Implementation of COVID-19 Protocols and Tele-Triage in an Academic Ophthalmology Department

Angelica C. Scanzera, OD[1,2] Emily Cole, MD, MPH[1] Nita Valikodath, MD, MS[1] Chau Pham, MD[1] Thasarat Sutabutr Vajaranant, MD[1] Deepak P. Edward, MD[1] Joelle A. Hallak, MS, PhD[1] Yannek I. Leiderman, MD, PhD[1] Lauren Kalinoski, MS[1] Peter MacIntosh, MD[1] Ahmad A. Aref, MD, MBA[1] Deepak Shukla, PhD[1] Pooja Bhat, MD[1] Elmer Tu, MD[1] R.V. Paul Chan, MD, MSc, MBA[1]

[1] Department of Ophthalmology and Visual Sciences, Illinois Eye and Ear Infirmary, University of Illinois at Chicago, Chicago, Illinois
[2] Division of Epidemiology and Biostatistics, School of Public Health, University of Illinois at Chicago, Chicago, Illinois

Address for correspondence R.V. Paul Chan, MD, MSc, MBA, Department of Ophthalmology and Visual Sciences, Illinois Eye and Ear Infirmary, University of Illinois at Chicago, 1855 W. Taylor Street, Chicago, IL 60612 (e-mail: rvpchan@uic.edu).

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Abstract

Background The coronavirus disease-2019 (COVID-19) pandemic has affected academic ophthalmology departments globally, causing changes in educational, research, and clinical operations in the short and long term. Healthcare workers are at higher risk of contracting the disease and given early reports suggestive of transmission through the tear film in COVID-19 cases with conjunctivitis, and close proximity during examination, eye care providers in particular may be at increased risk.

Objective To provide the experience from a single academic ophthalmology program in responding to the COVID-19 pandemic.

Methods This article describes the changes executed in the Department of Ophthalmology and Visual Sciences at the University of Illinois at Chicago, Illinois Eye and Ear Infirmary, with emphasis on the implementation of a tele-triage process for urgent visits.

Results In response to the pandemic, our department made rapid changes to its departmental protocols for education, research, and patient management. Early measures focused on limiting face-to-face interactions among patients, staff, residents, and faculty, decreasing the risk of exposure to disease while also providing access for patients in urgent need of care.

Conclusion We hope that the UIC experience will assist other academic tertiary referral centers in maximizing their opportunities to deliver excellent patient care while minimizing risks to patient and provider, all while continuing to provide a quality graduate medical educational experience during and beyond the pandemic.

Keywords
- coronavirus
- SARS-CoV-2
- tele-triage
- telehealth
- resident education
- medical education

The coronavirus disease2019 (COVID-19) pandemic is a serious global health threat that originated in Wuhan, China in late 2019. The viral illness has a wide spectrum of manifestations and situation specific public health and treatment protocols. However, as the pandemic progressed, there was scant information or guidance on how ophthalmology service providers and institutions should respond to this viral infection.

In February 2020, an outbreak of the novel coronavirus among five vitreoretinal surgeons at Oslo University Hospital

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in Norway forced the shutdown of the surgical retina service, and cancellations of all elective visits in the Department of Ophthalmology.[1] This incident showed the disruptive power of COVID-19, also known as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).[2,3]

Due to its novelty and the rapid spread of the pandemic, minimal information regarding ocular manifestations in COVID-19 exists. The prevalence of conjunctival congestion in COVID-19 patients has been estimated between 0.8 and 4.7%, though this is usually not the presenting symptom.[4–7] The association between COVID-19 and conjunctival injection remains unclear. Several studies have used reverse transcription polymerase chain reaction assay to detect viral load in the tears, but results have been variable due to sensitivity of testing and/or viral load.[8–11]

Eye care providers face an increased risk of contracting COVID-19, not only because of the possible presence of viral particles in ocular secretions, but also due to close contact to the patient's face during an ophthalmologic exam. Given the limitation in current data available, evidence from the previous SARS and Middle Eastern Respiratory Syndrome (MERS) outbreaks have been used to guide development of current practices for ophthalmic services. For example, ophthalmology practices in Hong Kong, which were heavily affected by the SARS epidemic, recommended the use of full personal protective equipment (PPE) for all cases regardless of SARS status—a practice that was implemented by Illinois Eye and Ear Infirmary (IEEI) in the early phases of COVID-19.[12]Following recommendations set forth by the Centers for Disease Control and Prevention (CDC),[13] American Academy of Ophthalmology,[14] and the University of Illinois Health System, the Department's primary goal during the initial response to the COVID-19 pandemic has been to limit face-to-face encounters of patients with staff and providers to minimize the viral transmission. To apply these principles into practice, a COVID-19 Task Force and Tele-triage/Telehealth Task Force developed an adaptable system of protocols in the rapidly evolving pandemic. These protocols aimed to minimize exposure without compromising trainee education, research, or patient care and to ensure that sufficient staff, trainees, and faculty would remain healthy enough to continue to deliver care.

