# Ocular Emergencies During the Coronavirus Disease 'Safer at Home Order' in Wisconsin

Nenita Maganti, MD; Leslie Huang, MS; Mark Banghart; Roomasa Channa, MD; Jonathan S. Chang, MD; Suzanne W. van Landingham, MD


## ABSTRACT

**Introduction:** The coronavirus pandemic created large shifts in utilization of hospital resources, patient presentations, and delivery of medical care.

**Objectives:** This retrospective study evaluated the ocular emergencies at a tertiary-care academic hospital in Wisconsin during the COVID-19-related "Safer at Home" order.

**Methods:** Ophthalmology consultations performed March 23 through May 26, 2020, were compared to the same time period in the 4 preceding years and the subsequent year. Billing codes were obtained to evaluate the diagnoses and procedures performed during this time frame.

**Results:** In 2020, 155 consultations were performed (42 emergency department, 113 inpatient), compared to a mean of 214 over the 5 other study years. The incidence rate ratio (IRR) of total consultations in 2020 was 0.72 ($P \leq 0.001$) compared to previous years. Significantly fewer emergency department consultations were performed (IRR 0.62, $P \leq 0.001$), while inpatient consultations were similar (IRR 0.88, $P = 0.119$). The most common diagnosis across all study years was fracture of the skull/orbit with injury to the eye/orbit. In 2020, 13% of consultations led to a procedure, compared to a total of 16% in the other years (IRR 0.59, $P = 0.018$).

**Conclusions:** This study demonstrated a 28% reduction in ophthalmology consultations at a major university hospital in Wisconsin during the COVID-19-related "Safer at Home" order, though the number of consultations leading to surgery were stable. This suggests that while patients with less acute needs may have deferred care, those requiring urgent surgery still presented to the emergency department. These data may help hospitals appropriately allocate eye care resources during future public health emergencies.


## INTRODUCTION

The coronavirus disease of 2019 (COVID-19) pandemic caused dramatic shifts in the use of hospital resources and personnel. Intensive care units and inpatient wards filled with COVID-19 patients, while concern for contagion and cancellations of elective procedures led to a 70% decrease in outpatient services following the declaration of a national emergency on March 13, 2020.[1] At the same time, voluntary lifestyle changes and "Safer at Home" Orders, such as the state of Wisconsin's Emergency Order #12,[2] led many to spend much more time in their homes. Emergency department (ED) visits declined by 42% in the United States during March-April, 2020, presumably due to a combination of fewer injuries occurring while staying at home and concerns about the risk of COVID-19 exposure while seeking care.[3] While many ophthalmology appointments were deferred during this time, emergency ophthalmic care continued, as eye trauma and other eye emergencies are an important source of morbidity.[4]

Eye injuries account for many ED visits. In the United States in 2017, about 413 000 ED visits were related to ocular injuries.[5] While many of these visits in a typical year are for true emergencies, many are not. Of 12 million eye-related ED visits from 2006-2011 studied using a nationally representative database, only 41% of eye-related ED visits could be categorized as emergent. In this cohort, corneal abrasions were the most common emergent diagnosis, and conjunctivitis was the most common diagnosis overall (28%).[6]

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**Author Affiliations:** Department of Ophthalmology and Visual Sciences, University of Wisconsin, Madison, Wisconsin (Maganti, Banghart, Channa, Chang, van Landingham); University of Wisconsin School of Medicine and Public Health, Madison, Wis (Huang).

