



Review Article

Utilizing teledentistry for managing patients: A systematic review of dentist satisfaction

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Abstract

Background: The global COVID-19 epidemic has hastened the digital disruption period, resulting in significant technical advancement in dental information and communication via teledentistry. Limited evidence regarding dentist satisfaction and improperly addressed challenges may hinder the sustainability and long-term implementation of teledentistry in dental practices and healthcare facilities. Therefore, addressing this gap and identifying challenges and mitigation plans are essential in evaluating the system and ensuring its long-term application.

Objective: The aim of the current study was to review dentist satisfaction in using teledentistry.

Methods: The current review followed the guideline of JBI Manual for Evidence Synthesis (2021). Four databases were used for searching the articles: PubMed, Medline, Scopus, and ScienceDirect. The last date of search was March 29th, 2023. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flowchart was used to record the selection process and the Mixed Methods Appraisal Tool (MMAT) 2018 was applied to assess quality of the articles.

Results: Eleven articles were included in this current review. Four studies were conducted in high income, three studies in middle income, three studies in middle-low income and one study were conducted in multi countries with various level of income. Dentist satisfaction scores ranged from satisfied to very satisfied. Factors influencing satisfaction were classified into five aspects: safety and convenience, quality and access, cost, infrastructure, and referral priorities. Included articles also provided information on challenges in implementing teledentistry, namely: access and infrastructure, financing, user awareness and knowledge, examination and diagnostic processes, and government support. We also identified some recommendations for enhance the implementation: improving audio-visual devices and access, maintaining data privacy, increasing remuneration, increasing training time and implementing formal curriculum of teledentistry, conducting case selections, and enforcing the use of evidence-based policies.

Conclusions: Implementation of teledentistry is promising as most dentists were satisfied and received benefits from it. Feasibility studies prior to the implementations of teledentistry must be planned collaboratively amongst dentists, policymakers and insurance agencies to ensure proper implementation. Future studies should explore the use of teledentistry in lower income or developing countries to add information related to cost and infrastructural structure.

Keywords: dentist satisfaction, patient management, teledentistry, systematic review.

Introduction

The global digital disruption era was significantly accelerated by the COVID-19 pandemic, driving rapid advancements in dental information and communication technologies through telehealth. The pandemic acted as a major catalyst for the swift implementation and widespread adoption of teledentistry.

According to the Centers for Disease Control and Prevention (CDC), telehealth visits increased by 154% in March 2020 compared with the same period in the previous year. This surge was primarily attributed to changes in public health regulations, including restrictions on non-essential in-person

interactions, as well as the establishment of emergency-telehealth policies following the official declaration of the pandemic.^{1,2}

Telehealth consists of two parts, namely telemedicine and teledentistry. Teledentistry combines the principles of information and communication technology and dental sciences in providing oral services remotely. The initial concept of teledentistry was developed in 1989 in Baltimore, USA as a project of the Westinghouse Electronics Systems Group with a focus on applying dental informatics in daily dental practice that will have a direct impact on the dental and oral health of the community.

The University of Minnesota School of Dentistry also developed a teledentistry network in 2004 focused on providing dental services to dental and oral patients in remote areas. Teledentistry consists of several applications, namely teleconsultation, telediagnosis, teletriage, and telemonitoring. This can be done synchronously (a two-way live interaction between an individual and dentists using audio-visual media) and asynchronously (the evaluation of stored photos and videos from patients by dentists outside of live communication).^{3,4}

The application of teledentistry has several essential roles. It plays as a medium for remote triage and screening of patients which facilitates healthcare workers in providing consultations in anywhere and at any time. This can also enhance the protection for patients with chronic diseases and high risk of exposure to disease while accessing health care services. At last, teledentistry guarantees the continuity of promotive and preventive activities during a pandemic remotely.⁵

However, teledentistry also brings its own challenges in the adoption process, which include legal and infrastructure issues including IT support, cost, ethical and privacy issues.^{6,7} High job demands in dentistry professional to provide the best service in a diverse work environment with patient characteristics and a dynamic health system can cause pressure and stress for dental health workers.⁸ Dentist satisfaction is one of the indicators that are able to reflect the level of technology acceptance, willingness to use, attitude, and confidence of utilizing teledentistry in their daily practices.

Dentist satisfaction, therefore, is crucial to be assessed in conjunction with patient satisfaction.⁹ Although the rapid expansion of teledentistry during the COVID-19 pandemic was driven by emergency regulations and temporary telehealth policies, existing studies have largely emphasized adoption rates, technical feasibility, and patient-related outcomes. Challenges during the early implementation have not been properly addressed. Empirical evidence on dentists' perceptions, acceptance, and satisfaction is lacking, which hinders sustained utilization and integration into clinical workflows and its underrepresentation represents a critical gap in the current literature.

