



Cross-Sectional Study

Identifying Potential Candidates for Teledentistry in Japanese Dental Clinics: Insights from a Patient Survey

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ABSTRACT

The global COVID-19 crisis has prompted increased use of teledentistry, yet its implementation in Japan remains limited, partly due to unclear identification of suitable patient groups. This study aimed to evaluate patient needs in Saitama dental clinics, support clinicians in adopting teledentistry, and determine which patients are most likely to benefit. A cross-sectional survey was conducted in September 2020 among patients visiting 28 dental clinics in Saitama, Japan. Participants provided demographic details, reported the impact of COVID-19, and indicated their interest in teledentistry, including willingness for future consultations. Data analysis involved descriptive statistics and multiple logistic regression modeling. From the 1,335 questionnaires distributed, 1,312 were retrieved (yielding a response rate of 98.3%). Of these, 835 valid submissions were analyzed for interest in future teledentistry. Among them, 299 respondents fell into the “interest” category, whereas 536 were placed in the “no-interest” category. A notable difference was observed in the pattern of dental attendance between the two groups ($p = 0.04$). Multivariate logistic regression further indicated that individuals who sought dental care solely when required showed a significantly stronger likelihood of preferring teledentistry (OR = 1.60, 95% CI = 1.00–2.57). Remote dentistry could represent a practical option for those with irregular dental appointments. More research is essential to determine which types of consultations these respondents favor most, and in what ways teledentistry might be tailored to effectively address their expectations.

Keywords: COVID-19, Teledentistry, Dental patients, Survey, Telehealth

Introduction

Teledentistry represents the integration of dental care services with telecommunication technology, allowing clinical information and diagnostic images to be shared remotely [1]. Before the COVID-19 outbreak, most teledentistry users were patients from rural or geographically distant areas who had limited access to dental clinics [2–4]. The emergence of the pandemic, however, accelerated the adoption of teledentistry worldwide, as lockdowns and restrictions curtailed routine dental visits in many countries [5]. One of the primary advantages of teledentistry is that patients can receive guidance from dental professionals regardless of location, using devices such as smartphones, tablets, or computers. In this study, teledentistry is defined as real-time interactions between a dentist and patient for consultation and diagnosis through communication tools, including telephone calls. Initially, teledentistry was conceived as video-based consultations for remote diagnosis and treatment guidance. Its scope has since expanded to include patient triage and preliminary screening, in addition to conventional

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consultations [6]. Several studies have confirmed the effectiveness of teledentistry in these roles [7–10]. Beyond individual care, teledentistry also contributes to dental public health by supporting behavioral interventions and professional training, thereby improving care quality and accessibility [11, 12].

In Japan, the Ministry of Health, Labour, and Welfare (MHLW) clarified in August 2015 that telemedicine is not exclusively for patients in remote regions or with specific medical conditions and can be integrated with in-person visits. Further guidance in April 2020 extended teledentistry measures to include initial face-to-face consultations and telephone-based assessments. Before these changes, teledentistry was generally not permitted for new symptoms or conditions, due to limitations in the information obtained visually and auditorily. Despite the expanded regulations, the number of dental clinics in Japan actively offering or planning teledentistry services remained limited, even during the COVID-19 pandemic [13].

Multiple factors have limited the widespread uptake of teledentistry among dental professionals in Japan. Key barriers include insufficient familiarity and expertise with telehealth tools, workplace conditions that do not support remote care, and inadequate financial compensation. Dentists also need to assess whether their current patient base could feasibly benefit from teledentistry, yet no clear guidance exists on the target population within Japan.

Evidence from international research suggests that teledentistry can be particularly beneficial for elderly patients, children, and individuals requiring specialized care. However, the exact patient groups that should be prioritized for these services remain ambiguous [12, 14–16]. Given the growing interest in digital health solutions among patients visiting dental clinics, dental professionals have an opportunity to integrate teledentistry into routine care. A systematic review examining literature published between 2021 and 2022 found that, despite dentists' general awareness of teledentistry, actual implementation remains limited globally [17]. Researchers have proposed that clarifying patient demand and identifying suitable candidates could positively influence clinicians' attitudes, which are often initially cautious or resistant. With this shift, dental consultations could be delivered more efficiently, optimizing time, cost, and patient satisfaction. Expanding the availability of teledentistry would offer patients more convenient and personalized access to dental care.

The objective of this study was to investigate patient demand in dental clinics within Saitama Prefecture, Japan. Insights from this research aim to assist dental professionals in adopting teledentistry and identifying which patient groups are most appropriate for remote consultation services.

