

MICHALCZEWSKA, Aneta, MARSZALEK-MOC, Kaja, PALACZ, Karolina Alicja, MIERNIK-SKRZYPCZAK, Magdalena, JASIEWICZ, Maria, KAMIŃSKA, Monika, KARNAS-BOGNACKA, Patrycja and DĄBROWSKA, Natalia. Retrospective Analysis of Reasons for Presenting to Emergency Ophthalmic Care in Poland and the USA – Literature Review. Quality in Sport. 2024;15:51798. eISSN 2450-3118.

<https://dx.doi.org/10.12775/QS.2024.15.51798>

<https://apcz.umk.pl/QS/article/view/51798>

The journal has had 20 points in Ministry of Higher Education and Science of Poland parametric evaluation. Annex to the announcement of the Minister of Higher Education and Science of 05.01.2024. No. 32553.

Has a Journal's Unique Identifier: 201398. Scientific disciplines assigned: Economics and finance (Field of social sciences); Management and Quality Sciences (Field of social sciences).

Punkty Ministerialne z 2019 - aktualny rok 20 punktów. Załącznik do komunikatu Ministra Szkolnictwa Wyższego i Nauki z dnia 05.01.2024 r. Lp. 32553. Posiada Unikatowy Identyfikator Czasopisma: 201398.

Przypisane dyscypliny naukowe: Ekonomia i finanse (Dziedzina nauk społecznych); Nauki o zarządzaniu i jakości (Dziedzina nauk społecznych).

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The authors declare that there is no conflict of interests regarding the publication of this paper.

Received: 27.05.2024. Revised: 20.06.2024. Accepted: 01.07.2024. Published: 04.07.2024.

## **Retrospective Analysis of Reasons for Presenting to Emergency Ophthalmic Care in Poland and the USA – Literature Review**

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## **Abstract**

**Introduction.** Emergency Department is a hospital unit, where is provided care in in cases of sudden threat to life and health. One of the reasons why patients come to the Emergency Department is eye damage. Emergency ophthalmological services are a very important form of ophthalmological care because some conditions and diseases require quick intervention to prevent permanent vision damage or eye loss. Patients come to hospital emergency departments for many reasons, such as: eyeball injury, sudden pain or unexpected deterioration of vision. It is worth noting that some patients do not understand the provision of services within health care units and in conditions that do not require urgent care, they seek it in emergency rooms.

**Aim of study.** The following study analyzes the reasons for reporting to emergency ophthalmological services in Poland and the United States. Knowing the most common causes of patients' ailments and the factors that influence them, we can plan strategies for providing specific services within health care units.

**Materials and methods.** The work reviews articles published in the years 2005-2023 in Poland and the United States of America. The results obtained from individual studies were divided in terms of age, gender, traumatic and non-traumatic causes. Additionally, it was checked how often patients had to be hospitalized after staying in Polish emergency departments.

**Conclusions.** Injuries and other eye diseases affect patients regardless of gender and age. Most often, these are adult men.

**KEY WORDS:** ED, eye trauma, eye injury, emergency department, vision damage, eye loss

## INTRODUCTION

Undoubtedly, disturbing symptoms that prompt patients to seek medical help, including in the Emergency Department (ED), are primarily pain in the eyeball or its surrounding area, as well as sudden loss or deterioration of vision, which may occur simultaneously or separately.

The causes of these emergencies can be briefly classified as traumatic and non-traumatic, with or without pain, and may be caused by pathology within the organ of vision or related to other diseases, including systemic ones.

Pain in the eyeball or its surrounding area may be caused by inflammation (e.g. eyeball, eyelid margins, conjunctiva, sclera, anterior uvea, orbit, lacrimal sac) [1, 2, 3, 4].

Other causes of ophthalmological pain include: incorrectly treated or untreated visual defects, dry eye syndrome, ischemic eye syndrome, acute angle closure, poisoning (e.g. with phosgene), and postoperative injuries and ailments within the eyeball [5, 6, 7, 8, 9].

