COVID-19 INFECTION CONTROL AND PREVENTION IN OPHTHALMOLOGY OFFICES
PRE- APPROVED TEMPLATE

Title: Implementing COVID-19 Infection Control Measures to Improve Both Physician and Patient Safety

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Project Description	Based on current medical practice as literature review of the current COVID-19 crisis, the purpose of this project will be to implement the following measures in all of our clinic / surgery centers: 1. Administrative control measures, 2. Environmental control measures, and 3. Use of personal protective equipment (PPE). Finally, we will work on the implementation of telemedicine - a novel idea for our practice in ophthalmology.
Background Information	Review of literature including several articles from JAMA, NEJM, as well as the Lancet provide important epidemiological information regarding the transmission and spread of the novel Coronavirus. In addition, after reading the article from Graefe's Archives of Clinical and Experimental Ophthalmology from Feb 2020: "Stepping up Infection Control Measures in ophthalmology during the n-Coronavirus outbreak: an experience from Hong Kong" as well as reviewing some of the successful methods used to quell the virus in other countries (e.g., Singapore and Taiwan), there is supporting evidence to indicate the spread of the virus can be contained and mitigated.
Project Setting	Group Practice Surgical Center
Study Population	The study population includes our clinic population in the greater Las Vegas area, including surgical patients. Employees will be trained on administrative control measures, environmental changes, as well as implementation and proper use of PPE. We plan on limiting our clinic population further as well as engaging in strict social distancing measures. Patients will be strictly screened prior to coming to the clinic as well as prior to entering our clinics (this will include a patient questionnaire to determine travel history, risk of exposure to COVID-19, as well as temperature checks at the very least). Sanitation and disinfection protocols will be implemented between every patient as well as regular time intervals in the clinic.

Quality Measures	Due to the dynamic nature of this abrupt pandemic, this project is aimed at improving the overall safety to staff, patients, and physicians by doing two things: 1. Improving infection control measures within the practice, 2. Implementing Telemedicine services to create the ultimate social distancing measures, especially for urgency calls as the strictest infection control measure. We will track the number of visits, both physical as well as virtual. It is anticipated and expected the number of actual (real) visits will dramatically decrease, as virtual visits increase. The real numbers of both will be tracked.
Project Team	As a physician evaluating and treating patients, my role will be to lead by example. We will implement these measures across all practice locations and with all practicing ophthalmologists. It is important that I play an integral role in determining which patients have urgent / emergent conditions. As one of the ways we will mitigate patient visits and create crowd control is to limit our practice (as recommended by the AAO, CDC, and other professional medical organizations have suggested) to only urgency and emergency conditions. I need to determine what constitutes an urgent condition so that we can triage patients accordingly. I will oversee the proper quality improvement measures are being followed, including environmental control as well as the use of PPE. We will only use two (of the six) office locations to see patients: one on the east side of town and one on the west. This way, we can consolidate and implement infection control measures in an efficient and safe manner. We will have one office manager staffing each office and one (to two) physicians per location on any given day. We will be consolidating our surgery center efforts as well (from 3 surgery centers to 1). This will allow us to preserve PPE and operate on an emergency basis for all surgeries. All elective procedures have already been cancelled.

PROJECT SUMMARY	Review the effect and adjustment of implementing the policy changes after a minimum of 30-days and in the following sections, please prepare a brief summary of the project highlighting the data collected, effectiveness of the measurement approach, interventions and the overall impact of the project.
BASELINE DATA	Several quality indicators will be used to assess the effectiveness of quality control measures implemented. The 3 main quality indicators that will be addressed are the following:

Several quality indicators will be used to assess the effectiveness of quality control measures implemented. The 3 main quality indicators that will be addressed are the following:

1. Administrative Control - this will be assessed by determining the number of patients seen and treated in our clinics and surgery centers in the months prior to the COVID-19 outbreak comparing that to the number of patients seen after institution of these quality control measures. An additional metric that will be instituted is the number of patients evaluated using Telemedicine. The baseline number for telemedicine is zero; that is, we instituted the use of Telemedicine only after the COVID-19 Pandemic started. This is relatively new technology that we had considered in the past; however, the current crisis forced us to fast-track its timeline and implement its use quickly.

