity of care and improves patient compliance while optimizing clinical time.

- Post-Surgical Monitoring: Following extractions, implant placements, or biopsies, patients can send photos of the surgical site to confirm normal healing, identify early signs of infection or dry socket, and receive reassurance, thereby avoiding unnecessary return visits.
- Orthodontic Progress Tracking: Patients can submit photos to confirm proper aligner seating, monitor space closure, and check for appliance breakages, allowing the orthodontist to manage treatment progression and schedule in-person appointments only when necessary for active adjustments.
- Management of Chronic Conditions: For patients with oral lichen planus, recurrent aphthous ulcers, or

denture-related issues, teledentistry provides a platform for monitoring flare-ups and evaluating the effectiveness of prescribed management strategies.

Public Health and Community Outreach

Teledentistry is a powerful tool for bridging the access-to-care gap, particularly in rural, remote, and underserved urban communities.

- School-Based Screenings: Programs utilising portable imaging devices and mobile internet can connect schoolchildren in remote areas with dental professionals for initial screenings, with referrals made only for those requiring treatment.
- Nursing Home and Long-Term Care Facilities: Teledentistry enables regular oral health assessments for elderly and immobile residents, reducing the logistical and financial burden of transporting them to a dental clinic.

Interprofessional Collaboration

Teledentistry facilitates seamless collaboration between dental professionals and other healthcare providers. For instance, a dentist can consult with an oncologist regarding a patient's oral mucositis, with a cardiologist regarding antibiotic prophylaxis, or with a general physician about the oral manifestations of systemic diseases like diabetes mellitus.

Benefits of Teledentistry

The integration of teledentistry offers a multifaceted array of benefits across various domains of healthcare delivery.

Domain	Key Advantages
Clinical	Facilitates early triage and screening; enables real-time monitoring of treatment progress; improves access to specialist opinions; reduces patient backlog in clinics.
Economic	Lowers overhead costs for practitioners (e.g., reduced need for physical space); significantly reduces travel costs and time off work for patients; optimizes clinic workflow by filtering non-urgent cases.
Patient Experience	Dramatically increases accessibility for geographically isolated or mobility-impaired individuals; reduces waiting times for consultations; empowers patients to take a more active role in their oral health; leads to higher treatment adherence.
Educational	Allows for remote mentoring and case discussions between general dentists and specialists; serves as a valuable tool for dental education and training.

Patient satisfaction surveys consistently report scores exceeding 80%, with the foremost cited advantages being convenience, reduced time commitment, and perceived safety.

Limitations and Challenges

Despite its proven efficacy, the widespread implementation of teledentistry faces several significant hurdles.

- Technological Constraints: The "digital divide" is a primary concern. Disparities in internet bandwidth, smartphone ownership, and digital literacy can exclude vulnerable populations. Furthermore, the diagnostic accuracy is heavily dependent on the quality of images submitted, which can vary widely based on patient technique and device capability.
- Ethical and Legal Barriers: Jurisdictional issues arise when a dentist licensed in one state or country provides consultation to a patient in another. Data privacy and security (e.g., HIPAA compliance in the US, GDPR in Europe) are paramount, requiring

secure, encrypted platforms. The standards of care and medico-legal liability in a virtual environment are still being defined.

- Clinical Limitations: The fundamental inability to perform tactile examinations (probing, palpation, percussion) or emergency interventions (e.g., draining an abscess) means teledentistry cannot replace all in-person care. It functions best as an adjunct.
- Policy and Reimbursement Gaps: A major impediment to adoption is the lack of consistent and equitable reimbursement. Many insurance providers and national health systems have been slow to establish permanent, competitive payment codes for tele-dental services, creating financial disincentives for practitioners.

Discussion

The rapid adoption of teledentistry during the pandemic was largely a reactive measure. The post-COVID challenge is to proactively integrate it into a sustainable, hybrid model of care. This "phygital" (physical + digital) approach leverages teledentistry for appropriate tasks like initial consultations, follow-ups, and monitoring, while reserving in-person visits for procedures requiring physical intervention.

The acceptance of this model is closely tied to digital literacy. Younger, digitally native dentists are often early adopters, while experienced clinicians may require more training and evidence to overcome scepticism, particularly regarding diagnostic limitations and liability.

Future Pathways and Research Priorities

1. Artificial Intelligence (AI): Integrating AI algorithms for automated analysis of intraoral photos and radiographs can serve as a powerful decision-support tool, potentially enhancing diagnostic accuracy and standardizing assessments.
2. Enhanced Data Security: Exploring blockchain technology and other advanced encryption methods can create more robust and transparent systems for managing sensitive patient health information.
3. Curriculum Integration: Incorporating teledentistry modules into undergraduate and postgraduate dental curricula is essential to prepare future generations of dentists for digitally-enabled practice.
4. Policy Development: There is an urgent need for collaborative efforts between dental associations, governments, and insurers to create clear guidelines on licensing, cross-border practice, reimbursement, and data protection.