High levels of satisfaction are crucial for continued use of telehealth services and for maintaining quality care. Therefore, assessing dentist satisfaction as well as identifying the challenges and finding suitable mitigations is essential for both evaluating the immediate success of teledentistry and ensuring its sustainable implementation in dental practice. To date, no systematic review has comprehensively examined dentist satisfaction in the utilization of teledentistry alongside its associated challenges and mitigation strategies. Existing evidence has predominantly focused on physician satisfaction

with telehealth services¹⁰, without specifically addressing dental health providers or the unique clinical, operational, and professional contexts of dental practice.

Methods

We used JBI Manual for Evidence Synthesis (2021) for the current review's guideline which consists of six components: 1) review question, 2) inclusion and exclusion criteria, 3) search strategy, 4) critical appraisal, 5) data extraction, and 6) data synthesis. The Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA) 2020 checklist was used to report this review article.

Review Question

The determination of the review question was assisted by using PICO elements (Population, Intervention, Comparison, and Outcome).

- a. P (Population): general dentists/ specialists/ consultants
- b. I (Intervention): teledentistry
- c. C (Comparison): conventional in-person dentistry, or no comparator
- d. (Outcome): dentist satisfaction in using teledentistry, factors affecting dentist satisfaction in using teledentistry, and/or challenges and mitigations to improve teledentistry.

Inclusion and Exclusion Criteria

The articles included in this study were the original research articles written in English that aims to present methodologically robust data in internationally indexed databases on dentist satisfaction in using teledentistry, and/or factors affecting dentist satisfaction in using teledentistry, and/or challenges and mitigations to improve teledentistry. We did not limit the publication year as we aimed to include as many publications as possible. Review articles, non-original articles, grey literatures that oftentimes lack peer review with incomplete reporting and insufficient data to be extracted, and inaccessible articles from journal databases were excluded.

Search Strategy

We included four different journal databases, namely: PubMed, Medline, Scopus, dan ScienceDirect. During searching, we combined keywords with the Boolean operator AND/OR (Table 2).

Article search was conducted during March 2023 (last search: March 29th, 2023) yielding in a total of 1,037 articles (Table 1). PRISMA flowchart 2020 (Figure 1) was completed to record the selection process of research articles with the help of reference manager application (Mendeley v.2.107.0). After duplication, non-original, and non-research articles were removed, 840 articles were screened for relevance by title and abstract. Next, 49 articles were screened for the full text. During this stage, 38 articles were excluded due to several reasons (Figure 1). Finally, 11 articles were included in the current systematic review. Two authors: JW and WS worked independently for selecting the articles and measuring the quality using MMAT 2018. If there were discrepancies, the full article was assessed by all authors until agreement was reached.

Critical Appraisal

We used Mixed Methods Appraisal Tool (MMAT) 2018 in appraising the included articles. This tool includes two screening questions and five following appraisal questions according to each research method used by each article (e.g., qualitative, quantitative RCT, quantitative non-RCT,

quantitative descriptive, and mixed methods). Differences in appraisal were discussed until agreement was reached. All included articles had >85% of “Yes” score which reflected sufficient quality of evidence (Table 2). All included articles yielded high total score using MMAT 2018 checklist (ranging from 85.71 to 100%), presenting sufficient eligibility to be included in this systematic review.

Table 1. Search Strategy for the Four Databases

Database	Search Strategy	Results
PubMed	((telemedicine) OR (telehealth)) OR (teledentistry) AND ((dentist*) AND (satisfaction))	83
Medline (PMC)	(((telehealth) OR telemedicine) OR teledentistry) AND (dentist) AND (satisfaction)	432
Scopus	(ALL (telemedicine) OR ALL (teledentistry) OR ALL (telehealth) AND ALL (dentist) AND ALL (satisfaction))	298
ScienceDirect	((telemedicine) OR (teledentistry) OR (telehealth)) AND (dentist) AND (satisfaction))	224
Total		1,037

