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RESEARCH ARTICLE

Tele-Ophthalmology for the Management and AssessmenT of Ophthalmic Symptoms (TOMATO): An Assessment of the Telemedicine Services at a Tertiary Eye Center in the Philippines

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ABSTRACT

Background: The COVID-19 pandemic has led to the rapid adoption of telemedicine in the Philippines; however, there is limited empirical evidence about how physicians and patients view this new form of care.
Objective: Our main objective is to evaluate Tele-Ophthalmology for the Management and AssessmenT of Ophthalmic Symptoms (TOMATO), a tele-ophthalmology program implemented in a national tertiary eye referral center in the Philippines. We specifically aim to evaluate the patient characteristics, patient satisfaction, and ophthalmologists' perception of TOMATO telemedicine for eye care.
Methodology: We employed a prospective, cross-sectional, questionnaire-based study among patients and physicians who participated in TOMATO during the study period.
Results: A total of 10,551 patients consulted TOMATO, from January to December 2021, with cataract as the most common diagnosis. During its pilot implementation, TOMATO received a low satisfaction rate of 33% among patients due to numerous barriers to its use, including technical and interpersonal problems. Filipino ophthalmologists had good knowledge and a positive attitude towards the use of TOMATO, with a mean score of 3.53 out of 5.
Conclusions: Tele-ophthalmology is a promising technology for improving access to eye care in the Philippines, but there are still some challenges that need to be addressed, such as improving the user experience, ensuring data security, and training future ophthalmologists in its use.

Introduction

The coronavirus disease 2019 (COVID-19) pandemic has led to major changes in public health policies by promoting physical distancing and home quarantine measures to prevent viral transmission. These policies have led to the reduction of patient volumes, cancellation of elective surgeries, enhancement of personal protective strategies in the clinics, and rapid adoption of telemedicine consults[1].

To continue the delivery eye care while enhancing clinic safety, the Department of Ophthalmology and Visual Sciences (DOVS) of the Philippine General Hospital (PGH) implemented the Tele-Ophthalmology for the Management and AssessmenT of Ophthalmic Symptoms (TOMATO). In this telemedicine program, patients desiring to consult will request an online appointment through the Online Consultation Request and Appointment (OCRA) system of PGH (https://pghopd.up.edu.ph/). From OCRA, patients with eye complaints will then be triaged to TOMATO, where a senior ophthalmology resident, fellow, or medical specialist will communicate with the patient on his desired schedule for a virtual consult. TOMATO provides direct and real-time tele-ophthalmology encounters using voice or video calls in history taking and remote physical examination. This virtual consult may further be supplemented by pictures of the affected eye, taken using the patient's mobile phone. Details of the consult will be securely documented and stored using the Computerized Registry of Admissions and Discharges (RADISH), the electronic medical record system of PGH. Patients diagnosed with benign eye conditions will then be given medical advice and an electronic prescription if warranted. On the other hand, those with urgent concerns will be asked to secure an appointment for a face-to-face consultation at the nearest eye clinic or in PGH.

Given that ophthalmology relies greatly on visual images for screening, diagnosis, treatment, and monitoring of disease, the use of digital imaging and telemedicine may offer an alternative avenue to provide effective clinical care[2]. Numerous studies have shown that tele-ophthalmology is similar to face-to-face consults in terms of clinical outcomes[3–5], but offers the advantage of increasing patient access[6,7] and increasing patient satisfaction [8,9] while lowering patient cost[10,11].

From a health human resource perspective, tele-ophthalmology protects clinicians by minimizing coronavirus exposure. Although the virus is largely transmitted by respiratory droplets, the ocular surface is thought to play a role in transmission as well. Conjunctivitis has been described as an early manifestation of COVID-19, preceding pneumonia by a few days[12]. Furthermore, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was detected in the conjunctival secretions of patients with COVID-19 and conjunctivitis, suggesting infectivity through this route[13]. While the risk of transmission through the tears may be low[14], the proximity needed to conduct a thorough slit-lamp and fundus examination may still put ophthalmologists at higher risk for droplet-borne infection with SARS-CoV-2[15].

