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ORIGINAL ARTICLE

Assessment of Factors Influencing the Patient's Perception of Teledentistry Services

Ika Oktaviani Risanti,[1] Iwan Dewanto[1]

1. Master in Hospital Administration, Postgraduate Program, University of Muhammadiyah Yogyakarta, Yogyakarta, Indonesia.

Abstract

Background/Aim: The trend of using teledentistry increased significantly during the pandemic. Many studies have analysed patients' perceptions of teledentistry, but no studies have examined the factors that influence these perceptions. Aim of this study was to determine the factors that influenced the patient's perception of teledentistry.

Methods: This type of research was a descriptive analysis with a cross sectional design. A total of 170 respondents filled out a questionnaire containing sociodemographic data and statements with a Likert scale related to the five perceptual domains of teledentistry. The data were analysed for correlation test with SPSS and model test with SEM-PLS.

Results: There were only two factors, namely age and level of education that appear as factors that affect the patient's perception with a correlation significance value of 0.001 for age and 0.005 for education. The value of the correlation coefficient was positive, which means that the higher the age and level of education, there was a greater tendency for perceived value to be more strongly agreed. These results were reinforced by the results of the coefficient values on the SEM-PLS model test which were positive and significant, namely 0.311. The results of the goodness of fit analysis in this study were in the moderate category with a value of 0.265. However, the imbalance in the number of respondents in each sociodemographic group makes the results of this study less representative.

Conclusion: There was a significant positive correlation between the level of education and the perception of teledentistry. This means that the higher a person's education level, the better his perception of teledentistry. Age had a significant positive correlation and influence with the patient's perception of teledentistry.

Key words: Telemedicine; Teledentistry; Teleconsultation; Health services; Perception.

Correspondence:
IKA OKTAVIANI RISANTI
E: ikaoktavianirisanti@gmail.com

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Introduction

Based on the WHO suggestion and a study conducted by Glogowsky et al, keeping a distance and avoiding contact with other people is the most effective way to control transmission.[1] The transmission of COVID-19 through droplets, aerosols and airborne, has caused dental practice to be postponed due to the high possibility of contamination with the SARS-CoV-2 virus.[2] The Executive Board of the Indonesian Dental Association (PB PDGI) on July 3, 2021 through circular letter number 4072/PB PDGI/VII-2/2021 urged all PDGI members not to open a dental practice tem-

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porarily except for emergency cases with level three personal protective equipment. In addition, dentists were also recommended to use teledentistry to provide services to patients.

Teledentistry technology, which is a branch of telehealth, is defined as the use of communication technology to make a diagnosis or obtain information from patients regarding the required care, education, supervision and post-dental monitoring, by dentists or practitioners to patients.[3] Services that can be accessed by teledentistry for patients and dentists are teleconsultation, telediagnosis, teletriage and telemonitoring.[4] A study stated that teledentistry can be a solution for dental and oral health services during the pandemic.[5] The trend of using teledentistry has increased significantly with the COVID-19 pandemic.[6] The increasing trend of teledentistry needs to be balanced with improving the quality of these services.

Various studies have been conducted to evaluate the perception of patients and dentists on teledentistry services. Teledentistry is considered effective to save costs and time required to perform maintenance.[7] A survey also showed data that as many as 97 % of respondents were satisfied with teledentistry treatment and as many as 96 % of respondents were willing to use teledentistry again to conduct consultations in the midst of the COVID-19 pandemic.[8] However, patients have a negative perspective on the technology in its implementation. The most frequently encountered barriers from the patient's perspective are patient satisfaction requiring the physical presence of a dentist, violation of patient privacy and low public knowledge of technology.[9] Technical barriers, access to technology and individual cognitive limitations were common in the older group of adults.[10]

According to Jacobalis,[11] the patient's perception of health services was influenced by several factors, namely, age, gender, education level, occupation, culture, physical environment and personality and experience. There has been considerable literature on patient perceptions of teledentistry as a health service.[12-15] However, there is no literature that analyses the relationship between factors that influence patient perceptions of health services and teledentistry services. Hence, the purpose of this study was to analyse the relationship between age, gender, education level, occupation, culture, physical environment and personality and experience to the five domains of teledentistry perception in previous studies, namely patient satisfaction, ease of use, teledentistry system, benefit for patients and effectiveness to improve access to clinics.[8]

