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Changes to Ophthalmic Clinical Care During the COVID Pandemic Current Opinions in Ophthalmology

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Abstract

Purpose of review—Given the impact that society as a whole, and medicine specifically, has experienced as a result of the COVID-19 pandemic, an examination of clinical care changes enacted in the field of ophthalmology is of interest to the specialty.

Recent Findings—In order to adapt to the reality of the COVID-19 pandemic, measures such as broadening telehealth capabilities, adopting universal masking, careful sanitation procedures, applying virtual teaching in academic environments, and deferring elective surgeries were put in place. These were aimed at reducing person-to-person spread of SARS-CoV-2. Though best efforts were made at triaging ophthalmic emergencies during these times, unfortunate delays in care were observed in some circumstances. Finally, a prospective study interrogating the risk of spread at slit lamp distances for short periods of time was encouraging, suggesting low risk of transmissibility, though limited by a small case-positive sample size.

Summary—Significant changes have been made in the design and delivery of ophthalmic care during the COVID-19 pandemic. Some of these, such as telemedicine, may provide value in a post-pandemic world.

Keywords

SARS-CoV-2; COVID-19; telemedicine

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Conflicts of interest: None

Dedication

When addressing ophthalmology-specific clinical changes brought about by the COVID-19 pandemic, we acknowledge that early recognition of the pandemic itself began in an ophthalmologic clinic environment. Dr. Li Wenliang, our late ophthalmology colleague from Wuhan, China, has been credited with sounding the early alarm of a new disease before succumbing to its devastating effects. We both honor his commitment and allow his memory to remind us of the importance of ophthalmology as an important contributor to advances in medicine in general.

Introduction

In early 2020, as more information became available regarding the transmissibility of SARS-CoV-2, it became clear that ophthalmology as a profession carried potential for increased risk of virus exposure. Along with our colleagues who also work in close proximity to the oral and upper respiratory mucosa including otolaryngology, anesthesiology, and oral and maxillofacial surgeons[1], early reports from China and Italy indicated that not only were we at greater risk of exposure, but exposure to a high viral load. This could predispose to significant morbidity and even mortality[2].

As ophthalmologists, we began critically evaluating our professional environments and determining means of minimizing viral transmission risks to both us and our patients. We rapidly learned that SARS-CoV-2 remained viable in aerosols for three hours and on metal and plastic surfaces for up to three days[3]. Many health agencies began to champion the six-foot distance as ideal for minimization of transmission. However, the vast majority of ophthalmology examinations and procedures cannot be performed from six feet; rather, we often find ourselves less than six inches away from our patients. Information regarding virus transmissibility began emerging at a furious pace. However, information regarding risk of SARS-CoV-2 transmission specifically at slit lamp distance was lacking. In the 1930's, it was thought that large respiratory droplets containing tuberculosis particles, another pathogen known to be spread through the air, were unlikely to travel greater than 3 feet when expelled[4]. Analysis of spread of the original severe acute respiratory syndrome (SARS) on an aircraft indicated that SARS-CoV-1 viral transmission could still occur at three feet and did occur at up to six feet. In addition, behaviors such as coughing and singing were shown to increase transmission likelihood at greater distances[5]. It became clear that distancing and minimizing vocalization would produce the most ideal environmental conditions. The traditional ophthalmologist's work environment, full of plastic and metal surfaces with shared aerosolized space in close quarters, as well as a close working distance to numerous patients per day, was less than ideal. Although transmission risk during examination of a patient, often actively speaking at the slit lamp, had not been studied specifically, it became readily apparent that this required further examination. By deduction from what was known regarding aerosolization at short distances, there was concern that this specific "slit lamp distance" would portend higher risk of viral transmission, and preventative measures at short distance were likely required.

Study of Short Distance SARS-CoV-2 Transmissibility

With the above in mind, the authors of this review executed a prospective study investigating the transmissibility of SARS-CoV-2 at short distances. Institutional review board approval was obtained in advance of this investigation. Symptomatic patients were recruited from the existing drive-through COVID-19 testing site at our academic institution. In addition to undergoing the routine nasal swab for SARS-CoV-2 RT-PCR testing via CLIA-certified laboratory, patients were asked to execute a short distance viral transmission protocol. This involved timed vocalizing onto a standardized piece of filter paper for one minute, held approximately two inches from the mouth. These samples were collected and processed in our laboratory and were interrogated for SARS-CoV-2 nucleotides using RT-PCR. In total,

439 patient samples were processed. Of these, 434 were found to be SARS-CoV-2 negative on both nasopharyngeal and filter paper samples (95% CI [0, 0.008]). Five samples were positive on routine nasopharyngeal RT-PCR; none of these were found to have detectable levels of SARS-CoV-2 nucleotides on the filter paper sample (95% CI [0, 0.522]). The study was limited by the small number of COVID-19 positive patients, resulting from a robust public health response and low infection rates locally. However, it was reassuring to find that with brief close contact, there was no dissemination of active virus to the local environment. With universal masking during examination, the transmission rate is likely even lower.