Despite these advantages offered by tele-ophthalmology, this technology has not been fully adopted for large-scale implementation in the country. One of the major obstacles to the widespread use of tele-ophthalmology is the lack of compelling evidence that its use will improve routine medical care in a cost-effective way[16]. This problem is particularly pertinent to developing countries like the Philippines, where sparse resources must be used wisely. Furthermore, there is limited empirical evidence about how physicians and patients view this new form of care and how it affects overall health system use[17].

This study aims to evaluate the Tele-Ophthalmology for the Management and AssessmenT of Ophthalmic Symptoms (TOMATO), the telemedicine program implemented by the Department of Ophthalmology and Visual Sciences of the Philippine General Hospital from January to December 2021. Specifically, we aim to (1) describe the demography, common chief complaints, diagnoses, and outcomes of patients who consulted using TOMATO, (2) determine patient satisfaction and barriers in the use of TOMATO, and (3) determine ophthalmologists' knowledge and perception

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towards the use of TOMATO. To our knowledge, this is the first study to implement and evaluate a tele-ophthalmology program for primary ophthalmic care in the Philippines. The telemedicine services of the hospital continued for the whole duration of the pandemic.

The results of the study may establish the utility of tele-ophthalmology in the country, as well as understand patient and physician barriers that prevent its optimal utilization. These may help shape guidelines and policies for large-scale implementation of tele-ophthalmology in the Philippines, thereby making quality eye care accessible for Filipinos especially in the era of the COVID-19 pandemic and beyond.

Methodology

Study Design and Setting

The study employed a single-center, cross-sectional prospective design. It was done from January to December 2021 at the DOVS PGH where TOMATO is currently being implemented.

Study Participants

Patients with ophthalmic complaints who consented to undergo TOMATO consultation were the target population. Furthermore, ophthalmologists from DOVS who performed virtual consultations during the study period were included in the study.

For the inclusion criteria, all consults received using TOMATO from January to December 2021 were eligible for inclusion. For patients with more than one video consultation, only their first encounter will be considered. General Clinic (GC) consults were considered as first encounters. Patients initially seen at the GC and subsequently referred to any subspecialty clinics were considered second encounters, and were therefore excluded. Patients aged <18 years were needed to be accompanied by their legal guardian during the conduct of the virtual examination. On the other hand, physicians must have performed tele-ophthalmology services for at least one month before they can participate in the research.

For the exclusion criteria, patients who did not have a valid ophthalmic complaint or those mistriaged to TOMATO were excluded from the analysis. Informed consent was an absolute requirement for study participation, and as such, patients and physicians without consent were likewise disqualified. Furthermore, participants who cannot recall their first encounter with TOMATO services were excluded.

Study Procedures

Patient characteristics in terms of demography, common chief complaints, diagnoses, and outcomes of patients who consulted using TOMATO from January to December 2021 were documented and analyzed.

To assess patient satisfaction, we employed a prospective cross-sectional questionnaire-based study among patients who consulted TOMATO during the study period.

Randomly selected participants were contacted by an investigator independent from the consultation in the days following their TOMATO consultation (three days, at most). A translated pre-validated questionnaire was administered via telephone. For patients > 18 years old, they had to verbally agree to the Informed Consent for Adult Patients. (For patients < 18 years old, they had to be accompanied by their parent/legal guardian during the survey. The parent/guardian answered the survey on the patient's behalf. He/she had to verbally agree to the Informed Consent for Pediatric Patients or to the Assent Form, as appropriate.

Finally, to assess the perception and knowledge of ophthalmologists towards TOMATO, we conducted a prospective cross-sectional questionnaire-based study among all PGH DOVS ophthalmologists who performed TOMATO services during the period between January and December 2021. Informed consent was a prerequisite before the survey.