**Corresponding Author:** Suzanne W. van Landingham, MD, Department of Ophthalmology and Visual Sciences, University of Wisconsin, 2870 University Ave, Suite 108, Madison, WI 53705; phone 608.263.4823; email svanlandingh@wisc.edu; ORCID ID 0000-0001-8347-6466

Little has been published about ocular emergencies during the COVID-19 pandemic due to the recent and ongoing nature of the pandemic. A cohort study conducted in Philadelphia, Pennsylvania, identified a 25% decrease in the daily number of patients presenting for emergency eye evaluation, although the incidence of severe ocular trauma remained similar to that prior to lockdown.[7] Globally, a 68.4% decline in the number of ED visits for eye injuries was reported in Italy, while a tertiary care center in India reported 58.5% fewer ED visits due to ocular trauma.[8,9] Injuries that continued to occur during stay-at-home orders included chemical injuries, injuries due to home improvement projects, and exercise-related injuries.[10,11]

This study aims to compare the ophthalmology consultations in the ED and inpatient settings at a tertiary-care academic hospital in Wisconsin during the 2020 "Safer at Home" order compared to the same period in prior years and the subsequent year. We hypothesized that the incidence of ophthalmology consultations would be lower during the 2020 study period, although the incidence of severe ocular emergencies would be similar compared to previous years. To our knowledge, this is the first study of its kind from the Midwestern United States.

## METHODS

This study was submitted to the Institutional Review Board (IRB) and was judged to be exempt from further IRB review given the deidentified nature of the data used for the study. This is a retrospective cohort study comparing the volume of ophthalmology consultations at a single academic Wisconsin hospital that occurred during the Wisconsin "Safer at Home" emergency order, March 23, 2020 through May 26, 2020, versus the same period in the 4 preceding years (2016-2019) and 1 following year (2021). The second year of the pandemic was studied to evaluate any differences in consultations as the pandemic restrictions eased. Consultations were identified by searching institutional billing records and subdivided into location of consultation (ED, inpatient, observation, and outpatient short stay). Observation is commonly used for patients who present to the ED and need a period of treatment or monitoring before further decisions are made and are not expected to stay more than 1 night, and outpatient short stay is used for patients who are not admitted and are not expected to stay overnight.

Additional information gathered via computerized extraction included demographic data (patient age, gender, and race), diagnosis codes, and procedure codes associated with the visit. Codes 2 weeks post discharge were also included to capture any procedures and diagnoses made subsequent, but related to the initial encounter. Ophthalmology-associated diagnosis codes (*International Classification of Diseases, Tenth Revision* [ICD-10]) and procedure codes (*Current Procedural Terminology* [CPT]) were isolated for further evaluation. CPT codes of interest were further categorized as requiring an operating room or as bedside procedures. Many visits had several associated diagnosis codes of interest.

Statistical analysis was performed using R (version 4.2.0). Chi-square testing was used to compare racial and gender differences among study years; *t* testing was used to compare age differences. These comparisons were between a particular year and all other years. Poisson models were used to compare the volume of consults and number of consultations leading to surgical interventions in 2020 compared to other years. A *P* value of less than 0.05 was considered statistically significant.

## RESULTS

The mean age of our cohort was 42 years; 55.3% identified as male and 87% as White. Participant demographics were similar across the years of the study (Table 1), except for a higher proportion of White participants in 2017 and a lower proportion in 2021.

A total of 1227 ophthalmology consults were performed during 2016-2021. During this time frame, a total of 101 941 patients were cared for at this hospital across all studied care locations. The total number of ophthalmology consultations was 155 in 2020 compared to a mean of 214 in the other years evaluated. The plurality of consultations occurred in the inpatient setting, followed by the ED (Figure 1). The incidence rate ratio (IRR) of ophthalmology consults in 2020 derived from the Poisson model was 0.72 ($P \leq 0.001$), meaning that the number of consultations was 72% of what would be expected compared to previous years. When subdivided into different consultation locations, the number of ED consults was significantly fewer compared to previous years (IRR 0.62, $P \leq 0.002$), but the number of inpatient consults was similar (IRR 0.88, $P = 0.254$).