We aim to share our experience in the development of constantly evolving Departmental protocols. Further, we describe the initiation of a tele-triage process for urgent visits to improve patient and provider safety during the COVID-19 pandemic, which may assist other academic tertiary referral centers in the future.

Trainee Education

Resident and Fellow Education

A primary goal of the Department's initial response to COVID-19 was assurance of continuity in resident, fellow, and medical student educational activities. To mitigate exposure and the risk of entire staff being quarantined, the formation of rotating resident care teams for clinical care created an opportunity for implementation of unique approaches to tele-education. In any given week, one of the three care teams participated in active clinical duties while the other two worked remotely. We created a daily one-hour interactive morning and afternoon educational session to provide structured activities for our residents and fellows working from home.

The educational activities were hosted on an online collaboration platform such as Cisco WebEx (Cisco Systems, Milpitas, CA) and/or Zoom (Zoom Video Communications, San Jose, CA). Lecture types included traditional didactic lectures and journal clubs, as well as newer approaches to resident education such as the flipped classroom, problem-based learning, and an oral boards practicum. These educational sessions were led by attending and fellow-level physicians. Challenges of web-based learning include familiarity with online platforms, internet connectivity issues, communication difficulties, learner adaptation and self-motivation, and assessment of learner engagement.[15] Our weekly Grand Rounds also shifted to a virtual format. Primarily intended to achieve social distancing, the virtual format also enabled effortless participation from invited speakers, alumni, and collaborators from around the world, with a noted increase in attendance by a factor of five as well as increased audience participation.

Web-based learning opportunities have also enabled curriculum expansion to include nonclinical topics, such as wellness and resiliency education. The Accreditation Council for Graduate Medical Education has placed increasing importance on improving physician well-being and integrating these strategies into resident education.[16] These topics are of particular importance given the current public health crisis. Isolation and loneliness due to shelter in place policies and the possibility of redeployment within the hospital to work in other areas of medicine can be significant sources of stress. At IEEI, residents and fellows participate in a weekly wellness session with the program director. The format of these sessions vary, however each session starts with a resident-led review of weekly material presented in the acclaimed Yale University online course, "The Science of Well-Being."[17] Wellness session activities have included a discussion of COVID-19, playing online group and getting-to-know-you games, and sharing wellness strategies and resources that residents have utilized during the shelter-in-place.

Medical Student Education

The University of Illinois at Chicago College of Medicine (UIC COM) is one of the largest medical schools in the country and has over 300 medical students each year across three campuses where the MD program is offered. Medical students from UIC and other programs across the country frequently perform clinical ophthalmology electives in the department throughout the year. Due to UIC COM guidelines during the pandemic, all medical student education moved from in-person to web-based learning. Our department devised a new curriculum—"Ophthalmology Online"—which was a 4-week sequential educational curriculum that built upon itself to provide a well-rounded educational experience for all medical students. This curriculum was presented to and approved by the UIC COM curricular committee. It consisted of a weekly ophthalmology subspecialty theme with

designated reading from e-textbooks in the initial part of each week, viewing of online videos, and solving clinical vignettes mid-week, and culminating into e-lectures specifically designed for medical students by our subspecialty faculty. The e-lectures were a mix of lecture and case-based learning with opportunity for discussion of the weekly reading and viewing assignments. The students were expected to craft a summary of their weekly e-learning, a final oral presentation via Zoom or WebEx, and a final exam administered via SurveyMonkey (San Mateo, CA), constituted toward their grade for the 4-week rotation. The department now offers students from other medical schools the opportunity to participate in electives that provide online ophthalmology education which includes web-based patient evaluations using slit-lamp camera systems that can be projected via Zoom or WebEx with opportunities for students to participate in patient exams and clinical decision-making.

Overall, the changes to medical education necessitated by the current coronavirus crisis enabled educators to utilize new strategies that can be implemented in trainee education moving forward.

Research Operations

Research is an integral part of every academic ophthalmology department. The onset of COVID-19 in the United States almost immediately impacted our research operations, facing the dilemma of performing cutting-edge research while ensuring the well-being of researchers, healthcare staff, and study participants.

Individual laboratory directors were asked to immediately stop nonessential research activities and minimize the on-site staff by identification of one or two essential personnel who would handle essential laboratory activities and services. Research activities that could be completed from home were performed remotely and subject interactions that could be delayed or performed via telehealth were delayed and rescheduled. In most cases, laboratory directors agreed to reduce animal studies by maintaining only essential animal colonies and not starting any new experiments or placing new animal orders. Research laboratories donated their stocks of PPE to the department for clinical use. In addition, ventilators and anesthesia equipment used for animal studies were prepared for any last-minute emergency usage in human patients.

