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Evaluation of the Manchester Triage System in Patients with Acute Primary Angle Closure Attack: A Retrospective Study

Avaliação do Sistema de Triagem de Manchester em Doentes com Crise de Encerramento Agudo Primário do Ângulo Iridocorneano: Um Estudo Retrospetivo

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ABSTRACT

Introduction: Acute primary angle closure attack is an ophthalmological emergency. The aim of this study was to describe the cases diagnosed in the Emergency Department, by correlating the initial complaint with the Manchester triage level and ultimately the time needed until ophthalmological evaluation and iridotomy.

Methods: Retrospective analysis of the electronic medical records of patients with acute primary angle closure attack that attended the Ophthalmology Emergency Department of our tertiary center between January 2010 and December 2020. Overall, 2228 Emergency Department episodes coded with the diagnoses glaucoma or ocular hypertension were retrieved, followed by screening of each episode for correct identification of true acute primary angle closure attacks. Clinical data was gathered, including Manchester triage level, presenting complaint, intraocular pressure at presentation, first medical specialty that observed the patient, time until observation by Ophthalmology and time until laser iridotomy.

Results: Among the 120 patients identified, 84 (70%) were female and the mean age was 68 ± 12 years. Mean intraocular pressure at admission was 53.4 ± 12.4 mmHg, and 9.2% of patients presented only non-ocular complaints, while 9.2% presented mixed complaints (ocular and non-ocular). Most patients (68.1%) with only non-ocular or mixed complaints were triaged to a non-ophthalmologist ($p < 0.001$). Concerning the triage system, at admission, most patients (66.7%) were labelled yellow (urgent), while 9.2% and none were labelled as orange (very urgent) or red (emergent), respectively. Most patients (83.3%) were directly sent to Ophthalmology (properly triaged), while the remaining were incorrectly assigned to a non-ophthalmologist. Median time until observation by Ophthalmology was 49 minutes in the properly triaged group (min. 15, max. 404), while it was 288 minutes (min. 45, max. 871) in those who were incorrectly triaged ($p < 0.001$). Likewise, median time until treatment with laser iridotomy was 203 minutes in the properly triaged group (min. 22, max. 1440) and 353 minutes in the incorrectly triaged group (min.112, max. 947) ($p < 0.001$).

Conclusion: Most patients with acute primary angle closure attack were not properly triaged according to the level of the Manchester triage system. There was a significant delay in the diagnosis and treatment of those patients who were first assigned to non-ophthalmologists. There is a need to raise awareness regarding the presenting signs and symptoms of an acute primary angle closure attack in order to avoid preventable vision loss.

Keywords: Emergency Service, Hospital; Glaucoma, Angle-Closure/diagnosis; Glaucoma, Angle-Closure/therapy; Triage

RESUMO

Introdução: A crise de encerramento agudo primário do ângulo iridocorneano é uma emergência oftalmológica. O objetivo deste estudo foi descrever os casos admitidos no Serviço de Urgência do Centro Hospitalar Universitário São João, correlacionando a queixa inicial com o nível de triagem de Manchester atribuído e o tempo até observação por Oftalmologia e realização de iridotomia.

Métodos: Análise retrospetiva dos registos clínicos dos doentes com encerramento agudo primário do ângulo, admitidos no Serviço de Urgência entre janeiro de 2010 e dezembro de 2020. Foram revistos 2228 episódios com diagnóstico de glaucoma ou hipertensão ocular para identificação correta dos casos de crise de encerramento do ângulo. Foram extraídas variáveis, nomeadamente o nível de triagem de Manchester atribuído, queixa principal, pressão intraocular à admissão, especialidade responsável pelo primeiro contacto médico e tempos até observação por Oftalmologia e até iridotomia.