Materials and Methods

Study design and setting

This study adopted a descriptive cross-sectional design, focusing on individuals who visited 28 dental practices in Saitama Prefecture, Japan, during the period September 14–19, 2020. Saitama, which ranks fifth in population among Japan's 47 prefectures, had an estimated 7.3 million residents in FY2020 [18]. Positioned adjacent to Tokyo, the prefecture encompasses both urban districts and mountainous regions. At the same time, Saitama hosted 3542 dental clinics, equivalent to 48.2 clinics per 100,000 inhabitants [19]. A total of 28 independently operated dental practices were enrolled for this study through the Saitama Dental Association, an organization that oversees 19 regional divisions. Clinics were chosen at random following stratification based on municipal population size. In Japan, over 99% of dental offices function under private ownership [19].

Ethical approval and consent procedures

The study protocol received authorization from the ethics review board at the National Institute of Public Health in Saitama, Japan, on August 27, 2020 (Ref #: 12293). The investigation prioritized protecting participants' privacy, ensuring confidentiality, and upholding individual autonomy. Participation was fully voluntary, and only those patients who gave informed consent were included in the survey. Choosing not to participate did not affect the dental care services provided at the clinics.

Sampling and data collection

For estimating the required sample size in this descriptive research, OpenEPI Version 3.01 was employed. Based on a 95% confidence interval, an assumed prevalence of 50% (drawn from dental claim records in Saitama, September 2019), and a 3% margin of error, the minimum number of participants was calculated as 1,066. Considering a projected response rate of 80%, a total of 1,333 surveys were handed out, which corresponded to nearly 0.14% of the mean monthly dental claims in Saitama for fiscal year 2020 [20]. No exclusion standards

were imposed; therefore, every patient visiting the participating clinics during the study timeframe was considered eligible. Questionnaires were provided by the clinics and returned by patients in sealed envelopes. For those unable to fill out the forms on their own because of comprehension challenges, family members, caregivers, or other proxies assisted by completing the responses on their behalf.

Questionnaire contents

The survey developed for this study consisted of three principal parts. The first part gathered basic demographic details of participants, such as their age, gender, place of residence, and frequency of dental visits. The second part examined the effects of the COVID-19 pandemic, including patients' experiences visiting dental clinics during the emergency declaration and their concerns or anxieties related to attending dental appointments. Questions about infection-control-related anxieties included topics such as "clinic facility disinfection," "instrument and equipment sterilization," "ventilation," "hand hygiene practices of staff," "staff mask usage," "interactions with other patients," "aerosols generated by dental equipment," "transport to the clinic," and "other concerns," allowing participants to select multiple applicable items. The final section explored teledentistry, focusing on both previous exposure and anticipated future interest. Participants' preferences for future teledentistry consultations were recorded with three possible responses: "yes," "no," or "unknown."

Data analysis

Initially, descriptive statistics were employed to provide an overview of participants' demographic profiles and key aspects of teledentistry. For continuous variables, results were presented as mean values along with ranges, whereas categorical variables were summarized using counts and percentages. Participants expressing a willingness to utilize teledentistry in the future were assigned to the "demand" group, while those who were not interested were placed in the "non-demand" group. Differences between these groups were evaluated using the χ^2 test. To explore factors influencing anticipated interest in teledentistry, a multiple logistic regression analysis was performed. The outcome variable represented future interest in teledentistry, and predictor variables included age, sex, location of residence, frequency of dental appointments, prior experience with dental care during the emergency declaration, and concerns regarding infection control at the clinic. Covariates incorporated into the model were age, infection-control-related anxiety, and prior dental visits during the emergency period. A two-tailed p-value of less than 0.05 was considered statistically meaningful. All statistical computations were conducted using Stata/MP Version 16.1 (StataCorp, TX, USA).

Results and Discussion

Demographic characteristics

Out of 1,335 distributed questionnaires, 1,312 were returned, corresponding to a response rate of 98.3%. To ensure data reliability, only responses submitted in sealed envelopes were included. From these returns, 1,227 surveys were deemed valid, representing a valid response rate of 93.5%. For the analysis focused on future interest in teledentistry, 835 responses with definitive "yes" or "no" answers were analyzed, while 17 incomplete surveys and 375 "unknown" responses were excluded (**Figure 1**). Among the analyzed participants, 299 individuals (35.8%) expressed interest in future teledentistry and were classified as the "demand" group, whereas 536 individuals (64.2%) formed the "unnecessary" group.