Although it may not be ideal, many research-related activities are particularly suited for remote performance. Scientific literature review, hypothesis development, existing data analysis and interpretation, manuscript preparation, and animal or human protocol development are all examples of activities that can be performed. Laboratory directors have transitioned to holding virtual meetings on a regular basis to provide an active forum for scientific discussion, information exchange, guidance, and oversight. Trainees and staff were also encouraged to participate in online seminars and journal clubs of their choice both within the department and university. This also provided an excellent opportunity for the expansion of resident involvement in research and quality improvement projects.

Although the research department has undergone significant changes and decreased laboratory activity, there was noted to be a slight increase in manuscript and grant submission activities. Out of seven principal investigators who responded to a survey, four reported an increase and three no net reduction in the number of manuscripts submitted for publication since the onset of COVID-19 in the Chicago area. COVID-19 has also presented a unique opportunity to develop new research ideas, diagnostic reagents, and collaborative programs for developing new treatments.

Clinical Operations

In this section, we describe changes to scheduling, staffing, clinic organization, and examination procedures that were implemented in the Department based on guidance from several sources.[13,14,18]

Screening and Check-In Procedures

A COVID-19 symptom screening developed at IEEI was performed over the phone and again by a medical assistant at the single open entryway into the building described in detail below (►**Fig. 1**). Those patients who screened positive for symptoms over the phone were asked to enter via a side entrance upon arrival and immediately directed into a designated isolation room (►**Fig. 2**).

Other changes in the patient flow prior to the patient examination included:

1. Minimizing crowding by consolidation of most ophthalmic subspecialties to two physical spaces.
2. Controlling entry sites into the facility and limiting entry of visitors into the building.
3. Early measures in the waiting area included demarcated areas on the floor indicating a 6-foot distance from the check-in counter, installation of a plexiglass physical barrier at check-in, and nonporous easily sanitized non-cloth chairs spaced at least 6feet apart.

In addition to screening for symptoms, a medical assistant checked the temperature of all staff and visitors upon entry into the building. As more information regarding asymptomatic transmission of the disease became available, and resources were more easily accessible,[19–21] a policy of universal surgical masking was implemented. Personal protective equipment guidelines also continued to change as shortages were replenished, and the department continues to follow the recommendations set forth by the CDC and Illinois Department of Public Health.[22,23]

Scheduling and Staffing Changes

Initial steps taken to reduce the risk of COVID-19 transmission included cancelling all nonurgent/nonemergent visits and elective surgeries. Outpatient visit and surgical triage stratification tables were created by the department to outline the urgency of a visit or procedure and served as a guideline for scheduling patients. Clinical productivity was reduced to approximately 10% of that seen in the department

