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Original Article

Effect of COVID-19 on dental telemedicine in Japan

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Abstract *Background/purpose:* In Japan, medical and dental care is provided by the universal health insurance system. The Ministry of Health, Labour, and Welfare (MHLW) in Japan sets the rules for health care services provided by health insurance. The MHLW issued a notice in 2020 permitting telemedicine and dental telemedicine for the first visit and for follow-up visits to prevent the spread of COVID-19 infection. We conducted this study to clarify the status of dental telemedicine during 2020.

Materials and methods: We used data from lists obtained on the MHLW website in the analysis. We investigated the number of dental institutions conducting dental telemedicine for the first visit and for follow-up visits by prefecture.

Results: In each prefecture, fewer dental institutions conducted telemedicine for the first visit than for follow-up visits. Regions with large metropolitan areas had higher numbers of dental institutions conducting dental telemedicine for the first visit and follow-up visits. Private dental clinics provided the largest proportion of dental telemedicine for the first visit, and general hospitals provided the largest proportion for follow-up visits.

Conclusion: Our study findings indicated that many dental institutions in Japan made efforts to provide dental services via dental telemedicine using the telephone or online with video to

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help prevent the spread of COVID-19 infection. Dental telemedicine can help patients to access dental services and dental care, thereby expanding the potential of dental telemedicine in Japan.

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Introduction

In Japan, medical care is provided through the universal health insurance system. The Ministry of Health, Labour, and Welfare (MHLW) in Japan sets the rules for health care services provided by health insurance. In 1997, the MHLW first approved telemedicine as a service to complement face-to-face consultations. In principle, patients should be treated in person at their first visit, but telemedicine was allowed for follow-up visits in a limited number of patients. Such patients include those who live on remote islands and remote areas or patients with chronic diseases, such as diabetes, who are homebound.¹ However, the use of telemedicine is not widespread owing to restrictions. However, the MHLW issued a notice in 2015 that triggered the expansion of telemedicine. This notice² stated that telemedicine should be appropriately combined with direct face-to-face consultation; however, telemedicine was not still not allowed for the first visit. Another notice was issued by the MHLW in 2017 indicating that it was not a violation of the Medical Practitioners Act and the Dental Practitioners Act in Japan to conduct telemedicine using email or SNS text messaging.³ The notice also permitted smoking cessation clinics to offer only telemedicine consultations, although with restrictions. In 2018, the MHLW established guidelines for the appropriate implementation of telemedicine.⁴ These guidelines accelerated the expansion of telemedicine in follow-up visits.⁴ However, telemedicine for the first visit was still not permitted. The guidelines were revised in 2019 based on social background. Telemedicine was allowed for the first visit in exceptional cases, with restrictions. As a general rule, face-to-face consultation was required after a first visit conducted via telemedicine. With the emergence and spread of COVID-19 in 2020, the MHLW finally lifted the ban on telemedicine and dental telemedicine for the first visit, on a limited and exceptional basis.⁵ The MHLW has indicated that dental telemedicine for the first visit is scheduled to be terminated once the COVID-19 epidemic is under control in Japan. Therefore, we examined the status of dental telemedicine during 2020 in Japan, which was temporarily permitted owing to the COVID-19 pandemic.

Materials and methods

Dental institutions in Japan providing visits via dental telemedicine

From April 10, 2020 the MHLW has permitted first visits and follow-up visits to be conducted over the phone or online with video for medical and dental services provided via the

universal health insurance system in Japan.⁵ On its website, the MHLW provided a list of medical and dental institutions in every prefecture that conducts telemedicine and dental telemedicine.⁶ We collected all lists from the MHLW website and extracted the data related to dental services. These data were analyzed and assessed using Qlik Sense® February 2018 (Qlik Technologies, Inc., King of Prussia, PA, USA).

