

Comparative Analysis of Dental Patients' Perspectives on Teledentistry Methods During the COVID-19 Pandemic in Semarang, Indonesia

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Academic Editor: Catarina Ribeiro Barros de Alencar

Received: July 23, 2024 / **Review:** November 16, 2024 / **Accepted:** January 21, 2025

How to cite: Wardhana ES, Failasufa H, Suhartono B, Firdausy MD. Comparative analysis of dental patients' perspectives on teledentistry methods during the COVID-19 pandemic in Semarang, Indonesia. *Pesqui Bras Odontopediatria Clín Integr.* 2025; 25:e240133. <https://doi.org/10.1590/pboci.2025.082>

ABSTRACT

Objective: To understand patients' perceptions of using teledentistry through virtual clinics *versus* telephone consultations during the COVID-19 pandemic. **Material and Methods:** This is a cross-sectional study with an analytical and quantitative approach. The sample consisted of 644 dental patients with experience using teledentistry services in Semarang, Indonesia. The research instrument was a questionnaire with a Likert scale, and the study was conducted in a hybrid manner, both online and through direct visits to dental practices. The data were analyzed using the Mann-Whitney test. The significance level was set at $p < 0.05$. **Results:** The average score for the teledentistry via virtual clinic user group was 73.25, while for the telephone user group, it was 29.50. A significant difference in patient perceptions regarding teledentistry via virtual clinics and telephone was found ($p < 0.05$). **Conclusion:** Patient perceptions of teledentistry through virtual clinics during the COVID-19 pandemic showed a significantly greater positive response than teledentistry via telephone.

Keywords: Telemedicine; Dentistry; Coronavirus Infections; Disease Outbreaks.

■ Introduction

Indonesia faced an emergency due to the Corona Virus Disease 2019 (COVID-19) pandemic, which affected national resilience, physical and mental health, the economy, infrastructure, social aspects, nature, and the environment. The Indonesian government took steps by ensuring healthcare guarantees as regulated by the country's constitution in Article 28H paragraph 1 of the 1945 Constitution of the Republic of Indonesia regarding Human Rights, stating that every individual has the right to live prosperously physically and mentally, reside in a good and healthy environment, and have access to healthcare services [1,2].

Efforts by the Indonesian government to mitigate the spread of the COVID-19 virus in healthcare practices, particularly in dental medicine during the pandemic, have been heavily restricted to reduce virus transmission [2]. The spread of COVID-19 through dental practices poses high risks due to blood and saliva contamination and aerosols generated from instruments such as ultrasonic scalers, air-water syringes, and air turbine handpieces, contributing to rapid and easy virus transmission [3,4].

The Indonesian government has issued policies to limit public health services using online healthcare services (telemedicine) through Circular No. HK.02.01/MENKES/303/2020 regarding the Implementation of Health Services Utilizing Information and Communication Technology in Preventing the Spread of COVID-19. According to this circular, telemedicine includes history-taking, physical examination, recommendations, and advice for referral to healthcare facilities, as well as information for diagnosis confirmation, management, and treatment through accountable electronic prescriptions [5-7].

The Indonesian Medical Council (KKI) has issued regulations, namely Indonesian Medical Council Regulation No. 74 Year 2020, concerning Clinical Authority and Practice of Medicine Through Telemedicine during the COVID-19 Pandemic, regarding medical practice during the COVID-19 pandemic which doctors and dentists can conduct through direct face-to-face consultations and/or electronic applications/systems such as telemedicine with attention to effective communication. Based on these regulations, telemedicine applied confidentiality principles, with modes of communication including written online platforms, telephone calls, and/or video consultations via virtual clinics for diagnosis confirmation, management, and patient treatment. It mandated the creation of medical records in transcript/manual form, diagnostic tests, and prescription medicines, prohibiting medical practice through telemedicine [8,9].

The restrictions on dental-medical practices by the Indonesian government have caused suffering for patients in need of emergency dental care, prompting dentists to require new standards and innovations such as online communication between dentists and patients. Government regulations related to the COVID-19 pandemic state that all dentists can communicate with patients from all over Indonesia via teledentistry [10,11]. Teledentistry is the use of dental medicine technology to provide communication facilities, facilitating interaction between dental professionals/healthcare providers and patients in geographically separated locations. The rapid development of information and communication technology has led to the emergence of modern applications on smartphones, tablets, and laptops that support the rapid growth of teledentistry as a new means of oral healthcare that is unrestricted by space and time [12,13].