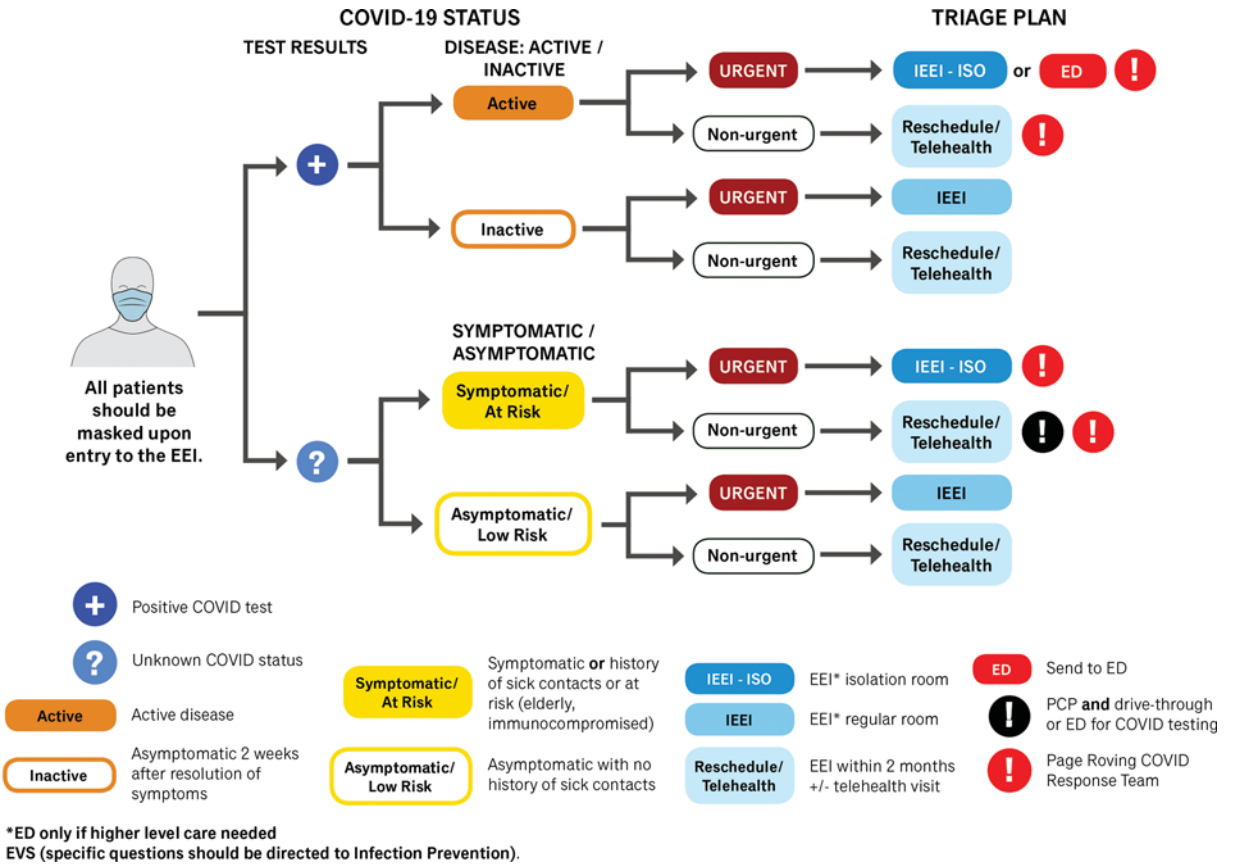

Fig. 1 Workflow demonstrating how patients are triaged based on COVID-19 status and urgency of eye visit. COVID-19, coronavirus disease-2019.

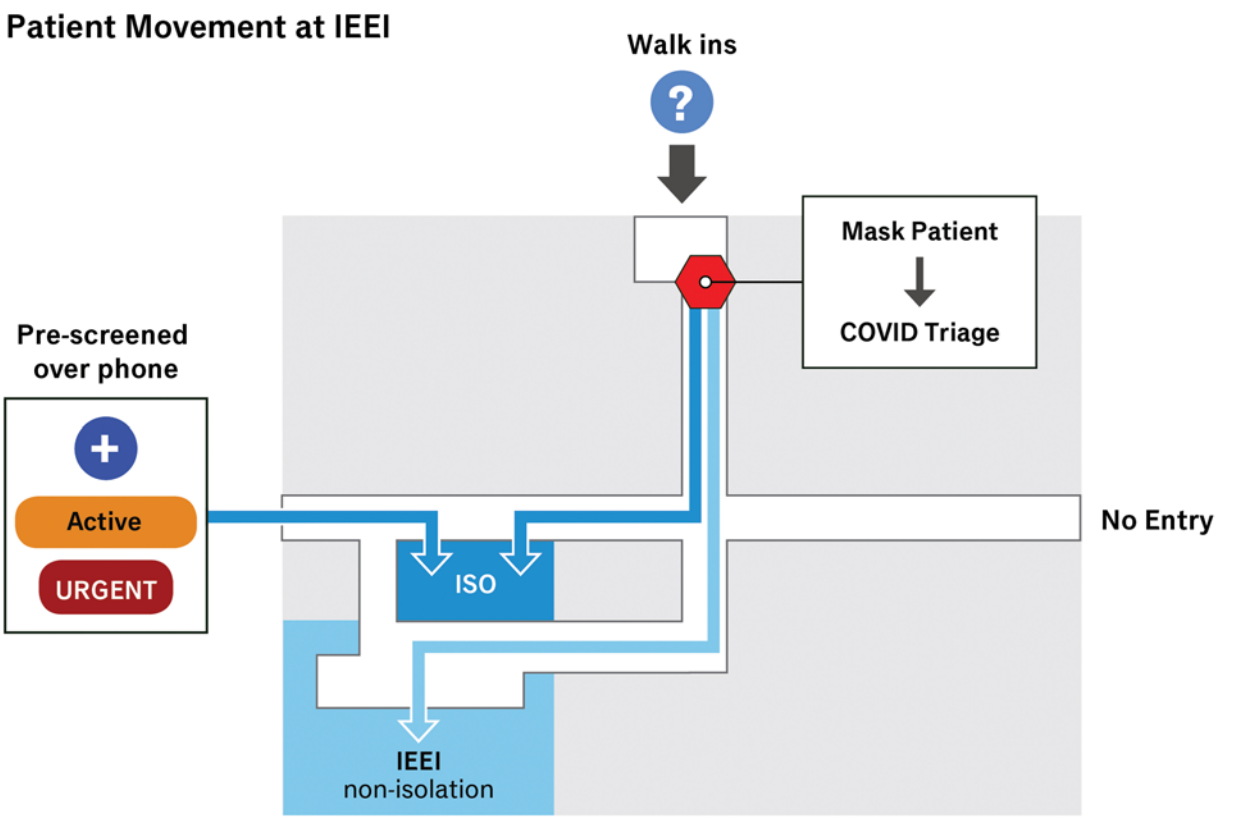

Fig. 2 Patient entry into the Infirmary. A single entrance is open, though patients who were positive for symptoms on prescreening are escorted from a secondary entrance directly into an isolation room.

before the onset of COVID-19. Some of the processes involved to limit exposure and follow social distancing principles among staff included creation of pools of attendings, residents, fellows, and ancillary staff.

