

COVID-19 pandemic and lockdown: Changing trends in Ophthalmology for in-patient and emergency services

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Purpose: The aim of this study was to evaluate the changing trends in terms of patient load, presenting complaints, surgical procedures and resource utilization in a multispecialty tertiary care hospital after lockdown due to COVID-19. **Methods:** Retrospective data were collected from Ophthalmology in-patient and emergency services of a government medical college and multispecialty tertiary care hospital in North India. Data pertaining to patient census, presenting complaints, surgical procedures and resource consumption were compared in the 6-month period (March 25 to September 30, 2020) following national lockdown and subsequent gradual unlock to data of same time period last year. **Results:** A total of 1152 new patients visited Ophthalmology emergency service, whereas 324 sought tele-ophthalmology consultation. Majority were males (61.8%, $n = 712$), whereas average age of presentation was 34 ± 7.2 years. The number of patients seeking emergency ophthalmic care reduced by 23.9% in the current year, in-patient record reduced by 96.53% and number of surgeries reduced by 98.13%. Tele-ophthalmology services comprised 21.95% of the total patient load. Use of triple layered surgical masks increased by 85.7%, use of disposable gloves increased by 89.5% but interestingly the availability of chlorhexidine hand rub fell by 15.9%, in the current year compared to last year. **Conclusion:** COVID-19 pandemic and lockdown have reduced the number of patients visiting tertiary health care facility for ophthalmic care. As manpower and resource consumption has increased, smart management is needed to tackle the current scenario efficiently. Tele-ophthalmology must be promoted and we must understand the changing trends to plan for the future accordingly.

Key words: COVID-19, emergency trends, lockdown, ophthalmic emergency, telemedicine

The novel corona virus has infected more than 48 million people worldwide so far, causing more than a million deaths (as of November 7, 2020).^[1] The pandemic has put a great burden on the medical fraternity worldwide. To curb virus transmission, India imposed nation-wide lockdown from March 25, 2020.^[2] A 14-h curfew was put into place, that restricted all outdoor movement except for essential services. Initially introduced for 21 days only, later the lockdown was extended.^[3] Areas were divided into red zones/hotspot, orange zones, green zones, and containment areas according to prevalence of COVID cases.^[4] The process of unlock was initiated in June 2020, in phases.^[5] The gradual unlocking did not see resumption of the routine Outpatient services and fear of contracting infection also contributed to the way patients seek ophthalmic care. This comprehensive study attempts to ascertain the changing trends in clinical presentations of patients visiting ophthalmic emergency services, eye care services provided and resource utilization.

Methods

This retrospective study was carried out in a government medical college and multispecialty tertiary care hospital in North India (Chandigarh). This hospital in addition to serving

the population of Chandigarh, also serves neighboring states of North India. All routine and outpatient services have been suspended since the national lockdown (March 24, 2020). The hospital in addition to providing emergency care services also has been treating systemically ill COVID patients, in COVID dedicated areas. A special hospital infection control committee was formed and nodal officers were appointed in each individual department to look into infection control practices. Data of patients who underwent COVID testing was reported to nodal officers each day.

Since March 25, 2020, Ophthalmic care delivery was managed via the hospital telemedicine portal and 24-h emergency services. At the time of submission of the manuscript, the hospital had still not resumed its outpatient services due to heavy COVID load.

The study adheres to tenets of the Declaration of Helsinki. No identifiable parameters of patient information were used for data analysis. Retrospective data containing records of clinical presentation to the ophthalmology emergency services, in-patient records, operating room records and

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utilization of items was analyzed for the 6-month period (March 25 to September 30, 2020) post national lockdown.

Triaging of patients was done and practice guidelines as issued by the All India Ophthalmological Society (AIOS) were followed.^[6] A detailed history was taken including contact and travel history, and patients were also enquired about their awareness regarding COVID. Personal protective equipment (PPE) kit was donned before examining COVID suspects in the emergency. All patients who required hospital admission underwent COVID testing prior to admission. The data pertaining to the 6 month study period was compared to retrospective data of the same time period in 2019.

All data was entered in Microsoft Excel 2019 (Microsoft Corporation, Redmond, USA). Descriptive data was described using mean (\pm Standard deviation) or median (Range). *P* value <0.05 was considered statistically significant.

