Knowledge and Awareness of Teledentistry among Dentists and General Population during Covid-19 Pandemic – A Cross-Sectional Study

Noopur Narayane*[1], Rajesh Gaikwad[2], Nilofar Attar[3], Veena Vishwanath[1]

[1]Post Graduate student, Department of Periodontology, Government Dental college and Hospital, Mumbai, India. [2]Professor, Department of Periodontology, Government Dental College and Hospital, Mumbai, India. [3]Associate Professor, Department of Periodontology, Government Dental college and Hospital, Mumbai, India.

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ABSTRACT

Teledentistry (TD) is a combination of telecommunications and dentistry which involves the exchange of clinical information and images over remote distances for dental consultation and treatment planning. During Covid-19, all major procedures in dentistry have been suspended. TD can be considered an innovative solution to restart dental practice during this scenario. Hence it is important to assess knowledge and awareness of TD among dentists and the general population during Covid-19 pandemic. A cross-sectional observational study was conducted among dentists and the general population over four weeks. An online structured self-explanatory questionnaire with a consent form attached to it was developed. The link of the questionnaire was sent as Google e-forms through various social messaging apps and social media. The response rate for the survey was 96.09%. Most of the dentists were aware of TD (83.1%) whereas 57.2% of the general population were ignorant about TD. However, the majority of the dentists (79.2%) and the general population (75.1%) agreed that TD was helpful during the ongoing Covid-19 pandemic.There is a further need to improve the knowledge and promote TD which can only be achieved by conducting continuing dental education programs and awareness campaigns which will help in professional advancement as well as in the betterment of oral health-care delivery to the general public.

INTRODUCTION

In this era of modern medicine, dentistry has been constantly changing with the advent of extensive technologic innovations. The science of dentistry has crossed much longer distances using advanced information technology which has not only improved the quality of management of dental patients but also has made it possible to diagnose and provide advice about treatment over a distance. The entire process of networking, sharing digital information, distant consultations, workup, and analysis are made possible by a segment of the science of telemedicine concerned with dentistry known as "Teledentistry (TD)." [1]

On the other hand, it is a combination of telecommunications and dentistry which involves the exchange of clinical information and images over remote distances for dental consultation and treatment planning. [2] The term "Teledentistry" was first used in 1997 when Cook defined it as "the practice of using video-conferencing technologies to diagnose and provide advice about treatment over a distance."[3]

TD mainly comprises of two techniques; real-time consultation and technique of store and forwards. Real-time consultation involves video-conferencing where the dentist and the patients communicate with each other using ultra-high bandwidth network connections. The technique of store and forward incorporate the exchange of clinical knowledge and images stored inside the telecommunication device. [4]

Covid-19 pandemic has challenged the existing healthcare systems across the globe. As a result most routine dental procedures all around the world, have been suspended, and only emergency dental procedures and surgeries are being performed. Due to fear of contracting the disease, people were reluctant to seek treatment from dental clinics. However, looking at the current increasing trend of Covid-19 cases, we can undoubtedly say that this pandemic will not end anytime soon. Therefore dental practice has to be reorganized to continue dental care with minimal risk of cross-infection. [5] Here, TD comes in picture, where patients can reach their dentists through various digital telecommunication methods. Hence it is important to make dentists as well as the general public aware of this tool of dentistry and its wide range of possibilities. Many studies were conducted to assess the knowledge and attitude levels of TD amongst dentists, but there is limited published evidence to show general public readiness and

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acceptance of TD services. To the best of our knowledge, this was the first study undertaken to assess knowledge and awareness of TD among dentists and the general population during Covid-19 pandemic.

MATERIALS AND METHODS:

A cross-sectional observational study was conducted among dentists and the general population over four weeks. Ethical clearance was obtained by the Institutional Ethical Committee (IEC) bearing a registration number 4126/2020. The sample size was calculated according to the given formula. [6]

$$n = \frac{1.96^2 \, p(1-p)(DEFF)}{d^2}$$

Where p = Estimate of the expected proportion

d = Desired level of absolute precision

Assuming the current prevalence/event rate to be at least 60%.