Measurement tools and data collection

A previously validated Filipino version of the Patient Satisfaction Questionnaire (PSQ18)[18] was used to measure levels of patient satisfaction. The questionnaire contained 18 closed-ended questions with five points answers on the Likert scale evaluating seven aspects of satisfaction: (1) general satisfaction, (2) technical quality, (3) interpersonal manner, (4) communication, (5) time spent during consult, (6) accessibility to tele-ophthalmology screening, and (7) accessibility to an ophthalmologist when a referral is needed. The financial aspect of satisfaction was not included in the questionnaire as tele-ophthalmology is delivered free in the hospital.

On the other hand, to assess physicians' perception and knowledge on the use of telemedicine, a previously validated five-point Likert scale questionnaire adapted from a previous study[19] was used. The scale ranged from very low (score = 1) to very high (score = 5). The questionnaire consists of seven parts: (1) demographics, (2) knowledge of telemedicine technology, (3) clinicians' perception of the advantages of telemedicine, and (4) disadvantages of telemedicine.

For both surveys, the instruments were pilot-tested on participants (n = 20 patients and n = 5 ophthalmologists). Feedback from the respondents as to comprehension, clarity, and length, were collected. Modification of the questionnaire was done as needed.

Informed consent was obtained before any data collection. Data collection was performed by the investigator and co-investigator. A research assistant was hired for data collection purposes, and access to medical records was granted by the chief of the Medical Records Division. To maintain privacy and confidentiality, all research personnel were asked to sign a confidentiality agreement. They underwent training on data handling and protection before the start of the study.

Statistical considerations

To determine the number of participants needed for our patient satisfaction study, we employed data from previous literature which showed that 88% of patients were satisfied with the tele-ophthalmology program in Saudi Arabia[20]. Using the G-power program[21] for calculating the minimal sample size with a 95% level of significance (the minimal β=0.2), and power of 80% (α=0.05) the minimal sample size needed is n = 132.

On the other hand, for our physician survey, we employed a total population sampling of all ophthalmology residents and fellows at the Department of Ophthalmology and Visual Sciences (DOVS) of the Philippine General Hospital. As of July 2020, there are 24 residents and 11 fellows, for a total sample size of n = 35 ophthalmologists.

Descriptive analyses were performed. Patient demographics and characteristics of virtual consults were described using frequency tables and appropriate graphs. Data were expressed in terms of the actual number and percentage. Data were analyzed using GraphPad Prism (Version 8.4.3). Descriptive statistics in terms of mean, standard deviation, median, range, and percentage were used to describe the characteristics of the studied sample.

Technical and Ethical Considerations

Technical approval was obtained from the Department of Ophthalmology and Visual Sciences before the conduct of the study. Ethical approval from the Research Ethics Board of the University of the Philippines Manila was secured before any participant recruitment. The ethical considerations in this study were done following the principles provided for in the Declaration of Helsinki and the National Ethical Guidelines for Health and Health-Related Research[22].

Results

From January to December 2021, a total of 10,551 patients consulted using TOMATO, averaging 40 patients a day, or around 200 patients per week. Among them, 89 percent were successfully contacted using mobile phones. The use of the mobile phone is the major mode of communication with our tele-ophthalmology patients, supplemented by photos being sent via email, or our official Facebook account.

However, a significant 11% of our patients, or 1 in 10, either canceled or were tagged as no-shows, which means that we cannot successfully reach them despite repeated attempts to call them. Usual reasons include the phone cannot be reached, or the patient does not answer the calls after 3 attempts.

In terms of sex distribution, 43% of them are female, and 57% of them are male, almost in a 1:1 ratio. In terms of age distribution, the majority of our patients are elderly, most of which are belonging to the 55-70 age group. (Figure 1).