This study aimed to understand differences in patient perceptions when using teledentistry via virtual clinics and telephone during the COVID-19 pandemic in Semarang City, Indonesia. The research focus includes patient satisfaction, ease of use, and effectiveness, including increasing access to clinical services, reliability of teledentistry systems, and patient benefits in utilizing teledentistry [14]. In the context of the COVID-19 pandemic, this study holds significant relevance for both the current and future situations. The pandemic has transformed dental practices, requiring healthcare professionals to adapt to new methods such as teledentistry.

Therefore, it is essential to understand patient perceptions of these services, which will help improve healthcare quality and provide a foundation for developing better health policies. The findings from this research can offer valuable insights for practitioners and policymakers to ensure that dental health services remain effective and safe amid the ongoing changes.

■ Material and Methods

Study Design and Ethical Clearance

This cross-sectional study employed an analytical, observational, and quantitative approach. This research has obtained ethical clearance from the Research Ethics Committee of the Faculty of Dentistry, Sultan Agung Islamic University, with Approval Number 399/B.1-KEPK/SA-FKG/VIII/2022.

Population and Sample

The population was comprised of dental patients with experience using teledentistry services in Semarang City, Indonesia, and the exact population size was unknown. Purposive sampling using the non-probability sampling method was used for sample selection. The sample size was determined using Lameshow's formula, resulting in 644 participants.

The inclusion criteria consisted of patients who agreed to participate, had prior experience consulting with a dentist online, presented with dental and oral health complaints, and were capable of completing the questionnaire either in written or online form. On the other hand, the exclusion criteria included patients who lacked communication devices such as smartphones, tablets, or personal computers and those who were not proficient in using technology. Patients with ethical concerns, such as fear of information breaches or misuse of their medical records, were excluded. Patients with mental disabilities or physical impairments, such as speech, vision, or hearing disabilities that could hinder effective communication, were also not included in the study.

Data Collection

The measurement tool used was a questionnaire adapted from a previous study [13]. The questionnaire was designed using a Google Form and a printed questionnaire. It consisted of 10 statement items for patients' perceptions of teledentistry by telephone and through virtual clinics and was designed using a Likert scale.

The Likert scale categories used are 5 points: Strongly Agree (SA), Agree (A), Neutral (N), Disagree (D), and Strongly Disagree (SD). The study was conducted in a hybrid manner, both online and through direct visits to dental practices, where questionnaires were distributed to patients over 6 months (February to August 2023). The questionnaire's validity and reliability were tested with 30 subjects. Dental health experts confirmed content validity, while factor analysis supported construct validity. Reliability was measured using Cronbach's alpha, with an overall score of 0.85, indicating high internal consistency.

Data Analysis

For statistical analysis, the normality of the data was assessed by the Kolmogorov-Smirnov test. The data were analyzed using the Mann-Whitney test. The significance level was set at $p < 0.05$. All data were analyzed using SPSS version 16 (SPSS, Chicago, IL, USA).

■ Results

Of the 644 participants, 39.9% (n=257) were male, 79% (n=509) were aged 20-29 years and 73% (n=470) were students (Table 1).

Table 1. Participants were distributed according to gender, age, and occupation.

Variables	N	%
Gender		
Male	257	39.0
Female	387	60.1
Age (in Years)		
10-19	45	7.0
20-29	509	79.0
30-39	19	3.0
40-49	26	4.0
50-59	45	7.0
Occupation Type		
Students	470	73.0
Government Employees	13	2.0
Private Employees	71	11.0
Laborers	26	4.0
Others	64	10.0

Tables 2 and 3 illustrate the distribution of patients with experience in teledentistry via virtual clinics and telephone. A different average perception decline was found between the teledentistry via virtual clinic groups (73.25) compared to telephone (29.50). There was a difference in patient perceptions regarding the use of teledentistry through these two modalities ($p < 0.05$)

Table 2. Percentage responses of participants to the use of teledentistry via virtual clinic.

