

Corneal transplantation and eye banking practices during COVID-19-related lockdown period in India from a network of tertiary eye care centers

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Purpose: The purpose of this study was to discuss the guidelines and modification of practices with respect to corneal transplantation and eye banking during the COVID-19 pandemic lockdown period and beyond, at a network of tertiary care centers in India. **Methods:** Descriptive study of the challenges faced in eye banking during the lockdown, and practices adopted to overcome the critical aspects in the clinical care of patients who presented with emergency corneal diseases requiring keratoplasty. **Results:** Complete lockdown orders from the Indian government, as a strategy to control the Coronavirus pandemic, resulted in drastic reduction of all types of elective corneal transplants and eye banking activities from March 24, 2020 to May 31, 2020. The sudden cessation of eye banking resulted in an acute demand and supply imbalance of fresh donor corneas for transplants during this time. Our network of eye banks addressed this issue by adopting glycerol preservation of donor corneas, which were subsequently utilized for tectonic penetrating keratoplasty. The donor cornea retrieval was resumed in a strategized manner 3 weeks prior to the date of exit of the lockdown, with modified guidelines on donor suitability, screening, retrieval, processing, and harvesting from various sources. A triage of keratoplasty priority was formulated to tide over the post lockdown shortage of corneas. We performed 31 therapeutic keratoplasties during the nationwide lockdown among our network of tertiary eye care centers. **Conclusion:** The study highlights the approach and strategies to manage and tide over an unprecedented crisis situation faced by corneal surgeons in general and, specifically, the eye banking community.

Key words: COVID-19, donor cornea, eyebanking, keratoplasty

The COVID-19 pandemic brought about dramatic changes in each and every aspect of human life.^[1] The very basis of human existence and nature that emphasized on "being social" was suddenly replaced with "social distancing" without a warning and preparedness for the same. In India, the pandemic crisis was managed by phased periods of lockdowns that began on March 24 and extended up to May 31.

Every medical specialty had to deal with several unprecedented problems and adopt strategies to provide continuity of patient care in a situation where they had no prior experience. The cornea specialty and eye banking fraternity had its own unique set of challenges that required several modifications and updated guidelines in the practice patterns from what existed in the pre COVID-19 era.^[2]

The purpose of this study is to highlight the management of emergency corneal transplants and newer eye banking protocols that were adopted during the lockdown period and beyond in India.

Methods

We assessed the standard operating procedures (SOP) for eye banking activities of our network of four eye banks formulated

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prior to lock down exit in India to address safety of eye bank personnel and donor corneas procured for transplantation. A review of all keratoplasty surgeries for emergency indications that were performed at the network of four tertiary centers of LV Prasad Eye Institute during the lockdown period was reviewed. The data of the emergency corneal procedures and donor cornea retrieval during this time period was collected from the institute's electronic medical records (EMR system: EyeSmart). The data on donor corneas collected and utilized was retrieved from the individual eye banks. The utilization of donor corneas for emergency keratoplasty at the eye bank network in the year 2019 during the same time period was collected for a comparison.

The eye banking practices and SOP's, clinical care and management protocols of corneal conditions that were followed routinely, prior to COVID-19 times, were similar across the LVP network^[3] and are described briefly as below:

A. Routine eye banking practices at the network of eye banks: The eye banks are affiliated and located within the premises of the tertiary ophthalmology care center at the four cities in India (Hyderabad, Bhubaneswar, Vishakhapatnam, and Vijayawada). The four eye banks harvest cornea predominantly (~ 70%) through Hospital Cornea Retrieval Program (HCRP)

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that are operational at the local general hospitals in the cities. A smaller percentage (~30%) of donor corneas are retrieved through voluntary donations and from affiliated cornea collection centers in the neighboring areas around the four cities. The donor cornea is stored in either MaCarey–Kaufman (MK) medium (3–4 days) or Cornisol preservation medium (10–14 days).