Resultados: Foram identificados 120 doentes, 84 (70%) do sexo feminino, com idade média de 68 ± 12 (desvio padrão) anos. A pressão intraocular média à admissão foi de 53,4 ± 12,4 mmHg. Em 9,2% dos doentes a queixa principal foi não-ocular, enquanto 9,2% apresentavam queixas não-oculares e oculares associadas. A maioria (68,1%) dos doentes com queixas não-oculares ou mistas foi triada para um não-oftalmologista. Segundo o sistema de triagem, a maioria (66,7%) dos doentes foi triada com nível amarelo (urgente), 9,2% foram triados com laranja (muito urgente) e nenhum vermelho (emergente). O primeiro especialista a observar os doentes após a triagem foi um oftalmologista em 83,3% dos casos (corretamente triados), enquanto os restantes foram inicialmente observados por outra especialidade. O tempo mediano até observação por Oftalmologia foi de 288 minutos (min. 45, máx. 871) num doente incorretamente triado e 49 minutos (min. 15, máx. 404) ($p < 0,001$) em doentes corretamente triados. O tempo mediano até realização de iridotomia laser foi de 353 minutos (min. 112, máx. 947) nos doentes incorretamente triados e 203 minutos (min. 22, máx. 1440) nos corretamente triados ($p < 0,001$).

Conclusão: A maioria dos doentes com crise de encerramento agudo primário do ângulo iridocorneano não foi triada de acordo com o grau de prioridade apropriado segundo o sistema de triagem de Manchester. Nos doentes que não foram imediatamente seguidos por Oftalmologia verificou-se um atraso significativo no diagnóstico e início do tratamento. Torna-se premente a consciencialização dos profissionais de saúde sobre esta condição clínica e a otimização do processo de triagem para minimizar a perda de visão.

Palavras-chave: Glaucoma de Ângulo Fechado/diagnóstico; Glaucoma de Ângulo Fechado/tratamento; Serviço de Urgência Hospitalar; Triagem

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INTRODUCTION

Glaucoma is a chronic, progressive eye disease caused by damage to the optic nerve, inducing the loss of nerve fibres and visual field loss. It is the leading cause of irreversible blindness worldwide.[1-4] Even though not very prevalent, considering all types of glaucoma, the acute closure of the iridocorneal angle [often called acute glaucoma - a form of presentation of primary angle-closure glaucoma (PACG)] - is one of the most potentially severe forms of the disease. Although the overall prevalence of PACG is lower than that of primary open-angle glaucoma - POAG (0.50% *vs.* 3.5%, respectively), PACG involves a higher risk of blindness (25% *vs.* 10% over a lifetime),[3,5] accounting for approximately 50% of cases of bilateral blindness caused by glaucoma.[4,5] An estimated 23.36 million cases of PACG affecting patients aged 40-80 have been found in 2020, increasing to 32.04 million in 2040, mostly affecting Asia (24.50 million cases) and Europe (1.46 million).[1] A higher prevalence of PACG has been found in Greenland and Canadian Eskimos and also in Asians, and lower in Afro-descendants, in whom POAG is more prevalent.[1-8]

Female patients are mostly affected, with major differences between genders at older ages, considering that women have a longer life expectancy.[2] This finding could also be related to the fact that female patients tend to present with narrower anterior chambers, showing a quicker reduction in its size between the fourth and fifth decades of life. On the other hand, no relationship between a greater anatomical predisposition was ever proved to underly the higher prevalence in Eskimos and Asians.[5] In addition to gender and an anatomical predisposition, ageing and a family history of angle-closure glaucoma are other known risk factors.[9] In addition to gender, age and anatomical predisposition (shallow anterior chamber, reduced corneal diameter and increased lens thickness), other factors predisposing to an acute angle closure crisis have been found.[3-5,10] There are some drugs that could potentially predispose to the anteroposition of the iris-crystal complex, narrowing of the angle due to mydriasis and/or disruption of the angle with uveal effusion. These mostly include alpha and beta-2 adrenergic agonists, anticholinergics, antihistamines with anticholinergic action, sulfonamides, and serotonergic agents. Cholinergic agonists are related to a different mechanism of angle closure, through pupillary block due to miosis.[11,12] Considering the ageing of the population and the increase in polymedication, including these drugs, particularly psychotropic drugs, the risk of angle closure must be considered in elderly patients with an underlying anatomical predisposition.