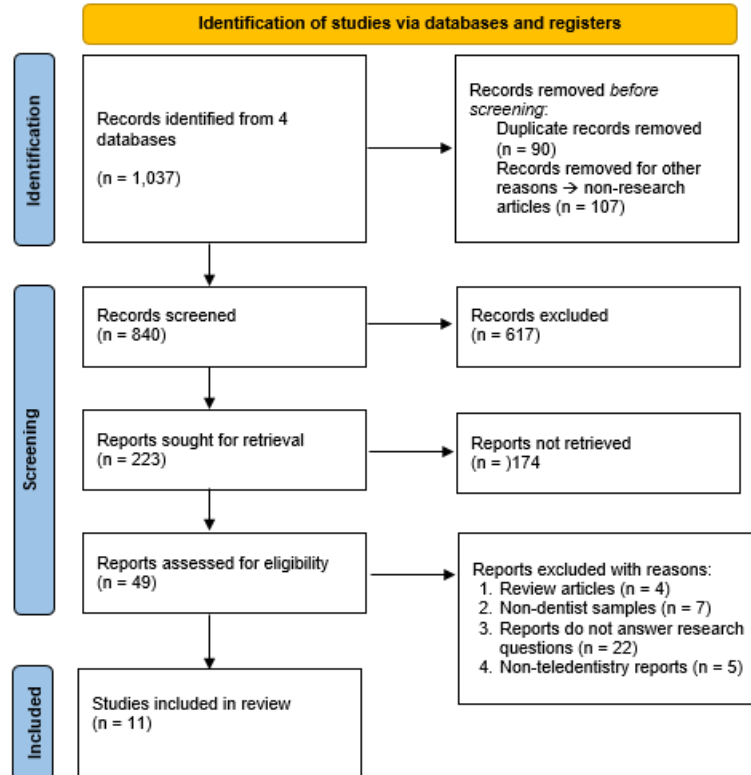


Figure 1. PRISMA flow chart for study selection

Table 2. Evaluation of The Selected Articles Using the Checklist of MMAT 2018

No	Author	Research design	Yes (%)	No (%)	Can't Tell (%)	Total Score (%)
1	Böhm da Costa, et al. ¹¹	Mixed methods	100	0	0	7/7 (100%)
2	Byrne & Watkinson. ¹²	Descriptive quantitative	100	0	0	7/7 (100%)
3	Dalessandri, et al. ¹³	Qualitative	100	0	0	7/7 (100%)
4	Fahim, et al. ¹⁴	Qualitative	100	0	0	7/7 (100%)
5	Kamath & Jawdekar. ¹⁵	Mixed methods	85.71	14.29	0	6/7 (85.71%)
6	Maqsood, et al. ¹⁶	Descriptive quantitative	100	0	0	7/7 (100%)
7	Paixão, et al. ¹⁷	Descriptive quantitative	100	0	0	7/7 (100%)
8	Parker & Chia. ¹⁸	Mixed methods	85.71	14.29	0	6/7 (85.71%)
9	Roxo-Gonçalves, et al. ¹⁹	Non-RCT	85.71	14.29	0	6/7 (85.71%)
10	Soegyanto, et al. ²⁰	Descriptive quantitative	100	0	0	7/7 (100%)
11	Villa, et al. ²¹	Descriptive quantitative	100	0	0	7/7 (100%)

Data Extraction and Synthesis

In this step, data were extracted from the primary sources and coded. The data from the current review were extracted with two tables. The first extraction was the characteristics of paper, namely author, year, country, research design, sample size, location of healthcare facilities, modality of teledentistry, and data collection instrument (Table 3). The second one focused on extracting information on dentist satisfaction and other aspects in using teledentistry (Table 4). It consists of information on assessment and other aspects of dentist satisfaction, factors affecting dentist satisfaction, challenges, and proposed solution/ mitigation in using teledentistry. Data synthesis was presenting in tables and narrative to yield thorough presentation of articles.

Results

Characteristics of Included Articles

The current review included 11 articles. Based on the World Bank data,²² there were four studies conducted in high income,^{12,13,18,21} three studies in middle income,^{11,17,19} three studies in middle-low-income countries^{14,15,20}, and one study was conducted in some countries with various level of income.¹⁶ All studies used cross-sectional observational study with quantitative,^{12,13,16,17,19-21} qualitative,¹⁴ and mixed

quantitative-qualitative data.^{11,15,18} Three modalities of teledentistry were included in the articles, namely: teleconsultation, telediagnosis, and telemonitoring with both synchronous and asynchronous meetings. From the included articles, teleconsultation was described as a remote dental consultation tool to provide reviews on dental development and discuss treatment options between dental professionals and patients¹². Telediagnosis was described as the exchange of patient's records, radiographic and intraoral images remotely to help decision-making process.^{14,19} Telemonitoring was described as the remote tool to maintain and control patients' dental conditions during treatments.¹³

Dentist Satisfaction in Using Teledentistry

Six out of 11 included articles^{11,15,17-19,21} specifically measured the degree of dentist satisfaction in using teledentistry. Most research participants were satisfied^{17,19} and very satisfied^{11,15,18,21} with the usage of teledentistry. A higher degree of satisfaction ("very satisfied") is mostly found across included articles conducted in higher income countries. Two articles mentioned that dentists will be most likely to recommend teledentistry to non-user colleagues^{11,18}. Some articles found positive experience (13,18)⁸ and attitude (13) of participating dental professionals towards the implementation (Table 5).

