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Impact of the coronavirus pandemic on pediatric eye-related emergency department services

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Literature describing the trends and utilization of pediatric eye-related emergency department (ED) visits is limited. We performed a retrospective cohort study of 311 pediatric patients visiting Bascom Palmer Eye Institute (BPEI) ED between March and May 2020 to quantify the effect of the coronavirus (COVID-19) on ophthalmology care utilization. In our study, pediatric ED visits declined by half at the onset of the pandemic in March. The number of visits reached the lowest point in early April and increased to 48% of the pre-COVID volume by the end of May. Despite changes in volume, patient demographics and clinical diagnoses were relatively consistent throughout the pandemic.

Utilization of emergency departments (ED) by pediatric patients has rapidly increased over the last two decades.¹ Currently, approximately 30 million pediatric ED visits take place annually.^{1,2} The emergence of the global coronavirus (COVID-19) pandemic has dramatically altered accessibility of medical care, leading to a 42% decline in ED visits nationally.³ The largest declines in visits have been observed in women, persons aged 14 years and younger, and visits taking place in April.³ Although this data has helped understand the overall effects of the COVID-19 pandemic on ED utilization, data regarding urgent and emergent ophthalmic complaints in children are lacking. In this study, we sought to analyze trends in pediatric eye-related ED visits during the COVID-19 pandemic.

Subjects and Methods

This study was approved by the Institutional Review Board at the University of Miami Miller School of Medicine, complied with the US Health Insurance Portability and Accountability Act of

1996, and adhered to the tenets of the Declaration of Helsinki. The medical records of pediatric patients (≤ 18 years of age) seen at the Bascom Palmer Eye Institute (BPEI) ED in Miami, Florida, over a 3-month period (March 1 through May 31, 2020) were reviewed retrospectively. The following data were collected: age, sex, diagnosis by the treating ophthalmologist, and date of visit. The study period was divided into six 2-week time periods to reflect stay-at-home orders delivered nationally on March 16 and resumption of elective outpatient ophthalmology care on May 4. Days were distributed equally across time periods, with 15 days allocated to the first four time-periods (March 1-15, March 16-30, March 31-April 14, April 15-April 29) and 16 days allocated to the last two (April 30-May 15, May 15-31). Data from March 2019 were used to gain an understanding of baseline ED utilization. All statistical analyses were performed using SPSS Statistics for Mac, version 26 (IBM Corp, Armonk, NY). Data were analyzed with the Pearson χ^2 test or the Fischer exact test, as appropriate. Age was compared among diagnosis groups using analysis of variance (ANOVA) with Tukey post hoc analysis. A P value of ≤ 0.05 was considered statistically significant.

Results

A total of 311 children (range, 0.04-18 years; 9.73 ± 5.77 years) were seen during the study period. Of these, 154 (49.5%) presented in March, 74 (23.8%) in April, and 83 (26.7%) in May. Compared to the March visits in 2019, the 2020 volume was lower by only 13 visits. Visit volume in late March 2020 decreased by 51% compared to early March. Visits dropped to the lowest in the study period in early April, at 30% of pre-COVID-19 volume. On relaxation of stay-at-home orders in early May, visits increased slightly, but only to 48% of pre-COVID volume.

The relationship between diagnosis and time period is depicted in Figure 1. Overall, the presenting diagnosis, age group (0-5, 6-12, 13-18 years), and patient gender did not significantly change over the six time periods ($P > 0.05$).

Forty-six unique diagnoses were observed, with the leading diagnoses being eye trauma (22.5%), conjunctivitis (18.6%), and chalazion/hordeolum (12.5%). Exploratory analysis revealed a statistically significant difference ($P < 0.001$) in diagnosis by age; however, the average age among the leading diagnoses was similar (Table 1). The greatest decreases in the number of visits occurred in children 13-18 years of age (63.2%) and for children diagnosed with chalazion/hordeolum (83.5%), comparing the first and second halves of March. Diagnosis also differed significantly by gender ($P = 0.021$), with eye trauma diagnosed more frequently in males (70.0%) and chalazion/hordeolum diagnosed more frequently in females (76.9%). Infectious conditions, such as conjunctivitis, were diagnosed equally in males and females.