Angle closure is defined by the presence of iridotrabecular contact in at least three quadrants, by apposition (it opens with gonioscopic indentation - pressure on the cornea with a contact lens suitable for evaluating the angle) or through the presence of anterior synechiae (it does not open with indentation). The following mechanisms have been described: a) pupillary block (blocking the passage of aqueous humour from the posterior chamber to the anterior chamber, with subsequent anterior bulging of the iris, closing the angle), b) plateau iris, c) intumescent lens (i.e., phacomorphic component: the closure of the angle by a phacomorphic mechanism results from pupillary blockage due to the presence of an intumescent lens), or by d) anteroposition of the iris-crystal complex, for example as a side-effect of drugs or due to posterior changes to the lens (as seen in malignant glaucoma - aqueous misdirection syndrome).[3-5] There is sometimes a combination of mechanisms, and the identification of a single mechanism could be a difficult task.

Primary angle closure can be divided into three subtypes according to its temporal evolution[4,5]:

- acute angle closure related to a rapid and circumferential apposition of the iris over the whole trabecular meshwork, abruptly preventing the drainage of aqueous humour, with a rapid and significant rise in intraocular pressure, requiring a quick diagnosis and emergent ophthalmic approach;
- intermittent angle closure, with clinical manifestations similar to those of acute closure, even though with lower intensity and spontaneous resolution;
- chronic angle closure, with a slow but progressive evolution, often with no symptoms, and potentially leading to chronic angle-closure glaucoma.

Depending on the mechanism and time course, angle closure can lead to ocular hypertension (with or without associated symptoms) and, with enough intensity for enough time, to optic neuropathy - glaucoma.

In an acute angle closure crisis, patients may present with acute eye symptoms (red eye and/or eye pain, tearing, reduced or blurred vision, among others) and/or systemic complaints, including headache, nausea and/or vomiting. Considering the eye signs (which are usually unilateral), the patients often present with conjunctival hyperaemia, corneal oedema, and clouding, with one pupil in mydriasis that is not very reactive to light (usually the most readily noticeable sign). These could be relevant for a differential diagnosis by non-ophthalmologists or other healthcare professionals.

Due to the fact that it is a sight-threatening eye condition, in which an irreversible loss of nerve fibres in the optic nerve could occur at any moment, acute angle closure should be considered an emergency (red level in Manchester Triage system), requiring an emergent approach (including the administration of topical and systemic ocular hypotensive agents and subsequent laser iridotomy to equalize intraocular pressure in the posterior and anterior chambers

and solve the pupillary block). Eye symptoms could help a referral to an ophthalmologist. However, systemic symptoms (headache, nausea and/or vomiting) may be considered more relevant by patients and/or those in charge of medical screening, sometimes leading to a delay in treatment.[13]

This study was aimed at characterising the group of patients attending the emergency department in our hospital, presenting with a primary angle closure crisis, focused on a specific attention from screening to treatment.

MATERIAL AND METHODS

This was a retrospective observational cross-sectional study involving all patients presenting with acute primary angle closure at emergency [*Centro Hospitalar e Universitário de São João* (CHUSJ)], the second largest tertiary centre in Portugal, between January 2010 and December 2020. All episodes with a diagnosis of glaucoma or ocular hypertension (International Classification of Diseases - ICD9 365.xx or ICD10 H40.xx) were obtained from the ALERT® computer system, to avoid excluding cases due to incorrect or unspecific coding. A diagnosis must be defined in the system, which is used for all patients attending emergency, before the patient is discharged. In an initial phase, 2,228 patients were selected. All patients with primary acute closure of the iridocorneal angle were included, including the mechanisms of pupillary block, plateau iris, phacomorphic glaucoma and closure potentially related to adverse effects of drugs, when these were associated with the acute angle closure crisis, as described in literature. Patient selection was based on the presence of the following inclusion criteria:

1. Presence of at least one of the following symptoms: blurred vision, light halos, loss of vision, eye or periocular pain, red eye, nausea, vomiting and/or headache;
2. Intraocular pressure > 21 mmHg;
3. Presence of at least one of the following signs: corneal oedema, low anterior chamber and/or pupil in non-reactive mydriasis;
4. Closure of the angle found on gonioscopy (when corneal transparency allowed it).