Methods

This research was a descriptive analysis with a cross sectional design. The data was taken during the National Dental Health Month November 2021 at the Dental and Oral Hospital, University of Muhammadiyah Yogyakarta, Indonesia. The sampling technique used was a convenience sample with a total of 170 respondents. This number has met the minimum sample criteria using statistical power of 123 respondents. This research had an ethical clearance from the Ethic Committee with number code No 188/EC-KEPK FKIK UMY/IX/2022.

There were five independent variable affecting factors mentioned in the sociodemographic questionnaire survey: age, gender, educational level, past experience and physical environment. Age categories were: < 15 years old, 15-24 years old, 25-44 years old and 45-65 years old. Educational level categories were: elementary school, junior high school (JHS), senior high school (SHS) and bachelor or postgraduate. Experience categories were: had or had not experienced teledentistry before. Physical environments categories were: visual (chatting/messaging), audio (phone call) and audio-visual (video conference). The dependent variable consisted of five domains with two statements within each domain. The statement covered five domains: patient satisfaction, ease of use, reliability of teledentistry systems, benefit to patients and effectiveness in increasing access to clinics.

Patients filled out a questionnaire containing the patient's sociodemographic data and 5 Likert scale statements 1-5 (strongly disagree-strongly agree) which were validated from previous studies on patients' teledentistry perceptions.[8] Data analysis was performed using Statistical Package for the Social Sciences (SPSS) and Structural Equation Model-Partial Least Square (SEM-PLS) applications. Statistical significance was set at $p < 0.05$.

Results

The patient characteristics obtained in the secondary data were age, gender, education level, experience in using teledentistry and physical environment (Table 1). The age distribution of respondents was dominated by the age of 15-24 years as much as 80 % and the age of 25-44 years as much as 16.5 %. For gender, it was dominated by women with a percentage of 62.4 %. Most of the respondents had a high school education level (47.1 %) and a bachelor's degree (51.2 %). As many as 91.8 % of respondents used teledentistry for the first time and 8.2 % had used teledentistry services before. The media or physical environment used in teledentistry visually using the chat feature or sending messages between patients and dentists still dominated with a percentage of 93.5 %, followed by audio-visual in the form of video calls at 5.9 % and audio with phone call features at 0.6 %.

Table 1: Data characteristics of respondents about teledentistry satisfaction

Parameter	Frequency	Percentage
Age		
< 15 years old	*1*	*0.60 %*
15-24 years old	*136*	*80.00 %*
25-44 years old	*28*	*16.50 %*
45-65 years old	*5*	*2.90 %*
Gender		
Male	*106*	*37.60 %*
Female	*64*	*62.40 %*
Educational level		
Elementary school	*1*	*0.60 %*
Junior high school (JHS)	*2*	*1.20 %*
Senior high school (SHS)	*80*	*47.10 %*
Bachelor/magister/doctoral (S1/S2/S3)	*87*	*51.20 %*
Experience		
Unexperienced	*156*	*91.80 %*
Experienced	*14*	*8.20 %*
Physical environment		
Visual	*159*	*93.50 %*
Audio	*1*	*0.60 %*
Audio Visual	*10*	*5.90 %*

Based on Table 3, it can be seen that the perceived value of each domain had a minimum value of 1 (strongly disagree) and a maximum value of 5 (strongly agree). On average, the benefit for patients dimension had an average value of 2.78. The ease of use domain has an average value of 2.83. The effectiveness to improve access to clinics domain had an average value of 2.75. The teledentistry system reliability domain had an average value of 2.79. The patient satisfaction domain had an average value of 2.74. These data indicated that respondents' perceptions of teledentistry in each domain had an even distribution between perceptions of strongly agree to strongly disagree.