There is no waiting list for keratoplasty patients at any of the tertiary eye care centers. Hence, the network of eye banks also provides for community distribution of corneas nationwide through a central Cornea Distribution System.

B. Emergency keratoplasty management guidelines: The major indication of emergency corneal transplants in the network is due to microbial keratitis. Medical management with specific antibiotics based on culture and sensitivity testing is the first line of management for microbial keratitis. Those cases of microbial keratitis that present in advanced stages threatening or involving the limbus, refractory to medical treatment, and/or develop complications such as large corneal perforations or melts not amenable to cyanoacrylate tissue adhesive application are managed by emergency therapeutic/tectonic keratoplasty.

Results

A. Modifications in eye banking practices

a. Immediate drastic reduction of donor retrieval

After the nationwide complete lockdown that was announced from March 24, 2020, there was absence of all modes of private and public transport facility. The donor cornea retrieval at the local HCRP hospitals in the cities and from neighboring areas, as well as cornea collection from affiliated centers and voluntary eye donation services, came to an abrupt halt. Simultaneously, there was a reduction in the number of patients that were referred for management of elective and emergency corneal conditions resulting in a sharp drop in the need for donor corneas.

b. Shift to glycerol preservation

The two available modes of donor cornea storage, MK medium and Cornisol, allowed for short- and intermediate-term storage, respectively; hence, there was a felt need for long-term preservation of donor corneas that would serve for emergency keratoplasty. As the lockdown period had uncertainties for tissue retrieval and utilization, the donor corneas reaching near expiry in the Cornisol corneal storage media were transferred to Glycerol for preservation and stored at -80°C for tectonic keratoplasty. Glycerol used for preservation was readily available from the pharmacies [Glycerol (medicinal use, oral route), Arihant traders, Hyderabad, India]. Glycerol was first autoclaved, and subsequently, donor cornea was transferred in the eye bank under a biological laminar airflow unit. The corneas processed in glycerol were then stored at -80°C.

c. Cessation of pre-cut tissues for posterior lamellar surgeries

Preparation of pre-cut donor lenticules for Descemet's stripping automated endothelial keratoplasty under sterile conditions for distribution to corneal surgeons is an independent facility in our network eye banks. This facility was shut down completely as elective surgeries stopped at the tertiary centers, local community hospitals, and surgical centers.

d. Resumption of donor cornea retrieval guidelines

Donor cornea retrieval was initiated in staggered manner in the last 3 weeks of the lockdown (on May 11) after careful strategic planning and revision of protocols and SOPs. The safety protocols are enumerated in Table 1, and the detailed account of eye banking operations is provided in Annexure 1 (Supplementary file). The donor cornea retrieval was restricted to only to non-COVID-19

hospitals (those not involved in the testing and management of COVID-19 patients). The voluntary eye donation home calls were minimized due to uncertainties pertaining to the exact cause of death and concerns of social distancing in this situation. Data was shared among the network eye bank personnel as to make available relevant information on tissue availability and utilization. Opinion was sought from eye bank medical directors with regard to queries related to donor screening whenever needed. A total of 30 donor corneas from 15 donors were retrieved and utilized during this time. One donor cornea collected before the lockdown period and stored in glycerol was also utilized.

B. Cornea clinical services strategic planning measures

a. Patient triage for keratoplasty and alternatives to emergency keratoplasty

A general working guideline was formulated on classification of corneal conditions that required priority management based on the clinical condition and individual need of the patient [Table 2]. During the lockdown phase, the surgical decision of therapeutic/tectonic keratoplasty was made based on the patient's ability to review at local eye clinics or the network hospitals after keratoplasty, associated systemic comorbidities along with the corneal condition. Those with systemic comorbidities who expressed their inability to follow up after keratoplasty even at local hospitals, either due to lack of facility or other reasons as assessed during their clinic visit, were managed with alternative procedures of maintaining globe integrity such as amniotic membrane grafting, tenoplasty, tarsorrhaphy, and Gunderson's flap. A plan to perform keratoplasty at a later date was explained at the time of management with these interim measures.