The year 2017 had more consultations than other study years (265 total). When 2017 was removed from the Poisson model in a sensitivity analysis, the decrease in consultations in 2020 remained significant (IRR 0.77, $P = 0.002$). The IRR of consultations in 2020 when comparing to all study years versus all study years except 2017 were 0.62 vs 0.66 ($P = 0.002$ vs $P = 0.010$) for ED, 0.88 vs 0.94 ($P = 0.254$ vs $P = 0.578$) for inpatient, 0.35 vs 0.34 ($P = 0.018$ vs $P = 0.016$) for observation, and 0.47 vs 0.51 ($P = 0.006$ vs $P = 0.017$) for outpatient short stay settings, respectively. Ophthalmology consultation volume returned to normal in 2021, with 198 total consultations (IRR 0.91, $P = 0.206$ when compared to 2016-2019).

The most common diagnosis across all years was fracture of the skull and orbit with injury to the eye or orbit (ICD codes S02 and S05) associated with 840 of 1227 (68.5%) consults. The most common diagnosis in 2020 was the same, with 112 of 155 (72.3%) consults. This was followed by disorders of the eyelid and lacrimal system (279/1227, 22.7%) and retinal detachments and breaks (224/1227, 18.3%) (Table 2). These percentages sum to greater than 100%, as more than 1 diagnosis can be associ-

ated with an encounter – for example, an orbital trauma patient may be diagnosed with both an eyelid laceration and an orbital fracture. The most common procedure across all years was the repair of eyelid laceration, accounting for 104 of 372 (28%) associated CPT codes, followed by repair of retinal detachments and tears, accounting for 103 of 372 (28%) related CPT codes (Table 3).

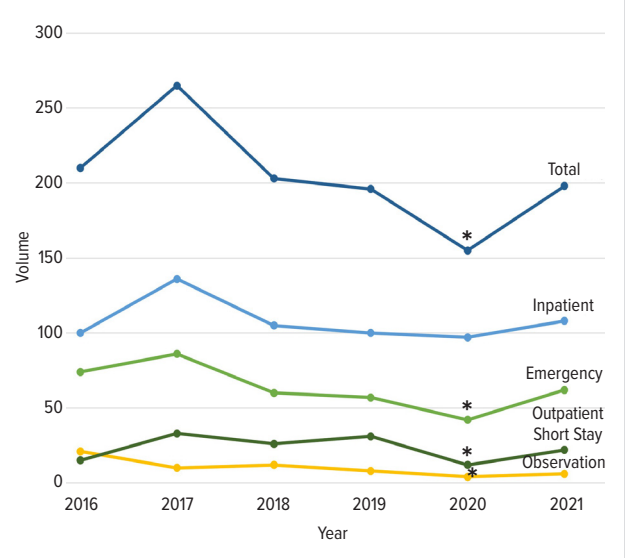
Twenty of 155 (13%) consultations led to a procedure in 2020, compared to a total of 169 of 1072 (16%) in the other study years (IRR 0.59, $P=0.018$) (Figure 2). In 2020, 7 of 155 (5%) consultations led to procedures that require an operating room compared to a total of 46 of 1072 (4%) in other study years (IRR 0.76, $P=0.486$), while 13 of 155 (8%) led to bedside procedures compared to a total of 123 of 1072 (11%) in other study years (IRR 0.53, $P=0.017$).

**Table 1.** Demographic Information

| Variable | Interval | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | Total |
|---|---|---|---|---|---|---|---|---|
| Age | Years (mean) | 41.4 $P=0.662$ | 41.8 $P=0.840$ | 44.3 $P=0.165$ | 42.3 $P=0.888$ | 38.8 $P=0.104$ | 43.1 $P=0.510$ | 42 |
| Gender | Male (%) | 116/210 (55.2%) $P=0.939$ | 142/265 (53.6%) $P=0.626$ | 121/203 (59.6%) $P=0.165$ | 111/196 (56.6%) $P=0.639$ | 80/155 (51.6%) $P=0.301$ | 108/198 (54.5%) $P=0.876$ | 678/1227 (55.3%) |
| Race | White (%) | 187/210 (89%) $P=0.369$ | 244/265 (92.1%) $P<0.007$[a] | 176/203 (86.7%) $P=0.909$ | 163/196 (83.2%) $P=0.082$ | 137/155 (88.4%) $P=0.613$ | 161/198 (81.3%) $P=0.011$[a] | 1068/1227 (87%) |
| Total consultations | | 210 | 265 | 203 | 196 | 155 | 198 | 1227 |

*P* values are from a *t* test (age) or a chi-square test (gender, race) comparing a particular year to all other years.
[a]Indicates *P* value < 0.05.

