Impact of the COVID-19 pandemic on emergency eye care provision: A perspective from the Manchester Royal Eye Hospital

Ritu Chaturvedi

Manchester Royal Eye Hospital

Jae Yee Ku (✉ jku@liverpool.ac.uk)

Manchester Royal Eye Hospital <https://orcid.org/0000-0002-5758-7346>

Wenyue Zhu

University of Liverpool

Felipe Eduardo Dhawahir-Scala

Manchester Royal Eye Hospital

Research article

Keywords: COVID-19, emergency eye care, emergency eye department (EED)

Posted Date: August 28th, 2020

DOI: <https://doi.org/10.21203/rs.3.rs-63535/v1>

License: This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Abstract

Background: The COVID-19 pandemic has posed global health care challenges. This paper examines the effect of the pandemic on patient numbers, demographics, type and severity of presentations to the emergency eye department (EED) at one of the largest tertiary referral eye hospitals in the United Kingdom (UK) and discusses the management strategies developed.

Methods: Retrospective data was collected to compare a four week time frame during the pre-COVID-19 period (PCP; 6/1/20 to 2/2/20) with the COVID-19 period (CP; 23/3/20 to 19/4/20).

Results: 2,664 patients were seen during the PCP and this decreased to 759 patients during the CP. This represented a significant decline in mean $\pm$ SD daily patient presentations from 74 $\pm$ 16 during the PCP to 27 $\pm$ 7 during the CP ($U=18.7$, $p<0.001$). This is equivalent to a decrease by a factor of 2.71 (95% CI: 2.49-2.96). There were proportionally fewer patients at both ends of the age spectrum (≤ 19 years and 70-89 years) during the CP compared to the PCP but these differences in age distribution were not significantly different ($\chi^2=1.37$, $p=0.50$). There were 73 presentations with sight-threatening conditions during the PCP and 51 during the CP. The mean $\pm$ SD number of patients who presented with sight-threatening conditions during the PCP (2.6 $\pm$ 1.8) was not significantly different from the CP (1.8 $\pm$ 1.4) ($U=289.5$, $p=0.09$).

Conclusion: These findings reassure that current measures at the Manchester Royal Eye Hospital (MREH) are sufficiently robust for patients to access eye care services and ensure patient safety during the CP. Moreover, telemedicine has emerged as an effective tool to meet increasing demand in times of limited resources and may serve an important role in future patient care.

Introduction

Coronavirus disease (COVID-19) has emerged as a global health threat and presented significant challenges to eye care provision. The World Health Organization (WHO) announced this disease to be a pandemic on 11th March 2020 due to rapidly increasing number of new cases outside of China. As of 26th June 2020, there were 9,473,214 cases with 484,249 deaths worldwide (1). Healthcare systems throughout the world have been overwhelmed with increasing demand for specialist care (2). It has become clear that there is no single approach in addressing the challenges posed and each unit has to adapt according to their locally available resources.

In the United Kingdom (UK), the National Health Service (NHS) has had to undergo extensive changes to combat the surge of patients presenting with COVID-19 symptoms. The NHS has been greatly strengthened by the return of over 10,000 healthcare professionals. Additionally, 27,000 student nurses, medical students and other health professionals started their NHS careers earlier than expected. The NHS also had 607,000 people sign up to be NHS volunteers (3). A great deal of work was done in partnership with the local government, social care, the voluntary sector, the military, hospices and the private sector (3).

The challenges faced did not solely concern the care of COVID-19 patients. Self-isolation and social distancing measures were also developed in order to provide a safe environment for the treatment of non-COVID-19 patients. All routine outpatient activities were reduced to 25 percent capacity following the implementation of teleconsultations and efficient triage played a significant role. This reduced the risk of exposure of COVID-19 to staff and patients while enabling the provision of safe patient care. All elective surgical activities were suspended to enable training and redeployment of staff to meet the growing needs.

