

Knowledge, Attitudes, and Practices on Teledermatology among Dermatologists in the Philippines

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Abstract

Background: Teledermatology has been widely used during the coronavirus disease 2019 (COVID-19) pandemic to overcome barriers in access to care. The objective of this study was to assess the current knowledge, attitudes, and practices regarding teledermatology among dermatologists in the Philippines.

Materials and Methods: This was a cross-sectional and analytical study conducted from January 2022 to April 2022, among Filipino dermatologists using a self-administered online questionnaire. Descriptive statistics was used to summarize the demographics of the participants. The two-sample *t*-test, Chi-square test, and multiple logistic regression model were used to analyze the data.

Results: Out of 113 respondents, 108 (95.5%) had adequate knowledge and a positive attitude toward teledermatology. The majority (110/113, 97.35%) practiced teledermatology. The most commonly used platform was instant messaging applications (78/100, 70.91%), and the most common factor that influenced their practice was patient demands or needs (74/110, 67.27%). Those who did not practice teledermatology cited technological difficulties as the main reason.

Conclusion: Teledermatology was widely used by Filipino dermatologists to provide remote care during the COVID-19 pandemic. However, to fully utilize its potential and limit potential issues associated with its use even after the pandemic, continuous training and education among dermatologists and a more enabling technological environment may be needed.

Keywords: Knowledge, attitude, practice, KAP, teledermatology, telemedicine

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INTRODUCTION

The coronavirus disease 2019 (COVID-19) pandemic has significantly changed health care. Due to the

enforced strict restrictions on movement, doctors have experienced a substantial decline in the number of non-COVID-19 patients both in the outpatient and inpatient departments.^[1,2] Unsurprisingly, this also made a

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huge impact in the practice of dermatology.^[3] Since the high volume of patients in the clinics has been identified as a vector for transmission of the virus, immediate cancellation of all nonurgent patient visits has been advocated.^[4,5] This has markedly reduced dermatologic visits in both private and public hospitals.^[6] These changes revealed new barriers in accessing health-care services.^[7] To overcome these barriers, telemedicine use has increased substantially during the pandemic.^[8]

According to the World Health Organization, telemedicine is defined as the “delivery of health-care services, where distance is a critical factor, by all health-care professionals using information and communication technologies for the exchange of valid information for diagnosis, treatment, and prevention of disease and injuries, research and evaluation, and for the continuing education of health-care providers, all in the interests of advancing the health of individuals and their communities.”^[9] It comprises different fields of specialization, which includes teleradiology, telepathology, teledermatology, and telepsychiatry.^[9] Teledermatology is defined as “the use of information and communication technologies to transmit medical information concerning skin conditions (e.g. tumors of the skin) for the purpose of interpretation and/or consultation.”^[9]

During the past few years, teledermatology has become a popular platform to provide remote care while mitigating the opportunities for COVID-19 transmission.^[10] It is a convenient, efficient, and cost-effective way to increase access to care.^[10] The increase in the usage of this technology over the past few years has highlighted the gaps in research regarding this topic. Currently, there are still few local studies on teledermatology.

This study aimed to determine the knowledge, attitudes, and practices (KAP) in teledermatology among Filipino dermatologists using an online survey. The results of this study can help policymakers and societies address the current problems encountered by dermatologists in the field of teledermatology.

MATERIALS AND METHODS

Research design

This was a cross-sectional and analytical study conducted from January to April 2022, among Filipino dermatologists using a self-administered online survey.

Setting and participants

Inclusion criteria

We included (1) Filipino citizens, (2) practicing Philippine Dermatological Society (PDS)-certified dermatologists, (3)

with access to a device that is capable of remote communication, and (4) can read, write, and speak English fluently.

Survey questionnaire

Development of the survey questionnaire

The 42 questions in the survey were based on the review of related literature.^[11] The questions were written in English. The questionnaire was divided into the following sections: (1) participant’s demographic profile (seven items), (2) technological proficiency (five items), (3) knowledge (six items), (4) attitudes (15 items), and (5) practices concerning teledermatology (nine items). Knowledge was evaluated through a “knowledge score,” computed by assigning one point for each correct answer to the six multiple-choice items concerning teledermatology. Attitude was assessed by grading statements using a 4-point Likert scale (4 – strongly agree, 3 – agree, 2 – disagree, and 1 – strongly disagree). Practices were assessed by asking questions regarding the actual use of teledermatology.