Results

Emergency services

A total of 1152 new patients were seen in emergency ophthalmology service from March 25 to September 30, 2020, as opposed to 1515 during the same time period last year (March 25 to September 30, 2020). A decrease of 23.9% was observed, due to the ongoing pandemic and lockdown. On triaging patients according to AIOS guidelines, 58.6% (*n* = 676) were classified as emergency cases, 18.3% (*n* = 211) as urgent cases and 23% (*n* = 265) as routine cases. Patients requiring routine care were referred to tele-ophthalmology service. One of the earliest Indian studies that evaluated patient presentation in ophthalmic emergency during lockdown had observed similar proportions, reporting 73% as emergency or urgent, whereas 26.85% as routine care patients.^[7] The average number of patients seen in emergency per day was 5.96 in the study period as opposed to 8.02 per day in same time period last year. Average number of patients per day nosedived to 3.64 in May 2020 but rising trends were again observed as lockdown was partially lifted in June, 2020 (6.03). The trends have been rising each month since, as further restrictions were relaxed. Trends of average number of patients seen in emergency have been illustrated in Fig. 1a. During this 6-month period, 324 patients directly accessed tele-ophthalmology services, forming only 21.95% of total patients that accessed eye care services.

Average age of patients presenting to emergency service was 34 ± 7.2 years in this year's study period as opposed to 40.2 ± 5.6 years in the same time period last year. Majority of patients in 2020 study period were males (61.8%, *n* = 712), whereas the male predominance was lower in 2019 study period (56.1%, *n* = 850).

Most common presenting complaint in emergency setting was eye trauma due to road traffic accidents (36.19%, *n* = 417), followed by dryness and allergy related symptoms (13.2%, *n* = 153), assault (9.2%, *n* = 106) and fall from height (9.4%, *n* = 109). Last year's data showed that eye trauma due to road traffic accidents (52.1%, *n* = 792) was most common presentation followed by fall from height (10.6%, *n* = 162) and trauma due to minor household accidents (7.1%, *n* = 108).

A downward trend was seen in ocular trauma secondary to road traffic accident, fall from height, minor household

accidental trauma, conjunctivitis cases and firecracker injury as compared to last year. Increased cases of assault, chemical injury, foreign body in eye, and dryness and allergy related problems were noted this year. A disturbing trend was noted in household violence this year (32% of all assault cases, *n* = 34) as compared to last year (14%, *n* = 14). The presenting complaints in emergency service have been summarized in Table 1.

In-patient census

Only 45 patients were admitted in the 6-month study period, as compared to 1300 last year in same time period. A decrease of 96.53% was noted this year. The most common indication for hospital admission in this year's study period was open globe injury, constituting 54.83% (*n* = 24) of all admitted patients. Other indications were traumatic optic neuropathy needing intravenous steroids (17.7%, *n* = 8), retinoblastoma patients for chemotherapy (11.1%, *n* = 5), orbital cellulitis (11.1%, *n* = 5), severe fungal corneal ulcer (4.4%, *n* = 2) and closed globe injury with total hyphema (2.2%, *n* = 1). Last year's data showed the most common indication for admission was elective surgery (78.9%, *n* = 1026). The monthly admission trends of study periods in both years have been illustrated in Fig. 1c.

Operating room data

A total of 1341 surgeries were performed in the time span mentioned in 2019, with 73 being emergency procedures. Most common elective surgery was phacoemulsification with intraocular lens implantation (39.6%, *n* = 531), whereas the most common emergency procedure was open globe injury repair (71.42% of emergency surgeries, *n* = 52).

This year's study period showed that only 25 surgeries were performed, a reduction of 98.13% from past year. The most common indication was open globe injury repair (81.25%, *n* = 21), others being intravitreal anti-Vascular Endothelial Growth Factor (anti-VEGF) injections (12%, *n* = 3) and intravitreal chemotherapy (4%, *n* = 1). The monthly trend of surgeries has been summarized in Fig. 1b.

Table 1: Summary of ocular emergencies in study periods of both years

Type of emergency	25 th March - 30 th September 2019	25 th March - 30 th September 2020
Road traffic accidents	792	417
Chemical injury	50	60
Assault	101	106
Fall from height	162	109
Minor home accidents	108	71
Infective conjunctivitis	99	59
Corneal ulcer	25	22
Fire cracker injury	66	18
Infections	23	26
Foreign body	89	111
Dryness and allergy related symptoms	0	153
Total	1515	1152
Average per day	8.02	5.96