Questions	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Patient Satisfaction					
During the COVID-19 pandemic, I suggest future consultations via virtual clinic	0.0	0.0	0.0	12.5	87.5
I can express myself effectively	0.0	0.0	2.1	12.5	85.4
Ease of use					
I can easily listen to and speak with the dentist	0.0	0.0	0.0	12.5	87.5
The system is very easy to use	0.0	0.0	10.4	62.5	27.1
Effectiveness Including Increased Access to Clinical Services					
I can converse through the virtual clinic just like face-to-face	0.0	0.0	2.1	10.4	87.5
Virtual clinic consultations meet my needs	0.0	0.0	2.1	10.4	87.5
Reliability of the teledentistry system					
I have no internet connection issues	0.0	2.1	18.7	68.8	10.4
I can access the virtual clinic teledentistry	0.0	2.1	0.0	66.7	31.3
Utility for patients					
Teledentistry via virtual clinic saves my time (traveling, working, or other needs)	0.0	0.0	0.0	14.6	85.4
I will use virtual clinic consultation services in the future	0.0	0.0	0.0	14.6	85.4

Table 3. Percentage responses of participants to the use of teledentistry via telephone.

Questions	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Patient Satisfaction					
During the COVID-19 pandemic, I suggest future consultations via virtual clinic	0.0	1.9	7.7	11.5	78.8
I can express myself effectively	1.9	61.5	17.3	7.7	11.5

Ease of use					
I can easily listen to and speak with the dentist	0.0	0.0	51.9	32.7	15.4
The system is very easy to use	0.0	0.0	9.6	57.7	32.7
Effectiveness Including Increased Access to Clinical Services					
I can converse through the virtual clinic just like face-to-face	1.9	32.7	53.8	9.6	1.9
Virtual clinic consultations meet my needs	0.0	0.0	11.5	69.2	19.2
Reliability of the teledentistry system					
I have no internet connection issues	0.0	0.0	5.8	51.9	42.3
I can access the virtual clinic teledentistry	0.0	0.0	0.0	23.1	76.9
Utility for patients					
Teledentistry via virtual clinic saves my time (traveling, working, or other needs)	0.0	0.0	0.0	19.2	80.8
I will use virtual clinic consultation services in the future	0.0	0.0	9.6	63.5	26.9

■ Discussion

The use of teledentistry via virtual clinics and telephone received positive responses from users of both systems. In this study, the reliability of the teledentistry system via virtual clinics was found to be higher compared to telephone-based teledentistry. Previous research showed superior results for telephone-based teledentistry compared to virtual clinics [14].

Patient perceptions regarding patient satisfaction with the use of teledentistry via virtual clinics and telephone indicate that patients feel their consultation needs with dentists are met well through both virtual clinics and phones. A large majority of respondents using virtual clinics services strongly agree regarding patient satisfaction, with 87.5% feeling satisfied with their needs being met through virtual clinic services. Virtual clinics users reported their needs being met and expressed willingness to use the service again. Some telephone users expressed disagreement and hesitation due to the lack of face-to-face interaction, which they believe makes doctor-patient communication more engaging. This lack of confidence among respondents can affect their willingness to engage effectively in teledentistry consultations for effective communication purposes [15,16].

The ease of use of teledentistry via virtual clinics and telephone indicates that patients understand the system well and can communicate effectively with their dentists. A majority of virtual clinic users agree that their needs related to teledentistry use are fulfilled, whereas telephone users show more hesitation. Dentist patients in Semarang understand how to use consultation services with dentists well, whether via telephone or virtual clinics. However, many are still unfamiliar with the definition of teledentistry itself, with some respondents having used teledentistry services without realizing it [17,18].

The effectiveness, including increased access to clinical teledentistry services via virtual clinics and telephone, allows patients to express themselves clearly and communicate with dentists online as if face-to-face. Patients using teledentistry feel comfortable and confident in their communication, making effective communication possible. Telephone communication involves only voice/audio, while virtual clinics involve audio and visual elements, allowing patients and dentists to hear and see each other directly, akin to face-to-face communication. This raises doubts among telephone users due to perceived suboptimal communication compared to virtual clinic users who have more comprehensive and satisfying services for dental patients. Psychological factors in interpersonal communication and in therapeutic communication will benefit both parties [19-21].