Examination Procedures

All examinations were problem focused. To limit exposure, technicians were directed to check visual acuity and intraocular pressure with a Tono-Pen only, unless applanation tonometry with disposable Goldmann applanation tip was indicated by the provider. Patient examinations were limited to three to four per hour, with additional patients added as determined by the triage team, and each patient was screened and examined in the same lane. Providers advised patients not to talk during close examination, and limited patient contact and exposure time during slit lamp and indirect examination. Dilated fundus exams were performed at the discretion of the provider. Upon completion of examination, patients were discharged and instructed that they will be called to schedule a follow-up visit. Exam lanes were disinfected after every encounter, and a system of signs identifying status of disinfection for each room was enacted. Isolation rooms were left unused for 1 hour to allow droplets to settle prior to disinfection.

Imaging Protocols

To minimize exposure risks, diagnostic imaging and visual field testing was limited to those in which the study influenced treatment or diagnostic decisions in real time. For example, urgent imaging included ultrasound studies to assess the posterior segment if there was a poor view or suspected malignancy. Ocular coherence tomography was also utilized based on the discretion of the provider. Nonurgent imaging, such as photo documentation, were deferred.

Tele-Triage Protocol

The walk-in clinic at the IEEI is the only dedicated walk-in ophthalmology clinic in the Chicago area. The introduction of a tele-triage protocol in this clinic was driven by several factors: (1) expected increase in urgent and emergent visits and walk-in clinic volume given closure of regional ophthalmology and optometry practices, (2) reduction of patient contact with clinic staff during their visit, (3) Decrease in staff, resident, and attending physicians in clinic on a given day, and (4) a need to immediately identify and isolate COVID-19 positive or symptomatic patients.

Triage protocols and resources in the ophthalmology setting have been previously described,[24,25] and have influenced our current model. We aimed to triage urgent ophthalmic visits immediately to the clinic or emergency department (ED), while ensuring appropriate follow-up for nonurgent issues. We implemented a phone triage and prescreening algorithm that was staffed by a physician to reduce in-house patient wait times and exposure risks.

IEEI Triage Team

A designated triage team was formed and made up of faculty, residents, and staff. (►**Fig. 3**).

Triage Workflow Model

Patient Entry into Triage System

Patients are triaged based on COVID-19 status, as previously described in ►**Fig. 1**, as well as urgency of eye symptoms. Triage entry points include: (1) physically walking into IEEI (2) transfers from the call center or (3) a URL attached to the IEEI website (►**Fig. 4**). Patients entering the triage system complete a HIPAA compliant survey in REDCap, which is a secure, web-based application used to build and manage

	TEAM MEMBER	RESPONSIBILITY
	Primary Triage Resident	Manages triage system and patient surveys/calls from home
	Backup Triage Resident	Assists primary triage resident
	Triage Technician	Screens and assists patients that enter triage system
	Clinic Contact Resident	Point person for all triage related issues
	Clinic Contact Technician	Administers patient surveys from calls that go directly to the clinic
	Front Desk	Registers patients based on triage resident recommendation
	Medical Assistant	Administers COVID-19 screening to patients/staff at IEEI entrance
	Attending Physician	Available for consultation by triage and clinic residents

Fig. 3 Triage team responsibilities.