**Figure 1.** Volume of Ophthalmology Consultations by Year and Patient Location




*Indicates a statistically significant difference ($P<0.05$) between 2020 and other years.

## DISCUSSION

This study demonstrated that 28% fewer ophthalmology consultations were performed at our large academic hospital during the COVID-19 "Safer at Home" order in 2020 compared to the same period in the surrounding years. This finding is similar to what was observed in a recent cohort study from Philadelphia; however, the magnitudes of change in both studies were smaller than what has been reported in 2 international studies.[7-9] Consultations returned to pre-COVID-19 volumes in 2021, when activity restrictions eased and rates of COVID-19 infections decreased. Variation in the magnitude of decline in ophthalmology consultations may be attributable to regional factors – for example, a starker decrease was observed in Italy,[8] where "Safer at Home" style regulations were stricter than in Wisconsin.

The decline in ophthalmology consultations was largely driven by a significant decrease in ED consultations, rather than those in the inpatient setting. A plausible explanation for this decrease is that outpatients deferred seeking care for their eye symptoms as they wanted to protect themselves from exposures to COVID-19, but those who were already admitted to the hospital had the ophthalmology service consulted on their behalf. Prior work has shown that up to 59% of eye-related ED visits are not urgent,[6] and it is possible that patients with less urgent concerns may have chosen not to seek care during the "Safer at Home" order. Interestingly, another study noted that patients who presented with retinal detachments during the first year of the pandemic were more likely to have a macula-off detachment with proliferative vitreoretinopathy, leading to worse final visual acuity outcomes – likely due to the delay in seeking care.[12] Our data demonstrate that the number of retinal detachments or tears and associated procedures were lower in 2020 compared to other years, suggesting that patients either deferred seeking care (as postulated in the aforementioned study) or actually had fewer retinal tears or detachments. This is somewhat unexpected, since the closure or limited availability of some local practices could have led to more patients seeking care at our ED. Another plausible reason for the lower volume of ophthalmology consultations during the "Safer at Home" order is that many eye-related ED visits are related to trauma occurring outside the home, such as motor vehicle accidents.[13,14] With fewer people leaving their homes, fewer injuries may have occurred, leading to fewer ED visits.

Our analysis showed that consultations leading to procedures that require use of an operating room remained similar to pre-COVID levels in 2020, while procedures that could be performed at bedside were 46% lower in 2020. This is consistent with the hypothesis that patients may have deferred care for less severe

