

# A RETROSPECTIVE ANALYSIS OF PATIENT AND CONSULTANT SATISFACTION OF TELEDERMATOLOGIC APPLICATION DURING COVID-19 PANDEMIC IN THAILAND

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## ABSTRACT

Teledermatology is becoming more popular recently as it might be a new transforming method to deliver healthcare services to the patients and also improve access to expertise, and improve quality of care. The reason that teledermatology is widely used because dermatologic lesions are obviously visible, it will be seen clearly via images and video. Since a COVID-19 was rapidly spread globally via respiratory droplets then was declared a pandemic in March, 2020. Frequently washing hands, wearing facial mask and social distancing are become everyday essential as everybody can be a vector of transmission even the doctors. During this pandemic, there was a limited non-urgent out-patient visit and this made teledermatology become useful and well-known. Not only reduce the cost of healthcare but also reduce the rate of COVID-19 infection, developing teledermatology to be more accessible might be a huge benefit for both patients and doctors. Patient and consultant satisfaction of teledermatology is very important as it will be the most valuable as groundwork to develop the quality of the system and will lead to the further development of treatment strategies. The results revealed that acne is the number problem that patients concern and also the most common diagnosis dermatologists recorded during that time. This study showed 56.39% of patients were satisfied with the service with error margin 6.45% at 95% confident level and 8.77% of consultants were satisfied with the service with error margin 7.42% at 95% confident level.

**Keywords:** Teledermatology, Telemedicine, Patients Satisfaction, Consultant Satisfaction, Covid-19

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## INTRODUCTION

Tele dermatology (TD) is now an increasingly common method of delivering dermatologic conditions and also will play a huge role in the up coming future(Whited 2001). Using TD makes a long distance shorter and seeing a doctor will not take a whole day anymore as we can cut out the transport time. There are many types of techniques used in TD to fit the conditions and make the most benefit out of it. In rural areas, the healthcare providers can send images to dermatologists across the globe to consult so they do not have to be in the same place or even the same time zone. When doctor-patient relationship is needed, we can use Real time Live interaction (RTLTI) so patient and doctor can talk and discuss their current problems together even they are miles away.

Coronavirus disease 2019 (COVID-19) is a contagious acute respiratory infection which caused by coronavirus2 (SARS-Cov-2). It was first reported in December, 2019 from Wuhan, China and it was widely spread globally. COVID-19 was declared a pandemic in March 2020 (Cucinotta D 2020). The outbreak was rapidly become a world biggest issue and the morbidity and mortality rates were rising so steep every single day.

The health officials advised all the people around the world to do a social distancing, wear facial mask, frequently washing hands, stay home and avoid contacting one another to limit the transmission of COVID-19. The medical staffs still provide and maintain all the services to the patients who cannot avoid treatments during the COVID-19 pandemic and also patients who need urgent treatments. Under these circumstances, telemedicine becomes more useful for patients who have chronic diseases which vulnerable to get infected but still need follow up with their doctors and also offer the opportunities for non-urgent patients to access experts without adding more risk of infection to both patients and healthcare providers. Not only improve access to subspecialty expertise but telemedicine also reduces cost of healthcare workers, transportation and improve overall quality of care(Lee and English 2018).

There are a lot of methods of telemedicine including Store and Forward (SAF), Real time Live interaction (RTLTI)/ live video teleconferencing (VTC), phone-calls, emails or even text messages and these are also used as the “online-triaging” that the patients will be screened online first if they have an emergency condition that have to come to the hospital or not. (Villani, Annunziata et al. 2020) (Villani, Scalvenzi et al. 2020). TD is one of the suitable methods to use during this COVID-19 pandemic as many dermatologic conditions are diagnosed by visuals and the most benefit of all is it can reduce risk of COVID-19 infection from physical contact. (Lee and English 2018)

To evaluate patient and doctors satisfaction might be the most profitable foundation to understand and develop telemedicine to get the most benefit out of it. This study aims to assess patient and consultant satisfaction with teledermatologic application (SkinX) during COVID-19 pandemic in Thailand from July 2021 to December 2021 as during that time there was a lockdown in Thailand which we were facing the high peak of new cases of COVID-19 infection.

