ORIGINAL ARTICLE

TELEOPHTHALMOLOGY SERVICE DURING COVID-19 IN INDONESIA: INITIAL REPORTS

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ABSTRACT

Introduction: *Due to difficulties in attending direct patient care and to limit the spread of the COVID-19, Indonesian ministry of health encourages hospitals to establish telemedicine service. This study was aimed to report the initial practice of real time teleophthalmology practice during COVID-19 pandemic in Indonesia.*

Methods: *This retrospective descriptive analytical study collected data of patients who had teleophthalmology consultation within 3 months period (April 27 – July 27, 2020). All consecutive patients were included in this study, except those with incomplete records. Patients' demographics, main reason for the consultation, working diagnosis, prescribed medication, management plan, and satisfaction survey were collected for the analysis.*

Result: *There were 251 video consultations from 206 patients with 4 patients (1.9%) excluded due to incomplete medical records. There were 52 (25.7%) new patients. The median number of consultations was 2 (1-8) each day. Median age was 43.5 (from <1 year to 95 years). Main reasons for consultation were dry eye-related symptoms and red eye. The three most common primary working diagnosis were dry eye syndrome, conjunctivitis, and style. Medication was prescribed for 149 patients (73.8 %) and 43 patients (21.3 %) were advised to have immediate direct consultation. Satisfaction survey revealed 21.3% response rate, of which 41.9% and 58.1% felt very satisfied and satisfied respectively.*

Conclusion: *Real-time teleophthalmology consultation seemed to be well-accepted by our population in spite of its early adoption with high satisfactory rate.*

Keywords: *telemedicine, teleophthalmology, real time teleophthalmology, COVID-19, Indonesia.*

INTRODUCTION

Historically, teleophthalmology was carried out to provide eye health services to populations in remote areas where direct access to eye care is not possible. It is a useful screening method for a number of certain eye conditions thereby reducing global burden of visual-threatening diseases such as cataract, glaucoma, age-related macular degeneration, diabetic retinopathy and retinopathy of prematurity.[1] The majority of suggested models in this field were focused on patient screening, appropriate referral to experts, and efficient follow-up systems.[2]

There are 3 kinds of telemedicine according to the timing of the information transmitted: real time or synchronous, store-and-forward or asynchronous, and remote monitoring which is also known as self-monitoring or self-testing. Based on interaction between

the individuals involved, 2 ways of telemedicine are available. The first is between healthcare professionals (HCP) which provide easier access to specialty care, referral and consultation services. Second, between HCP and patients which give them direct access to medical professionals.[3]

In the midst of the COVID-19 pandemic, ophthalmic practices worldwide are urged to adapt not only in delivering a safe practice and care for their patients but also for the ophthalmologists, nurses, and opticians, thus telemedicine became a visible option. Previously, teleophthalmology was not widely known and utilized in Indonesia. The government policy limited the service only between HCPs but not between HCP and patients. As the pandemic worsened, the government has since encouraged the use of telemedicine. Our practices opted to develop and apply teleophthalmology in the form of a real time online video consultation between ophthalmologists and patients named JEC Cloud.

JEC Cloud seeks to protect patients by keeping them away from the hospital environment and doctors by reducing the need for close contact with patients. The use of JEC Cloud is primarily intended for virtual triage where patients will get clear directions whether their eye complaint is an emergency and immediate treatment at the nearest eye health facility is necessary, or can be temporarily treated with home remedy and medicine.[4] In addition, JEC Cloud can be very useful for non-emergency cases that need monitoring without the need for face-to-face meetings during the COVID-19 pandemic.[5]

In this paper, we reported the demographic data of our first three month of teleophthalmology (JEC Cloud) patients. The most common eye complaints, working diagnosis and treatment for these patients as well as patient's feedback surveys (satisfaction rate) and input for our telemedicine services were discussed. To the best of our knowledge, there is no publication regarding real time teleophthalmology service in Indonesia. We hope that this paper can encourage ophthalmologists to implement teleophthalmology service, especially during COVID-19 pandemic by evaluating its current utilization, identify its limitations and provide recommendations for improvements.

METHODS

Inclusion Criteria

This is a retrospective study which collected the data and medical records of patients who had teleophthalmology consultation during the period April 27th to July 26th, 2020. All patients were included in this study consecutively. Patients with incomplete data or whose medical records could not be retrieved were excluded from the study.