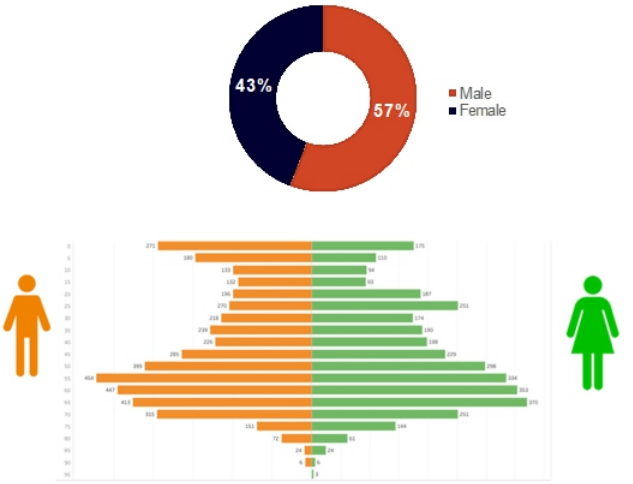

Figure 1. Sex and age distribution of patients who consulted TOMATO (N = 10,551)

The majority of our patients were from Manila and the nearby provinces of Cavite and Laguna, followed by Quezon City, Pasay City, Bulacan, Taguig, Rizal Province, Makati City, and Batangas (Figure 2).

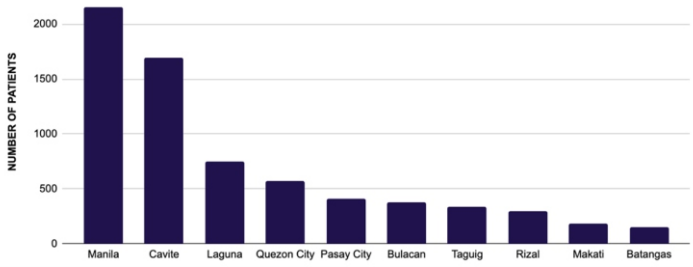

Figure 2. Top 10 locations of patients who consulted TOMATO (N = 10,551)

In terms of the outcomes, cataract was the most common diagnosis of TOMATO patients, followed by error of refraction, dry eye syndrome, and rule out diabetic retinopathy, and hypertensive retinopathy (Figure 3).

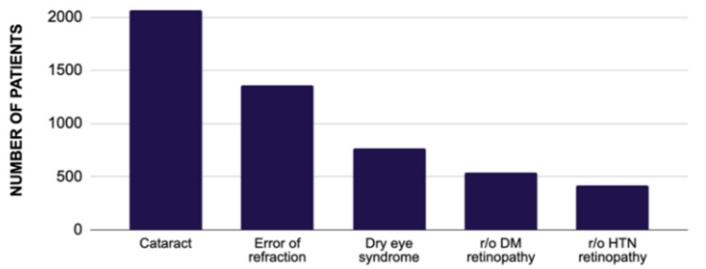

Figure 3. Top 5 diagnoses of patients who consulted TOMATO (N = 10,551)

As for the disposition, 2/3 of the patients were advised to seek further face-to-face consults, while 1/3 of them were deemed manageable enough to be followed up through teleconsultation, instead of face-to-face consultation.

On the other hand, a total of 135 patients were randomly selected from the total number of patients who availed of TOMATO services, meeting the minimum sample size of 132. Out of the 135 patients, 56% are females and 44% are males. The average age of the respondents is 48 years old, with age ranging from 18 to 78 years old.

Based on our cross-sectional survey, our tele-ophthalmology program only had a 33% satisfaction rate, out of a maximum 100 percentage points. Stratifying the satisfaction rate per domain, results showed a mean score

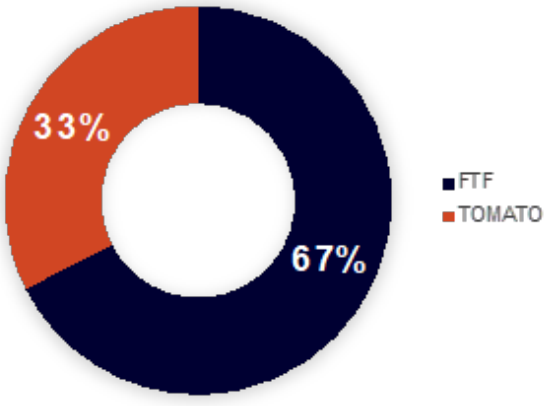

Figure 4. Disposition of patients who consulted TOMATO (N = 10,551)

ranging from 29% to 44% (Figure 5). The lowest score was noted on communication, as patients had difficulty communicating their medical concerns via voice call. The low score was also noted in interpersonal manner, as patients find teleconsultation too impersonal, and patients feel they were given less medical attention if consultation was done through the phone.