The therapeutic keratoplasties could be performed without a delay, as glycerol preserved corneas were used on the occasions when donor corneas stored either in MK or Cornisol medium were unavailable. It is likely that there may have been a preference for a more conservative approach to the management of microbial keratitis, as offering therapeutic

Table 1: Protocol for resumption of eye banking work after lock down

Parameter	Adopted guidelines
Donor Screening	Thorough screening before approaching the donor family Social and medical history from the family or hospital should be elicited. The history should include COVID or COVID like symptoms in the donor and for anyone in close contacts: Fever, cold, sore throat, dry cough, diarrhoea, vomiting, myalgia, headache, and shortness of breath in the past 14 days Visit to a function with large gathering in the past 14 day Hospital visit in the past 14 days Home quarantine On ventilator support
Cornea Collection	Use of protective shield/visor/glasses to protect entire face from any spillage Double gloves N95 masks Disposable/Nonporous gowns and linens
Cornea Preservation	Quarantine of tissues for 24 h Transfer of tissue to Cornisol/Glycerol from MK if not used within 4 days
Cornea Distribution	Categorization of patient Distribution as per priority

keratoplasty would obviously need a more frequent follow-up visits. As travel restrictions existed in these times, it is possible that therapeutic keratoplasty may have been advised only when absolutely felt essential in the course of management.

b. Surgical interventions and outcomes

A total of 31 penetrating keratoplasties (PKPs) were performed in the LVPEI network during the lockdown period (16 – Hyderabad, 4 – Vishakhapatnam, 2 – Bhubaneswar, 9 – Vijaywada). Of these, 7 were in emergency and 24 were in urgent category. Twelve surgeries were performed using glycerol preserved corneas. Majority ($n=30$) of the keratoplasty procedures were performed for microbial keratitis [16 were fungal, 4 were bacterial (gram positive cocci-2, gram negative bacillus-2) and 10 where microorganism could not be ascertained]; and one was a sterile corneal melt following chemical injury. Mean age of patients that underwent keratoplasty was 46.9 years, range (8–72) years. There were 23 males and 8 females who underwent PKP. The globe integrity was maintained in all patients except one. Three eyes had clear grafts at the last follow-up period of 3 months, 4 grafts (all with glycerol preserved corneas) had persistent epithelial defects that needed tarsorrhaphy augmentation, 23 eyes had graft edema, and 1 eye (Therapeutic PKP performed for an infected and partially extruded keratoprosthesis) eventually developed phthisis. During this time, no donor corneas were sent to corneal surgeons outside the network.

In the year 2019, from March 24 to May 31, 2019, 1766 corneal tissues were collected and utilized 1001 for transplants; of which 158 were therapeutic PKP. Out of 1001 corneas, 442 transplants including 94 therapeutic transplants were performed within the LVPEI network and the remaining 348 tissues were sent to cornea surgeons outside the network.

Discussion

In the most recent available global survey of cornea transplantation and eye banking, India was in the “almost sufficient” category with second highest numbers of cornea collection and utilization after the US.^[4] Even so, India with its population of 1.3 billion requires to target for 100,000 transplants, with 200,000 donor collection (since average utilization rate is 50%) annually to eliminate the burden of corneal blindness in the country.^[5]

Nevertheless, it was obvious from the keratoplasty trends over the years from Eye Bank Association of India that the growth of eye banking in India was showing positive trends until the nation was hit by unprecedented times as a result of the COVID-19 pandemic. The impact of this pandemic led to a disruption and cessation of the eye banking activities. It is anticipated that there could be a nationwide downward spiraling in eye banking activities for an uncertain duration that is likely to create an imbalance of demand versus supply

of corneas in the times to come. With very little knowledge about the novel coronavirus, COVID-19, the donor cornea retrieval and screening for transplants necessitate dynamic considerations in eye banking protocols and processes. Further, as most types of keratoplasty are vision restoring/enhancing surgical procedures, a priority stratification of patients with respect to their visual and social needs is required in times of shortage of corneas. Additionally, eye banks have to evolve alternative modes of donor cornea preservation that will allow for continuous supply of corneas at least for emergency reasons. Management options for alternatives to keratoplasty and reassessment of existing preferred practice patterns are the need of the hour.