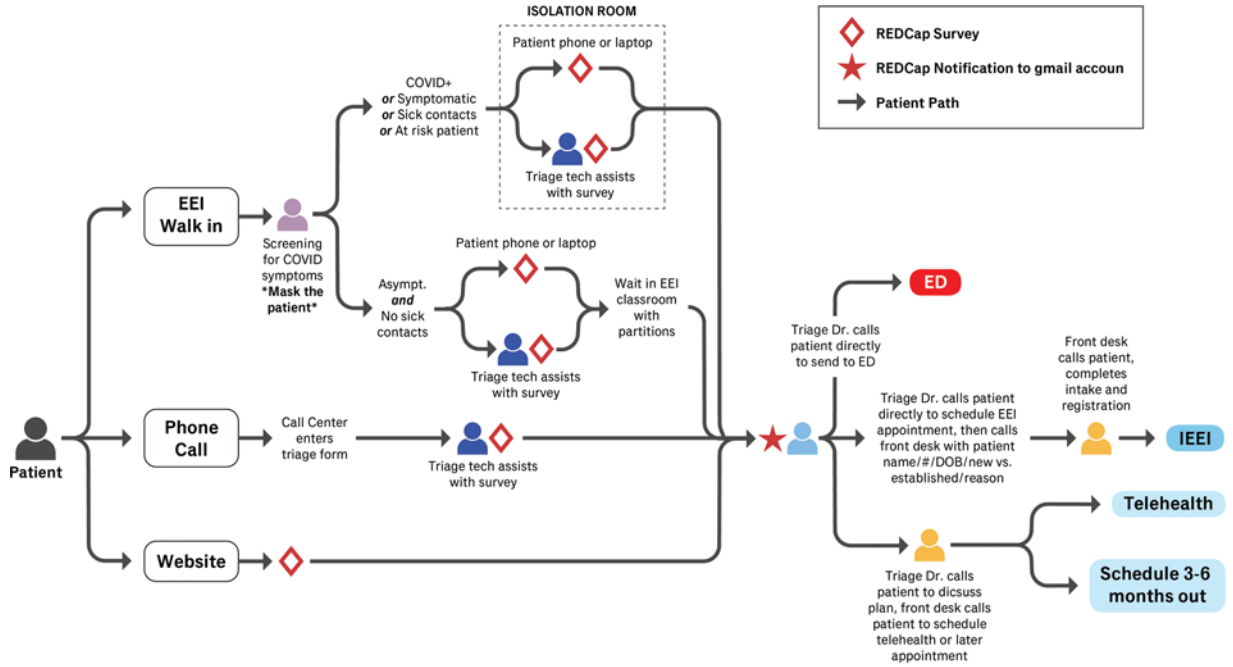

Fig. 4 Triage system workflow.

surveys and assist with data capture. This survey includes questions regarding demographics, COVID-19 symptoms, and ocular symptoms. Survey interfaces include personal computers, smart devices, or mobile phones, or on-site institutional iPads.

Triage Process

The completed survey, any pertinent information available in the electronic medical record (EMR), and a phone call for further discussion of any acute symptoms is reviewed and documented by a physician who is working remotely. Depending on the category of COVID-19 status and eye symptoms, the patient is triaged to: (1) IEEI in an isolation room; (2) IEEI in a regular examination room; (3) the ED; or (4) rescheduled for a future clinic visit or telehealth visit (►**Fig. 4**). In our experience, the turnaround time from notification of survey submission to triage of the patient is approximately 15 minutes. Additionally, documentation of the urgency of visit and history of present illness in the EMR help to streamline the in-person encounter.

Exceptions to the Survey

We found that the survey was unnecessary in a few circumstances. Ocular emergencies where clinical outcomes may be affected by the 15 to 20 minutes needed to process the survey were identified by the triage technician, confirmed by a physician, and directed immediately to IEEI or the ED after COVID screening. Direct internal or external referrals from an ophthalmologist or optometrist were treated similarly.

Telehealth

On March 6, 2020, the Centers for Medicare and Medicaid Services responded to the COVID-19 pandemic by temporarily broadening access to telehealth services.[26] Under the new 1135 waiver authority and Coronavirus Preparedness and Response Supplemental Appropriations Act, telehealth visits were expanded to allow new and established patients to receive these video visits from their home, and boundaries on where these visits were accessible were lifted. With this change, new telehealth protocols were implemented and IEEI began offering telehealth visits to patients deemed appropriate based on previously established criteria.

Telehealth fits well into the tele-triage system; it allows for patients to have access to an eye care provider from their home and gives the provider an opportunity to obtain more information regarding the patient complaint. This can assist in prioritizing patients requiring an urgent visit; however, the examination via telehealth is limited. Ophthalmic exams require several components which currently cannot be performed solely with a video visit. We are currently working to integrate residents into telehealth beyond their involvement in the tele-triage system.

Strengths

The strengths of this triage protocol based on our experience thus far include accurate and thorough screening for COVID positive individuals via redundancies in the system, maximization of the physician work pool, and increased efficiency of the in-person appointment to minimize exposure for patient and staff. In eighteen clinic days, 134 patients were triaged through the current system. Eighty-eight were considered urgent, two were sent to the ED, and 14 had symptoms of influenza like illness and were immediately isolated. The various entry points provide multiple avenues for COVID screening that include remote and in person screening by the medical assistant, triage technician, and ophthalmology provider. Multiple checks in the system

enable accuracy and thorough screening of COVID symptoms protects providers and other patients by identifying patients whorequire special precautions.