Classification of dental institutions

We divided dental institutions into three groups: hospitals, university hospitals, and clinics. Hospitals comprised general hospitals with any dentistry department, like oral surgery, not including university hospitals. University hospitals comprised medical and dental university hospitals with any dentistry departments, not including general hospitals. Clinics comprised private dental clinics with multiple dentistry departments, such as dentistry, oral surgery, orthodontics, and pedodontics.

Definitions of visits

We defined telemedicine conducted over the phone or online with video in the first visit as “dental telemedicine for the first visit” and follow-up visits conducted over the phone or with video as “dental telemedicine for follow-up visits.”

Classification of dental specialties in dental institutions

According to Japanese law, the MHLW defines clinical departments in dentistry as dentistry, oral surgery, orthodontics, and pedodontics. Each dental institution can choose its clinical department title from among these four titles and can advertise using the clinical department title that it chooses.

Classification according to regions of Japan

Japan has 47 prefectures. We divided the country into eight regions, with prefecture as the unit, as follows: Hokkaido, Tohoku, Kanto, Chubu, Kinki, Chugoku, Shikoku, and Kyushu/Okinawa. Hokkaido includes Hokkaido only. Tohoku includes Aomori, Iwate, Akita, Miyagi, Yamagata, and Fukushima. Kanto comprises Ibaraki, Tochigi, Gunma, Saitama, Chiba, Tokyo, and Kanagawa. Chubu comprises Niigata, Toyama, Ishikawa, Fukui, Yamanashi, Nagano, Gifu, Shizuoka, and Aichi. Kinki comprises Mie, Shiga, Kyoto, Osaka, Hyogo, Nara, and Wakayama. Chugoku includes Tottori, Shimane, Okayama, Hiroshima, and Yamaguchi. Shikoku comprises

Tokushima, Kagawa, Ehime, and Kochi. Kyushu/Okinawa comprises Fukuoka, Saga, Nagasaki, Kumamoto, Oita, Miyazaki, Kagoshima, and Okinawa (Fig. 2A).

Results

The number of dental institutions conducting dental telemedicine for the first visit is shown in Fig. 1A & Table 1A. Ishikawa had the highest number of dental institutions conducting dental telemedicine for the first visit. Fig. 1B & Table 1B show the number of dental institutions conducting dental telemedicine for follow-up visits. More dental institutions conducted dental telemedicine for follow-up visits than for first visits. Okayama and Nara did not conduct dental telemedicine for follow-up visits.

Fig. 2A shows the eight regions of Japan. Fig. 2B summarizes the distribution of dental institutions conducting dental telemedicine for the first visit in the eight regions. Chubu was the region with the most first visits conducted via dental telemedicine. The distribution of the number of dental institutions conducting dental telemedicine for follow-up visits is presented in Fig. 2C. Chubu and Kanto had the highest number of dental institutions conducting telemedicine among the eight regions.

Fig. 3A summarizes the distribution of each group according to dental institution. We found that clinics conducted the most first visits via telemedicine and hospitals conducted the most follow-up visits. The number of dental institutions conducting dental telemedicine in the eight regions for the first visit or for follow-up visits is shown in Fig. 3B and C, respectively. These results revealed that more clinics in Chubu conducted dental telemedicine for the first visit than in other regions. More hospitals in Chubu, Kanto, and Kinki used telemedicine for follow-up visits than in other regions.

Dental institutions conducting telemedicine for the first and follow-up visits in each dental specialty group are listed in Fig. 4A and B, respectively. Among all dental specialty groups, the dentistry group conducted the most first visits via telemedicine, and the oral surgery group conducted the most follow-up visits.