In Ophthalmology, a change in patient demographics, disease presentations and patient preference has led to a steady increase in the demand for emergency eye care over the years (4). A publication from the Royal College of Ophthalmologists (RCOph) in 2017 showed that the incidence of new eye casualty attendances was around 20–30 per 1000 UK citizens per year with eye emergencies making up 1.46-6% of all accident and emergency (A&E) attendances (4).

The Manchester Royal Eye Hospital (MREH) is one of the largest eye tertiary referral centres in the UK with a 24-hour on call service and a walk-in emergency eye department (EED) that opens between 8 am to 8 pm. In view of the COVID-19 pandemic, we have had to modify the processes by which how urgent eye-care is delivered. Limited local optometrist services and face-to-face general practitioner consultations due to the COVID-19 pandemic placed additional burden on the EED. A number of strategies were developed to reduce the transmission risk. These included training of staff to screen for patients with potential COVID-19 at triage, appropriate personal protective equipment, use of slit lamp breath shield, equipment disinfection, staff risk assessment, staff uniforms that are washable at high temperatures and supervised entry to the hospital premises to control visitor numbers.

A new pathway for patient flow through the emergency eye department was devised to separate any potential COVID-19 positive patient from others (Fig. 1). Telephone consultations were increased to ensure patient advice and care could be delivered remotely and minimize any unnecessary hospital visits. A pre-triage area was set up to screen for any patients with potential COVID-19 in a designated area. All patients were asked about COVID-19 symptoms including fever, cough, breathlessness and contact with COVID-19 positive people. Any suspected COVID-19 patients were treated in an isolation room in this area. If the patient was not suspected to have COVID-19, they were given a pass to enter the EED. In the EED, patients were triaged and then given an electronic pager to wait outside the clinical area prior to being seen. The seating arrangement in the waiting area in EED was altered to allow at least 2 meters between seats. This process minimised the number of people in EED and promoted social distancing.

As for the patients requiring follow-up care, those who were deemed as low risk were given telephone consultations known as welfare calls instead of being seen in the acute follow up clinics that were available in the PCP. For the patients who were at higher risk, they were given face-to-face appointments in subspecialty clinics. After welfare calls, some patients still needed to re-attend EED or a subspecialty clinic if they required ongoing follow-up. For the patients who were admitted or required surgery, they were swabbed for COVID-19. For patients who required an interpreter, the use of telephone interpreters was

encouraged instead of face-to-face interpreters. In addition to EED presentations, there were approximately 150 daily outpatient attendances in MREH.

Methods

Retrospective data was collected to assess the impact of COVID-19 pandemic on emergency eye care provision at MREH. We compared patient demographics and presentation patterns from a four week time frame during the pre-COVID-19 period (PCP; 6/1/20 to 2/2/20) with the COVID-19 period (CP; 23/3/20 to 19/4/20). These periods were selected as the UK government implemented lockdown measures on the 21st March 2020 (5). Anonymised data was collected from Symphony, a software package used to triage patients presenting to EED and their diagnoses were checked using the Gold Retrieve software which filed patients' notes. No data was collected from after-hours presentation. This study was conducted in accordance with the principles laid down in the Declaration of Helsinki. Ethical approval was waived from the UK Health Research Authority (HRA) and Research Ethics Committee (REC). Mann-Whitney U tests were used to compare the differences between data from the PCP and CP as the normality assumptions were violated. In addition, a Poisson model was used to compare the number of daily patient attendance between the PCP and CP. A model-based robust standard error estimator was obtained using the sandwich package in R statistical software (6). Pearson's chi-square test was applied to investigate whether there is a difference in the age distribution between the patient attendance during the PCP and CP. All data analyses were performed using Microsoft Excel 2016, GraphPad prism (version 8) and R statistical software (version 3.6.0).