Keeping 5% confidence limit, for p = 0.05

The sample size required for the present study was calculated as 368.79 which was rounded off to 370 participants.

Inclusion Criteria

• Participants willing to give informed consent for participation through Google forms.

Exclusion Criteria

• Five reminders were given through e-mail with an interval of two days and participants who did not respond were excluded from the study.

The questionnaire was formed on three sections: the first section involved questions regarding demographic details, the second part consisted of questions targeting dentists, and third part consisted of questions targeting the general population. A set of questions in English about

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various domains were prepared based on a literature review and emailed to five experts in the field to perform content validation. The reliability of the questionnaire was assessed by Cronbach's alpha value with a median of 0.87 showing good reliability. An online structured self-explanatory questionnaire with a consent form attached to it was developed. The link of the questionnaire was sent as Google e-forms through various social messaging apps and social media. Participants were automatically directed to the study details and informed consent after obtaining and clicking the link. When they decided to take the survey, the demographic details were filled in. Then, sequentially, a sequence of several questions emerged, which the participants were to answer. Every participant was allowed to give only one response. Completeness and consistency were checked for the collected information. Descriptive statistics of student's responses to different questions were assessed using IBM SPSS (Statistical Package for Social Sciences) Version 21.0, Chicago.

RESULTS AND DISCUSSION:

RESULTS

Among the 410 participants, 394 completed the questionnaire, yielding a response rate of 96.09%. Analysis of sociodemographic characteristics revealed that the majority of the participants were general population (53.2%) belonging to the age group between 18-30 years (85.4%), living in urban areas (84.7%) as shown in Figure 1,2,3.

Analysis of knowledge and awareness of TD among dentists revealed that most of the dentists were aware of TD (83.1%), most of them knew that (84.7%) TD was about the practice of using computers, the internet, and technologies to diagnose and provide advice about treatment, over a distance. Most of them (79.2%) agreed that TD was helpful during the ongoing Covid-19 pandemic and is the safest option for dentists (73.2%) to deliver dental care. Around 57.9% of dentists agreed that teledentistry could be applied in any branch of dentistry. TD is good for e-learning and for training primary health-care dentists, which was agreed by 68.9% of dentists. A large proportion of the dentists (76.5%) stated that TD was useful in improving the access to oral healthcare. TD will be able to monitor the patient's condition well, and the same was agreed by 44.8% of dentists. Around 40.4% of dentists suggested that dental examinations were not accurate via computers and intraoral camera when compared to a traditional office setting and

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23.5% of dentists were uncertain about the same. Most of the dentists (58.5%) agreed that it cannot be accessible to all the strata of society including the poor and illiterates. Around 41.8% of dentists stated that TD can increase the accessibility of the specialists to rural and underserved communities for their dental needs. Most of them (74.9%) agreed that TD is accessible to patients who are quarantined. Oral health maintenance and post-treatment follow-up are the best things possible, as suggested by most of the dentists (80.3%) in TD. Around 43.7% of dentists stated that it will help in reducing costs for dental practices and 37.7 % of dentists were uncertain about the same. Around 49.2% stated that it will ease the financial burden on dentists in these challenging times of Covid-19. According to the majority (56.3%), TD saves time for the dentist. Most of the dentists (54.6%) were not practicing TD during this Covid-19 pandemic and 68.3% of dentists never practiced TD. Most of the dentists (49.2%) agreed that they will practice TD post Covid-19 as depicted in Table 1 and figure 4.

Analysis of knowledge and awareness of TD among general population revealed that, majority of the general population (57.2%) were not aware of it. Around 37% of general population had visited a dentist 3-6 months back and almost 20.7% never visited a dentist. Most of them (45.2%) visits dentists very rarely, that too only in urgent cases. Most of the general population were aware that TD is about the practice of using computers, Internet, and technologies to diagnose and provide advice about treatment. About 44.2% of the general population fear most, about pain at the clinic. The majority (79.3%) were anxious about getting infected by a coronavirus from a dental clinic. Most of the general population (87%) didn't experience any emergency dental condition during the lockdown period and those who experienced it, tried to contact the dentist over phone. Around 56.7% of general population were uncertain about the accuracy of dentists to diagnose the dental condition using TD. Around 40.4% of general population stated that TD is cheaper than the usual visit to a dental clinic and 45.2% were uncertain about the same. Most of the general population (84.1%) agreed that TD is convenient to address people with a higher risk of infection to coronavirus such as the elderly, those with existing medical conditions, children. Around 75.1% of the population considered TD as more convenient to the people during the lockdown. Data provided to dentist through TD will be safe and confidential, which was agreed by 83.2% of general population. Around 46.6% population stated that they will be able maintain their oral health with the help of telecommunication with