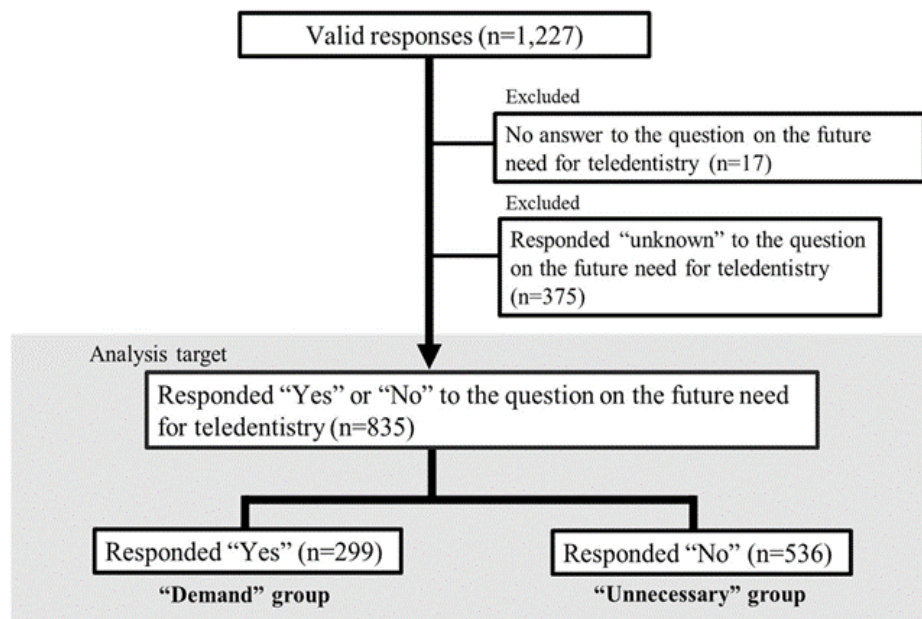


Figure 1. Flow diagram of participant selection.

Table 1 summarizes the demographic profile of the study population. The median age was 57.9 years (range: 3–100), with females representing 54.1% of participants. Furthermore, 14.4% of respondents reported visiting dental clinics more than once per month.

Table 1. Participants' demographic profile (n = 1,227)

		n (%)
1. Demographic information		
Mean (range)		57.9 (3–100)
Age ^a		
0 to 19 years		46 (3.8)
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20 to 29 years		70 (5.8)
30 to 39 years		106 (8.7)
40 to 49 years		144 (11.9)
50 to 59 years		186 (15.3)
60 to 69 years		248 (20.4)
70 to 79 years		309 (25.5)
80 years—		104 (8.6)
Sex ^a		
Male		551 (45.9)
Female		650 (54.1)
Residence ^a		
Saitama		1175 (97.2)
Others		21 (2.8)
Frequency of dental visits ^a		
At least once a month		175 (14.4)
Several times a year		414 (34.0)
Once a year		90 (7.4)
Only when necessary		537 (44.2)
2. Information regarding the impact of the COVID-19 pandemic		
Experience with dental visits during the emergency declaration ^{a, b}		

Visited	397 (33.7)
Wanted to visit a dentist, but refrained	214 (18.2)
Did not intend or plan to visit a dentist	568 (48.2)
Anxiety about infection control during dental visits ^a	
Yes	418 (34.8)
Disinfection of clinic facilities	288 (24.0)
Disinfection of machines and instruments	235 (19.6)
Ventilation	150 (12.5)
Handwashing of staff	83 (6.9)
Wearing masks by staffs	83 (6.9)
Contacts with other patients	163 (13.6)
Splashing water from machines during treatment	101 (8.4)
Transportation when visiting clinics	31 (2.6)
Others	24 (2.0)
No	784 (65.2)
3. Information regarding teledentistry	
Teledentistry experience ^a	
Yes	12 (1.0)
No	1202 (99.0)
Future demand ^a	
Yes	299 (24.7)
No	536 (44.3)
Unknown	375 (31.0)

^a Only individuals who answered each variable are included.

^b Corresponds to the initial state of emergency declared from April to May 2020.

Comparison of “demand” and “unnecessary” groups

Table 2 summarizes the contrasting features of participants who expressed willingness to use teledentistry and those who declined such interest. No meaningful distinctions were found in terms of age, gender, place of residence, dental attendance during the state of emergency, or concerns about infection control. Conversely, a significant variation emerged in how often dental services were utilized ($p = 0.04$), with a higher proportion of the interested group noting that they sought dental care solely when necessary (50.3%).

Table 2. Characteristics of participants showing interest versus no interest in prospective teledentistry services (n = 835).

