Impact of the COVID-19 Pandemic on Ophthalmology Training in the Philippines: A Nationwide Cross-sectional Study among Trainees

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ABSTRACT

Objective. This study was designed to assess the impact of the COVID-19 pandemic on ophthalmology training from the perspective of ophthalmology residents and fellows in the Philippines.

Methods. A 55-item online survey on the COVID-19 pandemic's impact on ophthalmology training was sent to 168 ophthalmologists-in-training from March 15, 2021 to April 19, 2021. Participants from all ophthalmology training programs in the Philippines were selected via random sampling and proportional allocation.

Results. A total of 158 ophthalmologists-in-training (138 residents and 20 fellows) completed the survey. The areas of ophthalmology training that were found to be most disrupted during the COVID-19 pandemic were surgical training (95%), clinical activity (94%), and in-person interaction with consultants in the out-patient department (94%) and operating room (85%). In contrast, trainees found an increase in didactic teaching activities (75%) and research activities (39%).

Overall, 78% of the trainees felt that the pandemic had a negative impact on their ophthalmology training. The aspects which were most frequently found to be negatively impacted by the pandemic were mental health (70%), followed by technical skills (69%), and clinical skills (61%). No major differences were found on the impact of COVID-19 on training when compared across year levels and across institutions compared by location (National Capital Region vs. non-National Capital Region) and funding type (government vs. private funding).

Ninety-nine percent (99%) of institutions shifted most of their didactic teaching activities to online platforms. Surgical video conferences and simulator training or skills labs were thought to be helpful to surgical training by 89% and 81% of the trainees, respectively. Majority of trainees attended to patients via telemedicine averaging 40% of their clinic consults. However, only 16% reported confidence in handling their patients through telemedicine.

Conclusions. The COVID-19 pandemic has had an overall negative impact on ophthalmology training in the Philippines. It caused significant disruption in trainees' clinical and surgical activities, and affected their mental health. Despite this, the situation provided an opportunity to boost trainees' theoretical knowledge. Majority are receptive to new technology-based learning tools to preserve the effectiveness of their training. Efforts to re-evaluate current training programs are needed to ensure sustainability and quality of ophthalmology training in the Philippines.

Keywords: COVID-19, ophthalmology, residency training, fellowship training, survey

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INTRODUCTION

On March 11, 2020, the World Health Organization declared the COVID-19 (Coronavirus disease) outbreak as a pandemic.[1] In the ophthalmology department of the largest public tertiary hospital in Manila, all non-emergency clinic visits and elective surgeries were cancelled following the implementation of a government lockdown. Out-patient department consults saw a 3-fold decline from 69,000 patients in 2019 to 18,000 patients in 2020. Skeletal schedules for all health workers were adopted. Residents and fellows were divided into teams to attend to in-person emergency and urgent consults and surgeries. All ophthalmology trainees were also redeployed to COVID-19 areas. Subsequently, several precautionary measures were implemented by the hospital's ophthalmology department to reduce exposure and limit transmission of disease. These included implementation of new safety protocols, conversion of non-urgent face-to-face consults to tele-ophthalmology, and shifting of didactic teaching activities to online platforms. Given these changes, residents and fellows experienced major changes and disruption in their training.

All ophthalmologists-in-training are required to develop core competencies in clinical work, surgical activity, theoretical knowledge, and research.[2] However, after a year of being in lockdown without training institutions' operations returning to normal, it became questionable whether these core competencies were being achieved by all trainees at their respective year levels. Few studies assessing the impact of the COVID-19 pandemic on ophthalmology training in various countries have been published. Survey studies among ophthalmologists-in-training were conducted in 2020 during the peak of the pandemic in Saudi Arabia[3], India[4], the United Kingdom[5], and throughout Europe[6]. Trainees from these studies reported significant disruption of clinical and surgical activities, a negative perception on the pandemic's impact on training, a negative effect on trainees' mental health, and an increase in acceptance of web-based didactic teaching activities.

Similarly, this study was conceived to assess the impact of the COVID-19 pandemic on ophthalmology training in the Philippines. The investigators were also interested in determining whether similar conclusions to the studies abroad were to be drawn from the Philippine trainees' experience one year into the lockdown and whether these experiences were similar to one another despite differences in year levels, institutional location, and institutional source of funding. Furthermore, by documenting the residents' and fellows' perspectives on the impact of COVID-19 on their training, the investigators hoped to identify the issues prompted by the pandemic and recommend solutions. The authors believe that identifying the pandemic's impact on training from the trainees' point of view would provide beneficial insight for training programs and decision-makers to implement solutions for disrupted ophthalmology residency and fellowship training.

OBJECTIVES

The general objective of this study was to assess the impact of the COVID-19 pandemic on ophthalmology residency and fellowship training in the Philippines from the perspective of the trainees.

The specific objectives were as follows: First, to describe the changes experienced by ophthalmologists-in-training in the Philippines during the COVID-19 pandemic according to four domains of their training: clinical activity, surgical training, didactic teaching activities, and research activity. Second, to determine the perception of trainees on the impact of COVID-19 on their clinical skills, technical skills, theoretical knowledge, research activities, and mental health. Third, to explore underlying factors such as differences in year level, location of training program, and institutional source of funding, that might influence the state of ophthalmology training during the COVID-19 pandemic. And lastly, to evaluate the views of ophthalmology trainees towards new training opportunities in the context of the COVID-19 pandemic.

METHODS

Selection and Description of Participants

This was a prospective, descriptive study conducted online via Survey Monkey™ from March 15, 2021 to April 19, 2021. An endorsement from the Philippine Board of Ophthalmology (PBO) was requested prior to administration of the study. A link to the 55-item electronic survey was distributed via e-mail to enrolled ophthalmology residents and fellows in all thirty-one PBO-accredited training institutions across the Philippines. Participants must have been enrolled as a resident or fellow in any of the PBO-accredited training programs. Trainees who were not formally recognized as either a resident or fellow in their institution such as hospitalists, adjuncts, or those on observerships, were excluded from the survey.

The study targeted a total of 155 respondents comprised of 135 residents and 20 fellows. The sample size was computed based on a total of 266 enrolled trainees (232 residents and 34 fellows) in the Philippines, with an error rate set at 5%, confidence level of 95%, and an assumed response rate of 60% referenced from the response rate of the survey study conducted by Balhareth et al.[7] To ensure proper representation of participants for each institution, proportional allocation was applied. Simple random sampling using a random number generator was used to select trainees responding to the survey.