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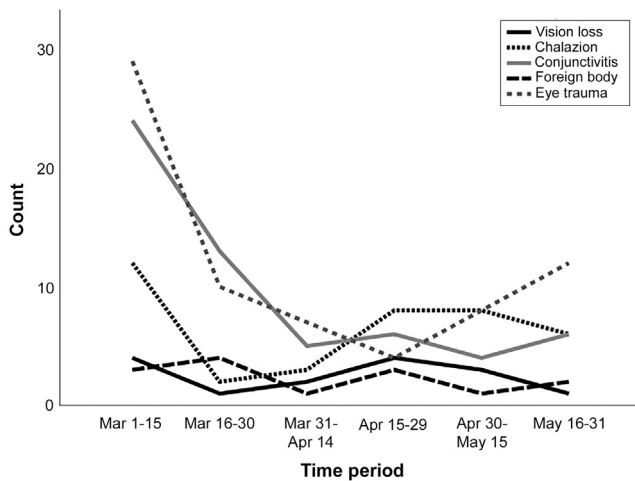


FIG 1. Trends in the top five diagnoses in children presenting to the emergency department (ED) at the Bascom Palmer Eye Institute (BPEI) from March to May 2020. The relationship between diagnosis and time period was not statistically significant, indicating that diagnoses contributing to ED visits at BPEI visits did not differ over the course of the study period.

Discussion

Our data suggest that the onset of the COVID-19 pandemic severely disrupted the clinical workflow in our

eye-specific ED, as evidenced by a dramatic decline in pediatric visits over a short timeframe. Although COVID-19 was initially regarded as an adult-limited and predominantly respiratory illness, evidence connecting the virus to a Kawasaki-like pediatric multisystemic inflammatory condition, first identified in April, may have fueled parental fears of viral exposure and led to the decline in non-COVID-related ED encounters.⁴ On the other hand, parents may have been more likely to present to our ED than to a general ED, because the risk of transmission of a respiratory virus would theoretically be lower given the eye-centered nature of our institution.

Mandated COVID-related lockdowns reached their peak in the latter half of April, leading to a significant drop in visits for the leading diagnosis, eye trauma, in our population. Several studies have noted the home environment as the most common setting for serious eye injuries in children.^{5,6} The low incidence of eye trauma in our study during this time period may be attributable to children transitioning toward indoor, sedentary activities as school closures and cessation of sports/recreational activities limited the risk for acute ocular injuries. Alternatively, this trend may reflect the broader healthcare climate, as public health concerns over contracting COVID-19 intensified the hesitancy to visit the ED. The proportion of visits for eye trauma did increase from 9% to 25% when state-mandated lockdowns ended.

Table 1. Demographic characteristics of children presenting to the Emergency Department at the Bascom Palmer Eye Institute from March to May 2020

