Clinical and epidemiological profile of ocular emergencies in a large teaching hospital

Perfil clínico y epidemiológico de las urgencias oftalmológicas en la sala de emergencias de un hospital universitario

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Abstract

Purpose: The purpose of the study was to characterize emergency room (ER) ophthalmology referrals to identify the most common pathologies, the frequency of urgent and non-urgent diagnoses, and compare diagnostic accuracy between the ER physician and the ophthalmologist. **Methods:** Cross-sectional study, we included consecutive patients referred to the ophthalmology department from the ER of a large general teaching hospital in Bogotá, Colombia, from November 1, 2016, to April 30, 2017. Variables extracted from the patients' medical records included age, sex, type of insurance, cause (traumatic vs. nontraumatic), referring physician's diagnosis, final diagnosis, and urgency (urgent, semi-urgent, or non-urgent). **Results:** A total of 473 patients were included in this study. 52.9% of visits were for an urgent condition, 17.1% were considered semi-urgent, and 30% of the visits were not urgent. The most common diagnosis was a corneal foreign body (22.4%), often from a work-related accident. Urgent or semi-urgent visits and traumatic injuries were more frequent in males and in patients with job insurance ($p < 0.01$). The agreement between the diagnosis given by the ER physician and the ophthalmologist was 34.1%. **Conclusions:** A much higher prevalence of corneal foreign bodies (22.4%) was observed compared to the reported global literature, highlighting the urgent need to increase eye protection at work and home. About 30% of visits were due to non-urgent conditions, which could be decreased by teaching patients and training our nurses in triage to identify true ocular emergencies. ER physicians need more ophthalmology training evidenced by the low agreement between their diagnosis and the ophthalmologist's diagnosis.

Key words: Emergency service. Hospital. Public health. Ophthalmology. Eye injuries. Epidemiology.

Resumen

Objetivo: Identificar las patologías oculares más frecuentes en el servicio de urgencias, categorizar el número de consultas urgentes y no urgentes, evaluar la concordancia diagnóstica entre el médico de urgencias (MU) y el oftalmólogo. **Métodos:** Estudio observacional analítico de corte transversal. Se incluyeron pacientes que asistieron al servicio de urgencias de un hospital universitario de alto nivel de complejidad en Bogotá, Colombia, por un motivo de consulta oftalmológico desde el 1 de noviembre de 2016 al 30 de abril de 2017. Se extrajeron variables sociodemográficas (edad, sexo, aseguradora de salud), tipo de lesión (traumática/no traumática), clasificación del cuadro clínico (urgente/semiurgente/no urgente), diagnóstico del MU, diagnóstico del oftalmólogo. **Resultados:** Se analizaron 473 pacientes. El 52.9% de las visitas fueron de carácter urgente,

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el 17.1%, semiurgentes y el 30%, no urgentes. El diagnóstico más frecuente fue de cuerpo extraño corneal (22.4%), la mayoría de ellos relacionados con accidentes laborales ($p < 0.01$), y el sexo masculino fue el más afectado. El acuerdo diagnóstico entre el MU y el oftalmólogo fue del 34.1%. **Conclusiones:** Se encontró una alta prevalencia de cuerpo extraño corneal comparado con la literatura mundial, lo que evidencia la necesidad de insistir en el uso de protección ocular en casa y en el trabajo. El 30% de las visitas se consideraron no urgentes, lo que enfatiza la necesidad de informar a los pacientes y al personal encargado del triage en urgencias para identificar urgencias oftalmológicas verdaderas. La pobre concordancia en los diagnósticos posiblemente refleja una falta de entrenamiento en oftalmología del personal de urgencias.

Palabras clave: Urgencias médicas. Salud pública. Oftalmología. Servicios de salud ocular. Epidemiología.