Description of Service

Each patient will have to register either by email or messaging application, agree to the terms and conditions before they are eligible to use our teleophthalmology services. After the registration process is completed, they will receive an email with the information of when the live consultation will take place (date and time) and the appointed ophthalmologist who will provide the care. Prior to the real time teleophthalmology, the patient will be asked to provide a number of data necessary as consideration for making diagnosis and commence treatment such as their eye symptoms, history of the current, as well as previous eye diseases and treatments, and history of any systemic conditions. They will also be expected to upload photos of their eyes. These data will then be passed on to the ophthalmologists before the live consultation takes place through email. It's proved to be very beneficial for the ophthalmologist to get a substantial description regarding the patient's condition prior to the consultation.

Five minutes before live consultation with the ophthalmologist, the patient is expected to be ready in front of their computer or smartphone so that a nurse can conduct visual acuity tests using screen share feature and dedicated ophthalmic chart designed specifically for that purpose. Doctor and patient were connected through an online video consultation service Zoom (Zoom Video Communications Inc, San Jose). Basic eye examinations such as Ishihara test and Amsler's grid can be performed remotely through the application if deemed necessary. At the end of real time consultation, the ophthalmologist will explain the possibility of diagnosis and therapy, and also whether it is necessary to immediately seek for direct ophthalmology consultation or to do another teleophthalmology for follow up. In addition, we also provide drug delivery service to patient's address, granted if it's in the same city, shall the need of prescribed medications arise.

Satisfaction survey was sent to the patient's email address immediately at the end of video consultation. Patients were asked to review overall satisfaction level towards the teleophthalmology service from number 1 to 10 where 1 is very disappointed and 10 is very satisfied. The satisfaction level was categorized to a 5-level Likert scale: very satisfied (9-10) , satisfied (7-8), neutral (5-6), dissatisfied (3-4), and very dissatisfied (1-2). The following day after the consultation, a phone call was also made by hospital staff to ask open-ended questions of how the patient felt about the consultation.

Data Collection

Demographic data such as gender, age, address was collected. We also collected the patient's chief complaint, status of the patient (new or established), registration process (self-registered or accompanied), working diagnosis, and treatment plan. We also take into account patient's

follow up, whether through another video consultation or direct visit to hospital. Furthermore, patients' responses in follow up calls and in satisfaction surveys were also gathered.

RESULTS

During the three-month study period, there were a total of 202 patients with 251 video consultations which is included in this study. Majority of the patients (64.9%) were from Jakarta and greater Jakarta, while the remaining were from easternmost to westernmost provinces of Indonesia. The median number of teleophthalmology consultations was 2 (1-8) consultations per day. There were 26 patients with more than one teleophthalmology consultations.

The daily number of teleconsultations was highly influenced by the government regulation on large scale social restriction (PSBB). During strict PSBB, the median number of consultations was 4 (1-8 consultation). This number significantly decreased to 2 (1-5) consultations per day after the PSBB were lifted and turned into transition phase ($p<0.001$).

The median age of the patients was 43.5 (<1 to 95) years with 44.6% of them being above 50 years. Majority of the patients were women (117 patients, 57.9%). There were 52 new patients (25.7%) to the hospital, while the remaining were established patients. As many as 137 patients (67.8%), especially paediatric and elderly patients, were accompanied by either family members or personal staff during video consultation.

Main reasons for consultation were dry eye-related symptoms and red eye (Table 1). There were 47 different eye conditions managed by real-time video consultations (Table 2). The most common primary working diagnosis in both established and new patients through video consultations was dry eye syndrome.

Table 1. Chief complaint for teleophthalmology consultation by order from most to least.

	Subject (n=202)
Dry eye symptoms (40)	
Burning sensation	6
Discomfort	2
Dryness	11
Foreign body sensation	11
Tired eyes	3
Tearing/watery eyes	7
Red eye (35)	
With decreased vision	2
Without decreased vision	33
Follow up (post-surgery) (31)	
Cataract	8
Corneal surgery	11
LASIK	1
Eyelid surgery	1
Retina	10

Follow up (routine) (29)	
Cornea	2
Glaucoma	20
Infection	2
Oculoplasty	1
Pediatric	3
Retina	1
Eyelid pathology (26)	
Eyelid mass	1
Eyelid swelling	24
Phtysical eye	1
Blurred vision	19
Floaters or flashes	5
Glasses uncomfortable	3
Trauma to the eye	3
Itching and allergic reaction	3
Child blink frequently	3
Squinting	3
Referred from others	
Glaucoma	1
Retina	1

Table 2. The primary working diagnoses for first real-time teleophthalmology consultations.