Table 3. The Characteristics of Included Articles

No.	Author (Year)	Country	Research Design	Sample size	Types of healthcare facilities	Modality of Teledentistry
1	Böhm da Costa, et al. ¹¹	Brazil	Mixed methods	26 primary healthcare's dentists	Healthcare facilities linked to <i>Santa Catarina Telehealth Center (SC-TC)</i>	Teleconsultation; Synchronous
2	Byrne & Watkinson. ¹²	United Kingdom	Quantitative Descriptive	3 consultants, 2 specialists, 1 resident, 2 dental hygienists	The Department of Orthodontics in 2 hospitals	Teleconsultation; Synchronous
3	Dalessandri, et al. ¹³	Italy	Quantitative Descriptive	40 general dentists and 40 orthodontists	Private practices and teaching hospitals (multicenter)	Telemonitoring; Synchronous
4	Fahim, et al. ¹⁴	Pakistan	Qualitative	10 dentists	Public and private healthcare facilities	Teleconsultation, Tlediagnosis, Telemonitoring; Synchronous and Asynchronous
5	Kamath & Jawdekar. ¹⁵	India	Mixed methods	22 dentists	Public and private healthcare facilities	Teleconsultation; Synchronous
6	Maqsood, et al. ¹⁶	Global study	Quantitative Descriptive	506 dentists (general dentists, specialists, and consultants)	Public-private healthcare facilities and academic institutions	Unspecified
7	Paixão, et al. ¹⁷	Brazil	Quantitative Descriptive	Secondary data from the database of the Brazil telehealth program	The Telehealth Brazil Networks Program 2019	Teleconsultation; Asynchronous
8	Parker & Chia. ¹⁸	United Kingdom	Mixed methods	6 dentists (general dentists, orthodontists, consultants, and residents)	Telemedicine center (Attend Anywhere), Croydon University Hospital	Teleconsultation; Synchronous
9	Roxo-Gonçalves, et al. ¹⁹	Brazil	Quantitative, Non RCT	8 user dentists dan 8 non-user residents of EstomatoNet	Unspecified	Tlediagnosis; Synchronous
10	Soegyanto, et al. ²⁰	Indonesia	Quantitative Descriptive	562 dentists (484 general dentists, 55 residents, dan 113 specialists)	Public-private healthcare facilities and academic institutions	Unspecified
11	Villa, et al. ²¹	The United States of America	Quantitative Descriptive	9 oral medicine specialists	Public and private healthcare facilities	Teleconsultation; Synchronous

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Table 4. Data Extraction: Dentist Satisfaction and Other Aspects in Using Teledentistry

No.	Author; Country	Instrument to measure dentist satisfaction	Dentists' Satisfaction in Using Teledentistry	Measurement of other aspects of satisfaction	Factors Affecting Dentist Satisfaction in Using Teledentistry	Challenges in Implementing Teledentistry	Proposed Solution and Mitigation
1	Böhm da Costa, et al. ¹¹ ; Brazil	RE-AIM (<i>Reach</i> , <i>Effectiveness</i> , <i>Adoption</i> , <i>Implementation</i> , <i>Maintenance</i>) framework → factors affecting the intervention of teledentistry	37% of general dentists in primary health care (PHC) are very satisfied with quality of teleconsultant	<ul style="list-style-type: none"> • 85% increase of teleconsultation • Knowledge improvement • Dentists will recommend to colleagues 	<ul style="list-style-type: none"> • Easy to use • Time-saving • Minimize referrals • Adequate information gained • Prioritize high risk patients 	<ul style="list-style-type: none"> • Added steps if referred • Integration of PHC and dental specialist center (DSC) 	<ul style="list-style-type: none"> • Collaboration of managers and dentists to improve care measures • Implement to other specialists
2	Byrne & Watkinson. ¹² ; The United Kingdom	Clinician-specific questionnaires → exploring the difficulties of consultation set up, connection issues, system feasibility, and clinician concerns.	N/A	90% of dentists and dental assistants agree that remote consultation is possible	<ul style="list-style-type: none"> • Easy to use • No connection problems on the majority of sessions • 64% of cases can be managed remotely • Lowering risk of infection 	30% of sessions → problem with video and audio	<ul style="list-style-type: none"> • Improvement of audiovisual quality • Dentists and patients can be more proactive
3	Dalessandri, et al. ¹³ ; Italy	Clinician-specific questionnaires → willingness to adopt a dental monitoring system	N/A	<ul style="list-style-type: none"> • 53,75% of dentists are aware of teledentistry, >50% have used it • Positive attitude and response 	<ul style="list-style-type: none"> • Support high-tech and high-quality services • Reducing in-person meetings at clinics 	Increase of financial cost	Additional cost for patients
4	Fahim, et al. ¹⁴ ; Pakistan	Interview with the technology– organization– environment framework to assess utilization challenges and potential solutions	N/A	<ul style="list-style-type: none"> • Patients are not satisfied with teleconsultations • Institutions and dentists are reluctant to apply teledentistry 	N/A	<ul style="list-style-type: none"> • Financial burden • Lack of awareness and acceptance • Lack of technical support and training • Low accessibility • Only 2D view • Lack of government support 	<ul style="list-style-type: none"> • Campaign to raise awareness • Adding support staff • Formal curriculum in dental schools • 3D viewing • Hardware and software addition to rural communities

