Adequacy of Referrals for First Consultation in Ophthalmology

Adequação dos Pedidos de Primeira Consulta de Oftalmologia

Mário Lima-Fontes[1,2], Tomás Bragança-Ribau[3], Fernando Falcão-Reis[1,4], João Barbosa-Breda[1,5,6]

[1] Department of Ophthalmology, Centro Hospitalar e Universitário São João, Porto, Portugal
[2] Department of Biomedicine, Faculty of Medicine of the University of Porto, Porto, Portugal
[3] Faculty of Medicine of the University of Porto, Porto, Portugal
[4] Department of Surgery and Physiology, Faculty of Medicine of the University of Porto, Porto, Portugal
[5] Cardiovascular R&D Centre – UnIC@RISE, Department of Surgery and Physiology, Faculty of Medicine of the University of Porto, Porto, Portugal
[6] KULeuven, Research Group Ophthalmology, Department of Neurosciences, Leuven, Belgium

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ABSTRACT

INTRODUCTION: In the Portuguese National Health System, the General Practitioner (GP) is usually the first medical contact of the patient, at the primary health care level, and the gatekeeper for referral to other medical and surgical specialties (through a P1 request). This referral process is complex and susceptible to great variability, due to the frequent absence of guidelines. Thus, the aim of this study was to evaluate the referral process made by GP physicians to Ophthalmology, namely the level of concordance between the chosen priority and the clinical scenario, and between the clinical scenario described in the referral letter and that which was described by the ophthalmologist upon seeing the patient.

METHODS: In this cross-sectional observational study, the electronic health records of 1500 randomly selected first appointments of the Ophthalmology Department of Centro Hospitalar Universitário do São João, and their respective P1 requests were analyzed, out of a total of 9340 first appointments performed in 2019. Information was collected on the priority of the request, reason for the request, symptoms, signs, diagnoses, and clinical orientation provided by the ophthalmologist.

RESULTS: No predictor of the P1 priority was identified, namely regarding the patient's signs and symptoms or diagnosis suspected by the GP in the P1 request. A general lack of concordance was also observed between the signs and symptoms referred in the P1 request and those identified in the consultation.

CONCLUSION: This study reinforces the need for the creation of objective protocols that help GP practitioners in decision making when referring patients to Ophthalmology, regarding the priority of the requests, as well as the destination of the referral (Outpatient consultation or Emergency Department), in order to make the whole process more cost-effective, maximize available healthcare resources and ensure patient satisfaction and timely management.

KEYWORDS: Ophthalmology; Primary Health Care; Referral and Consultation; Specialization.

RESUMO

INTRODUÇÃO: No Sistema Nacional de Saúde Português, a Medicina Geral e Familiar (MGF) é habitualmente o primeiro contacto médico do doente, ao nível dos cuidados de saúde primários, e a porta para a referenciação a outras especialidades médicas e cirúrgicas. Este processo de referenciação é complexo e suscetível a uma grande variabilidade, pela ausência frequente de linhas orientadores que o guiem. Assim, o objetivo deste trabalho foi avaliar a referenciação feita pelos médicos de MGF para Oftalmologia, relativamente à concordância entre a prioridade do pedido e o quadro clínico apresentado, e entre o quadro clínico referido no pedido P1 e o encontrado na consulta.

MÉTODOS: Neste estudo observacional transversal foram analisados os registos clínicos eletrónicos de 1500 primeiras consultas, selecionadas de forma aleatória, do Serviço de Oftalmologia do Centro Hospitalar Universitário do São João, e os seus respetivos pedidos P1, de um total de 9340 primeiras consultas realizadas em 2019, e recolhida informação sobre a prioridade do pedido, motivo da consulta, sintomas, sinais, diagnósticos e orientação clínica dada pelo oftalmologista.

RESULTADOS: Não se identificou nenhum fator preditor do tipo de prioridade dado ao pedido P1, nomeadamente no que diz respeito aos sinais e sintomas do doente ou diagnóstico suspeitado pelo médico de MGF. Também se observou uma falta de concordância generalizada entre os sinais e sintomas referidos no pedido P1 e os identificados na consulta.

CONCLUSÃO: Este trabalho reforça a necessidade da criação de protocolos objetivos que auxiliem os médicos de MGF na tomada de decisão aquando da referenciação para Oftalmologia, no que diz respeito à prioridade dos pedidos, assim como ao destino da referenciação (Consulta Externa ou Serviço de Urgência), por forma a tornar todo o processo mais custo-eficaz, maximizar os recursos disponíveis e garantir a satisfação e orientação atempada do utente.

PALAVRAS-CHAVE: Encaminhamento e Consulta; Cuidados de Saúde Primários; Especialização; Oftalmologia.