Pretesting and validation

The initial survey questionnaire was pretested among 10 PDS-certified dermatologists. The internal consistency of the questionnaire was determined using Cronbach’s alpha. The same set of consultants was asked to answer the survey questionnaire again after 1 week. Intraclass correlation was used to measure questionnaire reliability. After evaluation, suggested modifications were incorporated into the final questionnaire that was used in the study.

Survey proper

Participants were recruited using the convenience sampling method. A link to the survey questionnaire on Google Forms was passed on to the PDS, and members were asked to answer voluntarily.

Outcomes

A score of at least 70% in the knowledge items was considered adequate knowledge and < 70% was considered inadequate knowledge. A participant was considered to have a positive attitude regarding teledermatology if the average attitude score was higher than two. Positive practice of teledermatology was assessed by yes or no responses to questions regarding the actual use of teledermatology.

We also assessed if age, years of practice, and type of practice were correlated with KAP and if knowledge and attitudes were correlated with practice.

Data management

The raw data gathered during the study were encrypted in the Google Cloud Storage and will be kept for 5 years

from the final publication date. The responses were password-protected. Only the investigators had access to the participants' responses. Only summarized and anonymized data were sent to the statistician for statistical analysis.

Data analysis

Descriptive statistics were used to summarize the demographics of the participants. Categorical data were presented as frequency and proportions. We used a two-sample *t*-test to determine if there were statistical differences in terms of demographics in quantitative data, while the Chi-square test was used for categorical data, to compare those with adequate or inadequate knowledge and positive or negative attitudes in teledermatology. Those practicing or not practicing teledermatology were also identified. A multiple logistic regression model was used to identify the potential associations between the predictor variables and practice. Odds ratios and their confidence intervals were computed. $P < 0.05$ was considered statistically significant.

Ethical considerations

A certificate of approval from the Quirino Memorial Medical Center Research Ethics Board was obtained before the study commencement. Informed consent was also obtained before the start of the investigation. The participants were not asked to disclose any personal information that may be used to identify them. They remained anonymous in the entirety of the study. The collection of data was limited to the information necessary to fulfill the objectives of the study. All data that were gathered from the participants were held strictly confidential.

RESULTS

A total of 113 participants completed the survey questionnaire. The participants had a mean age of 48.16 ± 10.51 years, and the majority (109/113, 96.46%) of them were female. More than half (64/113, 56.64%) resided in NCR, and the majority (90/113, 79.65%) were fellows of the PDS. A third had been practicing dermatology for 1–10 years (37/113, 32.7%) and 21–30 years (41/113, 36.2%), and the majority (87/113, 76.99%) were in private practice [Table 1].

With regard to the use of devices and technological proficiency, the majority of the participants owned a mobile phone (111/113, 98.23%) and used a wireless Internet connection (98/113, 86.73%). The most commonly used instant messaging applications and social media platforms

were Viber (102/113, 90.27%) and Facebook (98/113, 86.73%), respectively. The majority (93/113, 82.30%) also used online banking and online payment applications.

The majority (108/113, 95.5%) of the participants had adequate knowledge on teledermatology [Table 2]. Respondents with adequate knowledge (mean age = 47.31, standard deviation [SD] = 9.82) were significantly younger than those with inadequate knowledge (mean age = 66.6, SD = 8.29, $P = 0.005$). Respondents with adequate knowledge had significantly shorter length of practice (mean = 15.73 years, SD = 9.56) than those with inadequate knowledge (mean = 37.4 years, SD = 9.63, $P = 0.006$). The rest of the demographic variables did not show any significant differences [Table 3].

Using simple logistic regression, the odds of having adequate knowledge significantly lower by 36% for every 1-year increase in age ($P = 0.02$). Moreover, the odds of having adequate knowledge significantly lower by 40% for every 1-year increase in length of practice ($P = 0.03$). However, multiple logistic regression, wherein all predictor variables are taken into account and considered constant with respect to the other variables, resulted in age ($P = 0.25$) and years of practice ($P = 0.28$) being no longer significant. The predictor variables in the model only explain 67% of the variation in knowledge ($R^2 = 0.67$). Thus, 33% of the variation in knowledge cannot be explained by the model [Table 4].

The majority (108/113, 95.5%) of participants had a positive attitude toward teledermatology, while only 5 (4.42%) had a negative attitude [Table 5]. There were no significant differences between those with positive and negative attitudes in all of the demographic variables [Table 6]. In both simple and logistic regression, no predictor variable is significantly associated with a positive attitude ($R^2 = 0.10$). The predictor variables in the model only explain 10% of the variation in attitude; thus, 90% of the variation in attitude cannot be explained by the model [Table 7].