No.	Author; Country	Instrument to measure dentist satisfaction	Dentists' Satisfaction in Using Teledentistry	Measurement of other aspects of satisfaction	Factors Affecting Dentist Satisfaction in Using Teledentistry	Challenges in Implementing Teledentistry	Proposed Solution and Mitigation
5	Kamath & Jawdekar. ¹⁵ ; India	Application usage survey → feedback on e-prescribing application in 3 domains (dosage accuracy, legible handwriting, and completeness of instructions) + clinician satisfaction scores	36,36% of dentists are satisfied and 59,09% are very satisfied	N/A	<ul style="list-style-type: none"> • 4 times faster prescription time for pediatric dental patients • Remote prescribing is proven to be accurate • More informative for dentists 	Can only be used if the user has a smart device	<ul style="list-style-type: none"> • Collaboration between stakeholders • The prescribing steps must be more detailed • Data privacy must be maintained (tamper-proof data)
6	Maqsood, et al. ¹⁶ ; Global study	Newly developed online questionnaire → 4 domains (data security issues, improvement of practice, benefits of teledentistry, and usability for patients)	N/A	A safe platform to perform daily practices	<ul style="list-style-type: none"> • Reducing waiting time • Lowering risk of infection • Continuous dental education • Improve dental communication and education • Assist in telemonitoring • Access for patients who live remotely 	<ul style="list-style-type: none"> • Inadequate informed consent and definitive diagnosis • Data confidentiality • Need additional devices • Fluency in using new technology for new users 	<ul style="list-style-type: none"> • Detailed informed consent • Collaboration with health insurer • Applicable to different dental specialties • Data security assurance
7	Paixão, et al. ¹⁷ ; Brazil	Data retrieval from database → measuring response time, professional satisfaction, and patient referral	90,9% of the dentists are satisfied with dental teleconsultation s	N/A	<ul style="list-style-type: none"> • Minimize referrals • Time-saving • Encourage collaboration between dentists • Accurate diagnosis • Quality improved 	<ul style="list-style-type: none"> • Adequacy of access and infrastructure • Connection problems 	<ul style="list-style-type: none"> • Teleconsultants must commit in giving feedback to GD in PHC • Infrastructure support to expand access
8	Parker & Chia. ¹⁸ ; The United Kingdom	Clinician-specific questionnaire →to assess clinician satisfaction experience using a five-point Likert scale	89% of the dentists and specialists: agree-strongly agree on the satisfaction statements	<ul style="list-style-type: none"> • Most satisfied in passive treatment monitoring • Positive experience • Will recommend to non-user colleagues 	<ul style="list-style-type: none"> • Easy and convenient to use • Can perform clinical assessment • Simple procedures can be managed remotely (orthodontic control and follow-up) 	<ul style="list-style-type: none"> • Poor connection may hinder assessment • Limitations in active treatment 	<ul style="list-style-type: none"> • Pre-screening to assess case suitability • Live video consultations can be applied to other areas of dental specialties.