Table 2: Data characteristics of respondents about teledentistry satisfaction

Independent Variable	Interpretation
Age	*Significant (very low)*
Gender	*Not significant*
Education level	*Significant (moderate)*
Experience	*Not significant*
Physical environment	*Not significant*

Table 3: Distribution of patient's teledentistry perception domains

Parameter	N	Min	Max	Q1	Median	Q3	IQR
Benefit for patients	*170*	*1*	*5*	*2*	*2.7824*	*4*	*2*
Ease of use	*170*	*1*	*5*	*2*	*2.8294*	*4*	*2*
Effectiveness to improve access to clinics	*170*	*1*	*5*	*2*	*2.7471*	*4*	*2*
Teledentistry system reliability	*170*	*1*	*5*	*2*	*2.7882*	*4*	*2*
Patient satisfaction	*170*	*1*	*5*	*1*	*2.7412*	*4*	*3*

Q1: first quartile; Q3: third quartile; IQR: interquartile range;

The patients' characteristics data correlated with the patients' perception of teledentistry and correlation test results are listed in Table 4. The results of the Spearman correlation test showed that age and education level were significantly correlated with patients' perception of teledentistry, each of which was 0.001 for age and 0.005 for education level. The value of the correlation coefficient was positive, which means that the higher the age and level of education, the tendency of the perceived value was more strongly agreed. On the other hand, the lower the age and level of education, the tendency of perceived value was strongly disagree.

Table 4: Correlation test results in respondents about teledentistry satisfaction

Characteristic	p-value	Coefficient correlation
Age	*0.001**	*0.023***
Gender	*0.439*	*-0.060*
Education level	*0.005**	*0.021***
Experience	*0.627*	*-0.038*
Physical environment	*0.818*	*0.018*

**Correlation is significant at the p-value 0.05 level (2-tailed)*

***Correlation is significant at the 0.01 level (2-tailed)*

Table 5: Correlation test results in respondents about teledentistry satisfaction

Teledentistry Perception	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T-statistics (IO/STDEVI)	p - values
Internal factor	*0.311*	*0.318*	*0.066*	*4.742*	*0.000*

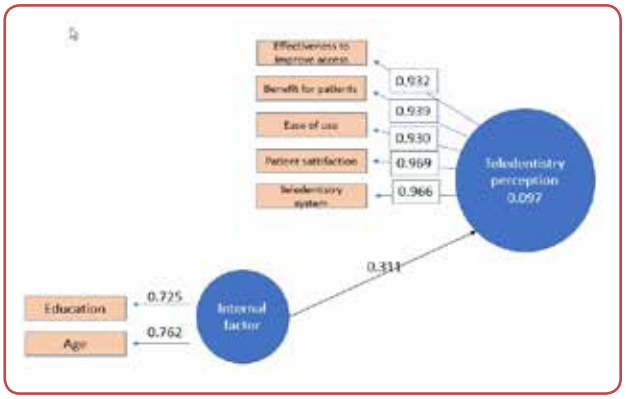

Figure 1: Model results of structural equation model - partial least square (SEM-PLS)

After the next Spearman correlation test, the data were analysed using SEM-PLS to strengthen the correlation findings or the effect of age and education level on patients' perceptions of teledentistry. Table 5 showed p-value of < 0.001 which means that there was a significant influence between the internal factor variables on the perception of teledentistry. The coefficient value of the internal factor on the perception of teledentistry was 0.311 which was positive and significant. This positive value also supported the results of the Spearman correlation test, which means that the higher the internal factor, the better the perception of teledentistry. Furthermore, godness of fit analysis was performed on this data of 0.265 which according to Hair,[16] this value was in the moderate category. Thus, the relationship model of the patient's internal factors on the perception of teledentistry can be accepted because the model test was proven to be valid and reliable.