Demographic and clinical variables were obtained, including any medication potentially predisposing to angle closure [from the *Registo Nacional de Saúde* (RSE)/ *Registo Nacional do Utente* (RNU) when available], Manchester triage level (blue - non-urgent; green - standard; yellow - urgent; orange - very urgent; red - immediate), chief complaints (eye symptoms – reduced vision, blurred vision, red eye, pain; systemic symptoms - headache, vomiting, nausea), intraocular pressure (IOP) on admission, referral specialty, time to ophthalmological evaluation and time to iridotomy. Consent was obtained from the Ethics Committee for the access to the ALERT® system and SClínico® platform. Informed consent was waived due to the retrospective nature of the study and the fact that no user-identifying data were used.

IBM SPSS Statistics® software, version 27 for Mac IOS® was used in statistical analysis. The Kolmogorov-Smirnov test and/or the qualitative evaluation of histograms were used to check the normal distribution of each continuous variable. Continuous variables were described using the mean (± standard deviation) or median (range), depending on whether they had a normal or non-normal distribution, respectively, and the comparison between groups was made using the t-test for independent samples or the Mann-Whitney U-test, depending on whether they had a normal or non-normal distribution, respectively. Categorical variables were described as relative proportions and groups were compared using the chi-square test or Fisher's exact test when there were not enough cases for the use of chi-square test.

RESULTS

A total of 120 emergency episodes were recorded, involving patients admitted for primary acute closure of the iridocorneal angle, between January 2010 and December 2020, and after reviewing the inclusion and exclusion criteria for secondary mechanisms of acute angle closure, including neovascular glaucoma, uveitis, trauma, and aqueous misdirection syndrome, as shown in Fig. 1.

Out of these, 84 (70%) female patients were included, with an average age of 68 ± 12 years. The average IOP on admission was 53.4 ± 12.4 mmHg. At triage, patients were mostly assessed as yellow (66.7%). No patients were assessed as red and only 9.2% were assessed as orange. Eleven patients (9.2%) mainly presented with isolated systemic symptoms (nausea, headaches and/or vomiting), while eleven patients (9.2%) presented with both systemic and eye symptoms (Table 1). Approximately one fifth of the patients (17.5%) were taking at least one drug that could potentially predispose to angle closure, and most (76.2%, n = 16) of these patients were taking a central nervous system (CNS) agent: antidepressants (57.1%),[11] including selective and non-selective serotonin and/or noradrenaline inhibitors, tricyclic antidepressants and trazodone, antipsychotics (9.5%),[11] dopamine agonists, namely levodopa (0.5%),[14] anticholinergics (9.5%)[11] and benzodiazepines (28.6%).[15] One (0.5%) patient was also taking indapamide[16] and one (0.5%) another patient was taking chlorthalidone.[17]

Patients were mostly evaluated by an ophthalmologist upon triage (83.3% of the patients), while 16.7% of the patients were incorrectly assessed at triage and were evaluated by another specialty: 13 patients (10.8%) by internal medicine, five patients (4.2%) by emergency medicine, one

patient (0.8%) by surgery and another patient by orthopaedics.

Patients were then analysed according to the type of screening: correct (directly to ophthalmology) or incorrect (Table 2). No significant differences were found between the groups in terms of age, gender and IOP. However, statistically significant differences ($p < 0.001$) were found as regards the symptoms described by the patients. Most patients who were referred to ophthalmology at triage presented with isolated eye symptoms (93%), while patients referred to other specialties mostly presented with isolated systemic complaints or systemic complaints combined with eye symptoms. Significant differences were also found in the Manchester triage level, where most patients (95%) who were directly evaluated by ophthalmology were assessed as green (standard) or yellow (urgent), while all incorrectly assessed patients were assigned a triage level of yellow (urgent) or orange (very urgent) ($p < 0.001$). There was a significant correlation between the triage assessment and the presenting symptom ($p = 0.009$). The median time up to medical evaluation by ophthalmology was 288 minutes (min 45, max 871) in patients who were not correctly assessed at triage and 49 minutes (min 15, max 404) ($p < 0.001$ between groups) in correctly assessed patients. Similarly, statistically significant differences were found in time to laser iridotomy [353 minutes (min 112, max 947) in patients who were not correctly assessed at triage *vs.* 203 minutes (min 22, max 1440) in those who were correctly assessed ($p < 0.001$)].