In addition, pain symptoms may have causes that do not have their source in ophthalmological diseases, such as ENT diseases (anatomical abnormalities, sinusitis), dental diseases (referred pain), neurological diseases (intracranial hypertension, migraine, cluster headaches, trigeminal neuralgia), oncological (orbital tumor), cardiological (atherosclerosis) or rheumatological (for example, vasculitis such as giant cell arteritis, Behçet's disease, or granulomatosis with polyangiitis) [10, 11, 12, 13, 14, 15, 16, 17, 18, 19].

Noteworthy are disturbing symptoms such as sudden loss of vision or deterioration of vision, which may also have various etiopathogenesis.

Ophthalmological causes include, among others, optic neuropathies, which may be inflammatory (caused by, among others, autoimmune diseases, including demyelinating diseases, such as multiple sclerosis), neuropathy caused by diabetes, ischemic, toxic (drug-induced, e.g. as a side effect of hydroxychloroquine, some antibiotics, chemotherapeutics) or as an implication of poisoning (e.g. with insecticides, heavy metals, methanol) [20, 21, 22, 23, 24, 25].

Moreover, vision disorders may be caused by retinal pathologies, such as retinal vein and artery occlusion, retinal detachment, and intraocular bleeding [26, 27, 28].

All of the above-mentioned ailments undoubtedly require immediate explanation and implementation of appropriate therapeutic procedures (especially if the cause may be a systemic disease or severe poisoning), although some of them can be successfully diagnosed and treated on an outpatient basis, without the need for intervention in the emergency department.

This paper will discuss the causes of patients reporting to emergency ophthalmological services in Poland, based on the analysis of data from the literature.

## **AGE**

Ocular injuries affect patients of all ages. An analysis of the average age of patients presenting to the Emergency Department (ED) in three major cities in Poland was conducted and compared with data from the United States. At the ED of the Ophthalmology Faculty and Clinic at Warsaw Medical University, patients aged 1 month to 99 years presented between 2001 and 2006, with the average age of patients being 43.34 years [29]. At the ED of the Military Hospital in Poznań in 2004, patients aged 5 weeks to 96 years presented, with the average age of those presenting being  $40.7 \pm 18.6$  years [30]. At the ED of Jan Mikulicz-Radecki University Hospital in Wrocław, patients presented with ocular injuries from January 1, 2018, to December 31, 2018, with the average age of patients being 39.37 years. A cross-sectional study examining ED visits for ocular trauma from 2006 to 2013 using discharge data from the Nationwide Emergency Department Sample (NEDS), a publicly available data source developed by the Agency for Healthcare Research and Quality as part of the Healthcare Cost and Utilization Project (HCUP), found a demographic breakdown similar to the Polish data: 28% (27.2%–29.0%) were aged 0-19 years, 62.7% (62.0%–63%) were aged 20-59 years, and 9.3% (9.1%–10.0%) were aged 60 years or older [32].

## **GENDER**

In the department of ophthalmology admissions, individuals of both genders, male and female, present themselves for examination and treatment. The present study aimed to compare the percentage distribution of male and female patients who sought treatment at the emergency ophthalmology department in several cities across Poland with the corresponding data obtained from the United States. A study conducted by the Department of Ophthalmology at the Medical University of Warsaw between 2001 and 2006 analyzed patient attendance in the emergency service. The study aimed to investigate the reasons that compelled patients to seek emergency care and the distribution of genders receiving assistance. Notably, the findings of the study revealed that women accounted for 45.61% of the patients seeking emergency care, while men constituted 54.39% of the patients [29]. According to a retrospective analysis conducted on ophthalmologic emergencies at Poznań Military Hospital in 2004, it was found that 61% of the male population and 39% of the female population presented to the ophthalmic emergency department [30]. During the year-long study from January 1, 2018, to