Survey Development and Distribution

The study consisted of three phases: pre-testing phase, pilot study, and full-scale administration of the survey. In the pre-testing phase, an initial draft of the survey instrument was developed by the investigators and submitted for review to a psychometrician. Once approved, the survey was distributed to one ophthalmology faculty member, five training officers, two chief residents, one fellow, and two residents. Participants were asked to answer the questionnaire and give inputs regarding the comprehensibility, brevity, organization, and importance of the questions in the survey.

Once pre-testing was completed, revisions were made accordingly and the survey instrument was disseminated in a pilot study. Ten ophthalmologists-in-training, half coming from institutions located in the National Capital Region (NCR) and the other half from outside NCR, were recruited for the pilot phase. Upon completion of the pilot phase and finalization of the survey form, a link to the questionnaire was distributed to chief residents of all 31 training programs for distribution to randomized trainees. Responses from a total of 168 anonymous trainees were received and 10 were excluded from the study (8 respondents had incomplete responses, 1 respondent had an adjunct training status, and 1 respondent gave no consent).

Survey Instrument

The questionnaire consisted of 55 questions which mainly covered participant demographics, experiences in ophthalmology training during the pandemic, perceptions towards the impact of COVID-19 on training, and views on new opportunities in ophthalmology training. Attitudes and perceptions were measured using 4-point or 5-point Likert scales. Few questions were patterned after the survey forms used by Mishra et al.[4] and Ferrara et al.[6] The average time it took to complete the survey was 13 minutes. All participants were given an option to receive a list of available mental health services catered to health care workers following survey completion.

Statistics

General characteristics of participants were summarized using descriptive statistics. Mann-Whitney U and Chi-square tests were used to compare Likert and non-Likert scaled questions, respectively, between two groups. A Kruskal-Wallis test was used to compare responses across all year levels. Responses were stratified according to year level (resident vs. fellow), location (NCR vs. non-NCR), and funding type of training institution (government vs. private).

RESULTS

A total of 158 responses were analyzed coming from 137 residents and 21 fellows (Table 1). A vast majority (77%) of trainees were located in NCR, followed by Regions 1 and 11 (5%), then Regions 3 and 7 (4%). Most (67%) trainees were part of government-funded institutions; those from private institutions made up about a third (33%) of the trainees while one respondent was not familiar with his institution's funding type.

Table 1. Demographic Information

Characteristic	Count (%)
Training Level	
Resident	137 (86.7)
1st Year	46 (29.1)
2nd Year	49 (31.0)
3rd Year	34 (21.5)
4th Year	8 (5.1)
Fellow	21 (13.3)
Training Program Location	
Ilocos Region (Region I)	8 (5.1)
Central Luzon (Region III)	7 (4.4)
CALABARZON (Region IV-A)	1 (0.6)
Western Visayas (Region VI)	3 (1.9)
Central Visayas (Region VII)	7 (4.4)
Northern Mindanao (Region X)	1 (0.6)
Davao Region (Region XI)	8 (5.1)
National Capital Region (NCR)	121 (76.6)
Cordillera Administrative Region (CAR)	2 (1.3)
Funding Type of Institution	
Government institution	105 (66.5)
Private institution	52 (32.9)

Ninety-three (59%) participants reported that their institutions were designated as COVID-19 referral centers. More than half (54%) of the trainees were either assigned to COVID-19 duties or redeployed to COVID-19 areas and more than three-fourths (78%) reported having their ophthalmologic training extended due to the COVID-19 pandemic, most often, by one year or more.

The domains with the greatest change were clinical activity and surgical activity, as well as in-person interaction with consultants at the out-patient clinics, each with at least 94% of the trainees saying that there was a decrease in these activities (Figure 1). There were 135 (85%) trainees who experienced reduced in-person interaction with consultants at the operating room. On the other hand, 75% and 39% of the trainees experienced an increase in didactic learning activities and research activities, respectively.

Among the 150 participants who answered that there was a decrease in a certain aspect of their training, they were asked to quantify the reduction of activity. Figure 2 shows the estimated decrease in training activities during the pandemic. The following were the top reported activities where a substantial (more than 50%) decrease was observed by trainees – surgical activity at 80%, in-person interaction with consultants at the out-patient clinics at 76%, and clinical activity at 71%.

All trainees reported performing a surgical procedure during the pandemic, but surgeries were postponed most frequently for 3-6 months (41%) (Figure 3).

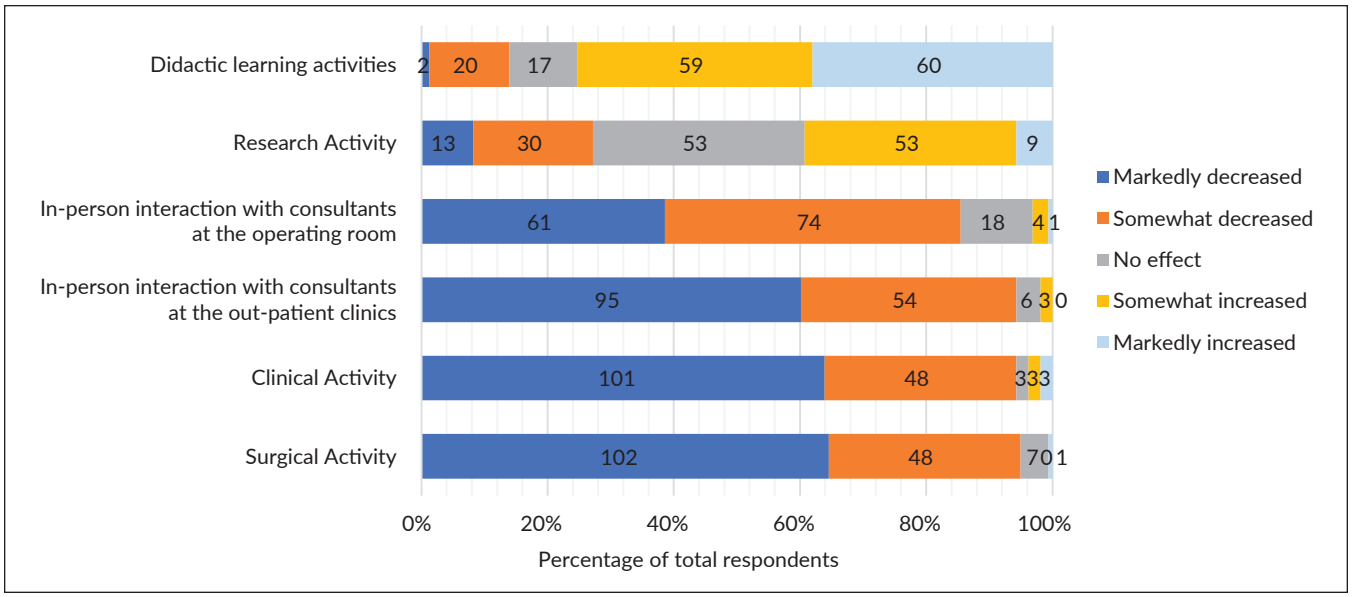

Figure 1. Changes in ophthalmology training activities during the COVID-19 pandemic (n=158).