Demand Group (n = 299)	Unnecessary Group (n = 536)	p ^d
Average Age (Range) ^b		
57.3 (3–91)	59.8 (5–100)	
Age Distribution ^a		0.25
0 to 19 years: 9 (3.1)	14 (2.6)	
20 to 29 years: 20 (6.8)	30 (5.6)	
30 to 39 years: 26 (8.8)	49 (9.2)	
40 to 49 years: 35 (11.9)	48 (9.0)	
50 to 59 years: 55 (18.6)	71 (13.3)	
60 to 69 years: 55 (18.6)	120 (22.4)	
70 to 79 years: 71 (24.1)	156 (29.2)	
80 years and above: 24 (8.1)	47 (8.8)	
Gender ^a		0.32
Men: 133 (44.8)	258 (48.4)	
Women: 164 (55.2)	275 (51.6)	
Place of Residence ^a		0.83
Saitama Region: 288 (97.6)	520 (97.4)	
Other Locations: 7 (2.4)	14 (2.6)	

Dental Visit Regularity ^a	0.04
Monthly or more: 39 (13.1)	81 (15.1)
Multiple times yearly: 91 (30.5)	198 (37.0)
Annually: 18 (6.0)	41 (7.7)
As needed: 150 (50.3)	215 (40.2)
Dental Visit Behavior During Emergency Period ^{a,c}	0.39
Attended appointments: 107 (37.0)	169 (32.8)
Desired to visit but avoided: 44 (15.2)	93 (18.1)
No plans to visit: 138 (47.8)	253 (49.1)
Concerns About Infection Safety in Dental Settings ^a	0.16
Yes: 110 (37.2)	171 (32.3)
No: 186 (62.8)	358 (67.7)

^a Only those who responded to each variable are listed.

^b The numbers show the vertical proportion for each item.

^c Denotes the first emergency period, spanning April to May 2020.

^d χ^2 test ($\alpha = 0.05$).

Logistic regression analyses

The regression analysis was carried out on datasets with no missing observations. In the single-variable model, no noteworthy link was detected between willingness to use teledentistry and the frequency of dental visits. By contrast, in the multivariable model, the tendency to “see a dentist only when absolutely necessary” emerged as an independent predictor of anticipated interest in teledentistry. This category showed an odds ratio (OR) of 1.60, with a 95% confidence interval (CI) ranging between 1.00 and 2.57 (**Table 3**).

Table 3. Results of univariate and multivariate logistic regression analyses

Statistical Analysis of Dental Care Factors				
Independent Variable	Univariate Analysis		Multivariate Analysis ^a	
	OR	(95% CI)	OR	(95% CI)
Age Categories				
0 to 19 years	1.00 (Ref)	—	1.00 (Ref)	—
20 to 29 years	1.04	(0.38–2.85)	1.03	(0.36–2.93)
30 to 39 years	0.83	(0.32–2.16)	0.79	(0.29–2.15)
40 to 49 years	1.13	(0.44–2.92)	1.12	(0.42–2.99)
50 to 59 years	1.21	(0.49–2.99)	1.27	(0.49–3.27)
60 to 69 years	0.71	(0.29–1.75)	0.74	(0.29–1.89)
70 to 79 years	0.71	(0.29–1.71)	0.75	(0.30–1.89)
80 years and above	0.79	(0.30–2.10)	0.60	(0.21–1.71)
Gender				
Men	1.00 (Ref)	—	1.00 (Ref)	—
Women	1.16	(0.87–1.54)	1.10	(0.82–1.50)
Residence Location				
Saitama Region	1.11	(0.44–2.78)	0.99	(0.38–2.56)
Other Areas	1.00 (Ref)	—	1.00 (Ref)	—
Dental Visit Patterns				
Monthly or more	1.00 (Ref)	—	1.00 (Ref)	—
Several times yearly	0.95	(0.61–1.51)	0.96	(0.59–1.57)
Once yearly	0.91	(0.47–1.79)	0.94	(0.46–1.94)
As needed	1.45	(0.94–2.24)	1.60	(1.00–2.57)
Dental Visit Behavior During Emergency				
Attended appointments	1.00 (Ref)	—	1.00 (Ref)	—
Desired to visit but avoided	0.75	(0.48–1.15)	0.66	(0.42–1.03)
No intention to visit	0.86	(0.62–1.19)	0.73	(0.52–1.02)
Concerns About Infection Safety				

Yes	1.24	(0.92–1.67)	1.20	(0.88–1.64)
No	1.00 (Ref)	—	1.00 (Ref)	—

Abbreviations: OR, odds ratio; CI, confidence interval.

^a Age, dental visit frequency, dental visits during the emergency period, and infection-control-related anxiety were included as covariates.