December 31, 2018, at Jan Mikulicz-Radecki University Hospital in Wrocław, 42.516% of patients who attended the ophthalmology emergency service were women, while 57.484% were men [31]. When analyzing research outcomes, it is worth noting that findings from the United States do not exhibit significant discrepancies compared to those derived from Poland. Between January 1, 2006, and December 31, 2013, a study was conducted to examine the prevalence of ocular trauma among patients presenting at the emergency department (ED). This study utilized discharge data from the Nationwide Emergency Department Sample (NEDS), which is a publicly available data source developed by the Agency for Healthcare Research and Quality as part of the Healthcare Cost and Utilization Project (HCUP). The study revealed a noteworthy finding that 6.1% (95% confidence interval [CI] 66.0%–66.3%) of the patients who presented at the ophthalmology emergency department were males [32]. The present study utilized data from three nationally representative surveys, namely the National Ambulatory Medical Care Survey (NAMCS), the National Hospital Ambulatory Medical Care Survey (NHAMCS), and the National Hospital Discharge Survey (NHDS), to estimate the incidence of eye injuries treated across various healthcare settings, including emergency departments, inpatient and outpatient facilities, and private physicians' offices, along with their etiology and clinical characteristics. The findings revealed that males had a significantly higher rate of eye injury (9.5 per 1000) compared to females (4.5 per 1000) [33].

## **HOSPITALIZATION**

Among patients presenting to the Hospital Emergency Department for ophthalmic reasons, there are those requiring urgent outpatient medical assistance as well as patients necessitating hospitalization.

In order to assess the frequency of hospitalizations among presenting patients, works by Polish and foreign authors were analyzed. Brzezińska et al. reported that out of 4722 ophthalmic patients who presented to the Emergency Department of the Military Hospital in Poznań in 2004, hospitalization was proposed to 112 individuals, accounting for 2.37% of all presentations [30].

Ewa Langwińska-Wośko, Izabella Wójcicki, and Sebastian Gajda retrospectively analyzed a group of 40,476 patients who presented to the emergency ophthalmology department of the Department and Clinic of Ophthalmology, Second Faculty of Medicine, Warsaw Medical University, between 2001 and 2006. Among those presenting, 905 individuals (2.24%) required hospitalization [29].

Piotr Marszałik, in his doctoral dissertation, undertook an analysis of the reasons for ophthalmic patient presentations to the Emergency Department of the Specialist Medical Center named św. Jana Pawła II in Polanica Zdrój, between 2011 and 2015. In the aforementioned years, 7545 individuals presented to the Emergency Department, out of which 95 (1.26%) required hospitalization [34].

In Remigiusz Chrostek's doctoral dissertation titled "Schorzenia okulistyczne w praktyce oddziału ratunkowego – analiza kliniczna i epidemiologiczna" it is stated that 4977 individuals presented to the University Clinical Hospital Emergency Department named after Jana Mikulicza-Radeckiego in Wrocław in 2018 with symptoms related to the visual organ. Among the study group, 645 individuals (12.96%) were referred for treatment to another hospital department, with 603 individuals (12.12%) directed to the Ophthalmology Department or Pediatric Ophthalmology Department [31].

## **NON-TRAUMATIC CAUSES**

According to a conducted study that covered 4722 patients [30] the most frequent reason for visiting the ER that wasn't caused by injury was pain in the eye or conjunctivitis. Similar findings come from [29] research, but they managed to classify each non-traumatic state in category: scleritis, subconjunctival hemorrhage, glaucoma, iritis, macular pathologies, extraocular inflammation.

Each research team states that most of the common reasons for seeking help in the emergency room are injuries. However, patients without trauma to the eye and surrounding tissue could seek help in ambulatory medicine, such as out-patients clinics.

In order to provide good quality ophthalmology care and sustain workflow in the ER, researchers agree that outpatient ophthalmology clinics should be considered to have a valid position in healthcare[29, 31].

To ensure better accessibility for patients needing ophthalmological care, the national health system should provide enhanced educational resources for both patients and primary care physicians. [31][35].