Introduction

The number of emergency room (ER) visits has increased dramatically in the past two decades, not only in Colombia, but in many other countries¹. There are few dedicated ophthalmology emergency departments in Bogotá and most patients go to a general hospital if they have an ophthalmic emergency. Treatment in the ER is up to 10 times more expensive than an outpatient appointment² and contributes to long waiting times in crowded ER. Furthermore, many ER consultations are not urgent (around 37% in general)³. In ophthalmology, non-urgent conditions seen at the ER are even more frequent, ranging from 50% to 80%⁴⁻⁹. The most common non-urgent ER visits are due to conjunctivitis, subconjunctival hemorrhage, and hordeolum^{4,10,11}. The most common urgent conditions are corneal abrasion, corneal foreign body, and orbital cellulitis^{4,10}.

Consequently, to be able to design policies to improve patient care and decrease waiting times, it is crucial to identify the frequency of urgent and non-urgent conditions in our population and the risk factors associated with an ocular emergency.

This study describes the frequency, urgency, and type of ER visits that were referred to the ophthalmology department of a large general hospital in Bogotá, Colombia. We also evaluated the risk factors for an urgent consultation and evaluated the agreement between the diagnosis given by the ER physician and the one given by the ophthalmologist.

Methods

This was a cross-sectional analytic study. The medical records of all consecutive patients who came into the ER of the Fundación Cardioinfantil (a large general teaching hospital in Bogotá, Colombia) and referred for ophthalmic evaluation from November 1, 2016, to April 30, 2017 were reviewed. Ethics approval was obtained from the Institutional Review Board. We estimated a sample size of 320 patients, considering the prevalence

of 50% for non-urgent visits to the ER^{4,12,13} (10 events per variable for a minimum number of 15 parameters).

The demographic variables evaluated included age, sex, day of visit, and type of health insurance (basic [universal insurance], complementary [higher income patients], and job insurance [for job-related conditions]). The cause (traumatic vs. nontraumatic) was also recorded. The initial diagnosis of the ER physician and of the ophthalmologist was recorded for each patient. Patient outcomes were classified into three categories: (1) treated and discharged, (2) admitted for emergency surgery or treatment, and (3) no treatment required. Ophthalmic diagnoses were categorized as urgent (evaluation by an ophthalmologist within minutes-hours), semi-urgent (can be evaluated by an ophthalmologist within 2-7 days), or non-urgent (schedule an outpatient appointment when available), according to a consensus from the ophthalmologists of the department (Table 1).

A multivariate logistic regression analysis was performed to determine demographic factors associated with an urgent/semi-urgent versus a non-urgent diagnosis. Urgent and semi-urgent diagnoses were grouped together in the analysis to include all potentially sight-threatening conditions. Covariates included age, sex, and type of insurance (basic, complementary [higher income patients], or work insurance [job-related accidents]). Individuals were categorized by age on the following categories: children (age 0-12), teenagers (age 13-20), adults (age 21-60), and older adults (age 61 years or older), given that the type and etiology of eye conditions differ with age. A separate model was used to determine whether the type of injury (traumatic vs. nontraumatic) was associated with an urgent/semi-urgent versus non-urgent diagnosis. The model was adjusted for the same covariates listed previously.

Results

A total of 473 patients were included in the analysis of visits made from November 1, 2016, to April 30, 2017.

Table 1. Classification of diagnosis according to urgency

Urgent	Semi-urgent	Non-urgent
Immediate evaluation	Evaluation in 2-7 days	Outpatient appointment
Moderate-to-severe chemical burn	Mild chemical trauma*	Infectious conjunctivitis
Corneal foreign body	Minor blunt trauma†	Subconjunctival hemorrhage
Infectious keratitis	Posterior vitreous detachment‡	Blepharitis/hordeolum/chalazion
Acute glaucoma	Muscle paresis (with otherwise normal exam)	Chronic glaucoma
Penetrating ocular trauma	Preseptal orbital cellulitis	Dry eye
Uveitis	Herpes zoster ophthalmicus (without keratitis)	Pterygium
Optic neuritis/papilledema		Migraine with ocular pain
Moderate-to-severe blunt trauma		Refractive error/cataract
Retinal detachment		
Postseptal orbital cellulitis		

*Mild chemical trauma included patients with exposure to a noncorrosive substance, with a normal exam, or mild hyperemia as the only present sign. †Mild blunt trauma included patients with a low energy trauma mechanism, with a normal exam, or mild hyperemia as the only present sign. ‡Posterior vitreous detachment included patients with a normal visual acuity who were complaining of new floaters without flashes or decrease in visual field.

