Evaluating the Effectiveness and Usability of Telehealth Applications for General Consultations

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Abstract: Telehealth uses digital information and telecommunication technologies in delivering health-related services. With the recent COVID-19 pandemic, there has been an increase in the adoption of telehealth to give people remote access to healthcare services, including the Philippines. It is important to ensure that the quality of health services acquired by patients remain satisfactory, regardless of the channel they are procured. As there has been a lack of studies regarding the implementation of telehealth in the country, this research study aims to evaluate the effectiveness and usability of telehealth applications for general medical consultations in certain regions in the Philippines, specifically Region III, Region IV-A, and the National Capital Region (NCR). A quantitative research approach was adopted and started with a preliminary survey to determine the most commonly-used telehealth applications among 196 respondents. Subsequently, 51 respondents answered the Usability Survey, based on the Telehealth Usability Questionnaire (TUQ). Data gathered from the survey were analyzed through statistical analysis, benchmarking, and gap analysis to determine possible recommendations for each application. It was revealed that there is no significant difference between the gender of the respondents and the ratings of telehealth applications. The overall ranking of the five most commonly-used applications are as follows: 1-KonsultaMD, 2-Medifi, 3-NowServing, 4-EzConsult and 5-DocKoTo, respectively. TUQ scores of KonsultaMD for usefulness, ease of use and learnability, interface quality, interaction quality, reliability and satisfaction and future use all exceeded the population mean. These results provide groundwork essential to the improvement of telehealth applications for wide use in the Philippines.

Key Words: telehealth; telehealth application; usability; HCI; medical consultation

1. INTRODUCTION

With the COVID-19 pandemic forcing individuals to self-isolate, more and more people are restricted from going outside, which leads to limitations in how often individuals can visit doctors and physicians. Telehealth, however, allows for patients to receive medical care without the need to go outside. It has become a widely used tool in the pandemic to accommodate patients who cannot leave their homes. Due to this, multiple researchers have commented on the immense rise in the use of telemedicine services and applications during the pandemic around the world, stating its effectiveness and widespread use (Hollander et al. 2020; British

Veterinary Association, 2020; Perrin et al., 2020). While forms of telemedicine have existed for decades, telemedicine has had much greater prevalence in the 21st century (Harting et al., 2019).

The healthcare of several first world countries such as the United States of America (Toten et al., 2020) were able to transition and adapt quickly to address the rapid increase in the necessity of a wider and more flexible remote healthcare delivery such as telehealth. Additionally, Kaiser Permanente of North California announced that their number of virtual communications is greater than in-person visits. The usage and development of telehealth mobile applications significantly helped and assisted medical practitioners in the record maintenance, communications and consulting, patient management and monitoring (Ventola, 2014). Bonsignore et al. (2018) evaluated the feasibility, usability, and acceptability of TapCloud, a remote patient monitoring application and videoconferencing, in terms of palliative care. In their in-depth interview with TapCloud users, three main advantages were noted regarding the interaction with the medical practitioners: access to clinicians, quick responses, and improved efficiency and quality of care. However, users believe that the application cannot replace in-person care and services. Nevertheless, TapCloud receives high approval from both patients and clinicians.

In a study by Anuran et al. (2021), telemedicine processes, good practices, and areas for improvement in the University of the Philippines Health Service (UPHS), the outpatient clinic of Philippine General Hospital (PGH) were demonstrated and observed within two weeks during the COVID-19 pandemic. The telehealth services of UPHS involved the use of virtual triage, through phone calls, short messaging service (SMS), emails, and Online Consultation Request and Appointment System (OCRA). It reported the areas for improvement in the lack of protocols in requesting for appointment, addressing unanswered calls, documentation in the logbook and electronic medical records, inconsistency of the OCRA system, as well as the Information and Communication Technology (ICT) requirement of telemedicine services which gravely disrupted the service usability and workflow efficiency.