**Table 2.** Diagnoses Associated With Ophthalmology Consults by Frequency

| ICD-10 code(s) | Diagnosis | ICD-10 Descriptions | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | Total |
|---|---|---|---|---|---|---|---|---|---|
| S02, S05 | Orbital fracture | Fracture of skull and facial bones; injury of eye and orbit | 161 | 166 | 116 | 97 | 112 | 188 | 840 |
| H00, H01, H02, H04, H05, L03.213 | Disorders of eyelid and lacrimal system | Hordeolum and chalazion; other inflammation of eyelid; disorders of lacrimal system; disorders of eyelid, lacrimal system and orbit; periorbital cellulitis | 35 | 65 | 47 | 47 | 35 | 50 | 279 |
| H33 | Retinal detachment and breaks | Retinal detachments and breaks | 38 | 55 | 33 | 50 | 19 | 29 | 224 |
| H53 | Visual disturbances | Visual disturbances | 42 | 34 | 39 | 31 | 29 | 38 | 213 |
| H25, H26, H27, Z96.1, Z98.41, Z98.42 | Cataract and intraocular lens | Age-related cataract; other cataract; other disorders of lens; presence of intraocular lens; cataract extraction status right and left eye | 56 | 37 | 20 | 33 | 26 | 27 | 199 |
| H35, H36 | Other retinal disorders | Other retinal disorders; retinal disorders in diseases classified elsewhere | 33 | 31 | 46 | 28 | 29 | 26 | 193 |
| H43 | Vitreous disorders | Disorders of vitreous body | 35 | 38 | 34 | 32 | 19 | 29 | 187 |
| E10.3, E10.9, E11.3, E11.9 | Diabetes | Type 1 and 2 diabetes with and without complications | 32 | 30 | 23 | 19 | 26 | 24 | 154 |
| H10, H11, H15 | Conjunctival and scleral disorders | Conjunctivitis; other disorders of conjunctiva; disorders of sclera | 21 | 24 | 21 | 14 | 23 | 28 | 131 |
| H16, H17, H18 | Corneal disorders | Keratitis; corneal scars and opacities; other disorders of cornea | 34 | 23 | 9 | 17 | 11 | 18 | 112 |
| H40, H42 | Glaucoma | Glaucoma; glaucoma in diseases classified elsewhere | 22 | 16 | 26 | 15 | 11 | 11 | 101 |
| H49, H50, H51 | Strabismus | Paralytic strabismus; other strabismus; other disorders of binocular movement | 11 | 27 | 27 | 14 | 5 | 11 | 95 |
| H52 | Refractive error | Disorders of refraction and accommodation | 20 | 19 | 16 | 8 | 14 | 13 | 90 |
| H46, H47 | Optic nerve disorders | Optic neuritis, other disorders of optic nerve and visual pathways | 13 | 20 | 12 | 14 | 12 | 18 | 89 |
| S01.1 | Eyelid and adnexal wounds | Open wound of eyelid and periocular area | 20 | 15 | 13 | 16 | 8 | 13 | 85 |
| H20, H21 | Iritis | Iridocyclitis, other disorders of iris and ciliary body | 9 | 25 | 10 | 13 | 12 | 10 | 79 |
| H57 | Miscellaneous | Other disorders of eye and adnexa | 10 | 17 | 14 | 14 | 13 | 10 | 78 |
| H54 | Blindness and low vision | Blindness and low vision | 15 | 16 | 12 | 3 | 6 | 18 | 70 |
| B37.7, B37.89, B37.9, B49 | Fungemia consultation | Candidal sepsis; other sites of candida; candidiasis unspecified; unspecified mycosis | 16 | 6 | 7 | 11 | 11 | 12 | 63 |
| H30, H31 | Choroidal disorders | Chorioretinal inflammation; other disorders of choroid | 7 | 12 | 11 | 2 | 3 | 6 | 41 |
| B25.8, B25.9 | Cytomegalovirus | Other cytomegalovirus; cytomegalovirus | 6 | 8 | 5 | 6 | 7 | 4 | 36 |
| H34 | Retinal vascular occlusions | Retinal vascular occlusions | 9 | 2 | 13 | 4 | 0 | 6 | 34 |
| H44 | Globe disorders | Disorders of globe | 3 | 10 | 3 | 9 | 5 | 4 | 34 |
| H59, Z98.89 | Postoperative issues | Intraoperative and postprocedural complications, disorders of eye and adnexa, not elsewhere classified, other specified postprocedural states | 25 | 3 | 1 | 1 | 0 | 2 | 32 |
| G93.2 | Intracranial hypertension | Benign intracranial hypertension | 4 | 6 | 3 | 4 | 2 | 4 | 23 |
| T15 | Foreign body | Foreign body on external eye | 3 | 5 | 0 | 7 | 2 | 5 | 22 |
| T26 | Burns | Burn and corrosion confined to eye and adnexa | 3 | 0 | 3 | 0 | 5 | 10 | 21 |
| H55 | Nystagmus | Nystagmus and other irregular eye movements | 5 | 1 | 4 | 1 | 2 | 3 | 16 |
| M31.6 | Giant cell arteritis | Giant cell arteritis | 3 | 2 | 2 | 0 | 1 | 3 | 11 |
| Z04.72 | Pediatric nonaccidental trauma | Encounter for examination for alleged child abuse | 0 | 0 | 1 | 0 | 1 | 0 | 2 |
| Total | | | 691 | 713 | 571 | 510 | 449 | 620 | 3554 |

Abbreviations: ICD, International Classification of Diseases.