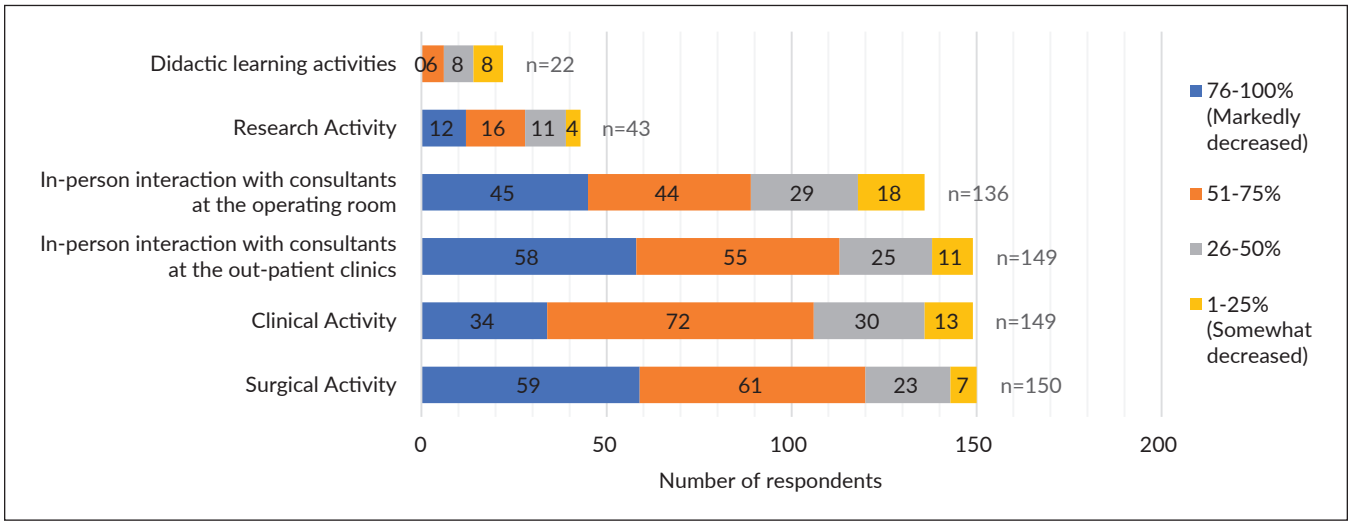

Figure 2. Estimated decrease in ophthalmology training activities during the COVID-19 pandemic among respondents who answered that there was a decrease in a certain aspect of their training.

The most commonly performed procedures during the pandemic were elective cataract surgery, lid repair, intravitreal injection, and corneal perforating injury repair (Figure 4). Not shown is the least performed procedure, dacryocystorhinostomy (DCR), which was performed by only four residents during the pandemic.

Thirty-nine percent of trainees reported an increase in research activities. Forty percent were compelled to come up with new research studies and approximately a third (27%) of trainees were forced to change or discontinue ongoing research studies. The most common form of data collection during the pandemic included medical records review (46%), clinical observation (26%), and interviews (8%). The most common study designs for ongoing researches during the pandemic were case reports/case series (22%), cohort studies (20%), and cross-sectional studies (17%).

Overall, 78% of the trainees said that the pandemic had a negative impact on their ophthalmology training (Figure 5). The area which was most frequently found to be negatively impacted by the pandemic was mental health (70%), followed by technical skills (69%), and clinical skills (61%). The perceived impact of the pandemic on theoretical knowledge was predominantly positive (45%) or neutral (39%). For research activity, almost half (47%) of the trainees found the pandemic to have no impact, the remainder was evenly divided between positive and negative.

Table 2. Trainees' sentiments towards their training and the impact of the COVID-19 pandemic (n=158)

Questionnaire Item	Frequency (%)				
	Strongly disagree	Disagree	Neither	Agree	Strongly agree
I have had enough time to read and study for exams since the beginning of the COVID-19 pandemic	11 (7)	35 (22.2)	48 (30.4)	57 (36.1)	6 (3.8)
I am psychologically prepared to read and study for exams despite the COVID-19 pandemic	23 (14.6)	65 (41.1)	32 (20.3)	35 (22.2)	3 (1.9)
Despite the COVID-19 pandemic, I feel prepared to manage patients at the clinics.	6 (3.8)	25 (15.8)	39 (24.7)	77 (48.7)	11 (7)
Despite the COVID-19 pandemic, I feel prepared to manage patients surgically in the operating room.	6 (3.8)	32 (20.3)	39 (24.7)	71 (44.9)	10 (6.3)

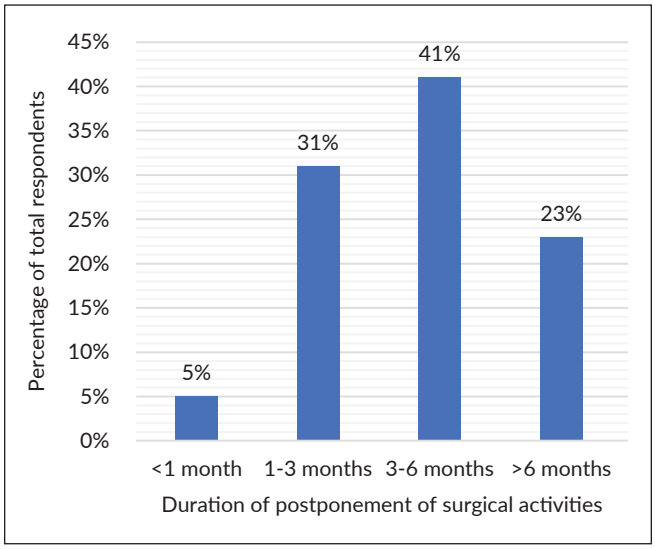

Figure 3. Duration of postponement of surgical activities among trainees during the COVID-19 pandemic (n=158).