## LITERATURE REVIEWS

### Tele dermatology definitions

Teleder dermatology is the service that allows dermatologists to evaluate patients without a regular face to face appointment and the use of TD has been increasing recently as time and place do not matter anymore(Mounessa, Chapman et al. 2018). There are main three TD care delivery platforms which are (1) Asynchronous e.g. SAF (2) Synchronous e.g. VTC/ RTLTI (3) Hybrid (mixed of both synchronous and asynchronous) e.g. mobile applications

### Asynchronous method / Store and Forward (SAF)

The teledermatology consultations can be used by sending a still digital images to dermatologists and then wait for the result or management plan. SAF is a major method of

asynchronous TD since there will be no doctor-patients relationship by this kind of TD. By this method, the digital photographs will be generated, sent then reviewed later by the expertise not only different places but also different time. Typically, SAF consultations will be reviewed a few hours or a few days after it has been forwarded. The good thing about SAF method is that image quality is not affected by bandwidth, only the download time does, so this makes SAF is more acceptable in the rural areas or less technologically advanced areas (Whited 2001). The downsides of this method are (1) The patients will feel that there is no interaction between patients and doctors and by the lack of this doctor-patient relationship might cause uncomfortable feeling to some patients. (2) Most of the time, the image reviews do not occur simultaneously so the patients have to wait for the results and might lead to delay for treatment. (Armstrong, Kwong et al. 2011)

### **Synchronous method /Real Time Interaction (RTLI)/ Live Video Teleconferencing (VTC)**

RTLI method uses the full-motion real-time video as a main idea so it needs a room with proper light setting and video camera equipment so it is called synchronous TD (Burg, Hasse et al. 2005). The RTLI may need at least three individuals, the patient, a dermatologist, a telepresenter to be available at the same time and all medical staffs should be well-trained to avoid any discomfort for both patients and doctors. This kind of TD requires a larger bandwidth to maintain the high resolution of the videoconferences (Whited 2001). However, time zone is also one of the most important factors to be considered as the RTLI allows patients and dermatologists to interact with one another, show different angles of dermatologic lesions, systematically review parts of the body, discuss current problems and get the most likely diagnosis right away. In rural areas or places that have low bandwidth, the quality of the RTLI will not be good enough to examine the lesions clearly and can lead to the misdiagnosis.

### **Hybrid platforms**

It is a combination of SAF platforms and RTLI to overcome the limitation of both synchronous and asynchronous methods so the patients can send the high definition images and also can interact with the doctors at the same time (Lee and English 2018). The best example to describe hybrid platforms is the teledermatology applications that are widely known and used recently. The applications are easily accessible with electronic devices mostly smart phones. The main advantages of these applications are portability, speed and cost effectiveness but there is also a limitation such as poor-quality images, legal responsibility and also privacy (Ömer Faruk Elmas and Ther. 2020 ).

### **Accuracy and Effectiveness**

The rates of diagnostic accuracy by TD are varied from study to study but mostly found around 50 %- 70% if compared to the regular face to face visit. (Whited, Hall et al. 1999) (Ríos-Yuil 2012). Some studies found TD is more accuracy (Lozzi GP 2007) but some found it significantly less accuracy than the conventional consultation (Warshaw, Lederle et al. 2009). Romero et al. (Romero, Sanchez et al. 2010) found a concordance in diagnosis and treatment plans as 85% and 78% respectively between all teledermatology techniques and conventional face to face care. In the other hand, Loane et al. (Loane, Bloomer et al. 2000) found that using asynchronous SAF technique would lead more face to face follow up than RTLI technique but the effectiveness of the RTLI technique is also based on the image quality.

### **Cost Effectiveness**

Costs and cost effectiveness are difficult to assess as they are varied during period of time and also the technology related nature of teledermatology. The cost studies will be vary by the perspective that is taken, health care system costs or societal costs. Health care system costs will base on the medical system and its structure but the society costs might include more of the expenses like medical system, travel costs and time lost from work (Whited 2001). There was one study in Finland compared the cost of using real-time technology with the conventional consultation and found that the RTLI costs were slightly higher (\$US3166 and

\$US3065) because to complete one RTLI session, there should be at least 3 individuals (patient, doctor and telepresenter) to start the consultation (Lamminen H 2000). If the patients travel long distances or have to be out from work to see a doctor, this would improve the cost effectiveness of TD(Whited 2001).

### **Satisfaction of Teledermatology**

The satisfaction and acceptance of users are very important to TD system as it can defines the trend of using TD. Not only patient satisfaction that we should focus but also the consultant satisfactory. This information is very useful and might be the most valuable as groundwork to develop the quality of TD(Whited 2001).