DISCUSSION

A total of 120 patients presenting with primary acute closure of the iridocorneal angle (acute glaucoma) attended emergency throughout 11 years at our tertiary centre (120 episodes). The gender percentage in our group of patients was in line with literature (70% female patients in our study *vs.* 75% according to the European Glaucoma Society),[3] probably due to an anatomical predisposition for a lower anterior chamber in female patients. The average age was 68 years, also in line with previous epidemiological studies, with angle closure having a peak incidence between 55 and 70 years.[9,18]

Although uncommon, this condition should be considered an emergency, and non-ophthalmologists should be aware of it. If it is considered an emergency, it would be expected to be assigned an red level in the Manchester triage, as its assessment and therapeutic approach should be immediate. According to the Portuguese Directorate-General of Health (DGS) guidelines,[19] 240 minutes is the maximum recommended waiting time when assessed as blue at triage

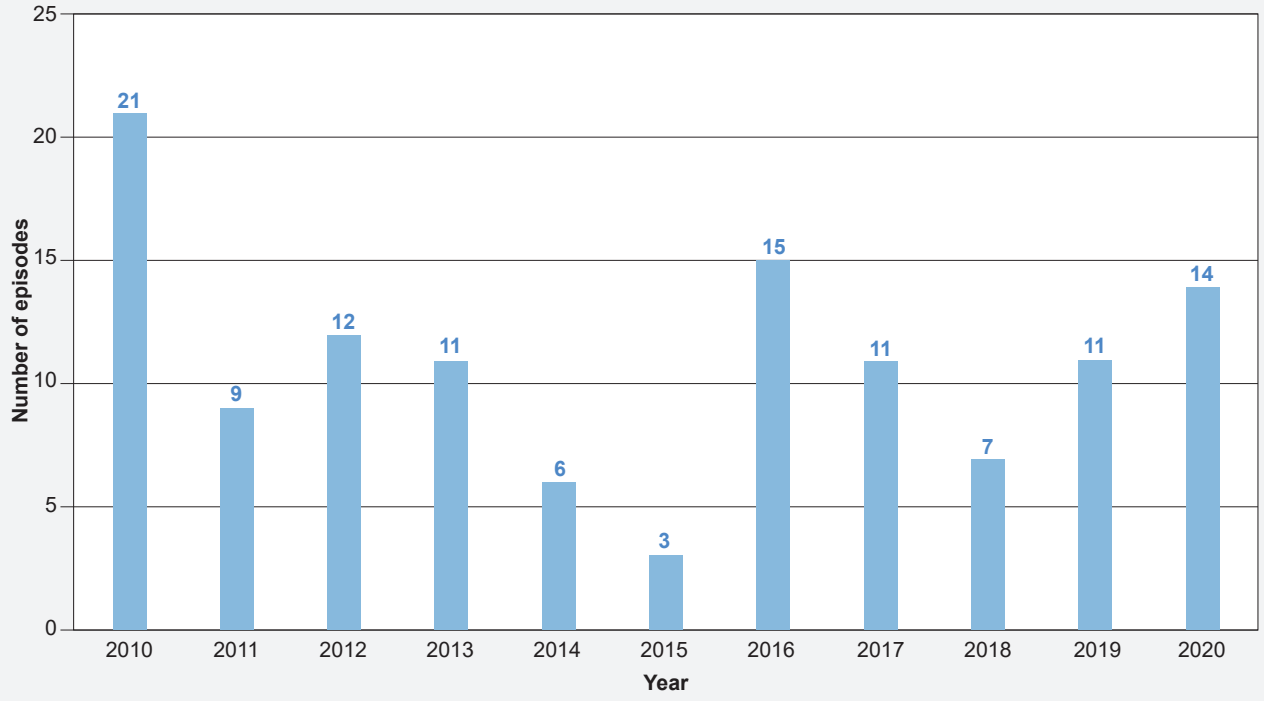

Figure 1 – Annual number of episodes of primary acute closure of the irido-corneal angle attending emergency at the *Centro Hospitalar Universitário de São João*, 2010-2020

Tabela 1 – Demographic and clinical characteristics (n = 120)