ICD-10 codes are grouped into diagnosis categories for simplicity.

**Table 3.** Procedures Associated With Ophthalmology Consultations by Frequency

| CPT Code(s) | Procedure | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | Total |
|---|---|---|---|---|---|---|---|---|
| 13151, 13152, 12051-12054, 67935, 12011, 12013, 12015, 67966, 67930, 67921, 10120, 68420, 68815, 68700 | Canalicular and eyelid laceration repair | 20 | 25 | 28 | 27 | 8 | 19 | 127 |
| 67108, 67145, 67113, 67228, 67105, 67107, 67039 | Retinal tear or detachment repair | 15 | 23 | 17 | 29 | 7 | 12 | 103 |
| 65286, 65280, 65285, 65105, 65093, 65755, 65730, 65750 | Open globe repair | 6 | 8 | 5 | 7 | 5 | 8 | 39 |
| 67028 | Intravitreal injection | 3 | 4 | 4 | 3 | 2 | 6 | 22 |
| 65220, 65430, 65222, 65205 | Extraocular foreign body removal, corneal scraping | 4 | 3 | 1 | 3 | 3 | 2 | 16 |
| 21390, 67715, 21406, 67500 | Orbital fracture repair | 2 | 3 | 2 | 3 | 3 | 2 | 15 |
| 65778, 67875 | Tarsorrhaphy, placement of amniotic membrane graft | 3 | 5 | 2 | 0 | 1 | 3 | 14 |
| 65800, 65810 | Paracentesis of anterior chamber | 3 | 3 | 1 | 3 | 2 | 1 | 13 |
| 69990 | Operating microscope | 2 | 2 | 1 | 3 | 1 | 1 | 10 |
| 37609 | Temporal artery biopsy | 2 | 1 | 2 | 0 | 1 | 1 | 7 |
| 67700, 10060 | Abscess drainage | 1 | 1 | 0 | 1 | 0 | 0 | 3 |
| 66761 | YAG peripheral iridotomy | 0 | 2 | 0 | 0 | 0 | 0 | 2 |
| 68200 | Injection procedures on the conjunctiva | 1 | 0 | 0 | 0 | 0 | 0 | 1 |

Current procedural terminology (CPT) codes are grouped with similar codes for simplicity.

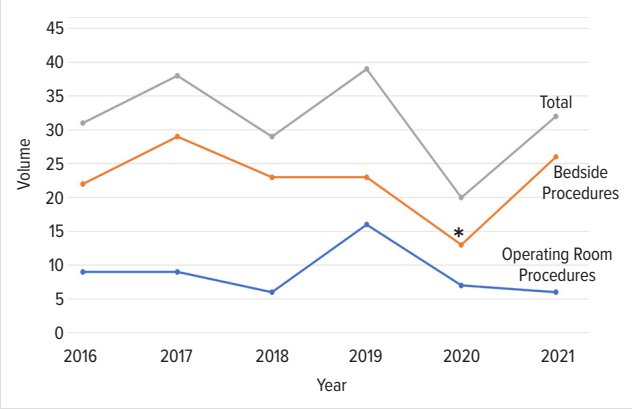
injuries or illnesses in 2020, and/or that patients staying at home engaged in fewer risky activities that might result in injury.