Ophthalmology Examination Room Changes made During Covid-19 Pandemic.

In addition to a mandatory and universal mask mandate, a number of changes were implemented in the ophthalmology examination room to minimize risk to patients and practitioners. Plastic shields were mounted, commonly to the oculars of slit lamps, in order to provide an additional physical barrier between the physician and patients. Plastic shields alone do not provide adequate protection from aerosolized virus and smaller aerosol transmission. However together with other forms of personal protective equipment (PPE) do provide an additional level of protection[6]. Although there has been no documented spread of COVID-19 with contact tonometry, and proof of transmission would have many confounding variables, other viruses, including adenovirus and herpes simplex virus, have been implicated in nosocomial spread. Combined with the potential risk of aerosolization with air-puff and pneumotonometry, the general recommendation during this pandemic has been to use disposable, individual use contact tonometry tips[7]. There appears to be good correlation between single-use contact tonometry and traditional Goldmann applanation tonometry (GAT)[8]. However, if GAT is preferred to confirm an atypical eye pressure reading, it is important that the tips be disinfected with a dilute 1:10 bleach solution. Additional re-emphasis was placed on sanitizing all patient-facing surfaces after each visit. Best practice reminders for all practitioners were continually stressed, particularly hand washing before and after patient contact.

Overall Ophthalmology Environment Changes Made During the COVID-19 Pandemic

Beyond the specific examination room changes mentioned above, many additional measures were taken during the early days of the pandemic to minimize overall contact. In late March of 2020, in keeping with local shelter in place orders, ambulatory clinics were limited only to emergency patients. Even in acute cases, face-to-face time was kept to a minimum. Prior practices of obtaining detailed HPIs and medication reconciliation ended. Patient screening, including history and review of systems, was more commonly performed over the phone in advance of the visit. Patients and their families were informed that the remainder of the management, including counseling, would be performed later, typically via telephone. As telehealth platforms became available, video conferencing was utilized for a majority of this counseling. During the peak of the pandemic in the United States, when it became necessary

to triage patients heavily, “drive-through” screening clinics were also implemented. This in particular was utilized to monitor intraocular pressure in high-risk patients[9].

In addition, we had to take measures to protect our more vulnerable elderly population. As most commonly encountered ophthalmic pathologies affect those in their later years, e.g., cataract, glaucoma, and macular degeneration, the median age of ophthalmology patients trends older. Additional care was taken to provide appropriate triage and telehealth services for these patients without exposing them to needless risk.

As time wore on and the public health response to the pandemic became uniform, measures to safely bring patients back to the clinic setting were put in place. These included universal masking, physical distancing in the clinic waiting room, and limiting visitors to only necessary persons, such as parents or caregivers.

The challenges of patient care triage during a pandemic with limitations in resources and services reminded our field of the continued importance of discussing, establishing, and dynamically re-evaluating ethical principles that serve to fairly distribute ophthalmologic acute care in dire times of need[10].

Telehealth and Ophthalmology

The COVID-19 pandemic forced a re-evaluation of the typical doctor-patient interaction. Whereas prior to the pandemic most ophthalmologists had not considered telehealth to play a part in patient care, innovations in virtual platforms allowed for re-examination of this technology in our field[11,12]. Numerous visual acuity applications and printed charts became available for at-home vision testing. Amsler grids have always been utilized as a remote screening tool and continued to prove useful during the pandemic. Application-based and virtual reality-based perimetry have been developed; several platforms are in testing for validity and are not widely available[13]. However, the technology is promising and has the potential to fill a post-pandemic clinical care gap in home-based monitoring, particularly for high-risk glaucoma patients. Most medical specialties trialed telehealth visits during the early part of the pandemic. With the return of normal volume clinic visits, it may be that some ophthalmic subspecialties, such as oculoplastics, are better suited for virtual visits and may keep them as a component of their patient visit strategy[14]. However, in general, the hybrid telehealth model, allowing for necessary patient examination and the incorporation of telehealth for subsequent lengthy counseling and treatment discussions, has many benefits[15]. It is important to acknowledge that not all patient demographics have access to telehealth tools, and heavy reliance on this modality may unintentionally contribute to further inequity in health care delivery[16].

Perioperative Considerations During the Pandemic

Elective surgery was for the most part halted during the peak of the pandemic. Reinstating elective surgery required communication with local public health officials regarding regional virus prevalence, adequacy of PPE and strategic implementation of pre-operative COVID-19 testing[17]. Full PPE including N-95 masks, eye protection and face shields were required for all in the room during induction of general anesthesia, where aerosolization of virus

becomes a greater risk. The use of eye protection at the slit lamp and operating microscope can be challenging, particularly due to fogging and reduced field of view[18], thus was not always possible to maintain for the duration of the case. With specific regard to cataract removal, there remains some difference of opinion as to whether phacoemulsification qualifies as an aerosol-generating procedure[19,20]. However, it is generally accepted that the use of povidone iodine pre-operatively would effectively eliminate the presence of virus on the ocular surface. In addition, with the frequent circulation of sterile fluid through the anterior chamber and the frequent reapplication of viscoelastic during surgery, the risk of transmission of Sars-Cov2 from phacoemulsification is exceedingly low[21].