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dentist.TD is convenient for 47.6% of the population for follow ups. Around 45.2% preferred TD over usual visits, for the consultation post Covid-19 as shown in Table 2.

DISCUSSION

TD is a fast-advancing branch that is an effective combination of technology with dentistry. This enables the effective exchange of information and knowledge between patient and doctor and among various specialists for better treatment planning and outcome. It is a useful tool for both the patient and doctor. It can also be used to assist general dentists with speciality work and improve services to underserved populations such as in rural or less developed areas. [7]

In today's circumstances of ongoing Covid-19 pandemic, the main aim is to avoid person-to-person contact. TD can be incorporated into routine dental practice as it offers a wide range of applications such as distant triaging of the suspected Covid-19 patients for dental treatment and decreasing the unnecessary exposure of healthy or uninfected patients by reducing their visits to already burdened dental offices and hospitals. [5] Considering this present scenario, it has become important to assess the knowledge and awareness regarding TD among dentists as well as the general public.

In our study, we observed that most of the dentists were aware of TD and considered it as the safest option for dentists to deliver dental care during the ongoing Covid-19 pandemic which was in accordance with the study conducted by Bhanushal et al.[8] where the author stated that TD could help dentists to assist patients without adding the risk of cross-infection. According to our study TD is good for training primary health-care dentists which was in line with a study conducted by Bavaresco *et al.*[9]where he proved that teleconsultation has been shown to reduce the number of referrals from primary health canters to higher canters. In our study, nearly half of dentists suggested that dental examinations were not accurate via computers and intraoral camera, when compared to a traditional office setting and few were uncertain about the same which was in contrast with study reported by Queyroux*et al*. [10] where TD showed excellent accuracy for diagnosing dental pathology. Oral health maintenance and post-treatment follow-up were the best things possible as suggested by most of the dentists in our study but according to Arora *et al.*[11] TD worked best in the field of oral medicine and radiology as teleconsultation and teleradiology were the most feasible options.

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Most of the general public in our study were not aware of TD however they agreed that it was convenient to address people with a higher risk of infection to coronavirus and as a convenient method of consultation to the people during the lockdown which was in accordance with the study conducted by Rahman *et al*.[11] where he found that TD system would be very useful in saving time and a substantial proportion would use this system again in light of Covid-19.

Even though TD is a promising branch, dentists and the general public lack acceptance towards it. This can be attributed to the fact that they may find it complex and may be resistant to new skills They may be technologically challenged, afraid of making an inaccurate diagnosis, and concerned about increased costs and expenses. There may be constraints related to infrastructures, such as poor internet access, shortage of hardware, lack of training, lack of technical support and expertise. Two-dimensional representation of lesions and inability to perform tests like palpation and auscultation are other limitations. To overcome these challenges, dentists must be trained adequately and educated about this technology, which will increase the acceptance of TD [12,13,14]. Moreover, proper awareness programs about teledentistry should be conducted among the general population, to train and make them conscious about its fullest potentialities.

CONCLUSION:

Dentistry constitutes a vital part of our healthcare system, which has become severely compromised during the current pandemic of Covid-19. The need of the hour is to integrate TD into routine dental practices so that it can complement the existing compromised dental practices. Moreover, there is a further need to improve the knowledge and promote TD which can be achieved by conducting continuing dental education programs and awareness campaigns that will help in professional advancement as well as in the betterment of oral health-care delivery to the general public.