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No.	Author; Country	Instrument to measure dentist satisfaction	Dentists' Satisfaction in Using Teledentistry	Measurement of other aspects of satisfaction	Factors Affecting Dentist Satisfaction in Using Teledentistry	Challenges in Implementing Teledentistry	Proposed Solution and Mitigation
9	Roxo- Gonçalves, et al. ¹⁹ ; Brazil	System usability score (SyUS) to assess satisfaction and usability of EstomatoNet application in diagnosing oral lesion remotely	System usability score for EstomatoNet →satisfactory (>82)	N/A	Easy and convenient to use	Non-user residents need more time to fill dental examinations' form	Requires more training time to shorten filling time
10	Soegyanto, et al. ²⁰ ; Indonesia	Modified validated survey questionnaire (four- part questions answered using five- point Likert scale) from previous study	N/A	<ul style="list-style-type: none"> ● Support quality of dental care ● Highly accepted by patients ● Beneficial for patients ● Can be applied in many dental specialties 	<ul style="list-style-type: none"> ● Adequate diagnosis ● Continuous dental education ● Reduce waiting lists ● Encourage collaboration between dentists and specialists ● Easy to use ● Minimized referrals ● Increase access ● Cost-efficient 	<ul style="list-style-type: none"> ● Cost availability to set up the system ● Possibility of data theft ● Infrastructure is inadequate 	<ul style="list-style-type: none"> ● Data encryption ● Infrastructure addition support
11	Villa, et al. ²¹ ; The United States of America	Modified validated survey questionnaire (to measure clinician satisfaction, ease of use, and willingness to use telemedicine for further consultations) from previous study	69,3% of the oral medicine dentists are satisfied-highly satisfied by telehealth	30% of oral medicine patients do not need additional biopsy tests	<ul style="list-style-type: none"> ● Improve access ● Convenient to use ● Cases can be managed remotely ● Good video resolution ● Medical and dental exam data is adequately collected from telehealth 	N/A	Improve access to rural areas

Factors Affecting Dentist Satisfaction in Using Teledentistry

All articles, except one¹⁴, discussed factors which could positively affect dentist satisfaction in using teledentistry. There were five factors identified and ranked (Table 5). Our data revealed that teledentistry is an ideal alternative to face-to-face appointments, since it is reducing the number of unnecessary visits to healthcare facilities, therefore it decreases the risk of disease transmission, and creates safety, and enhances the convenience for remote interaction, especially simple procedures^{12,13,15,16,18–20}. Furthermore, three included articles revealed that a feature of remote interaction between dental clinicians and patients is helpful to categorize patients based on their cases and urgencies.

Only those who require active treatments who would receive further schedule for face-to-face appointments to healthcare facilities, preventing unnecessary referrals from primary to tertiary level and non-emergency travel to the clinics during the pandemic, moreover, reducing the cost of transportation and the risk of disease transmission^{11,17,21}. Five out of eleven articles reported that the majority of dental professionals agreed that teledentistry improves decision-making process and increase interprofessional collaboration between clinicians, resulting in a more effective referral system-and treatment planning in accordance with established health protocols and safety measures during the pandemic^{11,15–17,20}.

The included articles also indicated that patients who live some distance away from oral health facilities can benefit from teledentistry; saving time, reducing unnecessary additional cost, and improving access to dental care^{11,13,15,16,21}. Three included articles mentioned that the availability and adequacy of supporting infrastructure, such as the establishment of standard connection and video consultations, would encourage non-user clinicians to start implementing teledentistry in their daily practices^{12,18,20}.

Challenges and Mitigations to Improve Teledentistry

All included articles explored the challenges as well as proposed mitigations for implementing teledentistry, all ranked in Table 6.

Six of the included articles mentioned problems of access and infrastructure, underlining the lack of support towards communities in rural areas and the unavailability of adequate devices for teleconsulting^{11,14,16,20,21}. Therefore, collaboration between managers and clinicians with public and private insurance must be established in order to guarantee cost coverage on developing infrastructure and access of remote consultations for patients, especially in rural areas. This would enhance the level usability and utility by patients and clinicians^{11,14–17}.

Three of the included articles mentioned concerns on safety, especially on data privacy in the installed infrastructure. These concerns must be thoroughly addressed to prevent privacy breach involving the development of data encryption and tamper-proof data to maintain confidentiality and privacy^{15,16,20}.

One qualitative study from the included articles identified a lack of awareness and knowledge from system users¹⁴. Another study also mentioned that professional groups and the faculties should establish trainings for dental students and the dentists for enhancing motivation, knowledge, and technological fluency in teledentistry¹⁶.

Included articles indicated that there are challenges on record taking and diagnosing in teledentistry because there is only a

limited number of examinations can be carried out remotely. Additional steps must be conducted for patient referral because of lack of integration between primary and advanced healthcare facilities. These could prolong examination and diagnostic processes^{11,16–18}.

Some articles considered that government regulations and standard procedure in teledentistry have not been generalized and fully integrated into health services. Government support in providing legal foundation of teledentistry by evidence-based policy is necessary in establishing the suitable ground for implementation^{12,14,17,20}.