With the scarcity of studies conducted to establish the overall implementation of telehealth in the Philippines, this research study aims to evaluate the effectiveness and usability of telehealth applications for general consultations in Region III, Region IV-A, and National Capital Region in the Philippines. This includes analyzing several factors affecting the usability of the identified telehealth applications and technologies in delivering healthcare.

The criteria for the scope of these telehealth applications are the ones which are solely used in telehealth practices. Other video conferencing programs like Zoom and Facebook messenger were not included in the study. Only the factors involving usefulness, ease of use and learnability, interface quality, interaction quality, reliability, and satisfaction and future use were used to determine the usability and provide recommendations on the current technologies or applications that are being used for telehealth general consultations.

2. METHODOLOGY

The approach that was used in this study is quantitative research. Quantitative research aims to examine the most commonly used telehealth applications used for general consultations. Additionally, the effectiveness and usability of the said technologies were evaluated on how it improves healthcare delivery to patients.

2.1 Data Collection

In order to obtain the necessary data to determine the usability of telehealth applications for general consultations, two data collection activities were done via Google Forms Survey. The initial survey was done among various individuals to scope and identify the top five most commonly used telehealth applications for general consultations. After conducting the initial survey, the main usability survey was disseminated among Region III, Region IV-A, and National Capital Region citizens with prior experience to telehealth general consultations to evaluate the usability of the identified telehealth applications. The main survey form was adapted and modified based on the Telehealth Usability Questionnaire (TUQ) of Parmanto et al. (2016). In line with this, the TUQ was anchored with other models as source material, which include the Telemedicine Satisfaction Questionnaire (TSQ) for the usability

factors of usefulness, satisfaction, and interaction quality, the Technology Acceptance Model (TAM) for usefulness and ease of use, and the IBM Post-Study System Usability Questionnaire (PSSUQ) for ease of use, interface quality, reliability, and satisfaction.

A simple random sampling was used to obtain the participants for the initial survey. In line with this, the selection of the participants for the main survey was done through the random purposive sampling method, as there is a specific characteristic, which is the telehealth application used, to represent the population.

2.2 Analysis

The data collected using the Usability Survey was analyzed through quantitative analysis. As the survey is divided into different criteria in evaluating the usability of telehealth applications, each factor was individually evaluated. The mean TUQ scores per factor of the different telehealth applications given by the respondents through the 5-point Likert Scale underwent benchmarking and gap analysis. Association between the mean score of each factor and gender was analyzed through a t-test. According to Xu et al. (2021), gender is an important factor that needs to be analyzed since it can significantly impact the TUQ scores. Moreover, a benchmark for each category in the TUQ was defined from the highest mean score among the five telehealth applications. Additionally, the gap analysis was conducted by comparing all the mean scores per factor for each application to the benchmark. The gaps of each telehealth application were compared and evaluated through sample screenshots and related literature to identify which of the five is the most effective application to use for general consultations.

3. RESULTS AND DISCUSSION

3.1 Initial Survey

A total of 207 individuals responded to the Survey of Commonly Used Telehealth Applications. However, unqualified respondents such as health practitioners, patients below 18 years old, and patients that used telehealth applications that did not confine with the scope and limitations of this study were filtered out systematically.

The final sample achieved for the preliminary survey was 196(n=196), of which 25 % (49) were male and 75 % (147) were female. Different age groups were also recorded with 87.76 % (172) respondents between 18-24, followed by 6.12 % (12) between 25-34, 3.57 % (7) were aged 35-44, 2.04 % (4) of the respondents were part of the 45 - 54 age group, and 0.51 % (1) belonged to the 55+ age group. In terms of the location, 82.14 % respondents reside Region III, followed by NCR at 8.67 %, 7.65 % came from Region IV-A, 0.51 % came from Region I, 0.51 % live in Region II, and also 0.51 % inhabit Region VII. Furthermore, Table 1 exhibits the most frequently used telehealth applications.