### **Patient Satisfaction**

There are several studies about the assessment of patient satisfaction with real-time interaction platform and overall they are satisfied with TD as they can get a consultation and discuss with their dermatologists as same as face-to-face / clinic based consultation but about equal number of patients still prefer a clinic based consultation(Whited 2001). In some cases in UK using RTLI method, patients felt uncomfortable (18%) and embarrassed (17%)to show up and talk in front of the camera(Gilmour, Campbell et al. 1998). In one study, they found out that patients had dissatisfaction with SAF system as the results took long time and some of them did not receive a follow-up with the staffs(Pak HS 1999).

### **Consultant Satisfaction**

Dermatologists are mostly have a positive feeling with teledermatology and all of the assessments were done with RTLI technology and dermatologist also prefer the consult with a higher bandwidth(Gilmour, Campbell et al. 1998) (Lowitt, Kessler et al. 1998).

## **RESEARCH METHODOLOGY**

The questionnaires will be developed using online data collection tool “Google Form®” The link and Quick Response code (QR code) will be distributed via email to minimize physical contact during COVID-19 pandemic and avoid any discomfort during doing questionnaires for both patients and consultants. All of the documents are completely confidential.

### **Population & sample**

#### **Patient part**

All patients who (1)age 18 years old or above (2)consulted with skinX doctor via application during July-December 2021 (3)provided valid email address (4) agree to sign an electronic consent form before starting the questionnaire (5)submit the questionnaire completely within 14 days after it was delivered via email. There were 227 patients that fit all criteria and enrolled for this project. The 12 multiple choice patient satisfaction questionnaire will be answered by using number of respondents by scale score from 0 to 5 (Need improvement to very satisfied) (Lanis L Hicks 2003) The score between 48 to 60 (80-100%) will be classified as content for the service.

#### **Consultant part**

Doctor who (1) gave consultation via SkinX application during July - December 2021 with more than 10 cases (2) agree to sign an electronic consent form before starting the questionnaire (3) submit the questionnaire completely within 14 days. Nine multiple choices consultant satisfaction questionnaires will be delivered and the questionnaire will be started once a doctor agree to sign an electronic consent form. Total doctors who enrolled in this project were 57. The score between 36 to 45 (80-100%) will be classified as content for the service.

### **Data collection & Data analysis**

All the data will be processed by Software package SPSS (IBM SPSS Statistic version 29.0). The categorical variable will be described using number and percentage and numerical variables will be presented as mean with SD.

The confident level of questionnaire will be set at 95%

### Ethical consideration

The study protocol was submitted and approved by the Human Ethics Committee of Thammasat University.

## RESEARCH RESULTS

### Patient group

At the beginning of the experiment, 1318 candidates was selected from Skin X records that fit in this project criteria. After 14days of waiting time there are 227 people answered the questionnaire (response rate =17.22%), The mean age of the subjects is  $31.61 \pm 8.26$  years which 56.83% are female and 41.41% are male. Acne (55.51%) is also the number one concern of patients who used skinX application during that period of time. The most reason patient chose to use skinX because it is fast and convenient (51.54%).

### Patient satisfaction evaluation

Patients who rated between 48-60 points (80-100%) will classified as content with the service which 128 subjects (57.38%) content with SkinX service. We also analyze each question of patient satisfaction questionnaire to see how patients think about the service in depth and found that patients chose scale score 4 (satisfied) the most for 62.11%. In each questions, the number of subjects who rate each question 4 or 5 (satisfied and very satisfied) will be calculated to show as a percentage of people who scored each question range between 61-100% in Table1. As the margin of error of this group was set at 95% confident level and had been calculated to be 6.45% that means in this study patients content with skinX service about 49.94 - 62.84% at 95% confident level(Franklin, 2002)

**Table 1** Patient satisfaction with skinX application: questionnaire results (n = 227)

Question	Number of respondents by scale score						% of respondents making rating of 4 or 5
	0	1	2	3	4	5	
1) How confident did you feel with SkinX doctors?	0	0	2	50	150	25	77.09
2) How well did the dermatologist understand and explain your your problem?	0	0	1	55	138	33	75.33
3) How thorough was the examination?	0	0	2	60	145	20	72.69
4) Was sufficient time allowed for examination per one session ?	0	1	3	61	139	23	71.37
5) How well did your questions and treatment plan got answered?	0	0	5	49	150	23	76.21
6) How well do you think your teledermatology session was as good as a regular in-person visit?	0	2	8	75	126	16	62.56
7) How well did the teledermatology equipment work?	0	3	1	67	141	15	68.72