Discussion

Studies examining the possibility of dental telemedicine began around 2000 in Japan. Research on dental practice support using information technology (IT) devices has progressed since then, coupled with the rapid increase in the use of cell phones and broadband in Japan.⁶ There are numerous published reports on the use of IT devices to examine and diagnose patients with orthodontic, pediatric, feeding and swallowing, and temporomandibular joint diseases.^{7–10} Several studies have reported the use of IT devices for dental telemedicine in 2020 to help prevent the spread of COVID-19 infections.^{11–14}

Ishikawa had the most dental institutions conducting dental telemedicine for the first visit ($n = 18$). Thirty dental institutions conducted dental telemedicine for follow-up visits in Tokyo, 23 in Ishikawa, and 18 in Aichi. In Ishikawa, all 18 dental institutions conducting dental telemedicine for the first visit were clinics; of 23 dental institutions

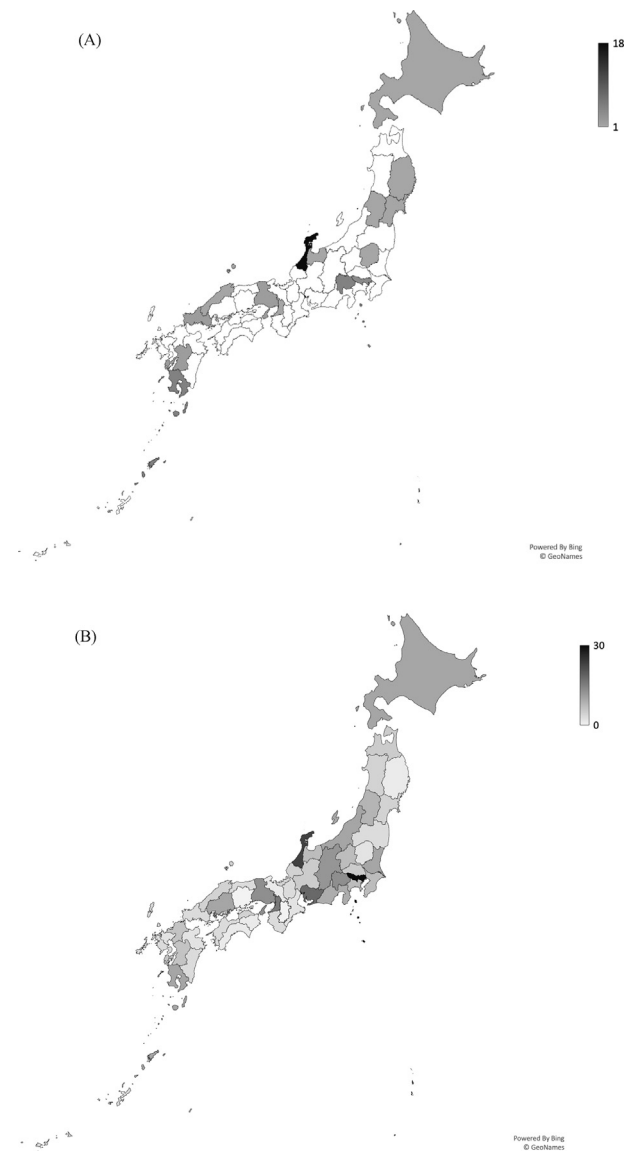


Figure 1 (A) Dental institutions conducting dental telemedicine for the first visit in each prefecture. (B) Dental institutions conducting dental telemedicine for follow-up visits in each prefecture.

conducting dental telemedicine for follow-up visits, 22 were clinics and 1 was a hospital (Fig. 1 & Table 1). We contacted the Ishikawa Dental Association to determine why Ishikawa has more dental institutions than any other prefecture. The vice president of the association, Dr. Mamoru Ohnori, DDS, PhD, who graduated from Kyushu Dental University, provided information related to using email (2020/11/11). Dr. Ohnori indicated that the number of dental institutions conducting dental telemedicine for the first visit and for follow-up visits in the prefecture might have increased to prevent the spread of COVID-19 infections because many clusters occurred in regional core hospitals during the first epidemic wave of COVID-19 in Japan.