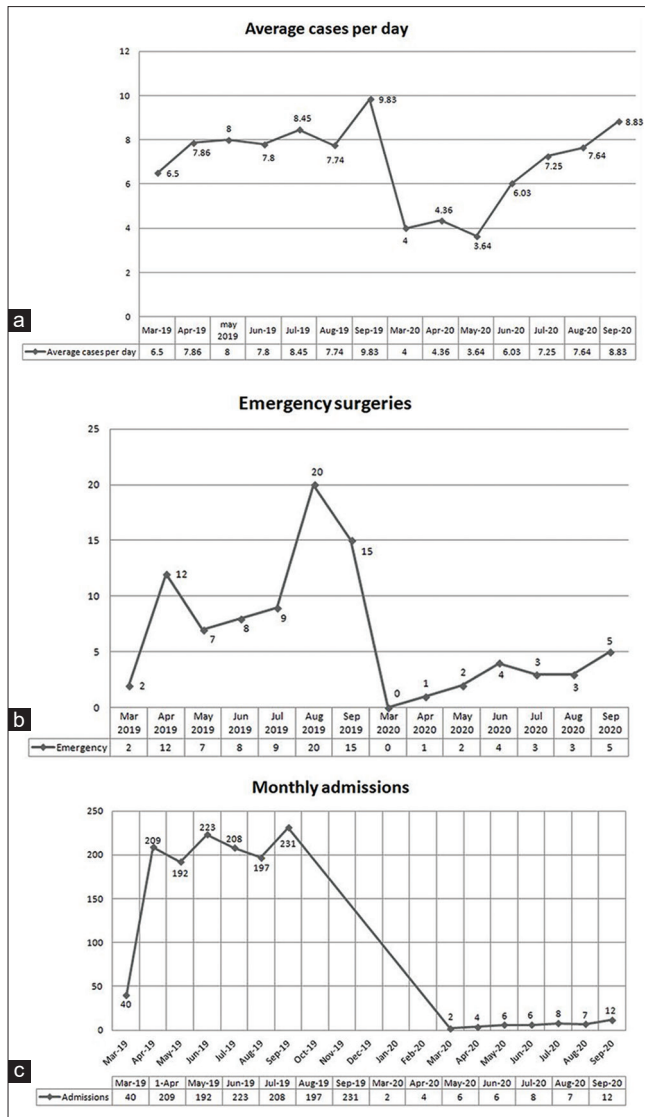


Figure 1: Average number of cases seen per day in emergency service (a); number of emergency surgical procedures performed each month (b); Comparison of in-patient admissions in both years (c)

Material and resource consumption

Data of material indent (from the hospital central store) were collected to understand monthly resource consumption in ophthalmology in-patient and emergency ward. The use of disposable gloves saw an 11 fold rise in April 2020 from April 2019 (1100 versus 100), whereas the number of triple layered surgical masks issued in April 2020 was 2400 as compared to only 100 in April 2019, i.e., 24 fold. N95/KN95 masks, previously not being used were put into use. Personal protective gear such as head caps, disposable gloves and PPE kits consumption increased over time [Fig. 2]. Use of surface disinfectants and sterilizers has also increased with passage of time as can be seen in Fig. 3. Use of sodium hypochlorite solution for cleaning increased by 6 times and of Povidone iodine hand scrub by 2.5 times, this September compared to September last year.

Manpower at work

Due to the COVID crisis and manpower crunch, postgraduate resident doctors are posted in COVID dedicated areas, on

rotation. This has resulted in a decrease in the pool of residents actively working in the Ophthalmology department for emergencies. In September 2020, 11 of 14 junior doctors (78.5%) were posted in COVID areas at some point. Table 2 elucidates the number of residents each month posted in COVID dedicated areas.

Discussion

The pandemic and lockdown created some unique challenges both for patients and health care services.^[8] Movement restriction, social distancing norms and fear of contracting the virus from the hospital were the common problems cited by patients. The ophthalmologists also had concerns regarding the extra risk of exposure as the patient and doctor come in close proximity whereas slit-lamp examination. An online survey amongst Indian ophthalmologists during the lockdown had revealed that majority of ophthalmologists were not seeing patients and there was near-total cessation of elective surgeries.^[8] Managing the available manpower, reducing risk of exposure and triaging patients also posed significant challenges. Health care sector had to modify practices to keep up with changing trends, including introduction of telemedicine services for addressing non-emergent issues.^[9] There are previous studies evaluating the impact of lockdown on ophthalmic services in India, but mostly from private centers.^[7,10]

As the hospital had several COVID dedicated areas, routine services could not be resumed in our institute even after lockdown, due to heavy load of COVID positive cases. Some interesting trends were noted in patients presenting to emergency services. It was noted that many did not follow the requisite precautions needed and poor compliance with face masks was commonly observed. It was also noted that some patients delayed seeking medical help due to risk of exposure to the virus and lack of transport facilities.