2. Infection Control Measures - this is obviously an area already practiced by all ophthalmologists and physicians; however, the current COVID-19 crisis forced us to implement much stricter infection control measures:

    a. Regular disinfecting protocol at regular pre-determined intervals (this included doorknobs, keyboards, tables, desks, etc.)

    b. Disinfecting all ophthalmic equipment (slit-lamps, indirect ophthalmoscopes, direct ophthalmoscopes, as well as exam chairs) between every single patient. We have always sanitized equipment between patients; however, we did not necessarily disinfect all utilized equipment between every single patient prior to this crisis).

    c. Installing protective shields on all slit-lamps in the office(s). Again, this is an area we implemented previously, but we only placed the protective shields in higher risk patients (e.g., acute conjunctivitis, URI patients, etc.). We are now using protective shields all the time with every single patient on all examinations.

    d. Social distancing between patients and staff members. Every effort has been made to keep a minimum distance of 6 feet at all times, with rare exception (during examination of the patient as well as surgical emergencies). Our exam rooms were limited to one physician, one patient, and one tech (or scribe). The scribe would enter the data while maintaining safe distancing, the physician would examine the patient and refrain from any verbal exchange until completion of the exam. At which point, the physician would discuss the patient's exam findings and recommendations from a safe distance (6 feet).

    e. Temperature measurements (non-contact) for anyone entering the clinic - patients as well as staff.

	3. Personal Protective Equipment (PPE). Masks and gloves were donned and worn by any staff member attending to patients as well as the ophthalmologist(s). An attempt was made to have patients wear masks as well (and this will be determined by the supply chain of available masks). This will be assessed by calculating the amount of times PPE / patient was required prior to the COVID-19 crisis and comparing that to the use of PPE / patient after implementation of these quality control measures. In addition, strict hand washing measures were implemented. Again, this is something we have always performed as physicians; however, given the gravity of this crisis, it has become imperative to institute stricter guidelines with more regular practice intervals.
FOLLOW-UP DATA	With respect to quality indicators and performance measures, the following three areas were analyzed: 1. Administrative Control. This was mostly assessed through patient volume(s). That is to say, we calculated the pre-pandemic patient volume and compared it to the post-pandemic patient volume. The primary goal was to limit patient foot traffic through our clinics. The mathematical calculation to determine the effectiveness of this was as follows: the average number of patient encounters per physician per week in the months preceding this crisis was calculated (pre-COVID-19 Vol). This was compared to the average number of patient encounters per physician per week (COVID-19 Vol). Since we restricted our clinic to only urgent and emergent encounters, the average weekly encounter per physician per week was definitely reduced. In addition, we calculated another variable Telemedicine COVID-19. This was implemented in response to the crisis. Therefore, we had no baseline to compare to. The calculations are as follows: Pre-COVID-19 Vol (Jan 2020): 5830 patient encounters (all physicians) COVID-19 Vol (April 2020): 515 patient encounters (all physicians) Telemedicine COVID-19 (April 2020): 685 non-physical encounters (all physicians) To assess the ratio of total number of patients seen & evaluated pre-crisis and during the crisis, the following formula can be used: (COVID-19 Vol + Telemedicine COVID-19) / Pre-COVID-19 Vol = (515+685) / 5830 = 0.20 or 20%. That is to say we encountered 1/5 the normal number of patients normally seen by our practice prior to the pandemic. In other words, we had an 80% drop in patient volume. What is not represented here is the surgical volume which took a much greater hit. As we opted (in accordance with AAO guidelines) to perform only urgent and emergent procedures, our surgical volume plummeted approx. 90-95%. What is more interesting is that we actually evaluated more patients using Telemedicine (Telemed April 2020 = 685) compared to physical office visits (Office April 2020 = 515). Another ratio we calculated is the patient clinic volume pre- and post-COVID = 515 / 5830 = 0.08 or 8%. That is to say, the physical foot traffic through our offices (during the COVID crisis) combined decreased by a whopping 92%.