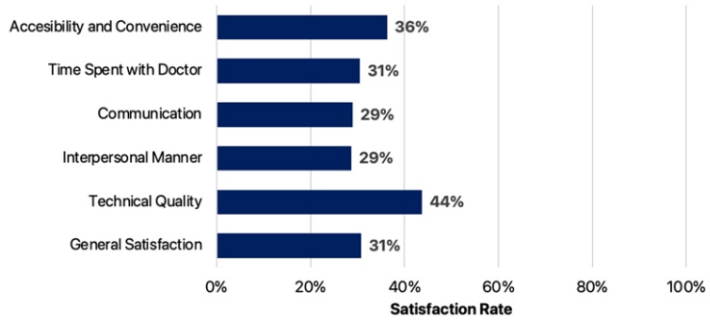

Figure 5. Satisfaction rate of patients who consulted using TOMATO across domains (n = 132)

A relatively high satisfaction rate was noted on the aspect of accessibility and convenience, as the patient no longer needed to come to the hospital for a face-to-face visit.

The highest score was noted on the technical quality of the consultation, as the patients felt that the physicians were very knowledgeable about the assessment and management of their ophthalmologic complaints.

On the other hand, a total of 35 ophthalmologists participated in the study, comprising of 24 residents, 11 fellows, with an average of 2 years of clinical experience.

A mean score of 3.53 out of 5 was obtained using the validated questionnaire, suggesting a high degree of knowledge and positive perception among ophthalmologists on the use of tele-ophthalmology. Stratifying the mean scores per domain, physicians agree regarding the necessity of telemedicine technology in delivering health services to patients. The majority of them are also aware of the advantages of telemedicine technology. Physicians had the lowest score on the perception of disadvantages of telemedicine technology (Figure 6).

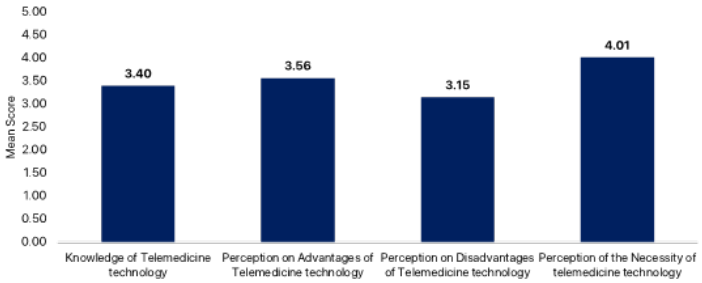

Figure 6. Physicians' knowledge and perception on the use of telemedicine

Discussion

A significant number of patients with a total of 10,551 were seen via TOMATO during the study period, indicating that the COVID-19 pandemic brought about a paradigm shift towards more engagement in tele-ophthalmology in our institution.

Comparing the total number of telemedicine consults, it corresponded to 2/3 of the total number of FTF consults received during that year, suggesting that the tele-ophthalmology services helped unburden the clinics from non-urgent cases during the time of the pandemic.

Cataract, error of refraction, and dry eye syndrome were the most common diagnoses among patients, which is consistent with the findings of a similar local study in 2021, which showed that ophthalmologists have high confidence in virtual diagnosis and management of the specified condition[23].

The most glaring finding in this study is the low satisfaction rate on the use of tele-ophthalmology among Filipino patients compared to other countries (Table 1). Similar studies done in Singapore[24], India[25], Finland[26], and Australia[27] showed a very high satisfaction rate, ranging from 96% to 99.8%, as opposed to our local data which only showed a satisfaction rate of 33%.