Results

Since the onset of UK lockdown measures in March, there has been a decline in total monthly patient attendance compared to previous years (Fig. 2). A total of 2664 patients (Males N = 1003, 49%) were seen during the PCP while 759 patients (Males N = 417, 55%) were seen during the CP. Mean $\pm$ SD daily patient attendance was significantly decreased during the CP (27 ± 7) compared to the PCP (74 ± 16) ($U = 8.7$, $p < 0.001$). After adjusting day-of-the-week variations, the mean number of daily patient attendance during the CP is lower than the attendance during the PCP by a factor of 2.71 (95% CI: 2.49–2.96) (Fig. 3).

The mean age $\pm$ SD for patients presenting during the PCP and CP was 45.8 ± 20.7 years and 46.4 ± 19.5 years respectively. A comparison of the patients' age distribution revealed that there were proportionally less patients presenting at both ends of the age spectrum (≤ 19 years and 70–89 years) presenting during the CP compared to the PCP (Fig. 4). However, there were no significant differences between the distribution of the age groups presenting during the PCP and CP when we divided the patients into age groups ≤ 19 years, 20–49 years and ≥ 70 years ($\chi^2 = 1.37$, $p = 0.50$).

Patient presentations were examined according to subspecialties (Fig. 5). The proportion of patients presenting with anterior segment and oculoplastic conditions decreased from 32–24% and 15–11%

respectively. On the other hand, the proportion of patients presenting with trauma, vitreoretinal, uveitis and neuro-ophthalmology conditions have increased.

Patients presenting with potential sight-threatening conditions such as retinal detachment (RD), acute angle closure glaucoma (AACG), papilloedema, chemical injury, retinal artery occlusion (RAO), endophthalmitis, arteritic anterior ischaemic optic neuropathy (AAION), penetrating eye injury (PEI), orbital cellulitis, corneal graft rejection and corneal melt were examined (Fig. 6). There were 73 patients who presented with sight-threatening conditions during the PCP and 51 who presented during the CP. The mean $\pm$ SD number of patients who presented with potential sight-threatening condition daily during the PCP and CP were 2.6 ± 1.8 and 1.8 ± 1.4 respectively and this difference was not statistically significant ($U = 289.5$, $p = 0.09$).

Additionally, we examined the number of teleconsultations during this period. Doctors based in EED carried out 50 teleconsultations in 1 week (08/04/20 to 14/04/20) while advanced nurse practitioners undertook 59 calls per week. This increased our capacity significantly to continue providing medical advice while minimising the need for patients to travel to EED. These were in addition to the welfare calls that replaced follow-up visits for some patients that needed reviewing. However, we are aware that our study did not capture patient presentations after EED opening hours or patients that were reviewed by Ophthalmologists on the wards or other hospitals. Therefore, this study may under-report overall patient presentations.

Discussion

Healthcare services worldwide have faced unprecedented challenges due to the COVID-19 pandemic with the strategies employed by many countries being based on demand and resource availability. At the MREH, routine outpatient activity was reduced by 75 percent and elective surgeries were suspended to divert resources to manage patients affected by the COVID-19 pandemic.

The total number of patients seen in the EED during CP was reduced by nearly 71 percent as compared to the PCP. This can be explained by how patients' accessed healthcare in these challenging times. There can be several factors contributing to this changed behaviour ranging from policy choices made in order to create capacity for COVID-19 patients or to protect non-COVID patients and staff, changes in patient behaviour who may choose to use a different NHS service, delay or not seek health care at all or changes in the prevalence of some conditions (7). Enhanced public awareness on the importance of isolation and social distancing reduced hospital visits. This enabled the NHS to cope better with patient surge needing specialist care due to COVID-19 related illness. However, it is important that these do not adversely affect patient care and outcomes. This was highlighted by the reduction of A&E attendances by 41.9% in England in May 2020 compared to the same month last year (7). The trend of reduced patient presentations as a result of the COVID-19 response is also reflected in the number of hospital admissions. There were 398,400 emergency admissions in May 2020 which was 27.2% lower compared

to the previous year (8). This has led the government and the Chief Medical Officer to emphasise the importance of seeking medical care if patients develop any acute symptoms to avoid long term harm (7).