This triage system takes advantage of the segmentation of the work pool into clinical and remote teams. The in-house clinic providers are able to focus on clinical care of emergent/urgent cases while the remote team directs the triage efforts. This system also allows for a quick turnaround time of approximately 15 minutes from survey submission to contacting the patient with the triage plan. The team is in constant communication using a private group channel on a web-based communication platform. This allows for time-sensitive communication, such as identifying patients requiring isolation, and identifying any logistical issues that could increase patient wait times during the triage process. The upfront time also helps in limiting face-to-face time between patients, technicians, and providers. An extensive history is taken before the patient enters the clinic and is documented in the medical record prior to their arrival. Additionally, having multiple checkpoints (temperature screening, triage, front desk, technician) prevents a bottleneck of patients in one location when clinic volumes have been higher.

Limitations

Areas for improvement and barriers to implementation that we have identified thus far include:

1. Survey completion: Although the survey and triage system was designed to accommodate a sixthgrade reading level, this does not account for all health and technology literacy levels. The web-based design can be a challenge for patients who cannot navigate the technology or do not have access to mobile smart phones, laptops, or computers. Hardware and technicians are available for individuals who present as a walk-in.
2. Survey volume: Another challenge is the potential for a high volume of surveys, up to 16 submitted in a 4-hour period so far, which can lead to delays in response and longer patient wait times. Over 37% of triage cases occurred within the last 3 days, and we continue to expect an increase in the volume of urgent cases. To address this, we have a backup triage resident to assist as needed.
3. Language: Currently, the triage survey is only available in English, though historically, many of our patients are Spanish speaking. To navigate this, a phone interpreter can be used by the triage resident and technician to communicate with the patients both on and off site.
4. Size of triage team. Though necessary to assist with triage during the current pandemic, the triage system requires up to eight individuals, two committed to the triage system full time, in order to run in its current state. This is possible due to the current low clinical workload and resident schedule; however, as clinics begin to return to their pre-COVID state, other options will need to be considered to sustain the current system.

We are evaluating the effectiveness of the system using a Plan-Do-Study-Act cycle, receiving feedback from the whole team and incorporating changes to improve the system on a weekly basis.

Future Directions

The post-COVID and transition period will bring about many changes in the practice of medicine and ophthalmology. The goals and utility of our clinical, educational, and research protocols will likely evolve with the changing clinical needs engendered by the shifting parameters of the pandemic. The triage system will continue to undergo numerous changes to adapt to continuous changes in healthcare practices due to COVID-19. Adaptation of this system may enable safe and efficient triage for inpatient consults and after-hours calls in addition to customization for use by phone staff in subspecialty clinics once reopened. Further evaluation will need to be done to assess feasibility, efficiency, and usefulness of this triage system in the post-COVID period.

Technological innovations may also help with improving triage efficiencies, routing patients to clinics, and decreasing wait times. Artificial intelligence (AI) for triage and diagnostic systems are being designed to alleviate high demands on healthcare systems. These systems could include online symptom evaluation and role-play modeling and have demonstrated promising results of accuracy. For example, Razzaki et al showed that triage advice recommended by an AI system was, on average, safer than that of human doctors.[27] However, for healthcare systems to develop confidence in AI systems for triage, several validation studies are required, especially when it comes to giving advice to patients. Additionally, for more accurate learning, algorithms need to be trained on real-world clinical and triage data. We expect automated systems to act as supporting systems for triage and diagnosis, and over time with longitudinal real-world data, AI algorithms can be developed and tested.

Conclusion

The key findings from standardized changes to Department-wide procedures and the implementation of an ophthalmology tele-triage and telehealth protocol are as follows: (1) Modifications in medical education enable innovation in tele-education and trainee education;(2) Clinical workflow has undergone several modifications and has resulted in overall reduction in patient–staff contact time and greater protection of all staff and patients;(3) Remote tele-triage of patients ensures that all patients seen in clinic are urgent or emergent. The implementation of these Departmental changes has required resilience and a team approach from all faculty, staff, and residents, and the protocols in effect continue to change as we learn more about COVID-19 in the coming weeks and months.

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Conflict of Interest

R.V.P.C. reports personal fees from Alcon, personal fees from Novartis, nonfinancial support from Phoenix Technology, outside of the submitted work.

References

1 Jorstad OK, Moe MC, Eriksen K, Petrovski G, Bragadottir R. Coronavirus disease 2019 (COVID-19) outbreak at the Department of Ophthalmology, Oslo University Hospital, Norway. Acta Ophthalmol 2020;98(03):e388–e389

2 WHO Director-General's remark at the media briefing on 2019-nCOV on 11 February 2020. World Health Organization; 2020

3 ECDC. COVID-19. Available at: https://www-ecdc-europa-eu.proxy.cc.uic.edu/en/covid-19-pandemic. Published 2020. Accessed April 5, 2020

4 Guan WJ, Ni ZY, Hu Y, et al; China Medical Treatment Expert Group for Covid-19. Clinical characteristics of coronavirus disease 2019 in China. N Engl J Med 2020;382(18):1708–1720