Around 40% of the trainees felt that they had sufficient time to study for exams, however, only 24% felt prepared to read and study for their exams (Table 2). Higher proportions of trainees reported confidence in managing patients at clinics (56%) and managing patients surgically in the operating room (51%). Nevertheless, only about a third (35%) of the total respondents felt that they achieved the required clinical, surgical, theoretical, and attitudinal competencies for their year level qualifying them for promotion or graduation.

Figure 6 shows the trainees' responses by year level in training. When responses were compared among residents only, there were no significant differences (*P*=.9671) between the four-year levels in their agreement that they achieved the required clinical, surgical, theoretical, and attitudinal competencies for their year level qualifying them for promotion or graduation despite the COVID-19 pandemic. However, when residents' and fellows' responses were compared, a significantly higher proportion of fellows agreed to this statement (*P*=.0157). Furthermore, more than three-quarters of the trainees believe that a re-evaluation of requirements for promotion/graduation is needed given the impact of the COVID-19 pandemic.

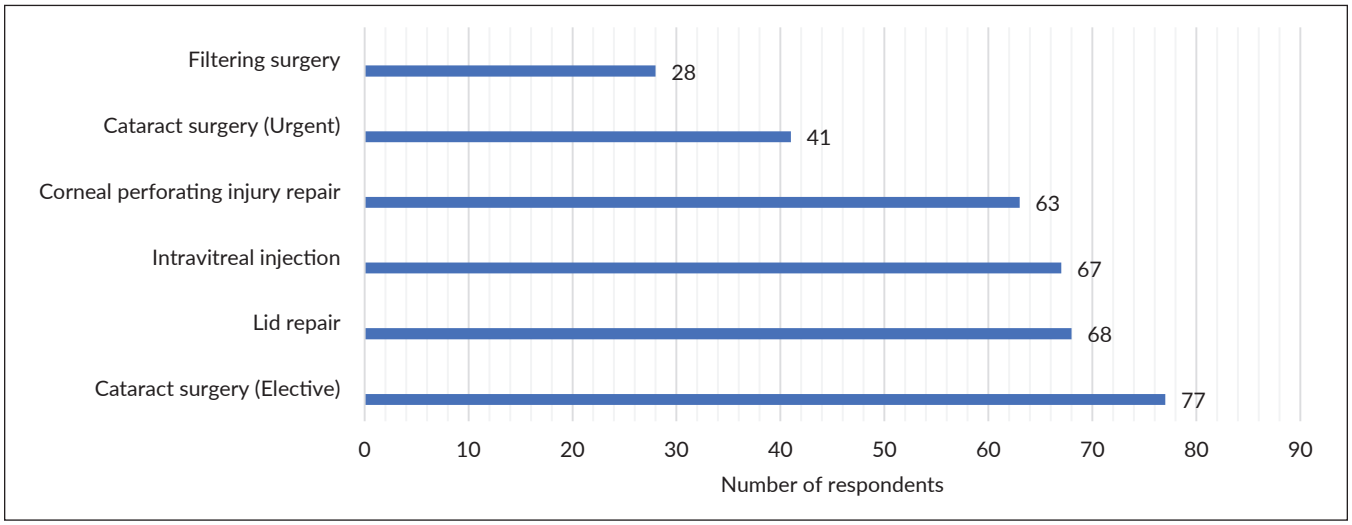

Figure 4. Most common procedures performed by trainees during the COVID-19 pandemic.

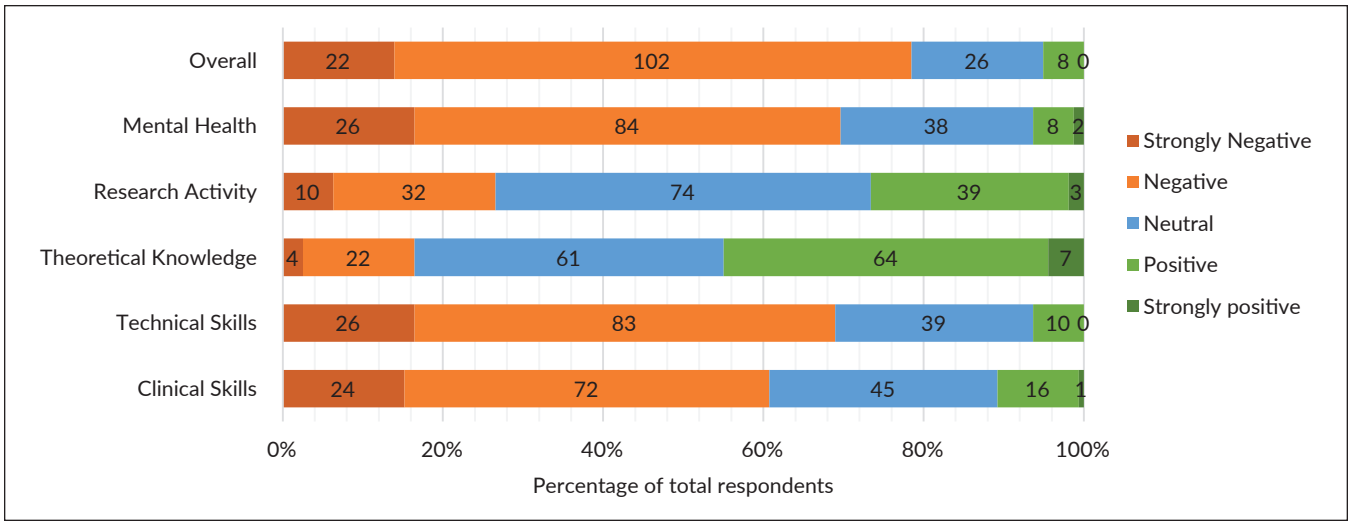

Figure 5. Perceived impact of the COVID-19 pandemic on ophthalmologists-in-training (n=158).