In our cohort, it was interesting to note that there were fewer patients at both extremes of the age range, although these differences were not statistically significant. This could possibly be explained by the government guidance on isolation for the vulnerable elderly group and the perceived COVID-19 risk for the younger children despite data showing children were less likely to develop severe complications (9).

The proportion of patients presenting with anterior segment and oculoplastic conditions decreased in the CP while the vision threatening and painful conditions such as trauma, uveitis, vitreoretinal and neuro-ophthalmology conditions have increased. This may reflect the fact that more common conditions such as conjunctivitis and blepharitis, which were included under these subspecialties were being managed in the community and by telephone consultations instead of presenting to EED.

Although daily attendances at eye casualty significantly reduced during the CP, the daily attendance of those with potential sight-threatening conditions did not. This was reassuring as it suggested that patients with sight-threatening conditions were accessing the necessary treatment and care during the CP. It also increased our confidence in the future use of telemedicine as an effective tool to meet increasing demand.

Shams et al reported a decrease in the cases of retinal detachment (RD) presenting to eye departments in Scotland suggesting that some cases of RD were left untreated during the lockdown period (10). In contrast, we have found increased cases of retinal detachment during the CP (N = 22) compared to the PCP (N = 19). Over the coming months, healthcare providers will get a more complete picture of any potential patient harm from delayed presentations due to the perceived COVID-19 risk.

Teleconsultation has emerged as a powerful tool with a potential to deliver eye care safely. We looked at the number of consultations done by doctors and advanced nurse practitioners during the COVID-19 period. A dedicated phone line was set up to be manned by senior clinicians to reduce non-urgent referrals and provide advice on phone. This increased our capacity significantly to continue providing eye care in challenging times. These were in addition to the welfare calls that replaced follow-up visits for acute patients that needed close reviewing. It has provided rapid access to subspecialist's opinion and care without exposing clinicians and patients to infection and being conducive to self-quarantine.

In these trying times, the NHS has seen unprecedented team work and innovation with the retraining and redeployment of staff to frontline services, of which many have been challenged to collaborate across medical specialties and work outside their comfort zones in using online resources to keep their skills updated. COVID-19 has also highlighted a need for a close partnership between primary and secondary eye care health professionals to ensure patients have safe access to eye care while minimising the risk of infection. The COVID-19 Urgent Eyecare Service (CUES) has been established and is now being trialled nationally through network of optical practices that aims to provide urgent eye-care within primary care

and hence reduce the burden on hospital resources. It has been commissioned in Manchester for 6 months but it may play a role in the long term (11).

In conclusion, the model we have used at the MREH made it possible to provide clinical care effectively while allowing flexibility when the resources were stretched. We intend to develop this further in the post-COVID-19 period to manage increasing demand on emergency eye care services.

Declarations

Ethics approval and consent to participate: This study was conducted in accordance with the principles laid down in the Declaration of Helsinki. Ethical approval was waived from the UK Health Research Authority (HRA) and Research Ethics Committee (REC).

Consent for publication: Not applicable

Availability of data materials: The datasets used for this study are available from the corresponding author on reasonable request.

Competing interests: The authors declare that they have no competing interests.

Funding: The authors declare that they have received funding for publication in this journal from the University of Liverpool.

Authors' contributions: RC contributed to the study design, data acquisition, and drafted the work. JK contributed to the study design, data acquisition and analysis and drafted the work. WZ analysed the data and drafted the work. FS contributed to the study conception and design and drafted the work. All authors have read and approved the final manuscript.

Acknowledgements: The authors would like to acknowledge Dr Ishaque Sayeed Mohammad, Nathan Johnson and Mugurel Lincan for proofreading of the work.