It is important to note that tele-ophthalmology modalities vary by country. Some countries employed a combination of audio and videoconferencing during consultations, while others may have relied solely on audio. In our setting, we were only limited to the use of audio calls during the consultation, which may have contributed to the low satisfaction rate compared to other countries.

Apart from the modality of the teleconsult, several barriers were identified in the implementation of TOMATO. Technical reasons include difficulty in sending photos of the patient's eye lesions online, as well as erratic and unreliable phone signals during the consult.

Interpersonal reasons include the perception of patients that tele-ophthalmology is convenient but impersonal, and physicians spend less time doing tele-consult compared to face-to-face consults.

In terms of the physicians' knowledge and perception on telemedicine, our participants had higher scores compared to physicians in other countries such as Iran and Saudi Arabia (Table 2).

In a study by Ayatollahi[19] in Iran and Albarrak[28] in Saudi Arabia, they noted that the lack of knowledge on telemedicine is one of the main factors that could have affected their positive perception toward the technology.

In our study, on the other hand, physicians are well aware of the advantages, disadvantages, and necessity of telemedicine, consistent with the study of Azarcon[23], who also showed that the majority of Filipino ophthalmologists believed that tele-ophthalmology would bring about a positive effect in their clinical practice.

In terms of limitations, this research is only a pilot study to evaluate the implementation of TOMATO from January to December 2021. The accuracy of TOMATO in the diagnosis of ophthalmic symptoms were not compared to standard face-to-face consultation. The survey component of the study were administered to patients and physicians of the DOVS PGH, and thus, may not be generalizable to the use of tele-ophthalmology in the country.

Conclusions

TOMATO was able to give remote eye services to 10,551 patients during the pandemic, from January to December 2021, with cataract as the most common diagnosis. Although ophthalmologists had positive attitude towards TOMATO, it has a low satisfaction rating among the key beneficiaries of the system which are the patients. Solutions to identified barriers must be addressed adequately in order to make it an effective and useful system.

Recommendations

Tele-ophthalmology is a promising technology for improving access to eye care, but there are still some challenges that need to be addressed, such as improving the user experience, ensuring data security, and training future ophthalmologists in its use.

Dedicated telemedicine applications that are easy to use and protect patient privacy could be very helpful. Integrating tele-ophthalmology into medical training would also help to ensure that future ophthalmologists are comfortable using this technology. Finally, it is important to develop low-cost tele-ophthalmology solutions so that this technology can be accessible to everyone, regardless of their income.

Table 1. Patient satisfaction in tele-ophthalmology among different countries

Author	Year	Study type	n	Method	Patient Satisfaction
Tan, *et al*. (Singapore)	2013	Prospective Cross-sectional	30	Store-and-forward with real-time audio conference	**97%**
Paul, *et al*. (India)	2006	Prospective Cross-sectional	348	Rural mobile teleophthalmology unit	**99.8%**
Tuulonen, *et al*. (Finland)	1999	Prospective Cross-sectional	29	Real-time teleconsultation at rural primary care center	**96%**
Kumar, *et al*. (Australia)	2005	Prospective Cross-sectional	118	Remote teleophthalmology center	**98%**
Poblete, *et al*. (Philippines)	**2023**	**Prospective Cross-sectional**	**132**	**Real-time teleophthalmology at a tertiary eye center**	**33%**

Table 2. Physicians' knowledge and perception of telemedicine

Author	Year	Study type	n	Method	Patient Satisfaction
Ayatollahi, *et al*. (Iran)	2019	Prospective Cross-sectional	532	Questionnaire-based survey	**1.51**
Albarrak, *et al*. (Saudi Arabia)	2019	Prospective Cross-sectional	391	Questionnaire-based survey	**2.31**
Poblete, *et al*. (Philippines)	**2023**	**Prospective Cross-sectional**	**37**	**Questionnaire-based survey**	**3.53**