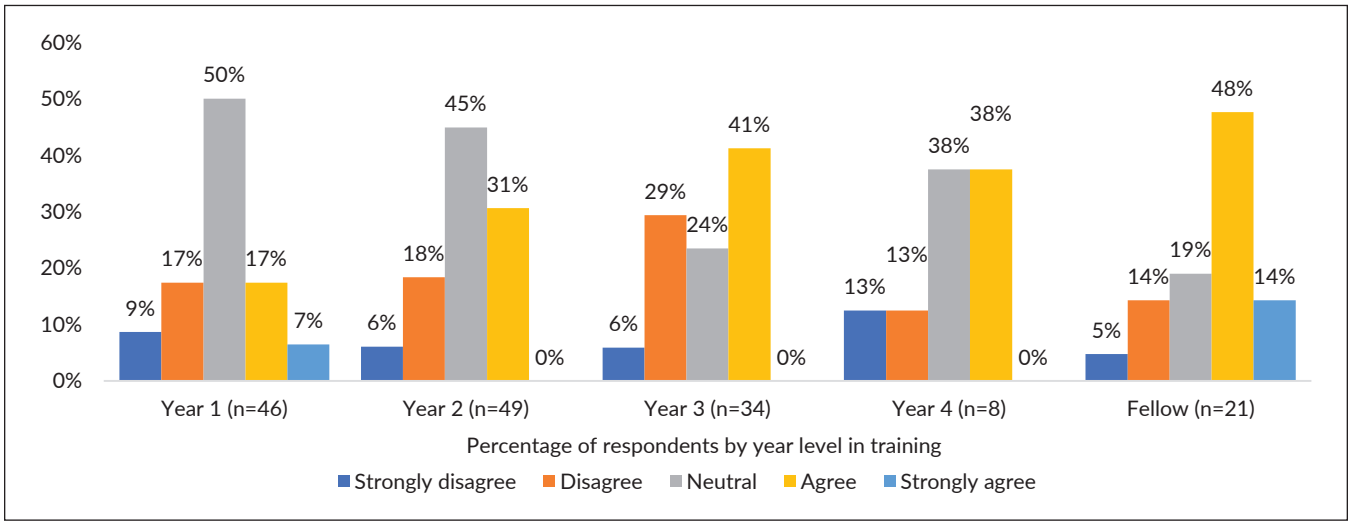

Figure 6. Trainees' sentiments by year level in training when asked if they achieved the required clinical, surgical, theoretical, and attitudinal competencies for their year level qualifying them for promotion or graduation despite the COVID-19 pandemic (n=158).

With regard to trainees' sentiments towards institutional responses towards the pandemic, most of the trainees felt that their training programs were able to adapt to the restrictions brought about by the pandemic (79%) and provided adequate and appropriate guidance on training (77%). However, while working in the hospital, 42% did not feel safe against COVID-19 versus 31% who felt safe.

Underlying factors, such as year level in training, institution location, and funding type of institution, were also explored to see if they influenced the state of ophthalmology training during the COVID-19 pandemic. When responses of residents and fellows were compared, more residents (42%) than fellows (14%) felt a marked increase in didactic teaching activities and marked decrease in surgical activities (*P*=.0131). More fellows (57%), however, felt that surgeries only "somewhat decreased" (*P*=.008). With regard to the perceived impact of the pandemic on training, more fellows (65%) than residents (36%) felt that they had enough time to read and study for exams during the pandemic (*P*=.0207) and more fellows (62%) felt that they had achieved the required competencies of their year level qualifying them for promotion or graduation (*P*=.0157).

Upon comparing responses of trainees from NCR and non-NCR (Table 3), more non-NCR trainees (89%) reported working in designated COVID-19 referral centers (*P*<.001). However, more NCR trainees (56%) were assigned to COVID-19 duties or redeployed to COVID-19 areas (*P*<.001). In terms of changes in activities and perceptions on

Table 3. Comparison between trainees from NCR-based institutions and non-NCR based institutions

	NCR (%) N = 121	Non-NCR (%) N = 37	*p*-value
Institution is a designated COVID-19 referral center	60 (49.6)	33 (89.2)	<0.001
Assigned to COVID-19 duties or redeployed to COVID-19 areas	68 (56.2)	18 (48.6)	<0.001
In-person interaction with consultants at the out-patient clinics			
Markedly decreased	80 (66.1)	15 (40.5)	0.0073
Somewhat decreased	35 (28.9)	19 (51.4)	
No effect	3 (2.5)	3 (8.1)	
Somewhat increased	3 (2.5)		

Table 4. Comparison between trainees from government institutions and private institutions

	Government (%) N = 105	Private (%) N = 52	*p*-value
Institution is a designated COVID-19 referral center	84 (80.0)	9 (17.3)	<0.001
Assigned to COVID-19 duties or redeployed to COVID-19 Areas	67 (63.8)	18 (34.6)	0.001
Ophthalmologic training was extended due to the COVID-19 pandemic	75 (71.4)	47 (90.4)	0.007

impact of COVID-19 on training, there were no significant differences found between the two groups, except more NCR trainees (66.1%) reported a marked decrease in in-person interaction with consultants at the out-patient clinics (*P*=.0073).

When responses of trainees from government versus private training institutions were compared (Table 4), there was a significantly higher proportion of trainees from government institutions (80.0%, *P*<.001) from COVID-19 referral centers and who were assigned to COVID-19 duties (63.8%, *P*=.001). Interestingly, training was extended due to the pandemic more among trainees from private institutions (90.4%) versus those from public institutions (71.4%, *P*=.007).

As expected, almost all institutions (99%) attended by the trainees shifted most of their didactic teaching activities to online platforms. A vast majority of trainees (98%) were also able to attend other didactic teaching activities held online (e.g., Philippine Academy of Ophthalmology Distance Learning Lecture Series, inter-hospital and international conferences). Upon evaluation of the views of ophthalmology trainees towards new learning opportunities in the context of the COVID-19 pandemic, surgical video conferences with experts and online simulator training or skills lab sessions were thought to be helpful to surgical training by 89% and 81% of the trainees, respectively. More residents (85%) compared to fellows (57%) were more favorably disposed to online simulator training or skills lab sessions and believed these could be helpful in their surgical training (*P*=.0043). However, online-based teaching cannot entirely replace in-person consultant surgical demonstrations and assists, nor traditional in-person case discussions, lectures, meetings, and conferences, with only about a third of the trainees agreeing to the statements, (27% and 33%), respectively.

With regard to telemedicine, approximately 84% of the trainees attended to patients via telemedicine, averaging 40% of their clinic consults. However, only 16% reported being confident in handling their patients through telemedicine. Forty-four percent of respondents think that telemedicine should be made part of the ophthalmology training program.

When using online platforms for didactic learning activities, the most frequently mentioned benefits were accessibility to international speakers (93%), flexible hours (76%), less cost (70%), and increased attendance (66%) (Figure 7). The most common problems encountered were decreased attention span (80%) and poor connectivity (77%) (Figure 8).