Our study illustrates the challenges and navigator strategies with respect to eye banking and management of emergent corneal conditions requiring keratoplasty during the coronavirus related nationwide lockdown.

It is well known that the radical changes in eye banking practice patterns during the Coronavirus outbreak have occurred globally^[6] and likely to continue evolving in future. The main reasons for these are: first, the potential risk of acquiring the infection during cornea retrieval, and second, the potential risk of Coronavirus transmission to the recipient from a positive donor. As of now, International tissue banks have not reported a transmission of corona virus due to tissue, cell transplantation, or blood transfusion.^[7,8] Although so far, no evidence exists on the transmission of coronavirus via corneal transplantation, the lack of evidence is not an assurance of safety of usage of corneas from these donors. A liberal use of povidone iodine 5% is likely to be a reliable method of decontamination of the ocular surface [Annexure 1].

Eye banking operations across the globe have undergone several modifications on account of the Coronavirus pandemic. Some of the priorities include safety of eye bank personnel, updating SOP, transitioning to normalcy while addressing financial stability, and focusing on newer techniques of long-term corneal preservation. Medical directors of eye banks are urged to dynamically assess organizational challenges and review operational capability of individual eye banks taking into account current realities.^[8] Our strategies for resumption of donor cornea retrieval led to changes in practice pattern of all functions of the eye bank that has been elucidated in Table 1. Screening criteria were reinforced to rule out COVID-19 infection in the donor or close contacts by a detailed history. The usage of Personal Protective Equipment (PPE) was made mandatory during cornea retrieval. Similarly, protocols were laid down for handling movement of tissue to the eye bank and while processing the tissue within the eye bank. One aspect that was considered while formulating the guidelines was testing of the donors for COVID-19 infection either using RT-PCR methods from naso/oropharyngeal swabs or antibody testing from the donor's blood sample collected during retrieval. As per the Eye Bank Association of America (EBAA) guidelines, RT-PCR has 2–22% false negative rate and testing in postmortem samples is not recommended.^[9] Few studies mention on keeping some amount of blood sample for future testing. There is a lack of clarity on the interpretation of COVID-19 antibody testing methods in the deceased donor's blood sample. Also, various logistics would be involved in this additional step while recovering cornea. Hence, presently, our guidelines lay emphasis on stringent donor screening criteria based on clinical history rather than on testing the donors.

During the period of nationwide lockdown, our eye banking activities reduced to 3% compared to a similar time period from the previous year. In addition, we had a threefold reduction of total number of therapeutic keratoplasty procedures. Of these, 38.7% ($n = 12/31$) were performed using glycerol preserved corneas. With variable lockdown exit plans, it would be

Table 2: Patient triage based on indication for corneal transplantation

Category	Indications
Emergency	Therapeutic PKP in one eyed with large perforation Tectonic graft Corneal trauma with large tissue loss
Urgent	Corneal perforation, other eye normal Extensive corneal infiltrates, approaching or involving limbus Pediatric/neonatal infectious keratitis with risk of perforation or limbal involvement Corneal scarring with risk of development of amblyopia Keratoplasty in bilateral blind
Routine	Elective corneal transplants, full thickness or lamellar

recommended to scale-up eye bank activities gradually over the months based on how the prevailing situation unfolds.