These data provide a useful framework for resource allocation in the event of a future public health emergency—for example, another pandemic requiring strict curfews. Any physician or other health care provider working during the 2020 pandemic will recall the many conversations and questions about reallocation of resources, both human and material: workers were reassigned to less familiar settings, and operating room access was limited to urgent cases in order to preserve ventilators and staff for patients severely ill with COVID-19. A drop in total consultations indicates that an ophthalmology service may be able to operate with slightly decreased staff. This could allow a portion of the service to reassigned to harder hit departments or could simply allow the service to continue to function effectively in the event that some team members become ill or need to quarantine. On the other hand, because the volume of consultations leading to surgery was consistent, operating room access for emergency eye cases would need to be preserved.

Our data revealed an unexpectedly high number of consultations in 2017. We speculate that this is due to the loss of ophthalmology call coverage at another local hospital. Soon thereafter, our center increased urgent outpatient appointment availability, facilitating the return to normal levels in 2018.

In this dataset, the most common reason for consultation was fractures in the orbital region. The most common ocular concern presenting to the ED used to be related to ocular surface disease, but studies have seen an increase in the number of orbital fractures from falls—especially in the elderly—and blunt force trauma.[6]

**Figure 2.** Volume of Ophthalmology Consultations Associated With Procedures by Year and Patient Location




*Indicates a statistically significant difference ($P<0.05$) between 2020 and other years.

The most common category of CPT codes in this dataset related to the repair of eyelid region lacerations. CPT codes for orbital fracture repair were less frequent, since many orbital fractures can be observed without surgical repair while few lacerations can be. Diagnosis codes for retinal tears and detachments and procedure codes for their repair were among the top 3 most common codes.

While this study was not designed to detect between-year volume differences for specific procedures, there were notably fewer eyelid laceration repairs and retinal detachment repairs in 2020 compared to other study years (7 vs a mean of 19 for both procedure types). Similar drop-offs in the number of eyelid laceration and retinal detachment diagnosis codes were observed. We suspect

this finding is due to decreased trauma among those complying with the "Safer at Home" order (and therefore not engaging in risky activities like driving, sports, and fighting).[15]

Strengths of this study include a large sample size. Additionally, inpatient data were also evaluated in this study, which plays a significant role when considering resource allocation (similar studies have assessed only ED data). While this was a single center study, the University of Wisconsin is one of two level I trauma centers in Wisconsin and a large referral center, so we likely captured many of the emergency eye visits in our region. Limitations include the retrospective nature of data collection. Coding data provided us with a reliable count of ophthalmology consultations; however, it lacks certain details such as mechanism of injury and long-term visual outcomes.

## CONCLUSIONS

This study demonstrated a 28% reduction in ophthalmology consultations at a major university hospital in Wisconsin during the COVID-19-related "Safer at Home" order compared to the same period in the years before and after. These findings were similar to those noted in other single center studies[7-9] and are the first to demonstrate a decrease in ophthalmology consultations during the lockdown order in the Midwestern United States. The volume of consultations leading to surgeries performed in the operating room remained consistent, suggesting that patients with severe eye emergencies continued to seek care. Future studies are needed to evaluate differences in mechanism and place of injury during this period. Findings from this study may influence resource allocation and strategic planning during future public health emergencies.

**Acknowledgements:** The authors would like to acknowledge Oliver Eng, data query analyst, at the Clinical Research Data Service (CRDS) team at the University of Wisconsin School of Medicine and Public Health (UWSMPH), who assisted with data extraction and creation of REDCap database.

**Financial Disclosures:** None declared.

**Funding/Support:** This work was supported in part by an Unrestricted Grant from Research to Prevent Blindness, Inc. to the UWSMPH Department of Ophthalmology and Visual Sciences. This work was also supported in part by the Core Grant for Vision Research from the National Institutes of Health to the University of Wisconsin-Madison (P30 EY016665). The content is solely the responsibility of the authors and does not necessarily represent the official views of the NIH.