Fig. 2A shows the classification of dental institutions in the eight regions, which suggests differences in the

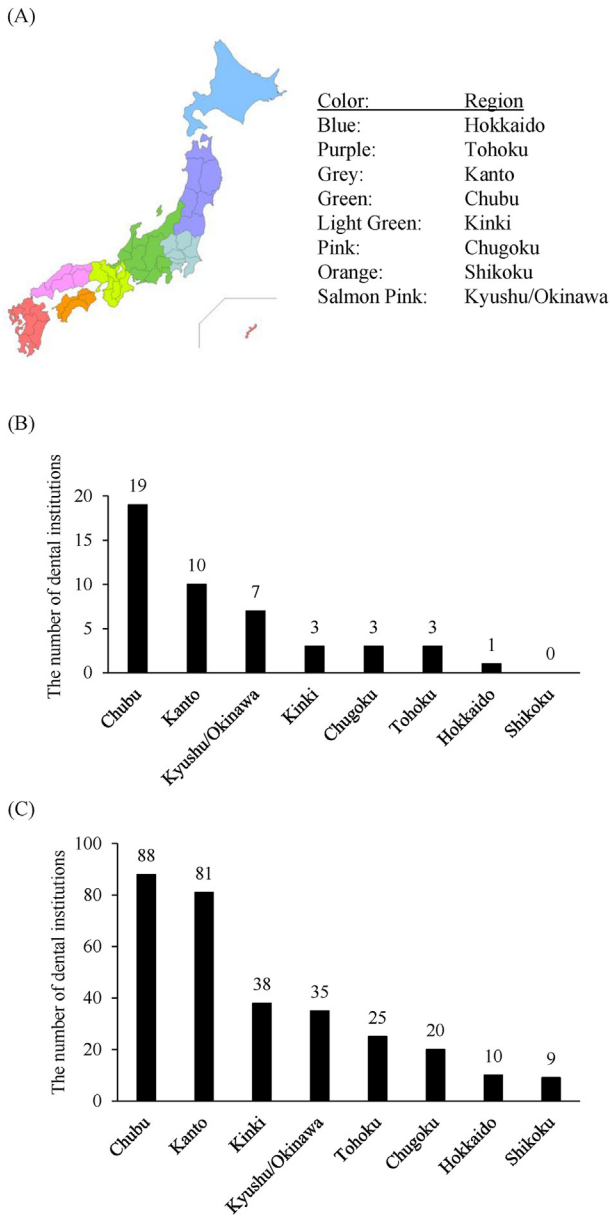


Figure 2 (A) Eight regions of Japan. (B) Dental institutions conducting dental telemedicine for the first visit in each region. (C) Dental institutions conducting dental telemedicine for follow-up visits in each region.

implementation of dental telemedicine in each region. We found that the Chubu region, to which Ishikawa belongs, has the most dental institutions conducting dental telemedicine for the first visit and follow-up visits among all regions (Fig. 2B and C). These results suggested that high demand among patients in metropolitan areas such as in Kanto, Kinki, and Kyushu/Okinawa, including Tokyo, Osaka, and Fukuoka, respectively, may result in regions with large metropolitan areas ranking higher in terms of the number of dental institutions conducting dental telemedicine for follow-up visits, except for the Chubu region.

Clinics conducted a large number of first visits via dental telemedicine (n = 36, Fig. 3A). This finding illustrates the efforts of private dental practitioners to respond to the

Table 1 (A) The number of dental institutions conducting dental telemedicine for the first visit in each prefecture. (B) The number of dental institutions conducting dental telemedicine for follow-up visits in each prefecture.