Question	Number of respondents by scale score						% of respondents making rating of 4 or 5
	0	1	2	3	4	5	
8) How do you think that about SkinX service fee?	0	1	5	63	141	15	69.60
9) How do you think about the cost of medication prescribed by SkinX doctor?	0	2	2	69	138	16	67.84
10) After the treatment, how was your symptom?	0	0	5	69	138	16	67.40
11) Overall, How well u get satisfied with SkinX application?	0	0	0	54	152	21	76.21
12) Do you still want to use this platform again?	0	0	2	56	146	23	74.45
Number of respondents on each scale	0	9	36	728	1692	259	
Percentage of total responses (%)	0	0.33	1.32	26.73	62.11	9.51	

### Consultant group

For consultant part, the questionnaire was sent successfully to all 71 subjects that fit to our criteria. Only 64 doctors have responded to the questionnaire (response rate = 90.14%) and 6 of them did not agree to sign the online consent form, 1 of them did not complete all the questions before submitting the answer (complete rate = 89.06%) that makes only 57 doctors (80.28% of total population) that have been enrolled to this project. The mean age of doctors is  $33.96 \pm 4.50$  years and mostly female (82.46%). No surprise that all of the doctor found acne is the most common diagnosis via SkinX application during this Covid19 era (July-December 2021) and again fast and convenient is the most popular choice that doctor chose for using SkinX application (57.89%).

### Consultant satisfaction evaluation

Consultant data was collected the same way as patient data was done. Doctors who scored between 36-45 points (80-100%) means they content with the service. There are only 5 doctors (8.77%) that content with skinX service. When the confident level was set at 95 then margin of error of consultant group was calculated to be 7.42% that means consultants content with SkinX service between 1.35 to 16.19% (Franklin, 2002)

Question	Number of respondents by scale score						% of respondents making rating of 4 or 5
	0	1	2	3	4	5	
1) I felt the color and quality of the photographs were sufficient.	1	0	5	28	19	4	10.13
2) I felt the color and quality of the RTLI were sufficient.	0	1	9	25	19	3	9.69
3) I felt the perspective photographs were sufficient.	0	2	9	21	22	3	11.01
4) I felt the time was sufficient for examination per one session ?	0	0	6	16	31	4	15.42
5) I felt teledermatology equipment work well?	4	2	8	24	16	3	8.37
6) I felt teledermatology is as good as the regular OPD visit.	0	4	9	27	15	2	7.49
7) I felt using teledermatology is harder to diagnose than a regular OPD visit.	0	2	12	19	21	3	10.57
8) Overall, How well u get satisfied with SkinX application?	0	0	5	20	28	4	14.10
9) I want to continue using SkinX for diagnosis and treatment.	0	1	3	19	30	4	14.98
Number of respondents on each scale	5	12	66	199	201	30	
Percentage of total responses (%)	0.97	2.34	12.87	38.79	39.18	5.85	

## DISCUSSION AND CONCLUSION

The result showed patient response rate = 17.22% which was very acceptable rate since the average response rate for external survey is about 10-15% (Johnson 2013). From the data, it showed that the minimal age is 18 years old and maximum age is 52 years old (mean =  $31.61 \pm 8.26$ ) and mode is 28, can represent that SkinX application can easily access to the wide range of age especially the working age group. A maskne is causing a problem again during this COVID-19 pandemic since it was first recognized in 2004 during SARS outbreak when people need to wear facial mask (Malczynska 2022) and our study also showed that acne is still the number one concern that patients seek for treatment and patients 57.14% were very satisfied with the treatment they had for acne.

For patient satisfaction score, our study shows that 128 subjects out of 227 subjects ( 56.39%) are satisfied with the service, as same as many recent studies which showed that even some people still prefer a face to face consultation, an overall patient satisfaction about

teledermatology is usually high in both SAF method and LI method(Mounessa, Chapman et al. 2018). Recently in 2021, Gu et al. (Gu L 2021) did a retrospective study to evaluate the acne visits during the pandemic, they found that even the OPD opened regularly about half of patients still choose to use teledermatology for an acne treatment, like our study that 74.45% of patients group still want to continue using SkinX application in the future. In 2001, T.L. Williams et al (Williams 2001) also published his results about patients satisfaction in teledermatology, he found that 93% were satisfied with the service and 86% of patients liked it because it was convenient, similar to our study that the most chosen reason (45.31%) to choose SkinX application because it is fast and convenient. In Italy 2020, Ruggiero et al. (Ruggiero, Megna et al. 2020) studied about teledermatology for acne during COVID-19, they found out that 92.30% satisfied with the service and 71% were satisfied the treatment they had, our study showed a lower satisfaction rate but 67.40% of our subjects reported that their symptoms got better (60-100%) after receiving the treatment via SkinX.