Age, mean ± standard deviation (years)	68 ± 12
Female gender, n (%)	84 (70)
Intraocular pressure on admission, mean ± standard deviation (mmHg)	53.4 ± 12.4
Main symptom	
Eye	98 (81.7)
Systemic (vomiting, headache and/or nausea)	11 (9.2)
Both	11 (9.2)
Manchester triage level, n (%)	
Blue	1 (0.8)
Green	27 (22.5)
Yellow	81 (67.5)
Orange	11 (9.2)
Red	0 (0)
Time (minutes) **from triage to ophthalmological evaluation**, median (range)	54 (15. 871)
Time to laser iridotomy (minutes), median (range)	211 (22. 1440)
Regularly on potentially predisposing drugs, n (%)	21 (17.5)
Antidepressants (SSRI, SNRI, TA, trazodone)	12 (57.1)
Benzodiazepine	6 (28.6)
Anticholinergic drugs	2 (9.5)
Antipsychotic drugs	2 (9.5)
Dopaminergic agonists (levodopa)	1 (0.5)
Indapamide	1 (0.5)
Chlortalidone	1 (0.5)

TA: tricyclic antidepressants; SNRI: serotonin and norepinephrine reuptake inhibitors; SSRI: selective serotonin reuptake inhibitors

(non-urgent), 120 minutes as green (standard), 60 minutes as yellow (urgent) and 10 minutes as orange (immediate). In the event of an emergency (red), care should be provided immediately. However, in our study, most patients (67.5%) were assessed as yellow. It is worth mentioning that the Manchester triage system was developed for the identification of patients at imminent risk of death, and visual impairment was not included in its design.[20] In addition, according to the DGS, there are still no guidelines or triage systems specifically aimed at eye symptoms including red eye and sudden loss of visual acuity, which is why we believe that the development of those is crucial.[19]

Even though no significant differences were found in terms of age and gender, the groups of patients correctly assessed and referred to ophthalmology and those initially assessed and referred to another specialty showed relevant differences related to the assessment of emergency, the type of symptoms, the presence of potentially predisposing medication and the times to ophthalmological evaluation and treatment with laser iridotomy. Patients presenting with eye symptoms and no systemic symptoms were correctly assessed to ophthalmology, even though these were more often assessed as green or yellow, while patients who presented with at least one systemic symptom (headache, nausea and/or vomiting), regardless of any association to eye symptoms, were more often referred and evaluated by another specialty.

Although the latter were more often assigned a higher priority level of care (yellow and orange), the time until they were correctly referred to ophthalmology, diagnosed and treated was significantly longer. Therefore, patients with systemic symptoms (with or without eye symptoms) tended to be referred to another medical area in emergency, presumably to exclude other differential diagnoses regarding the systemic symptoms. Almost a fifth (17.5%) of the patients were medicated with one or more drugs predisposing to angle closure. The effects of antidepressants (selective and non-selective serotonin and/or noradrenaline inhibitors, tricyclics and trazodone), anticholinergics and some antipsychotics are widely described in literature,[11] and some cases of angle closure related to dopamine analogues,[14] indapamide,[16] and chlorthalidone were described.[17] The

Table 2 – Comparison between patients correctly assessed (directly referred to ophthalmology) and those who were incorrectly assessed (referred to another specialty)

	Ophthalmology (n = 100, 83.3%)	**Other specialty** (n = 20, 16.7%)	***p*-value**
Age, mean ± standard deviation (years)	68 ± 13	69 ± 10	0.762[a]
Female gender, n (%)	67 (67)	17 (85)	0.18[b]
Intraocular pressure on admission, mean ± standard deviation (mmHg)	53.5 ± 12.3	53.2 ± 13.7	0.937[a]
Main symptom			
Eye	93 (93)	5 (25)	
Systemic (vomiting, headache and/or nausea)	2 (2)	9 (45)	**< 0.001**[c]
Both	5 (5)	6 (30)	
Manchester triage level, n (%)			
Blue	1 (1)	0 (0)	
Green	27 (27)	0 (0)	**< 0.001**[c]
Yellow	68 (68)	13 (65)	
Orange	4 (4)	7 (35)	
Time (minutes) **from triage to ophthalmological evaluation**, median (range)	49 (15 - 404)	288 (45 - 871)	**< 0.001**[d]
Time to laser iridotomy (minutes), median (range)	203 (22 - 1440)	353 (112 - 947)	**< 0.001**[d]

a: t-test for independent samples; **b**: chi-square test; **c**: Fisher's exact test; **d**: Mann-Whitney U-test.
Statistically significant values ($p < 0.05$) in bold.