REFERENCES:

1. Jampani ND, Nutalapati R, Dontula BS, Boyapati R. Applications of teledentistry: A literature review and update. Journal of International Society of Preventive & Community Dentistry. 2011 Jul;1(2):37.
2. Yoshinaga L. The use of teledentistry for remote learning applications. Practical procedures & aesthetic dentistry: PPAD. 2001 May;13(4):327.

Citation: Noopur Narayane et al. Ijsrm.Human, 2021; Vol. 17 (4): 58-71.

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3. Fricton J, Chen H. Using teledentistry to improve access to dental care for the underserved. Dental Clinics. 2009 Jul 1;53(3):537-48.

4. Pradhan D, Verma P, Sharma L, Khaitan T. Knowledge, awareness, and attitude regarding teledentistry among postgraduate dental students of Kanpur city, India: A questionnaire study. Journal of education and health promotion. 2019;8.

5. Ghai S. Teledentistry during COVID-19 pandemic. Diabetes & Metabolic Syndrome: Clinical Research & Reviews. 2020 Sep 1;14(5):933-5.

6. Gorstein J, Sullivan KM, Parvanta I, Begin F. Indicators and methods for cross-sectional surveys of vitamin and mineral status of populations. The Micronutrient Initiative (Ottawa) and the Centers for Disease Control and Prevention (Atlanta). 2007 May;53.

7. Boringi M, Waghray S, Lavanya R, Babu DB, Badam RK, Harsha N, Garlapati K, Chavva S. Knowledge and awareness of teledentistry among dental professionals–A cross sectional study. Journal of clinical and diagnostic research: JCDR. 2015 Aug;9(8):ZC41.

8. Bhanushali P, Katge F, Deshpande S, Chimata VK, Shetty S, Pradhan D. COVID-19: Changing Trends and Its Impact on Future of Dentistry. International Journal of Dentistry. 2020 May 29;2020.

9. Bavaresco Cs, Hauser L, Haddad Ae, Harzheim E. Impact of teleconsultations on the conduct of oral health teams in the Telehealth Brazil Networks Programme. Brazilian Oral Research. 2020;34.

10. Queyroux A, Saricassapian B, Herzog D, Müller K, Herafa I, Ducoux D, Marin B, Dantoine T, Preux PM, Tchalla A. Accuracy of Teledentistry for diagnosing dental pathology using direct examination as a gold standard: results of the Tel-e-dent study of older adults living in nursing homes. Journal of the American Medical Directors Association. 2017 Jun 1;18(6):528-32.

11. Arora PC, Kaur J, Kaur J, Arora A. Teledentistry: An innovative tool for the underserved population. Digital Medicine. 2019 Jan 1;5(1):6.

12. Smith AC, Thomas E, Snoswell CL, Haydon H, Mehrotra A, Clemensen J, Caffery LJ. Telehealth for global emergencies: Implications for coronavirus disease 2019 (COVID-19). Journal of telemedicine and telecare. 2020 Mar 20:1357633X20916567.

13. Estai M, Kruger E, Tennant M, Bunt S, Kanagasingam Y. Challenges in the uptake of telemedicine in dentistry. Rural and remote health. 2016;16(4):168.

14. Ghai S. Are dental schools adequately preparing dental students to face outbreaks of infectious diseases such as COVID- 19?. Journal of Dental Education. 2020 May 11.

Citation: Noopur Narayane et al. Ijsrm.Human, 2021; Vol. 17 (4): 58-71.
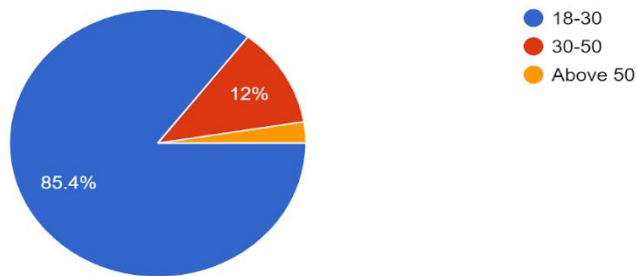
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Demographic characteristics of the study population