Table 2. Sociodemographic and visit characteristics of patients

Characteristic	Total	
Subjects, n (%)	473	(100)
Age, mean (SD), years	40.9	(17.7)
Gender, n (%)		
Male	301	(63.6)
Female	172	(36.4)
Visit urgency, n (%)		
Urgent	250	(52.9)
Semi-urgent	81	(17.1)
Non-urgent	142	(30)
Type of injury, n (%)		
Traumatic	210	(44.4)
Nontraumatic	263	(55.6)
Day of visit, n (%)		
Monday	91	(19.2)
Tuesday	110	(23.3)
Wednesday	79	(16.7)
Thursday	62	(13.1)
Friday	83	(17.5)
Saturday	37	(7.8)
Sunday	11	(2.3)
Insurance type, n (%)		
Basic	350	(74.)
Complementary	53	(11.2)
Work	70	(14.8)
Patient outcomes, n (%)		
Treated and discharged	393	(83.1)
Admission for surgery/treatment	50	(10.6)
No treatment required	30	(6.3)

Table 2 shows the demographic and visit characteristics of the patients. The mean age at presentation was 40.9 ± 17.7 and 64% of patients were male. Monday and Tuesday were the days with the highest frequency of visits (19.2% and 23.3%, respectively). About 74% of patients came in with basic health coverage, 11.2% with complementary insurance, and 14.8% with work insurance. Traumatic eye injuries accounted for 44.4% of all consults; 80% of these patients were male and the average age was 36.3 ± 13.8 . About 83% (83.1%) of patients were discharged after treatment, 10.6% were admitted for surgery or treatment, and 6.3% required no treatment (either the exam was normal or the condition was self-limited without treatment).

Around 52.9% of patients had an urgent ophthalmic condition, 17.1% were considered semi-urgent, and 30% were non-urgent. Non-urgent consultations were more common among the 0-12 (40%) and > 60 (42.7%) age groups compared to patients aged 13-60 (27%), although this difference was not statistically significant. The results of a multivariate logistic regression model (Table 3) showed that urgent or semi-urgent visits were more frequent among males odds ratio (OR: 2.06; 95% confidence interval [CI]: 1.36-3.13) and patients with work insurance (OR: 3.99; 95% CI: 1.76-9.06). Similarly, traumatic injuries were more frequent in males (OR: 3.46; 95% CI: 2.01-5.94) and in patients with work insurance (OR: 6.56; 95% CI 1.82-23.7).

Table 3. Multivariate logistic regression analysis of factors associated with ER visits that were urgent/semi-urgent or traumatic/nontraumatic

Variables	Number of subjects, (%)											
	Visit urgency						Type of injury					
	Urgent/semi-urgent		Non-urgent		OR (95% CI)		Traumatic		Nontraumatic		OR (95% CI)	
Total	331	(70.0)	142	(30.0)			210	(44.4)	263	(55.6)		
Age groups, years												
Reference: 21-60	257	(73.0)	95	(27.0)			180	(51.1)	172	(48.9)		
0-12	12	(60.0)	8	(40.0)	0.6	(0.23-1.57)	5	(25.0)	15	(75.0)	0.44	(0.12-1.61)
13-20	19	(73.1)	7	(26.9)	1.1	(0.42-2.70)	12	(46.2)	14	(53.8)	0.73	(0.27-2.24)
> 60	43	(57.3)	32	(42.7)	0.59	(0.35-1.01)	13	(17.3)	62	(82.7)	0.23	(0.11-0.49)
Gender												
Reference: Female	100	(58.1)	72	(41.9)			42	(24.4)	130	(75.6)		
Male	231	(76.7)	70	(23.3)	2.06	(1.36-3.13)	168	(55.8)	133	(44.2)	3.46	(2.01-5.94)
Insurer												
Reference: Basic	237	(67.7)	113	(32.3)			132	(37.7)	218	(62.3)		
Complementary	31	(58.5)	22	(41.5)	0.75	(0.41-1.37)	19	(35.9)	34	(64.2)	0.7	(0.31-1.59)
Work related	63	(90.0)	7	(10.0)	3.99	(1.76-9.06)	59	(84.3)	11	(15.7)	6.56	(1.82-23.7)

OR: Odds ratio; CI: Confidence interval.