Table 1. Top 5 Most Frequently Used Telehealth Applications

Telehealth Application	n(%)
KonsultaMD	21 (32.81%)
NowServing	12 (18.75%)
Medifi	11 (17.19%)
EzConsult	10 (15.63%)
DockoTo	10 (15.63%)

Other telehealth applications used by the respondents were WebMD (1), MDLIVE (1), and AIDE (1). Some respondents used telehealth applications that were not in line with the study's definition of telehealth, including Facebook (18), Zoom (3), Viber (2), PJG Telehealth (1), Google Meet (1), and ThOMedSS (1). Meanwhile, 116 respondents said that they have not used any telehealth application.

3.2 Usability Survey

The TUQ was sent to the 196 respondents of the preliminary survey. The respondents who answered that they have used telehealth applications were retained, which resulted in a final sample of 51(n=51) participants for the main telehealth survey. Among the total participants, 41.18% are male (21), and 58.82% are female (30). Looking at the age groups,

45.1% are aged between 18-24 years (23), followed by 29.41% between 25-34 years (15), 9.8% between 35-44 years (5), 7.84% between 45-54 years (4), and also 7.84% are aged 55 and above (4). With regards to location, 35.29% are residing in Region III (18), 21.57% are in Region 4A (11), and 43.14% are living in NCR (22).

To identify if gender affected the scores for each factor, a t-test was also conducted based from the study of Xu et al. (2021). The mean TUQ scores for both male and female respectively are: 4.03 and 4.07 for usefulness; 3.78 and 3.79 for ease of use; 3.58 and 3.69 for interface quality; 3.82 and 3.78 for interaction quality; 3.03 and 3.2 for reliability; 3.7 and 3.77 for satisfaction; and 21.94 and 22.29 for the total TUQ score. In all factors except interaction quality, the TUQ scores among female participants are higher compared to the males. This finding is in line and consistent with various literatures that state that telehealth is more prominent and usable among female physicians, nurses and other users (Xu et al., 2021). However, upon further testing, the p-values for all factors (usability, 0.8617; ease of use, 0.9672; interface quality, 0.7317; interface quality, 0.8334; reliability, 0.5614; satisfaction and future use, 0.8046; average, 0.8028) are greater than the level of significance (p>0.05) which means that the test is not statistically significant. Therefore, in this study, there is no significant difference in TUQ scores between genders.

3.3 Benchmarking

The different telehealth applications' score on the usability factors are listed in Table 2 (A-Usefulness, B-Ease of Use, C-Interface Quality, D-Interaction Quality, E-Reliability, F-Satisfaction & Future Use).

Table 2. Telehealth Applications Mean Scores per Usability Factor

Telehealth Application	n	A	B	C	D	E	F
KonsultaMD	11	4.52	3.97	4.36	4.42	4.41	4.35
NowServing	10	4.43	3.53	4.33	4.40	4.23	4.11
Medifi	10	4.40	3.23	4.07	3.93	4.18	3.95
EzConsult	10	3.67	2.60	3.03	3.10	2.80	3.14
DockoTo	10	3.20	2.23	2.83	3.00	2.55	2.84

All of the application's total score for the factors in the TUQ is listed in Table 3, All the applications ranked consistently with KonsultaMD as the highest, and DocKoTo with the lowest score in all categories. The mean scores are 26.09 for KonsultaMD, 24.67 for Medifi, 23.71 for NowServing, 18.85 for EzConsult, and 17.02 on DocKoTo.

Table 3. Total TUQ Scores of Telehealth Applications

Telehealth Application	n	Mean	Std. Dev.
KonsultaMD	11	26.09	2.4
NowServing	10	24.67	1.19
Medifi	10	23.71	2.88
EzConsult	10	18.85	6.07
DockoTo	10	17.02	1.9

3.4 Gap Analysis

Kayyli et al (2017) affirms that the inclusion of information and content addressing the barriers to patient acceptance and adaptation of telehealth boost the usefulness quality of an application. In addition, KonsultaMD proved how it enhances patients accessibility of healthcare services with its partnership with over 60 eHealth and payment services (GCR, 2021).