Prefecture	Number of dental institutions
Ishikawa	18
Yamanashi	5
Kagoshima	5
Tokyo	4
Kumamoto	2
Yamaguchi	2
Hyogo	2
Iwate	1
Miyagi	1
Yamagata	1
Osaka	1
Shimane	1
Tochigi	1
Toyama	1
Hokkaido	1

Prefecture	Number of dental institutions
Tokyo	30
Ishikawa	23
Aichi	18
Osaka	16
Yamanashi	13
Hyogo	13
Nagano	12
Ibaraki	10
Hiroshima	10
Kagoshima	10
Niigata	10
Hokkaido	10
Yamagata	8
Shizuoka	9
Gunma	7
Kanagawa	7
Chiba	7
Toyama	7
Kumamoto	6
Fukuoka	6
Gifu	5
Saitama	5
Aomori	5
Miyagi	4
Kagawa	4
Akita	4
Shimane	4
Fukui	4
Ehime	3
Okinawa	3
Miyazaki	3
Yamaguchi	3
Shiga	3
Nagasaki	3
Tottori	3
Fukushima	3
Wakayama	3
Saga	2

(continued on next page)

Table 1 (continued)

Prefecture	Number of dental institutions
Mie	2
Oita	2
Tochigi	2
Iwate	1
Kyoto	1
Kohchi	1
Tokushima	1
Okayama	0
Nara	0

needs of their patients. General hospitals are located in all prefectures. It is likely that oral surgery was conducted in the same way as telemedicine for follow-up visits in most medical departments because oral surgery is the most common dental department in general hospitals (Fig. 3C). Many hospitals required referral letters for patients at their first visit because the MHLW set this requirement in Japan's universal health insurance system. This suggests that the number of dental institutions did not increase in the hospital group because it was difficult to conduct the first visit via telemedicine without referral documents that included patients' information. The same situation existed in the university hospital group as in the hospital group. The