Diagnosis	Count (%)	Age ^a	Age range	Male (%)
Eye trauma	70 (22.5)	9.81 ± 5.51	0.33-18.00	49 (70.0)
Conjunctivitis	58 (18.6)	9.58 ± 5.23	0.04-18.00	29 (50.0)
Chalazion	39 (12.5)	9.06 ± 5.41	1.58-18.00	9 (30.0)
Vision loss ^b	15 (4.8)	13.27 ± 3.79	5.00-18.00	10 (66.7)
Foreign body	14 (4.5)	8.00 ± 5.78	0.75-16.00	5 (55.6)
Corneal ulcer ^b	12 (3.9)	13.89 ± 5.22	0.67-18.00	7 (58.3)
Chemical exposure ^b	9 (2.9)	5.09 ± 5.20	1.33-17.00	6 (55.7)
Dry eye	9 (2.9)	11.56 ± 5.57	5.00-18.00	7 (77.8)
Irritation	9 (2.9)	11.31 ± 6.45	1.75-18.00	3 (33.3)
Papilledema	6 (1.9)	14.50 ± 4.93	5.00-18.00	2 (33.3)
Retinal detachment	6 (1.9)	11.51 ± 8.35	0.58-18.00	3 (50.0)
Subconjunctival hemorrhage	6 (1.9)	8.67 ± 4.93	1.00-14.00	4 (66.7)
Glaucoma ^b	5 (1.6)	3.47 ± 4.20	0.42-9.00	1 (20.0)
Dermatitis	5 (1.6)	8.00 ± 2.65	5.00-12.00	2 (66.7)
Pain (unspecified)	5 (1.6)	11.00 ± 6.96	2.00-17.00	3 (60.0)
Double vision	4 (1.3)	7.88 ± 7.42	0.50-18.00	3 (75.0)
Strabismus	3 (1.0)	5.42 ± 7.46	0.50-14.00	1 (33.3)
Keratitis	3 (1.0)	11.33 ± 5.69	5.00-16.00	1 (33.3)
Other	33 (10.7)	9.00 ± 6.59	0.08-18.00	20 (60.6)
Total	311 (100.0)	9.73 ± 5.77	0.04-18.00	166 (53.4)

^aAge is presented as mean ± standard deviation.

^bStatistically significant ($P < 0.05$) differences in age were observed between the following diagnoses: vision loss vs chemical exposure, corneal ulcer vs chemical exposure, and corneal ulcer vs glaucoma.

Although our sample demonstrates a decrease in ED volume following the nationwide stay-at-home orders, we uncovered no change in patient demographic characteristics before, during or after mandated COVID-19 lockdowns. Eye trauma occurred predominantly in boys, which may be due to increased tendency to participate in violent or aggressive activities.⁷ Chalazion was another main driver of ED visits, and, consistent with published literature, was more prevalent in females.^{8,9} Our results highlight the fact that girls may be at greater risk for development of chalazia due to hormonal/pubertal changes, cosmetic use, and poor eyelid hygiene.¹⁰ Although telemedicine was made available to our patient population, it was used only moderately, even for diagnoses that are typically nonurgent, such as chalazia. This might be due to the ease of access and availability of an ophthalmology-centric ED.

Limitations of this study include the small sample size, short timeframe, and retrospective design. However, we focused on the immediate impact of the COVID-19 pandemic to assess short-term implications pertaining to pediatric ophthalmology-specific ED visits. Our study may not be generalizable to pediatric ED visits nationally, given geographic differences. It is possible that shorter time frames may elucidate more granular details regarding age and diagnoses. Future studies examining the long-term effects of the pandemic on ED services may help in guiding strategies and allocating resources to provide accessible eye care to children in an evolving healthcare climate.

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Long-term treatment outcomes for congenital ectropion uveae with ptosis and glaucoma

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We describe 3 cases of unilateral congenital ectropion uveae associated with ptosis and glaucoma in a syndrome with no systemic associations. Early detection of glaucoma and timely surgical intervention is required to preserve productive vision in such patients. In our case series, trabeculectomy with mitomycin C was effective in controlling glaucoma progression over a follow-up period of 5-15 years.



Congenital ectropion uveae (CEU) was first reported in association with glaucoma by Ritch and colleagues¹ in 1984. It is believed to arise from late developmental arrest of the posterior migration of neural crest cells, with abnormal retention of primordial endothelium, resulting in drainage angle dysgenesis and glaucoma.² Whereas Ritch and colleagues¹ and Liu and colleagues³ found most of their patients had systemic associations, Dowling and colleagues² found that a majority of cases had ptosis with glaucoma and ectropion uveae but no associated systemic signs.

Although cases of CEU associated with glaucoma have been reported,¹⁻³ there is no long-term data on treatment outcomes of CEU-associated glaucoma. We report 3 cases of unilateral CEU associated with glaucoma and ptosis (and no systemic associations) that were followed over a period of 5-15 years at Singapore National Eye Centre. All 3 cases underwent successful trabeculectomy with mitomycin C and had good postoperative control of glaucoma.

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