association between benzodiazepines, a pharmacological class that is used quite frequently, and the increased risk of angle closure in patients with predisposing anatomy has been questioned.[15] In theory, these drugs could predispose to angle closure by relaxing the pupil sphincter and a mild anticholinergic effect.[21,22] A systematic review refutes this predisposition, defended by a single clinical case,[23] and has described, on the contrary, its hypotensive effect, so the cause-effect relationship between the closure of the iridocorneal angle and benzodiazepines, and their subsequent contraindication, is a topic of debate.[24]

There were limitations to this study. At first, the fact that it was a retrospective study, which assumes that all episodes are correctly diagnosed, was a limitation. In addition to the retrospective and cross-sectional nature, there may have been selection biases, bearing in mind that some of the patients correctly referred to ophthalmology and with shorter consultation times had initially been evaluated elsewhere (for example, by a private ophthalmologist). On the other hand, the assessment of the difference in visual acuity (and visual field) before and after the closure crisis would be relevant, to correlate the time taken to evaluate the patient with the visual repercussions. However, the lack of such data in most records did not allow this analysis. Finally, the onset of the COVID-19 pandemic was included in the year 2020. Nevertheless, no significant influence on the results would be expected, given that this pathology is usually associated with severe symptoms, leading patients to seek medical care. This can be confirmed by the number of cases detected that year, which was higher than the average for previous years (Fig. 1). However, the possibility that this may have been due to the lower capacity of other hospitals within the CHUSJ's referral area should be considered.

Following a review of literature, this is the first study comparing the time taken to deal with an ophthalmic emergency according to patient triage. As shown, a delay may exist in identifying and guiding this condition. The overlapping of systemic symptoms in older patients on polymedication may lead to the need to exclude other systemic pathologies that could be the cause of headache, including vomiting and/or new-onset nausea. This study was aimed at increasing the awareness of non-ophthalmologists regarding eye symptoms and the possible signs that could easily be identified, including red eye, corneal clouding, low anterior chamber, and mid mydriasis with poor (or no) pupillary response to light. In the absence of a direct ophthalmoscope, these signs could be recognized by using almost any light source.

The guidelines "Good Practices in Ophthalmology - Clinical Elements for Assessment and Referral" were focused on the efforts made by primary health physicians, and were developed in 2008[25] by the DGS, namely the Coordinating Committee of the National Program for Eye Health and aimed mainly at primary care physicians involved in dealing with eye symptoms and pathologies. However, there is a need to improve the triage system in emergency, as well as

the development of specific guidelines and algorithms for rapid consultation and guidance of eye pathologies.

CONCLUSION

Most patients with primary acute closure of the iridocorneal angle were not assessed at triage with the adequate priority according to the Manchester triage system. There was a significant delay in diagnosis and treatment of patients who were initially evaluated by a specialty other than ophthalmology. As this is an emergent condition with potentially irreversible loss of vision, the correct evaluation of any eye symptoms is crucial. Even though not very common, given its severity, the optimisation of the screening process could minimise the loss of visual function and increase the quality of life of these patients.

AWARDS AND PREVIOUS PRESENTATIONS

The abstract of this study was submitted for presentation as free communication to the *64.º Congresso da Sociedade Portuguesa de Oftalmologia*, held in Dec 2021, and to the 15th Congress of the European Society of Glaucoma, in June 2022.

AUTHOR CONTRIBUTION

MR, FG: Study conception and design; data preparation, collection, and analysis; writing of the manuscript; review and approval of the final manuscript.

JBB: Study conception and design; data preparation, collection, and analysis; review and approval of the final manuscript.

AFP: Data preparation, collection, and analysis; review and approval of the final manuscript.

FFR, FA, SES: Review and approval of the final manuscript.

ABM: Study conception and design; review and approval of the final manuscript.

HUMAN AND ANIMAL PROTECTION

The authors declare that this project complied with the regulations that were established by the Ethics and Clinical Research Committee, according to the 2013 update of the Helsinki Declaration of the World Medical Association.

CONFLICTS OF INTEREST

The authors declare that there were no conflicts of interest in writing this manuscript.

DATA CONFIDENTIALITY

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

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