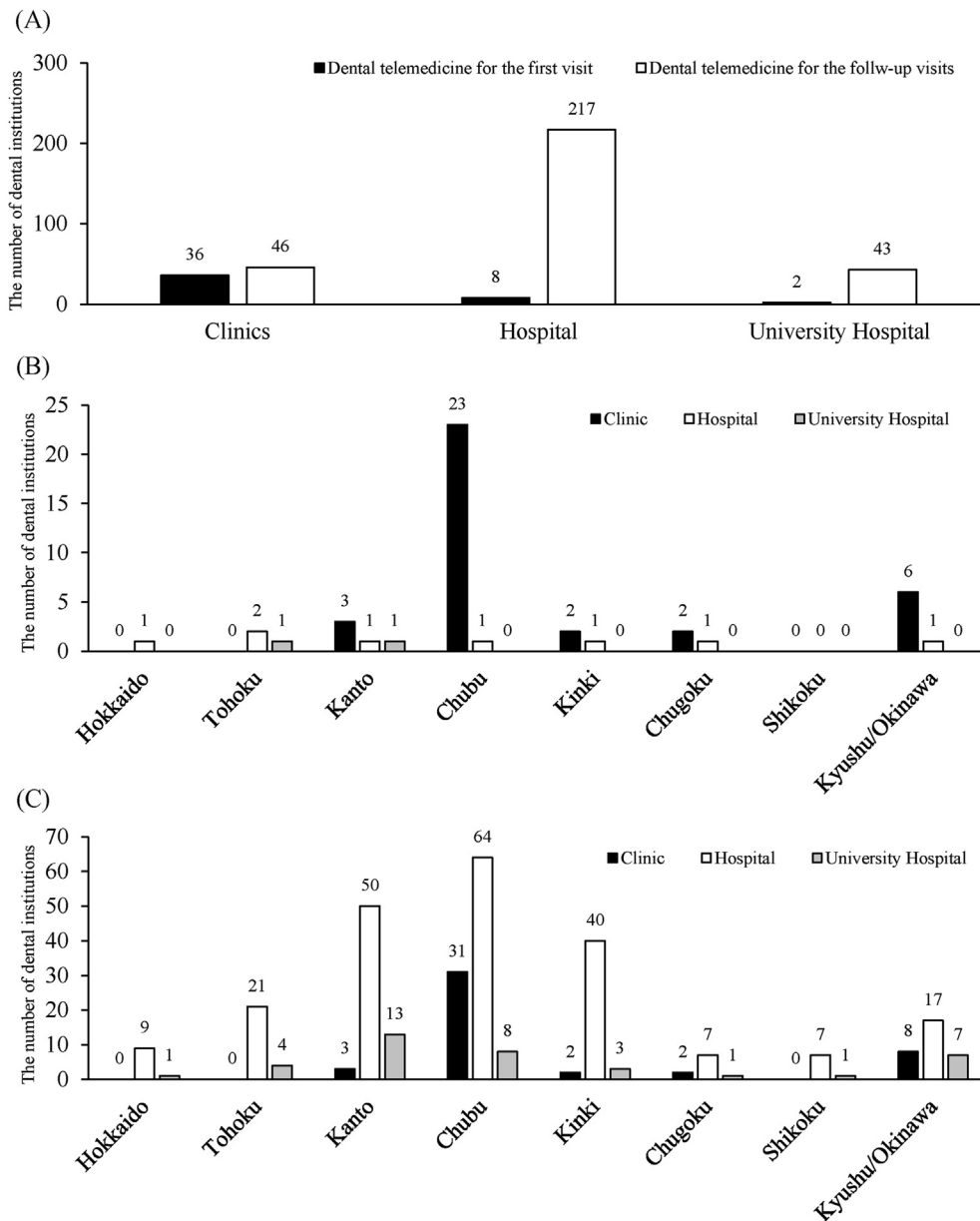


Figure 3 (A) Dental institutions conducting dental telemedicine for the first visit and follow-up visits in each group. (B) Dental institutions conducting dental telemedicine for the first visit in each region and group. (C) Dental institutions conducting dental telemedicine for follow-up visits in each region and group.

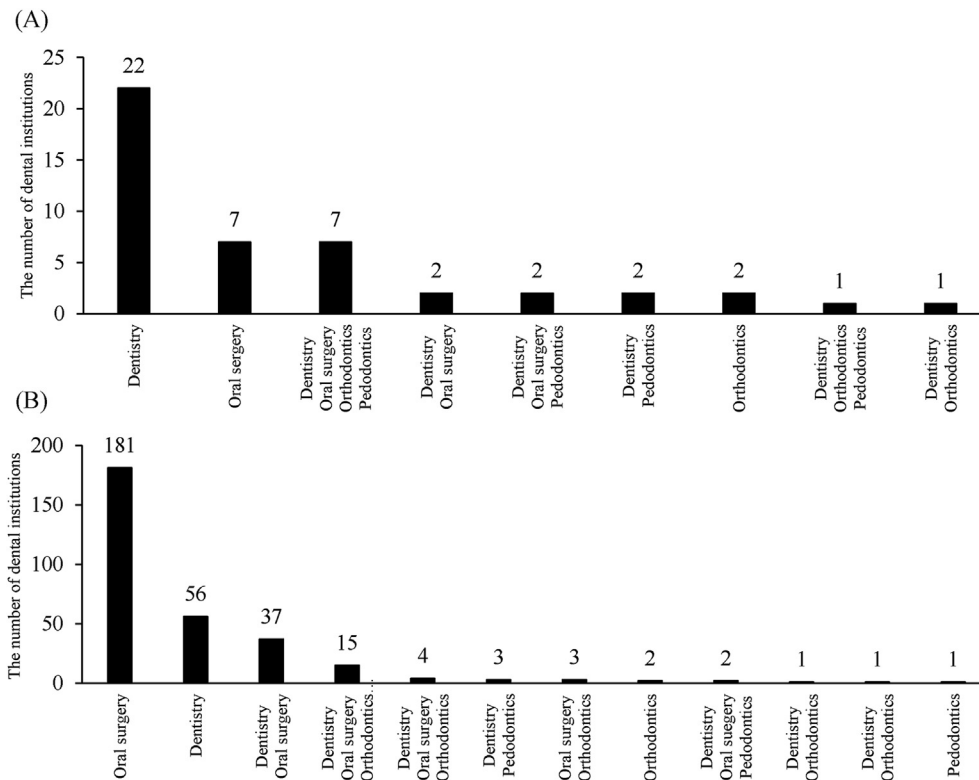


Figure 4 (A) Dental institutions conducting dental telemedicine for the first visit in each dental specialty group. (B) Dental institutions conducting dental telemedicine for follow-up visits in each dental specialty group.