Among the 113 participants, 110 (97.35%) practiced teledermatology [Table 8]. The most commonly used platforms were instant messaging applications (78, 70.91%), and the most common factor that influenced their practice was patient demands or needs (74, 67.27%). On average, dermatologists saw 2 (SD = 1.15) patients per hour and spent 26 (SD = 23.29) min per patient during teledermatology, while they saw 3 (SD = 1.68) patients per hour and spent 20 (SD = 10) min per patient during face-to-face consultations. The majority (69, 62.73%) charged the same amount for teledermatology

Table 1: Demographic characteristics of respondents (n=113)

Variables	Number of participants (%)
Sex	
Male	4 (3.54)
Female	109 (96.46)
Age (years), mean±SD	48.16±10.51
Residence, frequency (%)	
NCR	64 (56.64)
Region I (Ilocos Region)	6 (5.31)
Region II (Cagayan Valley)	3 (2.65)
Region III (Central Luzon)	4 (3.54)
Region IV-A (Calabarzon)	15 (13.27)
Region IV-B (Mimaropa)	1 (0.88)
Region V (Bicol Region)	4 (3.54)
Region VI (Western Visayas)	3 (2.65)
Region VII (Central Visayas)	1 (0.88)
Region X (Northern Mindanao)	3 (2.65)
Region XI (Davao Region)	2 (1.77)
Region XII (Soccsksargen)	2 (1.77)
CAR	4 (3.54)
Autonomous Region in Muslim Mindanao	1 (0.88)
Designation, frequency (%)	
Diplomate	23 (20.35)
Fellow	90 (79.65)
Years in practice, mean±SD	16.69±10.52
1-10	37 (32.74)
11-20	28 (24.78)
21-30	41 (36.28)
31-40	5 (4.42)
>40	2 (1.77)
Description of practice	
Private	87 (76.99)
Government	1 (0.88)
Both private and government	25 (22.12)
Presence of a telemedicine platform	
Yes	96 (84.96)
No	17 (15.04)
Devices owned	
Laptop	94 (83.19)
Mobile phone	111 (98.23)
Desktop	35 (30.97)
Tablet	77 (68.14)
Type of Internet connection	
Cable	28 (24.78)
Cellular data	90 (79.65)
Wireless	98 (86.73)
Social media platform	
Facebook	98 (86.73)
Hospital provided	1 (0.88)
Instagram	63 (55.75)
PPD	1 (0.88)
YouTube	1 (0.88)
TikTok	2 (1.77)
Twitter	17 (15.04)
Reddit	1 (0.88)
Viber	8 (7.08)
Zoom	2 (1.77)
Google Meet	3 (2.65)
MEDIFI	1 (0.88)
None	7 (6.19)
Instant messaging applications	
iMessage	41 (36.28)
Facebook Messenger	100 (88.50)
Viber	102 (90.27)
Telegram	29 (25.66)
WhatsApp	30 (26.55)

Table 1: Contd...

Variables	Number of participants (%)
Zoom	3 (2.65)
Google Meet	2 (1.77)
MEDIFI	1 (0.88)
PPD	1 (0.88)
Online payment apps	
Do not use	4 (3.54)
Online banking only	5 (4.42)
Online apps only	11 (9.73)
Both online banking and online apps	93 (82.30)

SD: Standard deviation, CAR: Cordillera Administrative Region, NCR: National Capital Region

Table 2: Knowledge scores

Knowledge adequacy	n (%)
Score (%), mean±SD	93.95±10.46
Adequate, n (%)	108 (95.58)
Inadequate, n (%)	5 (4.42)

and face-to-face consultations. There was no significant difference between those who practice and those who do not practice teledermatology in terms of their demographic variables [Table 9].

There was no significant difference between the practice of teledermatology among those with adequate and inadequate knowledge ($P > 0.9999$). Similarly, there is no significant difference between the practice of teledermatology among those with a positive and a negative attitude ($P = 0.13$) [Table 10].