References

1. WHO. Coronavirus disease (COVID-19) Situation Report – 158, 26 June 2020. https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200626-COVID-19-sitrep-158.pdf?sfvrsn=1d1aae8a_2. Accessed 8 July 2020.
2. IBISWorld. Effects of COVID-19 on Global Healthcare systems. <https://www.ibisworld.com/industry-insider/coronavirus-insights/effects-of-covid-19-on-global-healthcare-systems/>. Accessed 8 July 2020.
3. NHS. Second phase of NHS response to COVID-19. Letter from Sir Simon Stevens and Amanda Pritchard, 29 April 2020. <https://www.england.nhs.uk/coronavirus/publication/second-phase-of-nhs-response-to-COVID-19-letter-from-simon-stevens-and-amanda-pritchard/>. Accessed 8 July 2020.

4. Royal College of Ophthalmologists. Emergency eye care in hospital eye units and secondary care. August 2017. <https://www.rcophth.ac.uk/wp-content/uploads/2017/08/Emergency-eye-care-in-hospital-eye-units-and-secondary-care.pdf>. Accessed 8 July 2020.
5. UK government. Government announces further measures on social distancing. <https://www.gov.uk/government/news/government-announces-further-measures-on-social-distancing>. Accessed 8 July 2020.
6. Zeileis A. Econometric Computing with HC and HAC Covariance Matrix Estimators. *J Stat Softw.* 2004;11(10):1–17.
7. The Health Foundation. How is COVID-19 changing the use of emergency care? <https://www.health.org.uk/news-and-comment/charts-and-infographics/how-is-covid-19-changing-the-use-of-emergency-care>. Accessed 8 July 2020.
8. NHS England and NHS improvement. A&E Attendances and Emergency Admissions, May 2020 Statistical Commentary. <https://www.england.nhs.uk/statistics/wp-content/uploads/sites/2/2020/06/Statistical-commentary-May-2020-jf8hj.pdf>. Accessed 8 July 2020.
9. NHS. Who's at higher risk from Coronavirus? <https://www.nhs.uk/conditions/coronavirus-covid-19/people-at-higher-risk/whos-at-higher-risk-from-coronavirus/>. Accessed 8 July 2020.
10. Shams F, El-Abiary M, Goudie C, Youston D. Effects of lockdown on retinal detachment incidence in Scotland. *Eye*. Epub ahead of print 17 June 2020. DOI: 10.1038/s41433-020-1029-3.
11. Harper RA, Dhawahir-Scala F, Wilson H, Gunn PJG, Jinkinson M, Pretty IA, Fletcher S, Newman WD. Development and implementation of a Greater Manchester COVID19 Urgent Eyecare Service 2020. *Eye*. Epub ahead of print 29 June 2020. DOI: 10.1038/s41433-020-1042-6.

Figures

Figure 1

Patient pathway through the emergency eye department (EED) with COVID-19 control measures

Figure 2

Total monthly patient attendance to the emergency eye department from January to April in 2018, 2019 and 2020.

Figure 3

Comparison of daily patient attendance to the emergency eye department between the pre-COVID-19 period (PCP; 6/1/20 to 2/2/20) and COVID-19 period (CP; 23/3/20 to 19/4/20). The dashed line is the triangle moving average with filter size 2.

Figure 4

Age distribution of patients who attended during the pre-COVID-19 period (PCP) and COVID-19 period (CP). Percentage of patients who attended during each time period are shown above each bar.

Figure 5

Proportion of patients who presented during the pre-COVID-19 period (PCP) and COVID-19 period (CP) according to each subspecialty expressed in percentage shown adjacent to bar with patient numbers shown in brackets.

Figure 6

Proportion of patients who presented during the pre-COVID-19 period (PCP) and COVID-19 period (CP) with potential sight-threatening conditions expressed in percentage shown adjacent to bar with patient numbers shown in brackets. (Retinal detachment, RD; Acute angle closure glaucoma, AACG; retinal artery occlusion, RAO; arteritic anterior ischaemic optic neuropathy, AAION; penetrating eye injury, PEI).