DISCUSSION

This is the first nationwide survey examining the perceived impact of the COVID-19 pandemic on ophthalmology training in the Philippines. Our results show that COVID-19 has had an overall negative impact on training from the point of view of ophthalmology residents and fellows.

Similar to the previous surveys conducted in other countries,[3-6] the participants in this study also reported redeployment to COVID-19 areas, significant reduction in interactions with patients and consultants, and significant decrease in clinical and surgical activity. Training extension was not a change reported abroad likely because their surveys were conducted early during the first wave of the outbreak around April 2020. Domains reported with the greatest decrease such as surgical training, clinical activity, and in-person interaction with consultants in the out-patient department and operating rooms, were found to be in line with the published data from different international training programs worldwide.

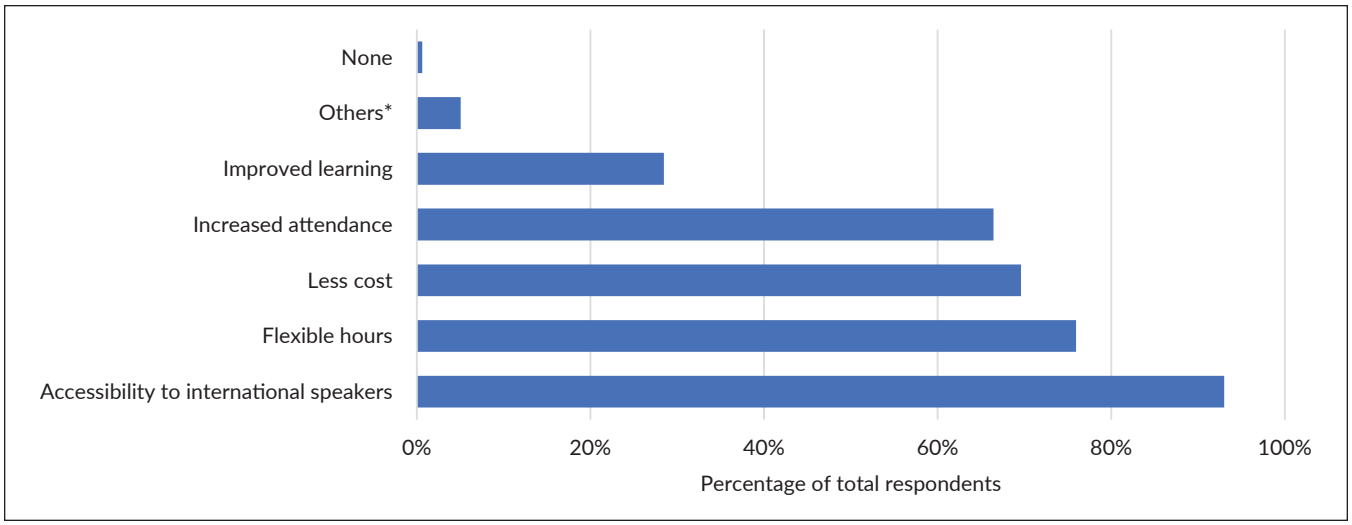

Figure 7. Benefits experienced with the shift of didactic teaching activities to online platforms (n=158).

**Others: Less travel, saves time, less exposure, improved audio-visuals, option to replay lectures, more fluid and organic interactions between trainees and consultants.*

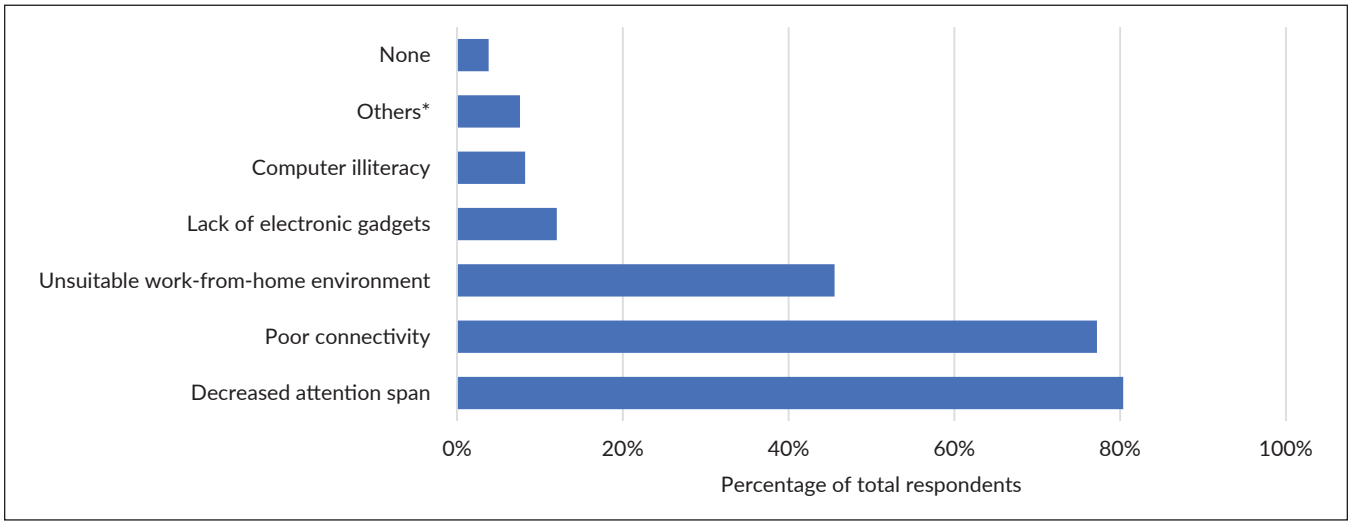

Figure 8. Problems encountered with the shift of didactic learning activities to online platforms (n=158).

**Others: Scheduling issues, overload in terms of number/frequency, less hours for self-study, webinar fatigue, need to multitask, lack of work-life balance.*

Surgical Training

Majority of Filipino trainees reported a marked decrease in surgical training by more than 50% which is consistent with previous studies. This is a serious issue for ophthalmologists-in-training since Hussain and colleagues[5] reported that cataract surgery was the aspect of training majority of ophthalmology trainees were most concerned about. Majority (64%) of study participants experienced postponement of surgical procedures of at least three months. The most common procedures performed during the pandemic were elective cataract surgery, lid repair, intravitreal injection, and corneal perforating injury repair. Besides lid repair and corneal perforating injury repair, which are both common in trauma and emergency cases, cataract surgery and intravitreal injections are relatively quick procedures and can be done under local anesthesia and thus have low risk of COVID-19 transmission. The least performed procedure was DCR, which is an operation that takes relatively longer and has a potential for aerosolization of the virus and consequent increased risk for transmission.