MHLW has designated university hospitals as hospitals with specific functions, and extra fees apply for patients who attend their first visit without referral documents. Hospitals accounted for the largest proportion of institutions conducting dental telemedicine for follow-up visits, with 217 cases (Fig. 3A). Because hospitals issue prescriptions to patients in follow-up visits to the hospital, it was assumed that many hospitals could conduct telemedicine for these follow-up visits; this was also the case in many university hospitals. Our findings also indicated that private dental clinics adapted so as to be able to issue prescriptions for their patients in follow-up visits.

Although not shown in the Figure, according to data of the 11th Study Group on the Review of Guidelines for the Appropriate Implementation of Online Medical Treatment from the MHLW in Japan, the average number (percentage) of telephone or online consultations from April to September 2020 was 4471 (64.1%) telephone consultations, 1785 (25.1%) online consultations using IT devices, and 741 (10.7%) consultations of unknown type.¹⁵ Telephone consultation was the primary telemedicine method for the first visit and for follow-up visits in the medical field; the same situation is presumed for the dental field. These results suggested that prescriptions were issued in telephone consultations with medical institutions conducting telemedicine for follow-up visits, not in telemedicine consultations using IT devices. It is expected that family physicians provide refill prescriptions to patients with chronic diseases in telephone consultations. However, examinations and diagnoses of patients who had never been

to a hospital or clinic prior to an initial telephone consultation cannot substitute face-to-face consultation. Accurate diagnosis via telemedicine is challenging because it is not supplemented with visual information and the patient's medical history, systemic diseases, and profile are unknown. This would support our finding that fewer dental institutions conducted dental telemedicine for the first visit than for follow-up visits.

The abovementioned study group indicated that telemedicine's following directions use IT devices; the ban on telemedicine, including for the first visit, should be lifted on the basis of its safety and reliability, in principle. Telemedicine should be conducted using video rather than by telephone. The study group highlighted that to solve the problem of safety and reliability in telemedicine, improving the accuracy of diagnosis using video is necessary.

Data of the above study group showed that among patients who received telephone consultation or online consultation, those aged 0–10 years accounted for the largest proportion, with 31.59% and 33.91%, respectively, which suggests that parents who wanted to prevent their children from COVID-19 infection preferred telephone or online consultations (data not shown).¹⁵ Patients aged 20–40 years would be likely to use smartphones daily, have a certain level of IT literacy, and have access to an environment in which telemedicine was readily available. Conversely, older people who do not use smartphones or tablets would be unable to participate in telemedicine visits. Data of the above study group also showed that the proportions of patients aged 0–40 and 41–100 years who had

telephone consultations were 77.47% and 22.52% and of those who had online consultation were 76.66% and 23.28%, respectively.¹⁵

Several companies provide telemedicine systems for medical and dental institutions in Japan. Medical and dental institutions can begin to use such systems by paying an initial fee and a monthly maintenance fee. The reimbursement fee for dental telemedicine is not as high as that for in-person consultation in the Japanese insurance system; this may be a factor preventing the growth of dental telemedicine use in Japan. Dental telemedicine has clear advantages in preventing the spread of COVID-19 infection in younger people and those with high IT literacy. Some dental practitioners in private dental clinics use dental telemedicine as a tool to attract patients to their clinics. New business models using dental telemedicine should be developed in the future, and we hope that barriers to their use will be lifted. Telemedicine and dental telemedicine are new methods that can help to expand access to medical and dental care in Japan.

Declaration of competing interest

The authors have no conflicts of interest relevant to this article.

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