	2. Infection Control Measures. As many of these measures were new implementations in response to the COVID Virus there was not a true baseline to compare to. Thus, we did not use a mathematical calculation to quantify this indicator. Rather, a log was created to ensure proper protocol was followed. In addition, the number of patients entering our clinics (with a temperature recording obtained) during the month of April 2020 was also recorded. All 515 patients entering our clinic during the month of April 2020 had a documented temperature logged. What is more, we had 2 patients with a body Temp > 100.4 degrees F which were NOT allowed to enter the clinic. 3. PPE. The use of PPE has been standard in our practice, but this was mostly reserved for in-office procedures. During the COVID crisis, however, the use of PPE dramatically increased. In other words, previously PPE was reserved for minor procedures, but was implemented for all patients and all visits during the crisis. A calculation for this was determined by using a ratio of PPE use / Pt encounter pre-COVID and comparing that to the use of PPE use during COVID / Pt encounter. The ratios are a follow: • PPE use pre-COVID / Pt encounter = (PPE was used approximately 50 times in the month of Jan, and we had approx. 5830 pt. encounters that month) = 0.008 or approx. 0.01 (1%). • PPE use COVID / Pt encounter = (PPE was used 510 times in the month of April, and we had approx. 515 pt. encounters that month) = 0.99 or 99% of the time.
PROJECT IMPACT	All of the safety and infection control measures we took definitely had an impact on preventing and controlling the spread of COVID-19. This can easily be seen from the numbers above and the dramatic decreases in our patient volumes. Obviously, our clinics took a major hit and these measures were only instituted as an acute phase reaction to this global pandemic. As this crisis evolves, we will need to adapt and modify our criteria for patients entering our office(s). This is not a sustainable way of caring for patients; it is, however, an effective way to deal with the virus (at least in the acute phase). As the CDC, AAO, and other professional organizations modify their criteria, we will plan on increasing our clinic volume(s) as well as our surgical cases. One thing is for certain, we will continue to utilize Telemedicine, mostly likely as an adjunct to our current practice. In the interim, telemedicine may be our major driving force. Obviously, it has its limitations and is not fully conducive to the practice of ophthalmology. It does play a very important role in the modern practice of medicine and is definitely here to stay. One final important note. Despite all of the safety changes taken above and the quality improvement measures implemented the key component of this entire project was to ensure no transmission of COVID-19 virus transpired to any physician, staff member, or patient. Although, we did not perform COVID-19 testing in our clinics, we did track our patients and staff during the months of March and April 2020. To date, we have not recorded any cases of COVID-19 in any physician or staff member in our office. In addition, we are not aware of any clinic patients who were seen at our offices during the Pandemic who subsequently tested positive. As of May 1, 2020, we are slowly re-opening our clinics and surgery

	schedule(s) while maintaining all of the social distancing measures and safety protocols put in place at the start of the Pandemic. In addition, we plan on creating a hybrid schedule which will involve both physical patient visits as well as virtual patient visits (telemedicine).
PROJECT REFLECTION	**Do you feel that the project was worthwhile, effective?** Yes **How might you have performed the project differently?** Given the rapidity and acute development of this whole Pandemic, this was more of a "learn as you go" type of project. There was not really any way to "prepare" for this much differently. In hindsight, however, having implemented telemedicine earlier in the year (even last year) would have been very, very helpful. We had always planned on instituting telemedicine; however, the sudden nature of this crisis forced us to speed-track the process of telemedicine. Thus, we were slow to ramp up, but within a few weeks after the Pandemic we had secured the software and licensing necessary for our physicians to implement telemedicine. Of course, there are still many limitations for the use of telemedicine in a highly specialized field such as ours. **Please offer suggestions for other ophthalmologists undertaking a similar project.** Given the sudden nature and surprising evolution of this pandemic and the crisis that followed, planning was not a viable option. Nonetheless, as physicians and ophthalmologists, we can certainly implement crisis protocols and create epidemic measures in our clinics in a type of preparedness model. That is to say, one should strongly consider having a plan to deal with unexpected and unforeseen crisis in any medical office. Ideally, the hope is that we will not need to implement any of these preparedness measures. Nonetheless, it is still best to have a system in place (no matter how simple or rudimentary it may be). For instance, given the increased incidence of mass shootings in our country (especially during the past decade), most businesses and ophthalmology clinics have implemented active shooter protocols. Even educational institutions now have active shooter drills (even more so than fire drills). Obviously, this is a completely different protocol than one of an epidemic or pandemic crisis. The point is, in our ever-changing society, human behavior is also evolving and changing; therefore, our reactions and preparedness models have to adjust accordingly. We cannot predict all crisis scenarios (nor should we be expected to), but as physicians, we should at least have a preparedness model in place for health and humanitarian crisis. Keep in mind, even the most prepared and well-thought of plan will still not fully protect us, our staff, or our patients. It will, however, give us a starting platform to work with so we can adapt and adjust as the crisis widens or shrinks in its development.