The downscaling of cornea collection during this time generated interest in long-term preservation methods to improve the flexibility of donor cornea availability for keratoplasty. There are several techniques of long-term and very long-term donor corneal preservation. Organ culture is a long-term preservation method that allows for storage of donor corneas with endothelial viability for 4–6 weeks. However, the organ culture methods are technology intensive and need human resources trained in this technique.^[10] Due to lack of experience with organ culture techniques of preservation in Indian eye banks, this strategy could not be adopted during this time. The other methods of long-term preservation such as gamma irradiation, glycerol preservation, freeze drying, and lyophilization allow for corneal preservation for those keratoplasty, where endothelial health is not a particular concern.^[11-13] The glycerol preservation of corneas using cryopreservation/ deep freezing techniques is a simple strategy of very long-term (2 years) cornea preservation for emergency keratoplasty. This technique was adopted in the eye banks to allow for preservation of corneas that were reaching near expiry in short-term and intermediate corneal preservation medium. Although there are several intraoperative and postoperative challenges in keratoplasty using glycerol preserved corneas, we found that until the last available follow-up, the globe integrity was well maintained after therapeutic keratoplasty in these patients.

Several methods have been recommended to maintain the integrity of the globe when corneal tissues are unavailable. These include cyanoacrylate glue for sealing corneal perforations. Tissue adhesives provide tectonic support without impeding the access of drugs to the underlying corneal stroma. Tissue adhesives assisted in healing of 63% cases of keratitis and provided tectonic support in an additional 12% cases while awaiting corneal transplantation.^[14] A study on comparison of fibrin with cyanoacrylate glue found no difference between the two modalities on resolution though fibrin was noted to have adherence of 2 weeks with faster rate of epithelialization and less vascularization compared to cyanoacrylate.^[9] Conjunctival flaps^[14] have been described in medical literature since more than half a century. Gunderson reported conjunctival flaps to successfully aid resolution of microbial keratitis with minimal vascularization while allowing partial visualization that facilitates monitoring of infection. There have been several modifications of this technique with advancement of the tenon's capsule for additional tectonic support, amniotic membrane, and bipedicle graft for enhanced vascular supply.^[15-17] The limitations for conjunctival flaps include lack of adequate tectonic support in larger perforations, vascularization of the cornea, and reduced chances of graft survival for keratoplasty performed later on.

As the world battles this pandemic and eye banks work to resume the state of near normalcy that existed earlier, there is a need for corneal surgeons to maintain a priority list for keratoplasty, which was in practice a few decades ago. Prioritization of distribution may be divided into two broad categories: emergency and routine elective surgeries. This categorization may change geographically depending on the volume of patients seeking care [Table 2].

Looking towards the future, adoption of various long-term donor cornea preservation techniques may be important. Research ideas may be implemented and tested for long-term preservation of the endothelial cell viability.

Conclusion

Our study highlights the approach and strategies to manage and tide over an unprecedented crisis faced by corneal surgeons

in general and, specifically, the eye banking community because of COVID-19-related lockdown. Newer insights about COVID-19 and its management are likely to lead to formulation and implementation of newer practice guidelines and protocols in the future.

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Conflicts of interest

There are no conflicts of interest.

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Annexure

Protocols/guidelines for the staff to follow after resuming eye bank operations (Version 1 implemented on May 11)

At the HCRP hospitals

1. PPE at the work place should include mask (N95), gloves, and visor and regular apron.
2. Staff should not touch the railings/walls in the hospital and maintain social distancing at all times.
3. Frequent hand washing and use of hand sanitizer is recommended.
4. During recovery always use PPE (hair cap, mask, and visor, disposable nonporous gown, and double gloves) when there is a need of touching any deceased /avoid touching the deceased and use torch light for examination of exposed areas and eyes.
5. Counselor should have the updated list of red zones/hot spots.