During the pandemic, operating room turnover has reflected the extra time required for enhanced cleaning practices and patient spacing. This has presented challenges in terms of resuming ambulatory surgery volumes at pre-pandemic levels. This is likely one of the reasons why there has been increased acceptance of immediate sequential bilateral cataract surgery[22]. Whereas previously there had been some hesitancy in adopting bilateral elective surgery, the rates of this practice are presently increasing[23].

Special Considerations for the Immunocompromised Ophthalmology Patient During the COVID-19 Pandemic

Special considerations were necessitated in ophthalmic sub-populations, for instance those with uveitis requiring systemic immunosuppression, at the onset of the pandemic. Given the limited data available in the early days of COVID-19, it was unclear whether immunosuppressive regimens should be continued without change. There was concern for increased susceptibility to SARS-CoV-19 if immunosuppressed; however, the move to drastically reduce overall numbers of patient visits would not support a large number of flares in a previously stable population. A consensus group, formed to address the need for cohesive recommendations, concluded that in healthy patients on conventional immunosuppression, the medication regimen should be continued without change. In cases of acquisition of COVID-19, the dosage should be reduced or the medication discontinued[24].

With the advent of vaccinations against COVID-19, additional direction was required. The American College of Rheumatology released guidelines for immunosuppressive dosing in setting of vaccination, with clear guidance based on medication. For those with stable disease on antimetabolites, for instance, the medication should be held for 1 week following each dose of a 2-stage mRNA vaccine[25].

Changes in the Academic Ophthalmology Learning Environment During COVID-19

Clinical ophthalmologic care, especially in the academic environment, is a critical component of ophthalmology training at all levels. As the pandemic progressed, we learned how to incorporate medical students' participation in telehealth visits and provide remote experiences for ophthalmology electives[26]. Camera technology allowed for effective virtual wet lab experiences[27]. Virtual lectures, grand rounds, and rotations were overall deemed

positive additions to the academic environment. These virtual learning experiences were not only cost- effective but also allowed for increased participation from attendance and diversity perspectives[28,29,30].

Delays in Care Attributable to the COVID-19 Pandemic

As discussed above, a difficult side effect of the pandemic was the need to limit routine care in order to minimize risk of exposure of both patients and the health care team to COVID-19. Despite best efforts to put triage systems in place, concerns that high risk patients might fall through the cracks were valid. Patients expressed concern that lack of in-person monitoring might lead to irreversible vision loss[31]. Surveys pre- and post- lockdown demonstrated that eye medication compliance reduced significantly during mandatory community quarantining[32]. As a result, incidence of penetrating keratoplasty graft failure was reported[33]. With regard to the delay in anti-VEGF intravitreal injections for diabetic macular edema, neovascular age-related macular degeneration (AMD), and retinal vein occlusions, when comparing those whose injections had been delayed > 8 weeks to those whose had not, a statistically significant difference in vision was noted in the AMD subgroup[34]. Only 74.6% of patients in the AMD group experienced return of visual acuity to baseline[32].

Overall, emergency ophthalmic referrals to a tertiary care hospital declined by 62% in one report, suggesting either that patients were not seeking care for emergencies, or that the threshold for referral had increased in setting of the ongoing pandemic[35].

Impact of the Covid-19 pandemic on practicing ophthalmologists

We began this review with an acknowledgement of Dr Li Wenliang's heroic contribution at the outset of the pandemic and his personal suffering as a result of it. It should also be noted that it is common for all ophthalmologists, and physicians in general, who have continued providing in-person care for patients during this unprecedented time in medicine and history to experience stress, anxiety, and burnout[36,37]. It is a privilege to practice medicine during historic times. It is also important that we remember to care for ourselves and one other so that we can continue to provide high level, evidenced-based care for all.

Conclusion

It is rare that humanity experiences a sea change as terrifying and humbling as a global pandemic. With great rapidity, in response to swiftly changing conditions and wholly new information and resource availability from day to day, we have all been called upon to adapt. We anticipate that many of these adaptations may be useful even in the aftermath of COVID-19.

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Key points:

- Significant changes were enacted within the field of ophthalmology in response to the COVID-19 pandemic, including increasing telehealth visits, encouraging universal masking, and deferring non-urgent surgical procedures.
- A small prospective study, limited by positive-case sample size, suggests that at slit lamp distances, vocalization for short periods of time does not import increased risk of SARS-CoV-2 transmissibility.
- Some populations did experience delays in care as a result of pandemic-related measures.