References

1. Williams AM, Kalra G, Commiskey PW, Bowers EMR, Rudolph BR, *et al.* (2020) Ophthalmology Practice During the Coronavirus Disease 2019 Pandemic: The University of Pittsburgh Experience in Promoting Clinic Safety and Embracing Video Visits. Ophthalmology and Therapy, 2019. https://doi.org/10.1007/s40123-020-00255-9
2. Caffery LJ, Taylor M, Gole G, Smith AC. (2019) Models of care in tele-ophthalmology: A scoping review. Journal of Telemedicine and Telecare, 25(2):106–122. https://doi.org/10.1177/1357633X17742182
3. Woodward MA, Musch DC, Hood CT, Greene JB, Niziol LM, Jeganathan VSE, Lee PP. (2017) Teleophthalmic Approach for Detection of Corneal Diseases: Accuracy and Reliability. Cornea, 36(10):1159–1165. https://doi.org/10.1097/ICO.0000000000001294
4. Gupta SC, Kumar Sinha S, Dagar AB. (2013) Evaluation of the effectiveness of diagnostic & management decision by teleophthalmology using indigenous equipment in comparison with in-clinic assessment of patients. Indian Journal of Medical Research, 138(OCT), 531–535.
5. Sreelatha OK, Ramesh SVS. (2016) Teleophthalmology: Improving patient outcomes? Clinical Ophthalmology, 10: 285–295. https://doi.org/10.2147/OPTH.S80487
6. Prathiba V, Rema M. (2011) Teleophthalmology: A Model for Eye Care Delivery in Rural and Underserved Areas of India. International Journal of Family Medicine, 2011:1–4. https://doi.org/10.1155/2011/683267
7. BenZion I, Helveston EM. (2007) Use of telemedicine to assist ophthalmologists in developing countries for the diagnosis and management of four categories of ophthalmic pathology. Clinical Ophthalmology (Auckland, N.Z.), 1(4):489–495.
8. Kalra G, Williams AM, Commiskey PW, Bowers EMR, Schempf T, Sahel JA, Waxman EL, Fu R. (2020) Incorporating Video Visits into Ophthalmology Practice: A Retrospective Analysis and Patient Survey to Assess Initial Experiences and Patient Acceptability at an Academic Eye Center. Ophthalmology and Therapy, 5. https://doi.org/10.1007/s40123-020-00269-3
9. Host BKJ, Turner AW, Muir J. (2018) Real-time teleophthalmology video consultation: an analysis of patient satisfaction in rural Western Australia. Clinical and Experimental Optometry, 101(1):129–134. https://doi.org/10.1111/cxo.12535
10. Kumar S, Tay-Kearney ML, Chaves F, Constable IJ, Yogesan K. (2006) Remote ophthalmology services: Cost comparison of telemedicine and alternative service delivery options. Journal of Telemedicine and Telecare, 12(1):19–22. https://doi.org/10.1258/135763306775321399
11. Michaud TL, Zhou J, McCarthy MA, Siahpush M, Su D. (2018) Costs of Home-based telemedicine programs: A Systematic Review. International Journal of Technology Assessment in Health Care, 34(4):400–409. https://doi.org/10.1017/S0266462318000454
12. Cheema M, Aghazadeh H, Nazarali S, Ting A, Hodges J, McFarlane A, Kanji JN, Zelyas N, Damji KF, Solarte C. (2020) Keratoconjunctivitis as the initial medical presentation of the novel coronavirus disease 2019 (COVID-19). Canadian Journal of Ophthalmology, January. https://doi.org/10.1016/j.jcjo.2020.03.003
13. Wu P, Duan F, Luo C, Liu Q, Qu X, Liang L, Wu K. (2020) Characteristics of Ocular Findings of Patients with Coronavirus Disease 2019 (COVID-19) in Hubei Province, China. JAMA Ophthalmology, 2019(5):575–578. https://doi.org/10.1001/jamaophthalmol.2020.1291