Donor screening

In both voluntary and HCRP, counselor or technician need to do thorough screening before approaching the donor family and take maximum social and medical history from the family or hospital and then approach for eye donation. Counselors need to check the following medical conditions and symptoms before approaching the deceased family. The history should include COVID or COVID-like symptoms for anyone in the family. Should avoid all doubtful cases or inform the Medical Director for clearance. *Embedded table # EBAA July 31st update at the end illustrates specific situations.*

In addition to the existing contra indications, the donor should be screened for the following:

- Address of the donor (exclude donors from red zone)
- History of COVID or COVID like symptoms in the donor and for anyone in close contacts: Fever, cold, sore throat, dry cough, diarrhea, vomiting, myalgia, headache, and shortness of breath in the past 14 days
- History of visit to a function with large gathering in the past 14 days
- History of hospital visit in the past 14 days (Verify papers for the cause of visit)
- History of suggestion for home quarantine
- History of ventilation

For the present, only RTA/poisoning/hanging cases will be approached for eye donation. Other cases may be approached on a case to case basis based on the Medical Directors advice.

Cornea collection

There would not be any change in cornea recovery procedure, but to maintain **personal safety**, one has to follow the below guidelines during recovery.

- Technician can do only torch light examination of exposed areas and eyes without physically touching the body with hands.
- Wear protective shield/visor/goggles to protect entire face from any spillage. This should be standard while on work so that there is no need to change during recovery.
- Always wear double gloves while doing cornea recovery.
- Use disposable linen set in place of cloth linen and dispose everything in yellow plastic cover post recovery except instruments.
- Collect used instruments and pack carefully in a separate polythene bag (do not touch outer surface)
- Instill 5% povidone iodine and allow a contact time of 5 min before cornea retrieval.
- Remove the gloves first then apply trillium on the hands and remove the gown ensure that this is folded with external surface inwards. Place in the yellow bag and close this properly. Apply sterillium again
- Both the above need to be handled very carefully till disposal/sterilization.
- Same protective measures have to be taken by those who assist for the recovery.
- Clean all external surfaces of MK medium/cornisol bottles, flask, ice gel packs, instrument tray, SS bin with surgical spirit, alcohol wipes or freshly prepared sodium hypochlorite after recovery and repeat at eye bank.

Post recovery protocols

(Either of the two methods can be used based on the eye bank practice/convenience/availability of personnel)

1. The same technician who attended eye donation call,
 - Will continue to wear gloves, goggles, and mask until he reaches the eye bank with the corneas with flask, used linen bag, instruments bag, and go directly to decontamination area in the eye bank without touching any door handles, can use his elbows to push the door or take any other techs help in the eye bank to open the doors.
 - Discard all the used linen (disposable) which is packed in a yellow polythene bag directly in to the yellow receptacle immediately after reaching the eye bank.
 - Sanitize all the kits/bins, torch, stationary, scissors, examination pad any bulk bottles, MK/cornisol Media vials (outer surface), blood vacutainer, ice gel packs, and MK carry flasks with alcohol-based solution and discard foam piece in yellow bin.
 - Soak all the instruments in appropriate solution/aseptic for washing.
 - Dispose all the biohazard waste in appropriate receptacles immediately.
 - Wear head cap, mask, gown, double gloves, and goggles while washing instrument to avoid any spillage.
 - Another technician working in the eye bank to wear PPE (cap, mask, and gloves) can handle the donor forms which are to be exposed to UV light in Laminar flow hood for 30 min immediately after team arrives at eye bank. (Expose both sides

of forms - 30 min + 30 min) The same tech will take the tissues after cleaning the flask and the vials and store them in a refrigerator/or keep them ready for labeling and further evaluation.