5 Chen L, Deng C, Chen X, et al. Ocular manifestations and clinical characteristics of 535 cases of COVID-19 in Wuhan, China: a cross-sectional study. Acta Ophthalmol 2020. Doi: 10.1101/2020.03.12.20034678

6 Cheema M, Aghazadeh H, Nazarali S, et al. Keratoconjunctivitis as the initial medical presentation of the novel coronavirus disease 2019 (COVID-19). Can J Ophthalmol 2020;55(04):e125–e129

7 Chen L, Liu M, Zhang Z, et al. Ocular manifestations of a hospitalised patient with confirmed 2019 novel coronavirus disease. Br J Ophthalmol 2020;104(06):748–751

8 Loon SC, Teoh SC, Oon LL, et al. The severe acute respiratory syndrome coronavirus in tears. Br J Ophthalmol 2004;88(07):861–863

9 Wu P, Duan F, Luo C, et al. Characteristics of ocular findings of patients with coronavirus disease 2019 (COVID-19) in Hubei Province, China. JAMA Ophthalmol 2020;138(05):575–578

10 Sun X, Zhang X, Chen X, et al. The infection evidence of SARS-COV-2 in ocular surface: a single-center cross-sectional study. Medrxiv 2020(e-pub ahead of print). Doi: 10.1101/2020.02.26.20027938

11 Xia J, Tong J, Liu M, Shen Y, Guo D. Evaluation of coronavirus in tears and conjunctival secretions of patients with SARS-CoV-2 infection. J Med Virol 2020;92(06):589–594

12 Seah I, Su X, Lingam G. Revisiting the dangers of the coronavirus in the ophthalmology practice. Eye (Lond) 2020;34(07):1155–1157

13 CDC. Social distancing, quarantine, and isolation. Centers for Disease Control and Prevention. Coronavirus Disease 2019 (COVID-19).Available at: https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/social-distancing.html. Published 2020. Accessed April 10, 2020

14 AAO. Important coronavirus updates for ophthalmologists. American Academy of Ophthalmology. Available at: https://www.aao.org/headline/alert-important-coronavirus-context. Published 2020. Accessed April 10, 2020

15 UNESCO. INRULED. Handbook on Facilitating Flexible Learning During Educational Disruption: The Chinese Experience in Maintaining Learning in COVID-19 Outbreak.Beijing: Smart Learning Institute of Beijing Normal University; 2020

16 ACGME. Improving physician well-being, restoring meaning in medicine. Available at: https://www.acgme.org/What-We-Do/Initiatives/Physician-Well-Being. Published 2020. Accessed April 13, 2020

17 Santos L. The Science of Well-Being. 2020 Coursera Inc. Personal Development Web site. Available at: https://www.coursera.org/learn/the-science-of-well-being. Published 2020. Accessed April 13, 2020

18 CDC. Symptoms of Coronavirus. U.S. Department of Health & Human Services. Available at: https://www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/symptoms.html. Published 2020. Accessed April 10, 2020

19 Nishiura H, Kobayashi T, Miyama T, et al. Estimation of the asymptomatic ratio of novel coronavirus infections (COVID-19). Int J Infect Dis 2020;94:154–155

20 Mizumoto K, Kagaya K, Zarebski A, Chowell G. Estimating the asymptomatic proportion of coronavirus disease 2019 (COVID-19) cases on board the Diamond Princess cruise ship, Yokohama, Japan, 2020. Euro Surveill 2020;25(10):2000180

21 Bai Y, Yao L, Wei T, et al. Presumed asymptomatic carrier transmission of COVID-19. JAMA 2020;323(14):1406–1407

22 CDC. Using Personal Protective Equipment (PPE). Available at: https://www.cdc.gov/coronavirus/2019-ncov/hcp/using-ppe.html. Published 2020. Accessed April 28, 2020

23 IDPH. EMS and Hospital PPE Conservation. Springfield, IL: Illinois Department of Public Health; 2020

24 Lai THT, Tang EWH, Chau SKY, Fung KSC, Li KKW. Stepping up infection control measures in ophthalmology during the novel coronavirus outbreak: an experience from Hong Kong. Graefes Arch Clin Exp Ophthalmol 2020;258(05):1049–1055

25 OMIC. Telephone screening of ophthalmic problems: sample contact forms and screening guideline. Available at:https://www.omic.com/telephone-screening-of-ophthalmic-problems-sample-contact-forms-and-screening-guideline/. Published 2020. Accessed April 13, 2020

26 Medicare Telemedicine Health Care Provider Fact Sheet [press release]. Centers for Medicare & Medicaid Services, March 17, 2020

27 Razzaki S, Baker A, Perov Y, et al. A Comparative Study of Artificial Intelligence and Human Doctors for the Purpose of Triage and Diagnosis. London: Babylon Health;2018