The reliability of teledentistry systems via virtual clinics and telephone shows that patients using these services do not encounter connection problems and can access the system without issues with microphones or cameras in virtual clinic use. The reliability of the teledentistry system via telephone has received a better response than virtual clinics, as telephone use is easier and the network requirements for making calls are more

affordable than video calls or other methods. Internet access can pose significant challenges during dental patient consultations, with potential interruptions or errors in diagnosis due to internet connection loss [22,23].

The utility of teledentistry via virtual clinics and telephone for patients allows dental patients to save time in travel, parking costs, or waiting room times. Mothers can manage childcare arrangements, and workers can schedule appointments more effectively with work leave planning. Research shows that respondents had a positive response to virtual clinic teledentistry services, with all dental patients indicating they would use virtual clinic consultation services in the future compared to telephone users [14,24]. A small percentage of telephone teledentistry users expressed hesitancy in using telephone consultation services because they believe dental consultations require face-to-face interactions rather than just audio communication. During the COVID-19 pandemic, patients and dentists benefited from teledentistry services, which provided healthcare access and protected dental professionals and patients from direct contact. The effectiveness of teledentistry services for consultation needs greatly assists patients, allowing dentists to facilitate patient diagnoses and risk classifications and prioritizing direct service for patients with high oral health risks [25-27].

The results of this study indicated that teledentistry could be an effective solution for meeting patient needs during the pandemic and beyond. With the increasing reliance on technology in healthcare delivery, this research highlighted the importance of understanding patient experiences with these services. The implications of these findings suggested that teledentistry was not only relevant in the context of COVID-19 but could also become an integral part of dental practice in the future. Therefore, policies and training for healthcare providers needed to be enhanced to optimally leverage teledentistry's potential and address the challenges that might have arisen in the post-pandemic era [26,28,29].





This study demonstrated several strengths that contributed to its findings. Firstly, the research utilized a robust analytical observational approach, allowing for comprehensive data collection and analysis of patient perceptions regarding teledentistry. Additionally, the study employed a validated questionnaire, enhancing the data's reliability. The sample size of 644 respondents further strengthened the findings, providing diverse patient experiences and perspectives. However, this study also faced certain limitations. One notable limitation was the reliance on self-reported data, which may be subject to biases such as social desirability or recall bias. Moreover, the study was conducted in a single geographic location, which may limit the generalizability of the findings to other regions or populations. Future research should include a more diverse population across various geographic locations to enhance the external validity of the results [15].

In terms of future recommendations, healthcare providers must continue exploring and integrating teledentistry into their practice, particularly in light of ongoing technological advancements. Training programs should be developed to equip dental professionals with the necessary skills to effectively utilize teledentistry, ensuring that patient care remains at the forefront. Furthermore, additional studies should be conducted to examine long-term patient outcomes related to teledentistry, which would provide deeper insights into its effectiveness and areas for improvement [23,30].

■ Conclusion

Patient perceptions of using teledentistry through virtual clinics during the COVID-19 pandemic showed a significantly higher positive response compared to teledentistry via telephone. A significant difference between patient perceptions using teledentistry via phone and virtual clinics was found.

■ Authors' Contributions

ESW		https://orcid.org/0000-0002-4054-8965	Conceptualization, Methodology, Formal Analysis, Investigation, Writing - Original Draft and Writing - Review and Editing.
HF		https://orcid.org/0009-0005-2814-6903	Conceptualization, Methodology, Validation, Formal Analysis, Writing - Review and Editing and Supervision.
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All authors declare that they contributed to a critical review of intellectual content and approval of the final version to be published.			

■ Financial Support

This research was funded by the Research and Community Service Institute (LPPM) of Sultan Agung Islamic University Semarang through the Internal Grant Program number 40a/B.1/SA-LPPM/VII/2024.

■ Conflict of Interest

The authors declare no conflicts of interest.

■ Data Availability

The data used to support the findings of this study can be made available upon request to the corresponding author.

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