A decrement of 23.9% in number of patients visiting emergency setting was noted in this year’s study period as compared to last year. A recent study from an apex institute in North India has also reported a decrease of 35.25% in ophthalmic emergency services since lockdown when compared to same time period last year.^[11] Nearly a quarter (23%; n = 265) of total patients that visited emergency setting were triaged as requiring routine care and were advised to follow-up on tele-consultation. As many patients require non-urgent care, we must create more awareness and promote use of tele-ophthalmology services. Movement restriction from neighboring states played a major role in reduction of patient load along with behavioral changes during lockdown. As restrictions were uplifted partially in June 2020, the average number of cases rose to 6.03 per day and have further risen to 8.83 per day in September 2020, as more restrictions were removed [Fig. 1a]. A reduced compliance with follow-ups and medication was seen, probably due to restricted movement to pharmacies and hospital during lockdown.

A male dominance and younger age of presentation during lockdown was noted in our study. These demographics are similar to those noted in a previous study in a tertiary care institute during lockdown.^[10] The gender and age bias could possibly be due to females being busier in household with children as schools were closed and elderly (being at higher risk of contracting infection) preferred staying at home.

Table 2: Number of residents posted in COVID areas each month

Month	March 2020	April 2020	May 2020	June 2020	July 2020	August 2020	September 2020
Number of residents in COVID areas	0/14	8/14	8/14	6/14	7/14	8/14	11/14

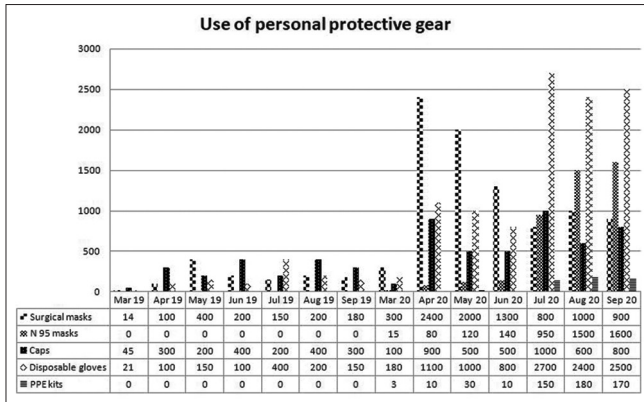


Figure 2: Use of personal protective gear during study period

One positive outcome of the lockdown was the substantial decrease in the number of road traffic accident patients. A decrement of 47.3% from last year was seen whereas the proportion of patients with drunk driving also came down to 30% this year from 51.4% in last year's study period. Authors from a study in an apex ophthalmic institute have also reported decrement of 41.75% in cases of mechanical trauma during lockdown.^[11]

Sixty patients (5.2%) had chemical injury with 17 of them reporting accidental splash of sanitizer in their eyes. As use of sanitizers has become common and the screen time on cellphones/laptops has increased, 153 patients (13.6%) presented with complaints of dryness and itching. After the initial prescription, such patients were advised to follow-up on tele-ophthalmology service. 106 patients (9.2%) came to emergency with history of assault, and 32% (*n* = 34) of these were victims of domestic violence. This disturbing increase in cases of domestic violence from 14% in last year's study period was secondary to misdirected anger and frustration due to loss of work and social interaction with family and friends. Reports have noted a 10 year high in the number of domestic violence cases during the lockdown.^[12] This increase in number of domestic violence cases emphasized the need for a mental health helpline to help people cope up with the changed environment in COVID times. We also came across two patients with pressure cooker blast injuries. Both cases presented with severe open globe injury and evisceration had to be performed. In both cases, the patients were not well acquainted with proper use of pressure cooker and were trying their hand at cooking during the lockdown. We suggest use of cookers/cookware only under supervision for the untrained to avoid such mishaps.

Seventy-eight health care personnel sought ophthalmic care for mask induced dry eyes, due to prolonged wearing of masks while on duty. The continuous breathing and re-breathing could be a reason behind the same. Thirteen health workers also reported sanitizer associated chemical injury.