There was a study that similar to our research published in 2018, studied about patient satisfaction with dermatologic consultation using MedX application. They collected data from 32 subjects at cosmetic laser clinic, Wanfang hospital, Taipei Medical University during February to April, 2017(Wang, Ganzorig et al. 2018) and the study revealed that 85.8% of all subjects gave the service above mean scores.

Both in MedX and SkinX showed that the number of female subjects seemed to be higher than male as they believed that female cares about their skin condition more than male(Wang, Ganzorig et al. 2018) and the mean age in both studies were in late twenties and early thirties which were the range of ages that use social media the most. MedX and SkinX are both teledermatologic applications but MedX used only Store and Forward (SAF) method while SkinX uses both SAF and RTLI. The qualities of pictures of SAF will not change after it had been taken if the senders created a clear photo, the receivers would receive a clear photo too, not like RTLI that the qualities of a video conferences will be fluctuated upon the bandwidth and the cellular signal that were using, this might make patients felt less satisfied if the RTLI was unstable during the consultation session.

For consultant group, acne is the most found chief complaint, 100% of skinX doctors in this project found that acne is the most common diagnosis they noted in the system, 56.41% of acne patients rated skinX service more than 80% of overall system, this can be related that teledermatologic application might be a beneficial method for diagnosis and treatment for acne as the result from Loh et al. (Loh, Chong Tam et al. 2021) in Singapore in 2021 also found that teledermatology is a useful method to diagnose cutaneous lesions during COVID-19 and the most common diagnosis are acne and eczema.

For consultant satisfaction score, in our study showed that most dermatologists prefer the regular OPD visit more than a teledermatology as the result from Marchell et al. (Marchell, Locatis et al. 2017) in 2017, they reported that from their study dermatologists prefer in-person examination than remote method as they wanted to see and touch the dermatologic lesions themselves. Most of SkinX doctors (57.89%) also chose to use SkinX application because it is fast and convenient as same as a result from Ruiz et al. (Ruiz C 2009) in 2009, they reported that dermatologists liked teledermatology because it was feasible, convenient and saved them time. While patients satisfaction score seems to be high in most of the studies (Mounessa, Chapman et al. 2018), consultant satisfaction score was concerned by many factors as in Bowns et al (Bowns, Collins et al. 2006) in 2006, reported that (1) more time consuming during the session (2) increased workload (3) electronical problems about the system were the things that consultants were uncomfortable about and other study from Ogbechie et al. (Ogbechie OA 2015) in 2015, found that not only diagnostic reliability that dermatologists concerned about teledermatology but also financial reimbursement and liability. In our study, we found out similar issues that previous researches had reported such as the quality of pictures and video,



the electrical problems about the system and also the time duration used per session that represent by the low percentage from our consultant satisfaction score.

In contrast to patient satisfaction score, consultant satisfaction score showed different aspects to review. In many studies (Marchell, Locatis et al. 2017, Mounessa, Chapman et al. 2018) also reported that clinic-based visit is still preferable for doctors, as in our study 7.49% of doctors reported that using teledermatology is as good as regular OPD visit and also 0% of doctors also answered that giving diagnosis via teledermatology is as easy as examine patient at OPD visit. As many of dermatologic conditions are diagnosed by visual that makes pictures and/or live interaction are very important, in Lowitt et al (Lowitt MH 1998) reported that dermatologists preferred high visual resolution video for LI TD and also wanted to see other anatomical areas that involved and this might be the challenging issue for dermatologists as receivers.

Dermatologic application might be a new resolution for patients and consultants because it is fast, convenient and accessible. To evaluate patient and consultant satisfaction might be the most valuable as groundwork to develop the quality of teledermatology as it could guide the further strategies for the new method of diagnosis, treatment and follow up.

The findings of this study showed the high patient satisfaction with SkinX application for overall and all aspects. On the other hand, the consultant satisfaction was still quite low because it depends on many aspects to get satisfied with the service as doctors are receivers and the accuracy and quality of treatment are depended on the information that have been sent, it is understandable that patients can be satisfied with the service a lot easier than the consultants.

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