Figure 1. Most common ophthalmic diagnoses.

Figure 1 shows the 15 most common diagnoses classified by urgency. The most common diagnosis was a corneal foreign body (22.4%), usually secondary to a job-related accident. The second, third, and fourth most common diagnoses were non-urgent diagnoses such as minor ocular trauma, infectious conjunctivitis, and subconjunctival hemorrhage (6.3%, 6.3%, and 5.1%, respectively). In the fifth place were corneal abrasions

(5.1%), also a frequent job-related accident. In 5.1% of patients, the ophthalmic examination was unremarkable, and the patient required no treatment.

Table 4 shows the 10 most frequent diagnoses recorded by the ER physicians and their agreement with the ophthalmologist's diagnosis. It was difficult to directly compare accuracy of diagnoses given that the diagnosis provided by the ER physician was often nonspecific

Table 4. Agreement between the 10 most frequent diagnoses recorded by the ER physician and the diagnosis recorded by the ophthalmologist

	ER physician diagnosis	Ophthalmologist's diagnosis	Agreement percentage (%)
Foreign body	130	98	75.4
Ocular pain	71	0	0.0
Decreased visual acuity	55	0	0.0
Ocular trauma	38	19	50.0
Conjunctivitis	37	10	27.0
Chemical/thermal trauma	24	18	75.0
Keratitis/corneal lesion	23	10	43.5
Penetrating ocular trauma	18	0	0.0
Subconjunctival hemorrhage	10	7	70.0
Red eye	8	0	0.0
Average agreement			34.1

ER: Emergency room.

(28.3% of patients were referred with a diagnosis of “ocular pain,” “decreased visual acuity,” and “red eye”). Overall, the diagnosis coincided in 34.1% of cases. The most frequent ER physician diagnosis was “foreign body” in 130 cases (75.4% agreement). Twenty-five patients were diagnosed in the ER with a penetrating eye injury or acute glaucoma, but none had the condition. In contrast, the eight patients who did have a penetrating injury or acute glaucoma had a different initial diagnosis.

Discussion

In Bogotá, as in most of the world, emergency services are overcrowded¹⁴. It is estimated that up to a third part of the visits to emergency departments in Bogotá do not constitute a real emergency¹⁵, but they spend significant human and physical ER resources. In our cohort, urgent conditions constituted 52.9% of all visits, 17.1% were semi-urgent, and non-urgent conditions accounted for 30% of all visits. A study evaluating almost 12 million ophthalmic ER visits in the US, categorized 44.3% of visits as non-urgent⁴. In Ireland, Fenton et al.⁶ reported that 80.9% of visits were non-urgent and Alotaibi et al.¹³ from Saudi Arabia reported that 50.4% of visits were non-urgent (dry eye, chalazion, blepharitis, and allergic conjunctivitis). In Latin America, a series in Brazil¹⁶ reported that 55% of eye-related visits were considered non-urgent and in Cuba¹⁷, 70.9% were considered non-urgent. Our series reported a lower percentage

of non-urgent visits (30%) compared to literature. This is partly due to a lower prevalence of infectious conjunctivitis (6.3%) and eyelid inflammation (1.7%) in our sample compared to other series (8.7-39.2%)^{4,16,18}. A likely explanation for this may be that patients with symptoms of conjunctivitis are treated by their primary care physician or they self-medicate (a very common practice in our country).