Based on [34] analysis a certain dependence can be observed. Ocular injuries, eye burns, and ailments affecting the protective structures of the eye such as eyelids and conjunctiva were notably more prevalent among individuals residing in rural areas. Conversely, urban residents showed a higher incidence of conditions like glaucoma, corneal diseases, and retinal ailments (excluding vascular conditions).

## EYE TRAUMA

According to numerous studies [29, 30, 31, 32, 33, 34, 35, 36, 37], traumatic causes are the most common reason for reporting to the Ophthalmological Emergency Department. [29] Among the traumatic diagnoses made at the Ophthalmological Emergency Department of the Military Hospital in Poznań in the period from January 1, 2004 to December 31, 2004, as many as 50% concerned the presence of a superficial foreign body. 30% of diagnoses were corneal erosions without information about a history of trauma, 8% were blunt injuries of the eyeball, 6% were isolated injuries of the protective apparatus of the eyeball, and 5.5% were burns, most of which were chemical burns (56%). , then photoelectric (28%) and thermal (16%). Penetrating injuries accounted for 0.5% of all trauma diagnoses [30]. In the case of another study conducted from January 1, 2018. until December 31, 2018 in the Emergency Department of the University Clinical Hospital. Jan Mikulicz-Radecki in Wrocław, the most common diagnosis was a foreign body in the outer part of the eye [31], this tendency was also confirmed by a retrospective analysis of the reasons for patients reporting eye complaints to the Emergency Department of the Emergency Department at the SCM in Polanica Zdrój in the years 2011-2015 [6]. Moreover, she indicated that the common causes were also a layered wound (11.9%) and eye contusion (6.83%). [36]

According to a retrospective study conducted from January 2004 to December 2018 at the Centro Hospitalar Universitário do Porto, the most common diagnoses for severe eye injuries in patients evaluated in the emergency room were ruptured (33.8%) and penetrating (20.9%) injuries, and the most common site of injury was was home [39].

In southern Finland in 2011-2012, the incidence of eye injuries was 38/100,000/year among people aged 61 years and older. The most common types of injuries were minor injuries (48%), contusions (22%), chemical injuries (10%), eyelid wounds (8%), open eye injuries (OGI; 7%), and orbital fractures (5%). The main causes of eye injuries were falls (22%), needlestick injuries (19%), superficial foreign bodies (18%), and chemicals (12%)[40].

Analyzing a study on the American population in the years 2006-2013, a decreasing trend in the incidence of eye injuries and significant seasonality in their occurrence were observed. Statistically, they occurred more often in late spring and summer, but with lower frequency in the winter months [32].

## **CONCLUSION**

Patients most often come to the ophthalmology emergency room because of injuries to the eyeball. Injuries and other eye diseases affect patients regardless of gender and age. Most often, these are adult men. A significant minority of patients require hospitalization. Patients who require outpatient care, rather than acute care, also come to emergency departments. In such cases, patients should be instructed where to seek help in similar situations.

## **DISCLOSURE**

### **Author's contribution**

**Aneta Michalczewska:** Conceptualization, writing rough preparation,

**Kaja Marszalek-Moc:** Writing rough preparation, formal analysis,

**Magdalena Miernik-Skrzypczak:** supervision, resources

**Maria Jasiewicz:** visualization, data curation

**Monika Kamińska:** Methodology, software,

**Patrycja Karnas-Bognacka:** check

**Natalia Dąbrowska:** investigation,

**Karolina Alicja Pałac:** writing and editing,

**Project administration:** **Karolina Alicja Pałac**

All authors have read and agreed with the published version of the manuscript.

### **Conflict of interest**

The authors deny any conflict of interest

### **Institutional Review Board Statement**

Not applicable – Not required

### **Financing statement**

The study received no specific funding

### **Informed Consent Statement**

Not applicable – Not required

### **Data Availability Statement**

Not applicable



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