## REFERENCES

**1.** Chatterji P, Li Y. Effects of the COVID-19 pandemic on outpatient providers in the United States. *Med Care*. 2021;59(1):58-61. doi:10.1097/MLR.0000000000001448

**2.** Palm A. Emergency order #12: safer at home order. Wisconsin Department of Health Services. March 24, 2020. Accessed May 2022. https://evers.wi.gov/Documents/COVID19/EMO12- SaferAtHome.pdf

**3.** Adjemian J, Hartnett KP, Kite-Powell A, et al. Update: COVID-19 pandemic-associated changes in emergency department visits - United States, December 2020-January 2021. *MMWR Morb Mortal Wkly Rep*. 2021;70(15):552-556. doi:10.15585/mmwr.mm7015a3

**4.** Katz J, Tielsch JM. Lifetime prevalence of ocular injuries from the Baltimore Eye Survey. *Arch Ophthalmol*. 1993;111(11):1564–1568. doi:10.1001/archopht.1993.01090110130038

**5.** Rui P, Kang K. National Hospital Ambulatory Medical Care Survey: 2017 emergency department summary tables. National Center for Health Statistics. Accessed March 2021. https://www.cdc.gov/nchs/data/nhamcs/web_tables/2017_ed_web_tables-508.pdf

**6.** Channa R, Zafar SN, Canner JK, Haring RS, Schneider EB, Friedman DS. Epidemiology of eye-related emergency department visits. *JAMA Ophthalmol*. 2016;134(3):312-319. doi:10.1001/jamaophthalmol.2015.5778

**7.** Wu C, Patel SN, Jenkins TL, Obeid A, Ho AC, Yonekawa Y. Ocular trauma during COVID-19 stay-at-home orders: a comparative cohort study. *Curr Opin Ophthalmol*. 2020;31(5):423-426. doi:10.1097/ICU.0000000000000687

**8.** Pellegrini M, Roda M, Di Geronimo N, Lupardi E, Giannaccare G, Schiavi C. Changing trends of ocular trauma in the time of COVID-19 pandemic. *Eye (Lond)*. 2020;34(7):1248-1250. doi:10.1038/s41433-020-0933-x

**9.** Agrawal D, Parchand S, Agrawal D, et al. Impact of COVID-19 pandemic and national lockdown on ocular trauma at a tertiary eye care institute. *Indian J Ophthalmol*. 2021;69(3):709-713. doi:10.4103/ijo.IJO_3200_20

**10.** Al-Khersan H, Lazzarini TA, Kunkler AL, et al. Ocular trauma secondary to exercise resistance bands during the COVID-19 pandemic. *Am J Emerg Med*. 2021;42:217-220. doi:10.1016/j.ajem.2020.11.054

**11.** Sibley D, Abdalla H, Gupta A, Ho J. Exercise in isolating during novel coronavirus 19: a case report of bilateral ocular trauma from elastic resistant bands. *Can J Ophthalmol*. 2020;55(6):e209-e211. doi:10.1016/j.jcjo.2020.05.001

**12.** Mundae R, Velez A, Sodhi GS, et al. Trends in the clinical presentation of primary rhegmatogenous retinal detachments during the first year of the COVID-19 pandemic. *Am J Ophthalmol*. 2022;237:49-57. doi:10.1016/j.ajo.2021.11.017

**13.** Haring RS, Canner JK, Haider AH, Schneider EB. Ocular injury in the United States: emergency department visits from 2006-2011. *Injury*. 2016;47(1):104-108. doi:10.1016/j.injury.2015.07.020

**14.** Patel SR, He C, Szlechter M, Parsikia A, Mbekeani J. Mechanisms of injury in mortality-related ocular trauma in the United States. *Invest Ophthalmol Vis Sci*. 2020;61(7):2105. ARVO 2020 Annual Meeting Abstracts. Accessed May 2022. https://iovs.arvojournals.org/article.aspx?articleid=2769061

**15.** Kamine TH, Rembisz A, Barron RJ, Baldwin C, Kromer M. Decrease in trauma admissions with COVID-19 pandemic. *West J Emerg Med*. 2020;21(4):819-822. doi:10.5811/westjem.2020.5.47780

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