14. Seah IYJ, Anderson DE, Kang AEZ, Wang L, Rao P, Young BE, Lye DC, Agrawal R. (2020) Assessing Viral Shedding and Infectivity of Tears in Coronavirus Disease 2019 (COVID-19) Patients. Ophthalmology, 2019:2019–2021. https://doi.org/10.1016/j.ophtha.2020.03.026
25. Seitzman GD, Doan T. (2020) No Time for Tears. Ophthalmology, 127(7):980–981. https://doi.org/10.1016/j.ophtha.2020.03.030
16. Fielder AR, Gilbert C, Ells A, Quinn GE. (2006) Internet-based eye care. Lancet, 367(9507):300–301. https://doi.org/10.1016/S0140-6736(06)68065-3
17. Bali S. (2018) Barriers to Development of Telemedicine in Developing Countries. In Intech (Vol. 1, pp. 1–14). IntechOpen. https://doi.org/http://dx.doi.org/10.5772/intechopen.81723
18. Dorado-Baesa MAC, Pumanes C. (2011) Development of a Filipino questionnaire on the factors affecting the level of patient satisfaction at the MDH-DFCM out-patient clinic. The Filipino Family Physician, 49(1):35–49. https://doi.org/10.1017/CBO9781107415324.004
19. Ayatollahi H, Sarabi FZP, Langarizadeh M. (2015) Clinicians' Knowledge and Perception of Telemedicine Technology. Perspectives in Health Information Management, 12(June 2019).
20. Kurji K, Kiage D, Rudnisky CJ, Damji KF. (2013) Improving diabetic retinopathy screening in Africa: Patient satisfaction with teleophthalmology versus ophthalmologist-based screening. Middle East African Journal of Ophthalmology, 20(1):56–60. https://doi.org/10.4103/0974-9233.106388
21. Faul F, Erdfelder E, Lang A-G., Buchner A. (2007) G*Power 3: a flexible statistical power analysis program for the social, behavioral, and biomedical sciences. Behavior Research Methods, 39(2), 175–191.
22. Reyes MVT, De Castro LD, Manalastas Jr, RM, Jimenez EB, Alora RAT, Tomas CV, Santos EO. (2017) National Ethical Guidelines for Health and Health-Related Research 2017.
23. Azarcon CP, Ranche FKT, Santiago DE. (2021) Tele-ophthalmology practices and attitudes in the Philippines in light of the COVID-19 pandemic: A survey. Clinical Ophthalmology, 15, 1239–1247. https://doi.org/10.2147/OPTH.S291790
24. Tan JCH, Poh EWT, Srinivasan S, Lim TH. (2013) A pilot trial of tele-ophthalmology for diagnosis of chronic blurred vision. Journal of Telemedicine and Telecare, 19(2):65–69. https://doi.org/10.1177/1357633X13476233
25. Rani PK, Raman R, Manikandan M, Mahajan S, Paul PG, Sharma T. (2006) Patient satisfaction with tele-ophthalmology versus ophthalmologist-based screening in diabetic retinopathy. Journal of Telemedicine and Telecare, 12(3):159–160. https://doi.org/10.1258/135763306776738639
26. Tuulonen A, Ohinmaa A, Alanko HI, Hyytinen P, Juutinen A, Toppinen E. (1999) The application of teleophthalmology in examining patients with glaucoma: A pilot study. In Journal of Glaucoma. 8(6):367–373. https://doi.org/10.1097/00061198-199912000-00005
27. Kumar S, Tay-Kearney M-L, Constable IJ, Yogesan K. (2005) Internet based ophthalmology service: impact assessment. In The British journal of ophthalmology. 89(10):1382–1383. https://doi.org/10.1136/bjo.2005.072579
28. Albarrak AI, Mohammed R, Almarshoud N, Almujalli L, Aljaeed R, Altuwaijiri S, Albohairy T. (2019) Assessment of physician's knowledge, perception and willingness of telemedicine in Riyadh region, Saudi Arabia. Journal of Infection and Public Health, 0–7. https://doi.org/10.1016/j.jiph.2019.04.006