We reported a very high prevalence of urgent conditions (52.9%) which is largely due to the high frequency of corneal foreign bodies observed in our series (22.4%) compared to global literature (1.9% in Egypt⁵, 4.5% in Australia¹⁹, 4.7% in Saudi Arabia¹³, 7.5% in the US⁴, and 9.3% in Ireland⁶). Our hospital is a referral center for many job-related health insurers and this may explain the high prevalence of corneal foreign bodies. At the same time, it highlights the frequency of traumatic eye injuries, especially job-related ones. In our series, 44.4% of visits were due to traumatic conditions and 28% of which were admitted with work insurance. This is similar to reports from Italy²⁰ and Finland²¹ where 29.6% and 34% of eye injuries, respectively, occurred at work. In our series, most of the corneal foreign bodies were diagnosed in welders. This is an avoidable accident if widespread use of eye protection was enforced in work settings. The percentage of job-related eye injuries is probably underestimated in this study because many workers do not have formal work insurance. As expected, the multivariate analysis revealed that being male (most welders are

male) and having work insurance was significantly associated with an urgent and traumatic eye injury.

Regarding patient outcomes, 89.4% of patients were either treated and discharged or required no treatment. The remaining 10.6% were admitted for surgery or management by another specialty. This means that almost 90% of the ophthalmic emergencies in this series could potentially be managed either by a primary care physician or be examined in an outpatient setting. A new system needs to be implemented in order to direct these patients to outpatient facilities to free up much needed ER resources for life-threatening emergencies.

In this series, the ER physicians who first attended the patients referred them to the ophthalmology department with a preliminary diagnosis. The diagnosis agreement between the ER physician and the ophthalmologist was low (34.1%). This discrepancy can be partly explained by the fact that the ER physician does not need to commit to diagnosis as the patient will be examined by an ophthalmologist anyway. However, it does point toward a lack of training in ophthalmology for ER physicians. This is especially evident in the fact that from the 8 patients who had a real ophthalmic emergency (acute glaucoma or penetrating eye injury) and the agreement between the ER physician and the ophthalmologist was 0%. A plan has to be created to train ER staff to identify true ophthalmic emergencies, avoid treatment delays and thus improve outcomes.

This study has several limitations. It is a snapshot of 6 months of the emergency visits and may not reflect all types of visits in our hospital, as insurance contracts vary throughout the year. However, given that the hospital has contracts with over 20 health insurance companies, we believe that the types of conditions may not vary significantly. Like in all retrospective medical record reviews, some information may be missing or incomplete. Not all patients who come in with ocular complaints are evaluated by an ophthalmologist for several reasons (the ophthalmologist is not available at that time; insurance issues or treatment is prescribed by the ER physician). Hence, this series may not be including all patients coming into the ER with ocular complaints. Despite these caveats, it provides valuable information for the hospital to better prepare the ER staff for ophthalmology patients and helps to shed light on the frequency of avoidable job-related eye injuries.

Conclusions

This is the first report on the frequency and type of urgent ophthalmic referrals from a general ER in Colombia.

Determining the prevalence and type of ophthalmic emergencies is crucial for health planning, decreasing waiting times in the ER, and improving patient care.

Our emergency department is receiving an alarming number of patients with corneal foreign bodies (22.4%) compared to worldwide literature. The majority of these were job-related and are potentially avoidable with adequate eye protection. Measures need to be taken to ensure eye protection is enforced both at work and home.

In addition, we reported a lower prevalence of non-urgent conditions compared to literature, especially regarding conjunctivitis and conditions associated with blepharitis. This needs to be further investigated to determine if these patients are being treated by their primary care physician or if they are self-medicating, as antibiotics can be bought without prescription in our country.

Finally, a large discrepancy was observed between the diagnosis given by the ER physician and the ophthalmologist, especially regarding true ophthalmic emergencies. Better ophthalmology training for ER physicians could lead to more effective management of ER eye-related visits and better outcomes for our patients.

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Conflicts of interest

The authors declare that there are no conflicts of interest regarding the publication of this article.

Ethical disclosures

Ethics approval was obtained from the Institutional Review Board. The research adhered to the resolution 8430/1993 of the Health Ministry of Colombia.

Protection of human and animal subjects. The authors declare that no experiments were performed on humans or animals for this study.

Confidentiality of data. The authors declare that they have followed the protocols of their work center on the publication of patient data.

Right to privacy and informed consent. The authors followed the official protocols from their work center.

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