DISCUSSION

In this study, the majority of dermatologists were found to have adequate knowledge regarding teledermatology. The lack of standardized training in the dermatology training curriculum in the Philippines may be an important consideration because having basic knowledge of telemedicine is fundamental for its correct implementation.^[12] Furthermore, continuous training in the use of telemedicine was found to be the most efficient solution to increase knowledge.^[13] Age and years in practice were the only variables that may influence knowledge. A previous study on telemedicine showed that most of the information sources about telemedicine were from colleagues.^[11] Younger dermatologists may be more technologically connected and able to share information easily through various communication media than older dermatologists.

The majority of the dermatologists had a positive attitude toward teledermatology because they recognized its advantages and compatibility to their practice, especially during the COVID-19 pandemic. Some of its advantages include

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Table 3: Association between knowledge adequacy of respondents and demographic characteristics

Characteristics	Adequate knowledge (n=108)	Inadequate knowledge (n=5)	P
Age, mean±SD	47.31±9.82	66.60±8.29	0.005*
Years in practice, mean±SD	15.73±9.56	37.40±9.63	0.006*
Fellow, frequency (proportion)	85 (94.44)	5 (5.62)	0.58**
Diplomate, frequency (proportion)	23 (100.00)	0	
Type of practice, frequency (proportion)			
Private	83 (95.40)	4 (4.60)	>0.9999**
Government	1 (100.00)	0	
Both	24 (96.00)	1 (4.00)	
Place of practice, frequency (proportion)			
NCR	62 (96.88)	2 (3.13)	0.65
Province	46 (93.88)	5 (4.42)	

*t-test, **Fisher's exact test. SD: Standard deviation

Table 4: Logistic regression model on adequate knowledge

Characteristics	Simple logistic regression		Multiple logistic regression	
	OR (95% CI)	P	OR (95% CI)	P
Age (years)	0.64 (0.44-0.94)	0.02	0.65 (0.31-1.35)	0.25
Years in practice	0.60 (0.39-0.94)	0.03	0.75 (0.46-1.25)	0.28
Type of practice (reference private)				
Both government and private	1.16 (0.12-10.84)	0.90	0.20 (0.0005-85.46)	0.60
Practice outside NCR	0.49 (0.08-3.08)	0.45	0.19 (0.007-5.58)	0.34

R²=0.67. OR: Odds ratio, CI: Confidence interval, NCR: National Capital Region**Table 5: Attitude rating**

Attitude toward teledermatology	n (%)
Score, mean±SD	2.87±0.46
Positive attitude (>2), n (%)	108/113 (95.58)
Negative attitude (<2), n (%)	5/113 (4.42)

SD: Standard deviation

Table 6: Positive attitude versus demographics

Characteristics	Positive attitude (n=108)	Negative attitude (n=5)	P
Age, mean±SD	47.97±10.20	52.2±17.11	0.38*
Years in practice, mean±SD	16.43±10.11	22.4±18.06	0.22*
Fellow, frequency (proportion)	86 (95.56)	4 (4.44)	>0.9999**
Diplomate, frequency (proportion)	22 (95.65)	1 (4.35)	
Type of practice, frequency (proportion)			
Private	84 (96.55)	3 (3.45)	0.34**
Government	1 (100)	0	
Both	23 (92.00)	2 (8.00)	
Place of practice, frequency (proportion)			
NCR	61 (95.31)	3 (4.69)	>0.9999**
Province	47 (95.92)	2 (4.08)	

*t-test, **Fisher's exact test. SD: Standard deviation, NCR: National Capital Region

providing greater access to care for patients who experience socioeconomic barriers, being time- and cost-effective for patients and physicians, cutting travel costs and eliminating time spent driving to a doctor's office, reducing medical costs, and saving waiting and visit times for the patients.^[10]

The majority of the dermatologists practiced teledermatology. However, this may be a result of recruitment bias, as those who were likely to answer the online survey were

the technologically savvy ones who were also more likely to practice teledermatology. A possible way to decrease this bias is to conduct the survey using pen-and-paper questionnaires during a face-to-face event like an annual conference. In a survey done among dermatologists in the US, the practice of teledermatology increased from 14.1% to 96.9% during the COVID-19 pandemic.^[14]

Instant messaging applications remain the most widely used platform. This is consistent with the study done by Naik,^[2] where he found that Facebook and WhatsApp were the most popular media due to familiarity with the platform and ease of use. In this study, the most commonly used methods of teledermatology among the dermatologists surveyed are instant messaging at 70.91% and video conference at 61.82%. These free online services can be harnessed at a negligible cost among Philippine dermatologists.