Diagnosis	Total (n=202)
Refraction	7
Adnexa and orbit (28)	
Anophthalmia	1
Chalazion	2
Hordeolum	19
Eyelid tumor (malignancy)	1
HZO blepharitis	1
Pthysical eye	1
Orbital fracture	1
NLD obstruction	2
Conjunctiva and sclera (34)	
Allergic conjunctivitis	6
Conjunctivitis	20
Pinguecula	1
Scleritis	1
Episcleritis	1
Subconjunctival bleeding	5
Cornea and ocular surface (54)	
Bullous keratopathy	1
Corneal neovascularization	1
Corneal scar	4
Chemical trauma	1
Dry eye syndrome	40
Keratitis	4
Keratoconjunctivitis	3
Uvea and ciliary body	
Panuveitis	1
Lens (5)	
Cataract	1
PCO	3

Aphakia	1
Glaucoma (26)	
Congenital glaucoma	1
Secondary glaucoma	4
Hyphema	1
Ocular hypertension	5
Primary glaucoma	13
Possner Schlossman	2
Post-operative follow-up (32)	
Cataract	8
Corneal graft (not specified)	6
DSAEK	5
LASIK	2
Ptosis surgery	1
Silicone oil removal	1
Vitrectomy	9
Vitreous, retina and choroid (12)	
Vitreous degeneration	5
Central serous retinopathy	1
Retinal detachment	3
CRAO	1
Diabetic retinopathy	1
Inner punctate choroidopathy	1
Ocular motility disorder	
Sixth nerve palsy	1
Strabismus	
Pseudostrabismus	2

Management plan for each patient after the first teleophthalmology consultations were described (Table 3). Immediate direct consultation was recommended in 43 patients (surgery 10 patients, intervention 7 patients, and further examination 26 patients). However, only 30 patients did come to the hospital. Meanwhile, there were 29 patients who decided to have direct consultations although immediate investigation was not required or recommended by the ophthalmologists.

Table 3. Management plan after the first teleophthalmology consultation.

	Subject (n=202)
Immediate direct consult recommended	
With drug prescription	16
Without prescription	25
Continue own medication	2
Medication prescribed	149
Continue own medications	1
Eye patching	1
Nil intervention	4
No data	4

Satisfaction survey with 1-10 scale were completed 21.3% response rate. However, of the 43 patients who finished the survey, 41.9% respondents were giving score 9 or 10 and the

remaining 58.1% were giving score 7 or 8. From the phone survey made by the hospital staff, there were 134 patients (66.3%) who answered the phone call and responded to the satisfaction question. Thirty-six out of 134 patients, however, were not willing to tell their satisfaction level. Meanwhile, 2 patients answered that they were dissatisfied due to audio and technical problem, and other 2 patients answered neutral. The remaining 90 patients were either satisfied or very satisfied.

DISCUSSION

COVID-19 pandemic has made ambulatory ophthalmology practices face issues supporting patient care and business operations. Patients are also aware of the risk of transmission if they are visiting the hospital, and are therefore looking for digital care as evidenced by recent surges reported by telehealth companies.[6] Although it was originally created as a way to treat patients who were located in remote places or in areas with shortages of medical professionals, teleophthalmology has now expanded into a real-time consultation between patient and HCP. This study revealed as many as 251 video consultations from 202 patients were performed during the first three month of our teleophthalmology service.

As a novel service which relies on information technology, it was expected that certain age groups, such as paediatric and elderly patients, would require companions for the registration process and during the consultation. One hundred and thirty-seven patients (67.8%), who belong to the paediatric and elderly group, were registered and accompanied by either family members or personal staff. Almost 65% of the patients were from Jakarta and greater Jakarta areas. The small proportion of patients from outside Jakarta and its greater areas might be due to multiple factors, such as unfamiliarity with such information technology, or uncertainty with the service provided.

Most common chief complaint and therefore the most common working diagnosis is dry eye syndrome. This could be related to the increased amount of screen time during pandemic COVID-19 since almost everything, such as working and studying were performed at home through screen.[7] Patients (15.3%) also utilized teleophthalmology service for their post-surgery follow up. Red eye chief complaint leads to a couple working diagnosis such as conjunctivitis, pinguecula, scleritis, episcleritis, keratitis and keratoconjunctivitis. There were 30 cases where follow-up was organized with the ophthalmologist through a direct outpatient consultation, supporting the use of telemedicine as a supplement to rather than a replacement for face-to-face visit. The teleophthalmology service served one of its purposes which is as a triage to decide whether direct consultation is mandatory or can be postponed.