The main aim of this research was to assess the current need for teledentistry among dental patients in Saitama, Japan, and to identify which categories of patients might gain the greatest advantage from its use. A distinct variation in dental visit patterns was found between individuals who showed interest in teledentistry (“interest” group) and those who showed no such preference (“no-interest” group). Results from the multivariate model demonstrated that patients who visited a dentist only when required had a higher probability of favoring teledentistry going forward.

During the COVID-19 pandemic, the number of dental visits in Japan dropped sharply from April to May 2020, coinciding with the initial state of emergency. By September 2020, at the time this study was carried out, the frequency of dental visits had mostly returned to pre-pandemic levels [21]. Patients who normally attended dental clinics less often were more likely to skip appointments during the early months of the pandemic [22]. Reduced access to dental care during this period was especially pronounced among socially vulnerable groups [23].

Teledentistry can support not only patients in remote areas but also those with limited time for in-person consultations. It reduces unnecessary trips to clinics, saves time, and provides a sense of security for patients within their homes [24, 25]. It also facilitates communication between patients and dental professionals [10]. Consequently, some patients may prefer teledentistry rather than foregoing dental care entirely. This interpretation aligns with the finding that patients who visited dentists only when necessary were more likely to indicate interest in future teledentistry services.

A limited number of respondents had ever used teledentistry, suggesting that the service had not yet gained traction in Saitama Prefecture. Although the region borders Tokyo and contains highly urbanized areas, it also includes rural and mountainous districts. In addition, only a small share of dental practices in Saitama offered teledentistry, so many patients may not have been exposed to it [13]. Previous studies have shown that older adults often hesitate to adopt new technologies, partly because of low digital competence, concerns over confidentiality, or attachment to traditional care methods [26]. Awareness of telehealth services also tends to depend on internet use, which is generally less common among the elderly [27]. These patterns emphasize the need to adapt teledentistry to generational habits and differing levels of digital access.

One possible reason for the slow uptake of teledentistry in both Saitama and Japan overall is that dental treatment usually requires in-person procedures beyond remote advice, virtual monitoring, or behavioral counseling [11, 12]. Additional barriers include limited technical infrastructure, insufficient practitioner training, challenges with reimbursement systems, and persistent concerns about data security [28]. Another contributing factor is that, at the time of data collection, teledentistry had not yet been fully integrated into Japan’s insurance system. In June 2024, the National Health Insurance Program—covering dental services for all residents—started reimbursing both initial and follow-up teledentistry consultations. Since this policy change, more dental providers have begun experimenting with the service, and broader use is expected moving forward.

Further investigation is needed to clarify which types of treatment are required by individuals who seek dental care only on an occasional basis, and how these needs could align with teledentistry. Findings from this study indicated that many participants expressed interest in such services. Even if dental professionals do not yet provide teledentistry as part of routine practice, they should be ready to introduce it quickly when demand rises.

The results of this research need to be understood in light of certain constraints. To begin with, the survey was limited to dental facilities in Saitama Prefecture, although the 19 regions of the area were represented through stratified selection. Another limitation is recall error, since participants were asked to report on clinic visits that occurred 4–5 months earlier. A further issue is that the questionnaires were distributed during the COVID-19 outbreak, meaning that interest in teledentistry might have been shaped more by the extraordinary circumstances than by long-term habits. In addition, no questions about financial background were included. Distribution and collection of questionnaires within the clinics may also have introduced selection bias, as not all patients had the same opportunity to take part. Finally, in cases where respondents such as young children or elderly people required help completing the forms, answers might have been influenced by companions. Even so, the age distribution in this dataset resembled that reported in the Ministry of Health, Labour and Welfare’s national dental survey, suggesting that the sample broadly reflects the characteristics of dental patients in Japan.

Although the two patient groups were uneven in size—reflecting actual demand—statistical reliability was maintained. Adjustments for covariates and use of proper analytical techniques ensured that the imbalance did not distort the conclusions. Moreover, the absence of meaningful differences in central variables such as sex, age, or place of residence further justifies the direct comparison of proportions, as shown in **Table 2**.

Conclusion

Overall, the key difference between groups related to how often patients visited dental practices. Those who sought treatment “only when necessary” were significantly more likely to express interest in teledentistry compared with those attending “once a month or more” (adjusted OR = 1.6). These findings suggest that remote dental care could play a role in serving people who do not regularly attend clinics. Still, the safety and effectiveness of such services must be verified in real-world practice to ensure they meet patient expectations. Future work should also clarify the types of services most needed by irregular attenders and how teledentistry can be adapted to address them.

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