Discussion

The current review aimed to review dentist satisfaction in using teledentistry. Six of eleven articles reported moderate to high satisfaction level of dentist satisfaction because teledentistry can be utilised for daily practices and it is able to maintain high standards of remote care.^{11,15,17–19,21} Five factors were identified affecting dentist satisfaction. Our review also identified several challenges in implementing teledentistry. Further, we also identified some recommendations to enhance the implementation of teledentistry. Satisfaction varied and was accompanied by the exploration of challenges, mainly on added steps for referrals, problems of integration and infrastructures with several proposed solutions on improving collaborations, applying pre-screening for patients, suggesting broader usage of smart devices, and gaining user knowledge by trainings.^{11,15,18}

A higher degree of satisfaction mostly found across included articles conducted in higher income countries was most likely linked to more favorable health system and implementation contexts. Previous studies have shown that robust digital infrastructure, reliable internet connectivity, and access to secure telehealth platforms significantly improve perceived usefulness and ease of use without adding excessive cost and infrastructural burden, which are key drivers of clinician acceptance of digital health technologies.^{23–25}

In addition, many high-income countries rapidly introduced clear regulatory guidance, reimbursement mechanisms, and medico-legal protections for telehealth services during the pandemic, reducing professional uncertainty and increasing clinicians' confidence in remote care delivery. Institutional support, including structured training and technical assistance, further strengthened facilitating conditions and promoted sustained use, contributing positively to professional satisfaction. Conversely, evidence from low- and middle-income countries suggests that limited infrastructure, unclear policies, and lack of financial incentives constrained effective implementation, which may partially explain lower reported satisfaction levels among dental professionals in these. These findings underscore that dentist satisfaction is not solely an individual perception but a system-dependent outcome, reinforcing its role as a critical determinant of sustainable teledentistry implementation beyond the pandemic period.^{26–32}

The implementation of teledentistry is inherently linked to cost considerations, which emerged as the second most frequently reported challenge in this review. This finding highlights the importance of conducting comprehensive financial planning (including, but not limited to including cost-effectiveness analysis and budget impact analyses) and feasibility assessments prior to implementation to ensure acceptability, adaptability, and long-term sustainability, especially towards potentially saving excessive and unnecessary costs that may burden health systems and patients.^{33,34}

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Table 5. Dentist satisfaction and factors affecting dentists' satisfaction in using teledentistry

Author (Year)	Böhm da Costa, <i>et al.</i> (2021)	Byrne & Watkinson (2021)	Dalessandri, <i>et al.</i> (2021)	Fahim, <i>et al.</i> (2022)	Kamath & Jawdekar, 2023	Maqsood, <i>et al.</i> (2021)	Paixão, <i>et al.</i> (2022)	Parker & Chia (2021)	Roxo-Gonçalves, <i>et al.</i> (2020)	Soegyanto, <i>et al.</i> (2022)	Villa, <i>et al.</i> (2022)
Degree of Satisfaction	V	N/A	N/A	N/A	V	N/A	V	V	V	N/A	V
Cost (money and time)	V	N/A	V	N/A	V	V	V	N/A	N/A	V	N/A
Safety and Convenience	V	V	V	N/A	V	V	N/A	V	V	V	V
Quality and Access	V	N/A	V	N/A	V	V	V	V	N/A	V	V
Infrastructure	N/A	V	V	N/A	N/A	N/A	V	V	N/A	N/A	V
Patient and Referral Priorities	V	V	N/A	N/A	N/A	N/A	V	N/A	N/A	V	N/A

Table 6. Identifying Challenges and Mitigations to Improve Teledentistry

Author (Year)	Böhm da Costa, <i>et al.</i> (2021)	Byrne & Watkinson (2021)	Dalessandri, <i>et al.</i> (2021)	Fahim, <i>et al.</i> (2022)	Kamath & Jawdekar, 2023	Maqsood, <i>et al.</i> (2021)	Paixão, <i>et al.</i> (2022)	Parker & Chia (2021)	Roxo-Gonçalves, <i>et al.</i> (2020)	Soegyanto, <i>et al.</i> (2022)	Villa, <i>et al.</i> (2022)
Access and infrastructure	V	N/A	N/A	V	V	V	N/A	N/A	N/A	V	V
Cost	N/A	N/A	V	V	N/A	V	V	N/A	N/A	V	N/A
User awareness and knowledge	N/A	V	N/A	V	N/A	V	N/A	N/A	V	N/A	N/A
Examination and diagnostic processes	N/A	N/A	N/A	N/A	N/A	V	N/A	V	N/A	N/A	N/A
Government support	N/A	N/A	N/A	V	N/A	N/A	N/A	N/A	N/A	V	N/A

Note:

V : specifically identified

N/A : not applicable or not specified

Blue : High-income countries (HICs)

Green : Low- to middle-income countries (LMICs)