For an application to be deemed easy to use and learn, it needs to be navigated easily, has apparent information visible, appears trustworthy and appealing. The KonsultaMD application satisfies all the criteria suggested by Horkey et al. (2019). Only KonsultaMD has incorporated FAQ among its Menu Bar, whereas the remaining apps have not allotted such a menu.

Graphical user interface, ease of navigation, and an overall impression of patient interaction with the telehealth applications are the deciding factors affecting their interface quality (Parmanto et al., 2016). KonsultaMD, Medifi and NowServing readily show graphics and pictures that aid the users in navigating within the application. Among the five applications, KonsultaMD is the only one with a text-

based sidebar menu; compared to others which have it on the bottom of the page.

The interactions of patients with clinicians, including audio and video quality and the similarity of telehealth consultations with in-person consultations comprise the interaction quality of telehealth applications. The accessibility of such functions within the applications are significant in considering the quality of interaction with the physicians. In-person visits usually allow patients to be examined by a resident on duty for general consultations, and a follow up consultation with a consultant is scheduled for further evaluation (Provincial Health Office, 2020). Coherently, KonsultaMD, and Medifi have a common tab of talking or consulting a doctor, separate from an option of looking for a specialist. This makes it optimal for such applications as tools for general consultations. In contrast, NowServing, EzConsult and DocKoTo only have the menu item to seek a subspecialty, which deviates from the notion of general consultations provided by the applications.

The reliability of the technology depends on the software's ability to avoid system issues. However, if an error occurs, reliability is also measured in how the user can recover from the error and how the application provides instruction to the user. This also includes simple exit confirmation buttons. KonsultaMD, Medifi, and NowServing included instructions in the application on how to reach customer service in case of issues. The last two apps which scored significantly lower than the top three, have no contact information given. DocKoTO settings does not open in the program but links to its website instead.

Satisfaction and future use refer to the overall satisfaction of users regarding the healthcare services provided by the application and the willingness to use it again. The service quality of the application which, including all the previous factors, affects the user's satisfaction (Tantarto, 2020). As the ranking of the applications in previous factors stayed almost consistent, it is predicted that it will be similar with the result for the satisfaction factor.

4. CONCLUSIONS

This investigatory project mainly aimed to evaluate the effectiveness and usability of telehealth applications, as well as provide recommendations for the improvement of the usability of each telehealth application utilized in general consultations. KonsultaMD, Medifi, NowServing, EzConsult and DocKoTo are the top five most commonly used telehealth applications in Region III, Region IV-A and National Capital Region. The results of the study clearly exhibited that among the five most commonly-used telehealth applications in the geographic scope, KonsultaMD is the most efficient in terms of all the telehealth usability factors; including usefulness, ease of use and learnability, interface quality, interaction quality, reliability and satisfaction and future use.

Sample screencaps and related literature revealed that factors regarding content quality and information accessibility affect their usefulness; information visibility, and visuals for ease of use; graphical user interface, ease of navigation and overall patient impression influence interface quality; audio and video quality and similarity to in-person visits for interaction quality; quick recovery and instruction manual for reliability; and application consistency and customer service for satisfaction and future use. With the gap analysis, it can be deduced that the use of telehealth applications is an effective alternative in managing health care and accessing eHealth services, by allowing patients in rural areas to experience quality consultations without the expense of traveling long distances. Furthermore, the study has provided noteworthy insights and more information regarding the comparison of the different telehealth applications, the relation between the six subdomains of telehealth usability, as well as its significance in academic and real-life contexts. The findings may provide sound groundwork for government agencies and non-government organizations, hospital staff and healthcare workers, and patients in planning, developing, and implementing telehealth consultation services, along with its wide use in the Philippines.

5. ACKNOWLEDGMENTS

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