A high proportion (85%) of trainees reported reduced interaction with consultants in the operating room. This was a cause of concern because trainees lose the opportunity for live feedback during surgeries and observational learning while assisting. Additionally, majority of trainees felt that their technical skills were negatively impacted by the

pandemic and only about half reported having confidence in managing patients surgically in the operating room. Given these concerns, majority of respondents agree that surgical video conferences with a consultant and simulator training or skills lab sessions could be helpful in their surgical training. These provide opportunities for trainees to acquire and retain surgical skills in a safe environment.

Based on the survey results, the authors propose the following recommendations to further improve surgical training during the pandemic:

- Hold regular surgical video conferences
- Conduct skills lab training (e.g., pig's eye wet lab) or invest in surgical simulators
- Explore the possibility of surgical telementoring. In a study published in 2009 by Camara and colleagues,[8] the investigators were able to do a live feed of a surgical procedure on an endoscopic laser-assisted dacryocystorhinostomy (ELA-DCR) from Hawaii to the Philippines with interactive discussions during and after the procedure.

Clinical activity

A decrease in in-person clinical work was reported by almost all trainees with majority reporting a decrease in activity by more than 50%. Both clinical skills and technical skills were found to be negatively impacted during the pandemic. Consequently, it is understandable why 44% said that they did not feel prepared in managing patients at the clinics. Reduction in technical skills is in line with reported data on markedly reduced activities in the laser clinic and office-based procedures as reported by trainees in Saudi Arabia.[3] Furthermore, a high proportion (94%) of trainees reported reduced in-person interaction with consultants in the out-patient clinics. To address this problem, most case discussions were shifted virtually whenever in-person meetings with consultants were not possible. On a positive note, given that case discussions were shifted to online platforms, this afforded more flexibility, and thus allowed more consultants to become available for clinical dialogues. However, of course, the disadvantage of reduced in-person interaction with consultants remains substantial as there is lost opportunity for observational and demonstrative learning.

Majority of trainees attended to patients via telemedicine averaging 40% of their clinic consults. However, only 16% reported confidence in handling their patients through telemedicine. This finding is lower than the reported result of Azarcon and colleagues[9] where they found that 47% of practicing ophthalmologists and ophthalmologists-in-training felt confident with discussing a patient's condition remotely. The lower confidence reported in our survey may be attributed to the fact that all respondents were ophthalmologists-in-training whereas Azarcon et al.'s participants were mostly (70%) practicing ophthalmologists. Nevertheless, given that more than half of their respondents did not report having confidence in discussing a patient's condition remotely, Azarcon et al. suggested integration of tele-ophthalmology into training programs in order to improve competence and confidence of future ophthalmologists in its use. In our study, 44% of trainees felt that telemedicine should be made part of ophthalmology training, 32% were neutral, while 24% were in disagreement. Based on this result of interest of many trainees to incorporate tele-ophthalmology into their training accompanied by the increasing willingness by Filipino ophthalmologists to engage in tele-ophthalmology as reported by Azarcon and colleagues, it is now important to explore barriers and solutions towards adopting tele-ophthalmology into practice and consider opportunities for training in order to increase familiarity and confidence in performing tele-ophthalmology. That being said, the investigators recommend the following to mitigate the pandemic's perceived impact on clinical activity:

- Hold virtual clinics with mentors or consultants when a face-to-face set-up is not possible
- Conduct regular case discussions or patient chart reviews via online platforms
- Utilize tele-ophthalmology for screening and monitoring of stable patients in order to reduce unnecessary exposure at the clinics
- Explore options in tele-ophthalmology training such as online courses, conference lectures, or integration in the residency clinical curriculum

Theoretical Knowledge

Seventy-five percent of participants in this survey found a marked increase in didactic teaching activities which agrees with the positive impact of the pandemic on the trainees' theoretical knowledge. It is interesting to note however, that there is some discrepancy between the 75% who reported an increase in didactic teaching activities during the pandemic while only 41% felt that it had positive impact on their knowledge. This gap suggests that there may be issues with the shift to online activities that are unaddressed and/or there are other external factors involved, such as mental health problems, that may have affected the trainees' gain in knowledge.

Almost all institutions shifted to online platforms for conferences, meetings, and lectures when the pandemic started and this shift correlated with the increase in learning activities and positive impact on the trainees' theoretical knowledge. Most common benefits from transition of didactic teaching activities to online platforms include increased accessibility to expert speakers, less cost, and flexible hours.

The positive reception of respondents to the transition to online platforms is in line with the findings of Alahmadi et al.[3] where they reported that 67% of trainees were satisfied with web-based teaching. They also reported that the preferred platform of most trainees was Zoom. However, in this survey, despite good reception of trainees to the shift to online activities, a significant number of trainees agreed

that online-based teaching cannot entirely replace in-person interactions. As mentioned earlier, there are intangible losses of the transition of in-person interactions to online platforms which affect observational learning during clinic referrals, networking during conferences, and camaraderie among colleagues within the department. Additionally, most common problems associated with shift to online platforms for didactic teaching activities include poor attention span and internet connectivity issues. And although not presented as a formal choice in the questionnaire, signs of "Zoom fatigue," such as feeling overwhelmed and having no clear delineation of work and after-work hours, were volunteered by some respondents.

The investigators recommend the following to further improve trainees' theoretical knowledge during the pandemic:

- Optimize 'hybrid' learning by balancing between incorporating face-to-face and online-based teaching sessions
- Encourage online participation in inter-institutional or international conferences whenever possible
- Take active steps towards reducing "Zoom fatigue" among trainees by implementing "office hours," organizing schedules of trainees to ensure they are not over-worked, and using stimulating online learning activities.

Research Activity

During the pandemic, non-COVID-19 clinical research was the most affected due to limited in-person interaction with patients from out-patient clinic closures, restrictions in travel, and general avoidance of unnecessary exposure in the hospital. Consequently, the top three most common forms of study designs of ongoing researches during the pandemic were case reports/case series, cohort studies, and cross-sectional studies - all of which could be done remotely without patient interaction. On the other hand, all efforts and funding were mobilized towards COVID-19-related research during this time. As a result, forty percent were compelled to come up with new research studies and about a third were forced to change/discontinue ongoing research studies. Additionally, given that more time was spent working remotely and less time was allocated to surgical and clinical training, it is only expected that a number of trainees (39%) reported an increase in research activity during the COVID-19 pandemic. None of the aforementioned international studies explored the effect of the pandemic on their trainees' research activity.