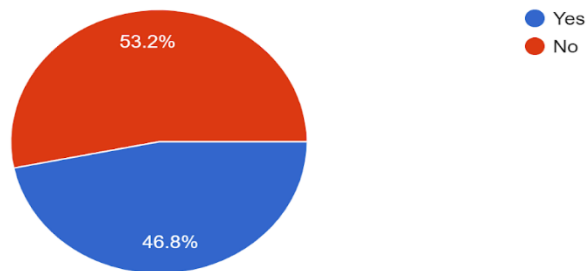**Figure No. 1: Distribution of Age**
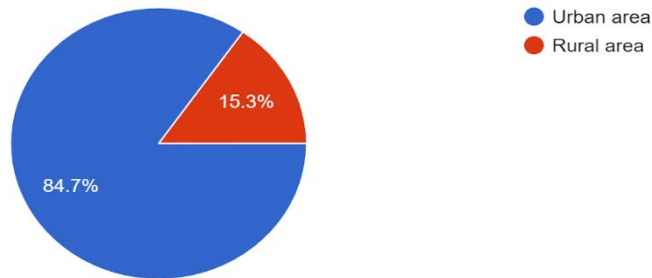
Figure No. 2: Where do you live?

Figure No. 3: Are you a dental practitioner?

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Table 1: Knowledge and awareness of teledentistry among dentists

Sr. No.	Questions	Responses	Frequency (%)
1.	Do you know what teledentistry is?	Yes	83.1
		No	16.9
2.	Is teledentistry about the practice of use of computers, Internet, and technologies to diagnose and provide advice about treatment over a distance?	Yes	84.7
		No	2.2
		I don't know	13.1
3.	Do you think it is helpful in ongoing Coronavirus crisis?	Yes	79.2
		No	4.9
		May be	15.8
4.	Do you think it is the safest option for dentists to deliver dental care in this ongoing pandemic	Yes	73.2
		No	8.7
		May be	18
5.	Can teledentistry be applied in any branch of dentistry?	Yes	57.9
		No	42.1
6.	Do you think that teledentistry is good for dental education over Internet and for training primary health-care dentists?	Yes	68.9
		No	9.8
		May be	21.3
7.	Is teledentistry useful in improving the access to oral healthcare?	Yes	76.5
		No	8.7
		May be	14.8
8.	Can teledentistry will be able to monitor your patient's condition well?	Yes	44.8
		No	26.8
		May be	28.4
9.	Do you think that dental examinations are accurate via computers and intraoral camera as in the traditional office setting?	Yes	36.1
		No	40.4
		May be	23.5
10.	Can it be accessible to all the strata of society including the poor and illiterates?	Yes	22.4
		No	58.5

		May be	19.1
11.	Do you think that teledentistry can increase accessibility of the specialists to rural and underserved communities for their dental needs?	Yes	48.1
		No	21.3
		May be	30.6
12.	Can it be accessible to the patients who are quarantined?	Yes	74.9
		No	11.5
		May be	18.6
13.	Does teledentistry can help in reducing costs for the dental practices?	Yes	43.7
		No	18.6
		May be	37.7
14.	Do you think it will ease the financial burden on dentists in this challenging times of Covid-19?	Yes	49.2
		No	26.8
		May be	24
15.	Do you think that teledentistry saves time for the dentist?	Yes	56.3
		No	19.7
		May be	24
16.	Are you practicing teledentistry in this Covid-19 pandemic period?	Yes	38.3
		No	54.6
		May be	7.1
17.	Have you practiced teledentistry before Covid-19 pandemic?	Yes	24
		No	68.3
		May be	7.7
18.	In the future, post Covid-19, will you practice teledentistry?	Yes	49.2
		No	9.3
		May be	41.5