Due to the descriptive design of this study, an evaluation of diagnostic accuracy and clinical efficacy was not possible. The conditions described were the working diagnoses of the ophthalmologist only with thorough history taking and limited ocular examination. Medication changes, care plan modifications, recommended referrals, consenting for upcoming previously planned procedures, and revising surgical dates based on disease severity are all examples of care interventions conducted during our video online consultation. The entire online video consultation process was recorded in our medical record and also obtained patient approval.

It is important to recognize that some subspecialties are more amenable to real-time teleophthalmology than others. The challenges in order to make teleophthalmology as beneficial as direct outpatient setting relies on the ocular examination. Specialties such as oculoplastic, neuro-ophthalmology, and pediatrics may be better suited for video online consultation as much of these exams can be performed externally. Anterior segment pathology is more difficult to address via teleophthalmology unless the pathology is grossly obvious on external evaluation or applying standard macro lens 90 diopters on patients' smartphones to provide more precise images of the cornea and anterior segment.[8] For glaucoma, video online consultations are particularly useful for medicine reconciliation and assessment of glaucoma medication tolerance.[9] Applied implantable sensors to the smartphone suggested that patients themselves could measure IOP even in their home, providing an automated 24-hours ambulatory recording of IOP. Retinal telehealth is best supported by store-and-forward asynchronous models which are already well-established in some settings.[10,11] For retinal subspecialists, video online consultation may be helpful in the assessment of macula function of selected diabetic retinopathy and age related macular disease patients. Several smartphone ophthalmoscopes which can capture clear retinal images with portable kit are available, such as Cell Scope, Eye Go, D Eye, and Peek.[12,13,14,15]

Despite the fact that the technology for remote ophthalmic monitoring is not scalable or ready, it seems that our patients are willing to adopt this approach. This COVID-19 era will likely spur innovation that will transform care delivery. For ophthalmology that could mean scalable and more accurate home testing. There may be improved near focus on smartphone cameras or attachments for self-photography. Remotely controlled slit lamp devices, non-mydriatic fundus cameras and OCT machines may become more available in public areas. Perhaps the ophthalmologist will routinely have scheduled telephone calls and online video consultation with patients to review test results, check on medication adherence, or triage patients.[16] Remote automated visual fields with the Melbourne Rapid Fields (MRF) Neural Lite program, shown to strongly reflect results of Humphrey Visual Fields with good test-retest

reliability.[17] With the wide variety of mobile health apps that are consumer- friendly, patients are starting to use technology to monitor and track their eye conditions. Many practices may first start by looking for a mobile platform and then adapt their workflow to the technology. We, authors advocate for the alternative approach of conceptualizing the desired future state first and then finding the right technology for the workflow. Some options are large platforms branded with the practice's name, while others are a simple link to join a visit. Technology is replaceable; however, a robust process to integrate that technology allows a program to thrive. A perfect system is difficult to achieve in a short time, but we seek to coordinate our personnels to create an adequate teleophthalmology system.

Although the response rate to the satisfaction survey was low (21.3%), there was a high level of satisfaction with the teleophthalmology consultation service with 100% respondents either reported as satisfied or very satisfied. This finding justified the use of real-time teleophthalmology as a good alternative to face-to-face consultation for patients during this COVID-19 era. Another study focusing on patient's satisfaction level throughout teleophthalmology service concluded that almost all patients (97.4%) preferred teleophthalmology for their next eye examination.[18] In other studies, the majority of the participants were either 'Very satisfied' (69.1 per cent) or 'Satisfied' (24.5 per cent) with real-time teleophthalmology video consultation.[19]

This study has several limitations such as unavailability of diagnostic accuracy comparing teleophthalmology and direct consultation due to the descriptive design of this study. Other limitation is the low response rate of satisfaction survey and also the simplicity of our satisfaction survey.

CONCLUSION

The COVID-19 pandemic has presented challenges to ophthalmic practice. We have discussed ways in which our hospital has worked to promote safe practice by introducing online video consultations to allow access to ophthalmic care without healthcare exposure. As many as 251 video consultations from 202 patients were received in the first three month of our teleophthalmology service. Despite the low response rate, the patient's satisfaction level was very high. Real-time teleophthalmology consultation seemed to be well-accepted by our population in spite of its technical drawbacks which we will improve from time to time.

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