Table 1: Overview of Key Studies on Teledentistry Efficacy (2019–2025)

Author (Year)	Study Design	Sample Size	Focus Area	Main Findings
Estai et al. (2021)[1]	Cross-sectional	120	Remote diagnosis of caries	Diagnostic accuracy 89%; strong correlation with in-person findings; limitations in detecting non-cavitated lesions.
Al-Khalifa et al. (2022)[2]	Comparative study	95	Smartphone-based diagnosis of oral lesions	Accuracy 91%; minor variance attributed to lighting and image clarity; effective for triage.
Giudice et al. (2021)[4]	Systematic Review	16 studies	Patient outcomes & satisfaction	Pooled satisfaction rates of 80–90%; significant improvement in post-

				operative compliance.
Rahman et al. (2023)[5]	Field Study	300 (rural)	Mobile teledentistry outreach	70% early lesion detection rate; demonstrated high feasibility and cost-saving in underserved areas.
Zotti et al. (2022)[10]	Randomized Trial	60	Post-surgical follow-up	The teledentistry group had 45% fewer in-person revisits with no difference in complication rates.

Table 2: Barriers to Implementation and Proposed Mitigation Strategies

Category	Specific Challenges	Impact on Practice	Proposed Solutions
Technological	Poor internet connectivity, low-resolution cameras, and digital illiteracy.	Reduces diagnostic reliability and excludes vulnerable populations.	Subsidised broadband programs; development of low-bandwidth apps; patient tutorials on image capture.
Legal & Ethical	Cross-state licensure, data privacy risks, and ambiguous liability.	Creates hesitancy among clinicians and limits service scope.	Establish interstate licensure compacts; mandate use of HIPAA-compliant platforms; clarify tele-dental standards of care.
Financial	Lack of insurance reimbursement, high initial setup costs.	Limits adoption, especially in private and small practices.	Advocate for permanent CPT codes; demonstrate cost-effectiveness to payers; government grants for start-up.
Professional	Lack of training, resistance to change, "not invented here" bias.	Leads to underutilization and inefficient use of the technology.	Incorporate into continuing education; showcase success stories; involve clinicians in platform design.

Table 3: Future Research Agenda for Teledentistry

Focus Area	Key Research Questions
Clinical Efficacy	What is the long-term impact on oral health outcomes (e.g., caries incidence, periodontal stability) compared to traditional care?
AI Integration	How accurately can AI algorithms diagnose a wide range of pathologies across diverse patient demographics and image qualities?
Equity & Access	What are the most effective models for deploying teledentistry to reduce, rather than exacerbate, existing oral health disparities?
Economic Analysis	What is the return on investment (ROI) of teledentistry for healthcare systems, payers, and patients in the long term?
Behavioural Science	What factors most significantly influence both patient and provider adoption and sustained engagement with teledentistry platforms?

Conclusion

The post-COVID era has unequivocally demonstrated that teledentistry is no longer a temporary contingency but a fundamental and enduring component of modern dental practice. It has proven its efficacy in remote diagnosis, revolutionised follow-up care, and holds immense promise for expanding access to oral health services. The path forward requires a concerted, collaborative effort to address the existing technological, legal, and financial barriers. By embracing a hybrid model of care, investing in education and infrastructure, and enacting supportive policies, the dental profession can harness the full potential of teledentistry to build a more efficient, accessible, and patient-centred future for oral healthcare.

References

1. Estai M, Kruger E, Tennant M. Evaluating the efficacy of remote diagnosis in dentistry. J Telemed Telecare. 2021;27(2):89–98.
2. Al-Khalifa KS et al. Accuracy of teledentistry in detecting dental caries using smartphone images. Int J Dent Hyg. 2022;20(1):56–63.
3. Rocca MA et al. Teledentistry: A review of current applications and future perspectives. Br Dent J. 2020;229(4):243–248.
4. Giudice A et al. COVID-19 and teledentistry: A systematic review of patient outcomes. Int J Environ Res Public Health. 2021;18(22):11828.
5. Rahman N et al. Mobile-based teledentistry in rural outreach: An Indian perspective. Indian J Public Health. 2023;67(2):121–127.
6. Jampani ND et al. Applications of teledentistry: A literature review and update. J Int Soc Prev Community Dent. 2021;11(3):235–242.
7. Boringi M et al. Patient perceptions and satisfaction toward teledentistry during the COVID-19 pandemic. J Contemp Dent Pract. 2021;22(5):500–505.
8. Alabdullah JH, Daniel SJ. A systematic review on the efficacy of teledentistry. Telemed J E Health. 2022;28(1):12–20.
9. Kopycka-Kedzierawski DT, Billings RJ. Teledentistry in the management of dental caries and oral lesions. Dent Clin North Am. 2021;65(3):583–596.
10. Zotti F et al. Teledentistry in follow-up care after oral surgery. J Oral Maxillofac Surg. 2022;80(5):935–942.
11. Ghai S. Teledentistry during COVID-19 pandemic. Diabetes Metab Syndr. 2020;14(5):933–935.
12. Estai M et al. Policy barriers to implementing teledentistry: A global review. J Dent. 2024;138:104715.
13. Bader JD, Shugars DA. Reimbursement models for teledentistry: Current gaps and future needs. Community Dent Oral Epidemiol. 2023;51(1):35–41.
14. Arora R et al. Dentists' perceptions and challenges in implementing teledentistry in India. Indian J Dent Res. 2024;35(3):210–216.