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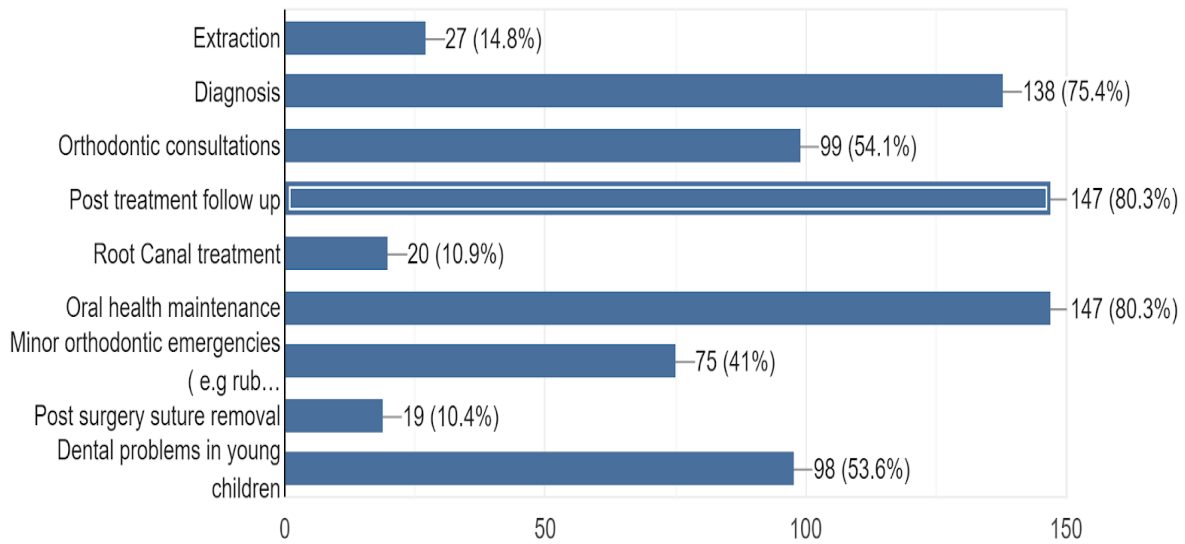
Figure No. 4: What all among the following are possible in teledentistry

Table 2: Knowledge and awareness of teledentistry among general population

Sr.No	Questions	Responses	Frequency (%)
1.	When was the last time you visited a dentist?	One week back	3.4
		Last month	5.3
		3-6 months back	37
		Last year	33.7
		Never	20.7
2.	How often do you usually visit a dentist?	1-2 times per year	29.8
		Very often	11.1
		Very rarely- in urgent cases	45.2
		Never	13.9
3.	Have you heard about teledentistry?	Yes	42.8
		No	57.2
4.	Is teledentistry about the practice of use of computers,	Yes	59.6

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	the Internet, and technologies to diagnose and provide advice about treatment over the distance	No	9.1
		I don't know	31.3
5.	What do you fear most at the dentist's office	Pain	44.2
		Sound of drill	8.7
		Smell of chemicals	3.4
		Being stuck in a dental chair	6.7
		Bill	17.3
		All of the above	19.7
6.	Are you anxious to get infected in a dental office by coronavirus?	Yes	79.3
		No	20.7
7.	Have you experienced any emergency dental condition during the lockdown period?	Yes	13
		No	87
8.	If yes, how have you tried to contact your dentist?	Phone call	13.9
		Video call	4.3
		Visit	4.3
		Messaging	9.1
		Not applicable	68.3
9.	Do you think using teledentistry dentists can accurately diagnose dental condition?	Yes	20.2
		No	23.1
		May be	56.7
10.	Do you think teledentistry is affordable or cheaper than the usual visit to a dental clinic?	Yes	40.4
		No	14.4
		May be	45.2
11.	Do you think teledentistry is convenient to address people with higher risk of infection to coronavirus such as elderly, medical conditions, children?	Yes	84.1
		No	15.9
12.	Do you think it is more convenient to the people during the lockdown?	Yes	75
		No	20.2
		May be	4.8

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13.	Do you think the data you provide to your dentist through teledentistry will be safe and confidential?	Yes	83.2
		No	16.8
14.	Do you think you will be able to maintain your oral health with the help of telecommunication with your dentist?	Yes	46.6
		No	7.7
		May be	45..7
15.	Is it convenient for you to opt for teledentistry for the follow-ups?	Yes	47.6
		No	8.7
		May be	43.8
16.	Will you prefer teledentistry over usual visits for the consultation post-Covid-19?	Yes	45.2
		No	26.4
		May be	28.4

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