The team's recommendations to promote continuous research activity despite the pandemic are as follows:

- Explore COVID-19-related studies that currently have expedited approval processes and,
- Non-COVID-19 studies that may be done remotely without need for in-person interaction such as retrospective chart reviews, systematic reviews, and non-clinical studies

Mental Health

Lastly, the mental health of trainees was perceived to be most negatively impacted by the COVID-19 pandemic. Several studies have shown increased levels of stress, anxiety, and depression among health workers during the pandemic.[10,11] In a study by Khanna et al.[10] where the psychological impact of COVID-19 on trainees and practicing ophthalmologists were studied, they reported that 32% of ophthalmologists had some degree of depression and that it was higher among trainees.

Although 40% of our participants felt that they had sufficient time to study for exams, much less (24%) felt prepared to read and study for them. Among other factors, this discrepancy may be partly explained by poor mental health and well-being among trainees during this difficult time. Additionally, it is worth mentioning that about a third of our respondents requested for a list of resources for psychological services catered to healthcare workers at the end of the survey. It has been reported that despite less in-person clinic and surgical hours, trainees still felt "overwhelmed." In a study conducted by Kaplan et al.[11] among residents in New York City, USA, psychological distress and burnout affected approximately one-third of trainees and they reported that feeling valued by superiors decreased odds of burnout.

Kaplan and colleagues[11] offered the following recommendations to address mental health issues among residents and fellows and implemented these at the Mount Sinai Hospital in New York:

- Increase accessibility to counseling services and psycho-logical support services
- Support trainees' basic needs including advocating for adequate access to PPE, scrubs, and food provisions
- Create schedules that avoid increasing trainee work hours
- Advocate for crisis pay to financially support trainees and show appreciation, especially when workstreams are outside of specialty training areas
- Make direct efforts to communicate with trainees and demonstrate value through direct messaging and acts of appreciation

Comparisons between Year Level in Training, Training Location, and Institution Funding Type

This study also explored possible underlying factors that might have influenced the state of ophthalmology training during the pandemic. Based on our results, no major differences were found in the impact of COVID-19 on training across year levels and across institutions compared by location (NCR vs. non-NCR) and funding type (government vs. private).

When residents and fellows were compared, increase in didactic teaching activities, and decrease in surgeries were more experienced by residents likely because they are required

to attend all teaching activities and were not prioritized to perform emergency surgeries. It is also understandable why more fellows felt they had more time for studying and that they achieved the required competence for promotion/graduation since they have considerably less on-call duties, no "scut work," and have already gained more knowledge and experience compared to their junior colleagues.

When responses of NCR and non-NCR trainees were compared, more non-NCR trainees were enrolled in COVID-19 referral centers. Among the 31 PBO training programs at the time this survey was conducted, there were a total of 15 institutions that were designated as COVID-19 referral centers; of those 15, nine institutions were located in non-NCR areas. Results also show that more NCR trainees were assigned to COVID-19 posts and felt marked decrease in in-person consultant interaction compared to their non-NCR colleagues. These findings are consistent with the fact that NCR was the epicenter of the Philippine COVID-19 outbreak for the longest time.

When government and private institutions were compared, more trainees in government institutions were in COVID-19 referral centers and redeployed to COVID-19 areas. Interestingly though, more trainees in private institutions experienced training extension. This shows that being enrolled in a COVID-19 referral center and assigned to COVID-19 duties were not correlated with training extension. Instead, this result might be better explained by the location of the private institutions since they are all within NCR, which experienced the strictest and longest government lockdown.

One year into the pandemic, only about a third of participants (36%) in this survey felt that they achieved the required competencies of their year level. Majority of the respondents also agreed that a re-evaluation of requirements for promotion or graduation was needed. This goes back to our previous point that although there was good reception by trainees towards online-based education, it is clear that it cannot entirely replace in-person training. The very limited patient and consultant interaction during the government lockdown made it very difficult for the trainees to achieve their required competencies in the clinics and operating rooms. Although online didactic activities and telemedicine proved to be helpful, their usefulness proves to be only supplementary as it is truly only via in-person education that trainees are able to hone their clinical, technical, and surgical skills in preparation for practice in the real world. That being said, an extension of training for most institutions was very much warranted to allow more time to catch up with missed clinical rotations and surgical procedures. When the pandemic ends, however, it seems that virtual teaching methods will persist, and so it will be important for training institutions to re-evaluate the value of online didactic activities and telemedicine in ophthalmology training programs.

Limitations

This study has several limitations. The reliability of the data is slightly impacted by the inability of the principal investigator to control the sampling method per institution. Although random assignments were given, in some cases, the survey link was sent to all residents for completion. Despite this, the investigators ensured that proportional allocation of respondents was still observed.

Additionally, in order to objectively determine the pandemic's impact on residents' and fellows' training, it would have been more informative to have included measurable parameters predicated on the requirements set by the PBO and the various subspecialty societies, respectively. For example, the breakdown of surgeries and exam scores based on standardized requirements could have been reported and analyzed together with the responses to evaluate the pandemic's effect on surgical activity and theoretical knowledge. Also, data on the number of trainees dropping out of their training programs during the pandemic and reasons behind this would have been useful in the assessment of COVID-19's impact on mental health.

As with any other survey, the provided answers may differ from actual practices, and the responses of participants from March to April 2021 may not reflect changes in their attitudes over time.

CONCLUSION

In conclusion, the COVID-19 pandemic has had a negative impact on ophthalmology training in the Philippines. It has caused significant disruption in trainees' clinical and surgical activities and affected their mental health. Despite this, the situation provided an opportunity to boost trainees' theoretical knowledge. Majority are receptive to new technology-based learning tools and clinical practices such as tele-ophthalmology to preserve the effectiveness of their training. Efforts to re-evaluate current training framework are needed to ensure sustainability and quality of ophthalmology training in the Philippines.

Statement of Authorship

MOOS contributed in the conceptualization of work, acquisition and analysis of data, drafting and revising of manuscript, and final approval of the version to be published. TRC, BVQM and DES contributed in the conceptualization of work, revising of manuscript, and final approval of the version to be published.

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