Orange : Multiple countries with various level of income

Such assessments should account for initial investment, operational costs, and workforce readiness, including the availability of dentists or dental specialists trained to deliver remote consultations. In this context, pilot projects are strongly recommended to generate real-time data, as they allow stakeholders to evaluate feasibility, workflow integration, and resource allocation before large-scale deployment. In parallel, collaboration among insurance agencies and policymakers is essential to establish clear and equitable reimbursement schemes for teledentistry services based on service coverage, geographic location, care modality, and provider type, thereby supporting financial sustainability and health equity.^{35,36}

Beyond cost-related challenges, our review underscores the critical role of government support in enabling effective teledentistry implementation. Several included studies reported inadequate integration and dissemination of policies and procedures within health systems, which hindered routine adoption of teledentistry services.^{12,14,17,19,21} Previous evidence emphasizes that legal certainty and evidence-based regulatory frameworks issued by governing bodies are fundamental to ensuring patient safety, professional accountability, and clinician confidence, even within low- and middle-income country settings. Without such policy integration, teledentistry risks remaining fragmented and underutilized despite demonstrated need. Furthermore, reimbursement remains a decisive factor influencing provider participation and satisfaction. There has been consistent report that the absence of standardized reimbursement mechanisms reduces clinicians' willingness to offer teledentistry services, regardless of technological readiness.^{37,38}

Efficient use of available resources further influences the utilization and impact of teledentistry. Findings from this review indicate that providers were often limited in the number of examinations conducted remotely, and that referral processes remained time-consuming.^{11,16-18}

Prior research suggests that incorporating teletriage as an initial screening mechanism before teleconsultation can optimize case selection, streamline referrals, and ensure that only appropriate cases proceed to remote dental consultations, thereby improving efficiency and reducing unnecessary workload.³⁹⁻⁴¹

Finally, adequate training and education emerged as essential enablers of effective teledentistry implementation. Our review identified gaps in awareness, knowledge, and technical fluency among providers, which may compromise clinical efficiency and user satisfaction.^{14,19}

Previous studies consistently report that insufficient training in teledentistry can disrupt clinical workflows, prolong consultation time, and reduce both provider and patient satisfaction. Therefore, structured and continuous training programs for dental students, primary care dentists, and hospital-based practitioners are necessary to enhance competency, confidence, and sustained engagement with teledentistry services.^{10,33,37}

Strengths and Limitations

This current review did not limit specific time frame for article search; it is expected to reach a wider scope of articles. Apart from the main aim, this review is provided information on factors affecting satisfaction and limitations in the implementation of teledentistry. Some limitation exists. First, the search strategy was intentionally designed to include the broader terms "telehealth" and "telemedicine", rather than being restricted to "teledentistry" alone. This decision was

based on evidence that many teledentistry-related studies are indexed under more general telemedicine or telehealth terminology. Restricting the search exclusively to "teledentistry" may therefore have resulted in the omission of relevant studies and loss of relevant data. Accordingly, the broader terminology was adopted to maximize yield results, increase sensitivity, and ensure comprehensive retrieval of eligible literature. Second, the degree of satisfaction could not be statistically synthesized or compared between research since the included articles used a variety of assessment tools, including both quantitative scales and qualitative statements. This methodological diversity affected the capacity of this review to conduct meta-analysis evaluations of satisfaction results. Therefore, we only presented information on the range from unsatisfied to very satisfied.

Conclusion

Overall, this systematic review demonstrates that teledentistry is a feasible and well-accepted modality for patient management, with most dentists reporting moderate to high levels of satisfaction across diverse clinical and economic settings. Perceived safety and convenience, increased access and quality of treatment, time and cost efficiency, and enhanced referral prioritization all had a significant impact on dentist satisfaction. Teledentistry was consistently viewed as a valuable adjunct to conventional dental care, particularly for remote consultations, triage, follow-up, and preventive services, while contributing to reduced unnecessary in-person visits and improved interprofessional collaboration during and after the pandemic. These findings emphasize the importance of dentist satisfaction as a key indicator of technology acceptance and long-term sustainability of teledentistry services.

Despite its promising potential, the successful implementation of teledentistry remains dependent on system-level readiness and supportive policy environments. Major challenges identified include inadequate access and infrastructure, limited access in rural and low-resource settings, financial and reimbursement barriers, concerns regarding data privacy, limited scope of examinations that can be conducted remotely, variability in user knowledge and training, and unintegrated public regulation and standard procedure. Addressing these challenges requires coordinated efforts among dentists, policymakers, insurance providers, and educational institutions through feasibility studies, pilot programs, standardized reimbursement mechanisms, robust regulatory frameworks, and formal teledentistry training curricula. Future research should prioritize low- and middle-income countries to generate context-specific evidence on cost, infrastructure, and governance, thereby supporting equitable and sustainable integration of teledentistry beyond emergency and pandemic-driven contexts.

Conflict of Interest

No potential conflict of interest regarding to this article.

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