Discussion

In this research, age had a significant correlation and effected perception of teledentistry. The highest correlation was in beneft for patient domain with p-value 0.008 and lower in teledentistry system domain with p-value < 0.001. The research showed that age affected the perception, the youngest patients precepted benefit of technology the most.[17] It is different with system reliability, older the age of the individual the lower his perception regarding the use of technology was.[18]

A positive value on the significant test result indicated that the higher the age, better was the patient's perception of teledentistry. Age differences had a significant effect on a person's attitude towards health services and information.[19] The difference of attitude on the each age can affected the individual attitude toward health service.[20]

Nowadays, the age group are divided into generations, there are generation of babyboomers, x, y and z. Those generations are classified in accordance with born from age as: 1946-1964 for babyboomers, 1965-1979 for generation X, 1980-2001 for generation Y and the birth 2001 until now are called generation Z.[21] Babyboomers have higher awareness and concern regarding health information compared to other generations.[22] Beside that, babyboomers characterise as a hard workers and lifelong learners, so babyboomers can adapt to technological developments.[23] Generations X, Y and Z are exposed to technology earlier so they do not find it difficult to adapt. In addition, the tendency of pragmatic characteristics of generations X, Y and Z makes them more dependent on technology.[24] However, the youngest generations have lower awareness and care regarding information.[22]

The finding in this study was that there was a significant positive correlation between the level of education and the perception of teledentistry. This means that the higher a person's education level, the better his perception of teledentistry was. These findings are in line with research which showed that a person's educational background significantly influences an individual's cognitive and behavioural abilities.[25] Someone with a higher level of education tends to have awareness and curiosity about new technologies that are being developed, so the level of education is positively and significantly correlated with one's perception of technology.[26]

However, several factors such as gender, experience and physical environment did not correlate with the patient's perception of teledentistry. There was no difference in the perception of males and females on the perception of using technology, which can occur due to individual exposure to technology.[27] Another study showed that quantitatively, gender differences are not significant with

individual perceptions of technology, but qualitatively women have better perceptions of technology.[28] Thus, further studies with qualitative methods are needed to dig deeper into the influence of gender on patient perceptions.

Furthermore, in this study experience in previous use of teledentistry was insignificantly correlated with perception of teledentistry. Teledentistry, as a new technology, was exposed to the public for a short period of time. Even though it has been used it is still a new thing. Hence, there is no relationship between experience and perception of technology.[27] In one study, the short period of exposure to technology made the experience insignificant with perceived ease of use.[29]

The physical environment, which was grouped as audio, audio visual and visual in teledentistry was intended as an audio call, video call or chat. The groups in this study were insignificantly correlated. This cannot be used as a finding because 93.5 % of respondents used the visual physical environment through the chat feature. Differences in the physical environment in the form of audio, audio visual and visual were considered to have different effectiveness from the user's point of view.[30, 31] Research showed that the use of a physical audio environment increased productivity in terms of time and recipients' understanding of the message more than text or chat.[31] The increasing trend of video conferencing during a pandemic has resulted in a shift in people's satisfaction, who felt that they were more effective in using the audio-visual physical environment in the form of video conferencing rather than audio or text calls.[30]

Some of the results in this study can support the theory presented by Jacobalis,[11] that age and education level were factors that influence a person's perception of health services. Updates in this study support that age and education level were significantly correlated with patients' perceptions of teledentistry by using two mutually reinforcing data analyses, namely the Spearman correlation test and the SEM-PLS model test.

However, the research still has limitations in the research process carried out. The data collection technique using the convenience sampling method made the distribution of respondents uneven so the results presented in this study were less representative. In addition, the number of respondents in this study was also relatively small. Participants who participated in this study were opened to all regions in Indonesia, but in reality, most of the respondents were still dominated by respondents from the province of Yogyakarta.

Conclusion

Based on the result, there were only two factors that influenced the patient's perception of teledentistry services, namely age and level of education, with a correlation significance value of 0.001 and 0.005, respectively. These results were reinforced by the results of the coefficient values on the SEM-PLS model test which were positive and significant, namely 0.311. The results of the goodness of fit analysis in this study were in the moderate category with a value of 0.265. However, the imbalance in the number of respondents in each sociodemographic group made the results of this study less representative. Thus, further research is needed on the factors that influence teledentistry with a balanced number of respondents in each group in order to obtain more representative results.

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Conflict of interest

None.

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