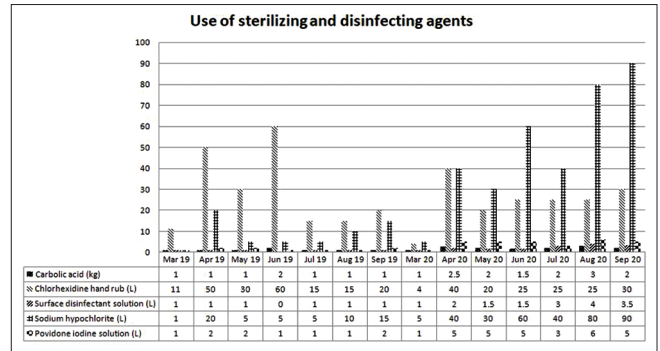


Figure 3: Use of sterilizing and disinfecting agents during study period

Of 45 patients admitted to eye ward, 25 patients (55.5%) were admitted for surgical purposes; 24 requiring surgical globe repair for open globe injury and 1 needing intravitreal chemotherapy for retinoblastoma. This was in contrast to last year, when 72% (*n* = 1091) were admitted for surgical purposes. Due to the close contact between surgeon and patient during surgical time, there was apprehension at both ends towards surgical management. All patients who were operated underwent COVID testing one day before surgery. Only COVID negative patients were operated in emergency OT. Two patients needing open globe repair tested positive for COVID and were operated in dedicated COVID OT, after taking all necessary precautions. Post-operatively, they were managed in COVID ward.

Data for the aforementioned study period for 2019, showed that of 1237 patients that were operated, 67% (*n* = 829) surgeries were operated on in-patient basis whereas rest were on outpatient basis. This year only 21 surgeries were performed in the same time period, all on in-patient basis. Of the 24 open globe injury patients, 3 refused surgery and only 21 were operated.

Our hospital also has a dedicated eye bank for donor cornea collection and processing. All eye bank related processes have been suspended since the national lockdown, due to fear of COVID transmission. Although a total of 189 donor corneas were collected and 44.9% of these utilized (*n* = 85) for transplantation during last year's study period, this year the collection and transplantation numbers stand at zero. Another study from an apex North Indian institute reported decrease in cornea collection by 99.61% since announcement of lockdown.^[8]

Another crucial aspect that must be considered in the present scenario is the availability and management of resources. Resource availability is not only an issue for over populated, developing nations but may also become a limiting factor in even in developed countries due to surging demands. Therefore, both material and manpower resources need to be managed properly for proper functioning of health care delivery system. Our hospital is also academically oriented, apart from providing health care services. Clinical and surgical learning has been disrupted due to closure of routine services. Academic classes

were also suspended for a while, before resumption on online platforms.

If we look at the manpower availability, several postgraduate doctors from Ophthalmology department were posted in COVID areas each month on rotation leading to depletion from the actively functional pool available for Ophthalmology services. Residents were apprehensive due to the risk of contracting COVID, especially those living at their own homes. Four Ophthalmology residents also contracted COVID during the month of August. Rest of the residents were posted in emergency areas on rotation to ensure learning and proper manpower management. Manpower management is thus a crucial aspect in current times to minimize exposure to other residents as well as manage the workload of emergency services.

Material resources are needed for personal protection as well as sterilization/disinfection purposes. In pre-COVID times, a casual approach was seen amongst many ophthalmologists but practices have become much stringent since the pandemic. In this year's study period, 4405 N95/KN95 masks were used. If we look at the ratio of triple layered surgical masks to N95 masks, in April 2020 it was 3:1, whereas it became 3:5 by September 2020. The overall use of N95/KN95 masks has increased, whereas that of surgical masks has come down. The use of other personal protective gear such as head caps and PPE kits has also increased. An interesting aspect that came up in this study was the decreased availability of Chlorhexidine hand rub in this year's study period. Overall use of Chlorhexidine hand rub in this year's study period was 169 liters versus 201 liters in same time period in 2019 (decrease of 15.9%). This is perhaps due to the huge surge in demand of hand sanitizer solutions leading to less availability.

This study has highlighted how the trends are changing and the need to adapt to them. The pandemic is here to stay and our practices should be modified accordingly. Resource building and management is a crucial factor that must be looked into.

Conclusion

There is uncertainty regarding how long the pandemic might last and its future repercussions. The pandemic and subsequent lockdown have certainly affected patient presentation, health care delivery and the pool of resources. Understanding the changing trends will help in better preparedness, if a similar cycle were to repeat in the future. Awareness regarding tele-ophthalmology will ensure that no patient faces delay in primary treatment due to the pandemic. We must look into optimum utilization of our current resources, keeping an eye on future needs at the same time. Efficient planning is needed to ensure smooth health care delivery that is safe for the patient as well as health care personnel.

Chief limitation was no data from last year pertaining to fundus examination calls and in-patient calls in other

departments. Emergency patients that were seen in OPD last year and those who were directly referred to tele-ophthalmology service this year were also not considered for analysis.

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Conflicts of interest

There are no conflicts of interest.

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