Those who do not practice teledermatology cite technological difficulties as the main reason for their decision. Other commonly implicated reasons include poor Internet connection, lack of physical examination, and inability to perform diagnostic and therapeutic procedures. This is consistent with the findings of a survey among dermatologists in the US. In addition, they also mentioned low reimbursements, concerns regarding malpractice/liability, and government regulations as common barriers to implementation.^[14]

The main limitation of this study is the small sample size. Future studies should aim to recruit more participants to provide a more representative result. Furthermore,

Table 7: Logistic regression model on positive attitude

Characteristics	Simple logistic regression		Multiple logistic regression	
	OR (95% CI)	P	OR (95% CI)	P
Age (years)	0.96 (0.88–1.05)	0.38	1.10 (0.79–1.53)	0.57
Years in practice	0.95 (0.87–1.03)	0.22	0.85 (0.63–1.14)	0.27
Fellow	0.98 (0.10–9.19)	0.98	3.39 (0.18–62.93)	0.41
Type of practice (reference private)				
Both government and private	0.41 (0.06–2.61)	0.35	0.32 (0.04–2.79)	0.30
Practice outside NCR	1.16 (0.19–7.20)	0.88	1.37 (0.19–9.80)	0.76

R²=0.10. OR: Odds ratio, CI: Confidence interval

Table 8: Practice of teledermatology among respondents

Characteristics	Number of participants (%)
Practices dermatology (n=113)	
Yes	110 (97.35)
No	3 (2.65)
Platforms used (n=110)	
Landline/telephone	33 (30.00)
Text	56 (50.91)
Social media	59 (53.64)
Instant messaging	78 (70.91)
Video conference	68 (61.82)
Factors that influenced (n=110)	
Patient demands/needs	74 (67.27)
Pandemic/safety	21 (19.09)
Financial	4 (3.64)
Webinar	5 (4.55)
Colleagues	3 (2.73)
Hospital requirements	3 (2.73)
Patients per hour during teledermatology, mean±SD	2.15±1.15
Patients per hour during face-to-face consultation, mean±SD	3.53±1.68
Time per patient during teledermatology (min), mean±SD	26.1±23.29
Time per patient during face-to-face consultation (min), mean±SD	20.45±10.00
How much do you charge teledermatology versus face-to-face (n=110)	
Less	28 (25.45)
More	13 (11.82)
Same	69 (62.73)

SD: Standard deviation

Table 9: Practice of teledermatology versus demographics

Characteristics	Practices teledermatology (n=110)	Does not practice teledermatology (n=3)	P
Age, mean±SD	47.92±10.53	57.00±5.29	0.14*
Years in practice, mean±SD	16.45±10.55	25.33±4.51	0.15*
Designation, frequency (proportion)			
Fellow	88 (97.78)	2 (2.22)	0.50**
Diplomate	22 (95.65)	1 (4.35)	
Type of practice, frequency (proportion)			
Private	85 (97.70)	2 (2.30)	0.55**
Government	1 (100.00)	0	
Both	24 (96.00)	1 (4.00)	
Place of practice, frequency (proportion)			
NCR	62 (96.88)	2 (3.13)	>0.9999**
Province	48 (97.96)	1 (2.04)	

* t-test, **Fisher's exact test. SD: Standard deviation, NCR: National Capital Region

dermatologists practicing in different provinces should also be recruited to identify possible problems and challenges that may be unique to their geographic locations.

CONCLUSION

The majority of Filipino dermatologists practiced teledermatology at the time of the COVID-19 pandemic.

They tended to be younger and with shorter length of practice. Barriers to the use of teledermatology are mostly technological difficulties such as poor Internet connection or practical limitations in diagnostic and therapeutic procedures.

Teledermatology has been an effective platform to provide remote care while mitigating the opportunities for COVID-19 transmission during the pandemic. However, to

Table 10: Practice of tele dermatology versus knowledge and attitude

	Practices tele dermatology (n=110), n (%)	Does not practice tele dermatology (n=3), n (%)	P
Knowledge			
Adequate	105 (97.22)	3 (2.78)	>0.9999*
Inadequate	5 (100)	0	
Attitude (cutoff: 2)			
Positive	106 (98.15)	2 (1.85)	0.13*
Negative	4 (80.00)	1 (20.00)	

*Fisher's exact test

fully utilize its potential and limit potential issues associated with its use even after the pandemic, continuous training and education among dermatologists and a more enabling technological environment may be needed.

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Conflicts of interest

There are no conflicts of interest.

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