2. Alternately, a tech/counselor from eye bank will wear PPE (cap, mask, gloves, and goggles) and go to the HCRP hospital and collect the recovered corneas with flask, used linen, instruments, and go directly to decontamination area in the eye bank without touching any door handles, can use his elbows to push the door or take any other techs help in the eye bank to open the doors.
 - Discard all the used linen (disposable) which is packed in a yellow polythene bag directly in to the yellow receptacle immediately after reaching the eye bank.
 - Sanitize all the kits/bins, torch, stationary, scissors, examination pad any bulk bottles, MK/cornisol media vials (outer surface), blood vaccutainer, ice gel packs and MK carry flasks with alcohol-based solution and discard foam piece in yellow bin.
 - Soak all the instruments in appropriate solution/aseptic for washing.
 - Dispose all the biohazard waste in appropriate receptacles immediately.
 - Wear head cap, mask, gown, double gloves, and goggles while washing instrument to avoid any spillage.
 - Another technician working in the eye bank to wear PPE (cap, mask, and gloves) can handle the donor forms, which are to be exposed to UV light in laminar flow hood for 30 min immediately after team arrives at eye bank (Expose both sides of forms – 30 min + 30 min). The same tech will take the tissues after cleaning the flask and the vials and store them in a refrigerator/or keep them ready for labeling and further evaluation.
 - Both technicians who handled the tissues and material to wash hands thoroughly with soap and water for about 30 s up to elbow before handling any other work in the eye bank. (Staff should occupy only their dedicated chair and should not sit in somebody's chair)
 - There exists some possibility of inadvertently retrieving corneas from COVID-19 donors despite following all the donor screening protocols. As there is a perceived belief that virus is not likely to remain viable for long in the absence of a host, donor corneas would be ideally quarantined for 24 h prior to release, unless there is an urgent need of donor corneas for keratoplasty.
 - All technicians in the eye bank laboratory to use examination gloves, disposable head cap, and masks to protect themselves as a safety measure in all stages of tissue evaluation and distribution and while handling tissues and any other donor material.
 - All the technicians who work in the administration area should wear mask, continue to maintain social distance while working in the office.
 - All staff to use hand sanitizers regularly when they are in the lab and before and after tissue evaluation, storage, and distribution work.
 - Limit the access to eye bank laboratory only to those who perform laboratory processes.
 - There would not be any change in rest of the tissue preparation procedures in the eye bank laboratory (such as tissue transfer, precut tissue preparation, and scleral tissue preparation as technician shall maintain all the standard protocols as outlined in the SOPs to protect themselves and as well as to maintain sterility and quality of the tissue).
 - Medical Directors to decide regarding collecting corneas in Cornisol medium during the initial weeks (2 weeks) of resuming eye bank activity.

Staff training

A training program is to be periodically organized to all the staff of eye bank, covering all the above guidelines prior to resuming eye donation program by the Medical Directors/eye bank managers.

#Courtesy EBAA (July 31st Update on Donor suitability)

PCR Test Status ¹	COVID-19 Signs ¹	COVID-19 Symptoms ²	Plausible Alternative Etiology of Signs or Symptoms	Close Contact ³	Eligibility	
Positive within the last 28 days	Yes or No	Yes or No	Yes or No	Yes or No	Not Eligible	
Negative (post-mortem or recent pre-mortem test)	Yes	Yes or No	Yes	Yes or No	Medical Director Review	
			No	Yes or No	Not Eligible	
	No	Yes	Yes	Yes or No	Medical Director Review	
			No	Yes or No	Not Eligible	
		No	N/A	Yes	Yes	Medical Director Review
				No	No	Eligible
Not done	Yes	Yes or No	Yes	Yes	Not Eligible	
				No	Medical Director Review	
			No	Yes or No	Not Eligible	
	No	Yes	Yes	Yes	Yes	Not Eligible
				No	No	Medical Director Review
				No	Yes or No	Not Eligible
		No	N/A	Yes	Yes	Not Eligible
				No	No	Eligible

COVID-19 Updates [Internet]. Eye Bank Association of America [Last cited on 2020 Jul 20]; Available from: <https://restoresight.org/covid-19-updates/>