INTRODUCTION

In Portugal's National Health System (called SNS), the General Practitioner (GP) typically is the initial contact patients have with SNS. When the clinical circumstances dictate, among its many responsibilities, the GP refers patients to other medical specialties. This role serves as the cornerstone of the referral system, an administrative framework for forwarding particular clinical scenarios to other specialists, when an additional diagnostic workup or more specialized care are required (gatekeeper method).[1]

Moreover, in the context of Primary Care, Portugal has a National Strategy for Vision Health,[2] which promotes ophthalmological examination for people at high risk of developing ophthalmic pathology, the remote systematic screening of diabetic retinopathy (DR) in a primary care setting, as well as the dissemination of the National Ophthalmology Referral Network on the SNS Portal, among others. Despite the screening for DR taking place at the primary care level (with remote collection of retinographies which are later classified elsewhere), several patients still do not have access to it and require the screening to be done at a hospital level.

Centro Hospitalar Universitário de São João EPE (CHUSJ) is the largest hospital institution in the North of Portugal, being classified as a tertiary center and the referral hospital for around 3.5 million people.[3] Therefore, it not only provides direct assistance to the population of the parishes of Bonfim, Paranhos and Campanhã in the municipality of Porto, and to the municipalities of Maia and Valongo, but also indirectly, and according to the specialty/subspecialty in question, it can serve as a reference for any area of the North Region.[4]

The referral for the Ophthalmology outpatient consultation is done by the GP through an electronic platform called "ALERT-P1". The GP is responsible for submitting clinical information, in the form of a request (hereinafter referred to as P1) to the destination hospital. In the hospital, the information from the P1 is evaluated and, depending on the chosen priority, signs and symptoms, diagnoses and medical history of the patient, the appointment is scheduled.

The escalation of health care is a multidimensional and complex process,[5,6] that depends not only on the characteristics of the patient,[7] but also on the examining physician8 and his clinical experience. It entails economic and human costs, both for the patient and for the SNS, and must therefore be a thoughtful and conscious process. Therefore, it should be cost-effective, maximizing available healthcare resources and ensuring patient satisfaction and timely management.

Given the inherent interpersonal variability in this process and the lack of guidelines, it is understandable that misreferrals occur in daily practice. This means that the patient's chosen priority and/or location for referral (outpatient consultation versus emergency department, ED) have been suboptimal. Despite this, little research has been conducted in this area, particularly in interventions aimed at improving the referral process.[1]

Thus, the primary goal of this work was to assess the adequacy of GP referrals to Ophthalmology in terms of consultation request priority and location for referral (outpatient *vs* ED) based on patient complaints/signs and diagnoses identified in the Ophthalmology Consultation.

MATERIAL AND METHODS

This was a cross-sectional retrospective observational study based on electronic health records of first comprehensive Ophthalmology consultations (the first appointment all patients entering the department have) performed in 2019 in CHUSJ and their respective P1.

The CHUSJ Ethics Committee approved this study, which was designed in accordance with the Helsinki Declaration. Given the lack of patient identifiable data and the retrospective nature of the data, informed consent was not obtained.

Being under 18 years of age was an exclusion criteria. A final list of 9340 consultations was obtained, from which 1500 were chosen at random.

All patients referred for ophthalmology observation were first examined in a comprehensive Ophthalmology consultation before being guided by the Ophthalmologist's indication for subspecialty consultations or surgical interventions, depending on the clinical scenario.

The "SClínico" and "ALERT P1" platforms were used to collect data on the 1500 consultations under investigation.

The ALERT P1 platform was used to collect information such as the type of priority assigned ("Normal" or "Urgent"), reason for referral, symptoms reported by the patient, and signs and possible diagnoses identified by the GP.

Regarding the reason for referral, the following classes were considered: "Patient complaint" when the P1 was requested due to a patient's ophthalmological complaint; "Screening for Diabetic Retinopathy"; "Reassessment" when there was an indication from a previous Ophthalmology consultation for a new assessment (which happens in conditions that do not require follow up in less than 12 months); "Recommended by an ophthalmologist" when referred by an ophthalmologist from the private sector; "Indication by optometrist"; "Loss of follow-up" when the patient failed to attend a regular hospital follow-up; "Refractive surgery" and "Renewal of driver's license" when explicitly described in P1.

The "SClínico" platform was used to collect information about the Ophthalmology consultation, such as the signs/symptoms and diagnoses, as well as the patient's gender and age. When the ophthalmologist's diagnosis was not clear or was not described in the first consultation, the first subsequent consultation was analyzed for clarification.

In order to facilitate the analysis, diagnoses were grouped into the following categories:

- Optic nerve and neurological diseases, other than glaucoma (including anterior ischemic optic neuropathy; optic nerve atrophy; persistence of myelin fibers; visual field changes);
- Existing strabismus;
- Refractive errors;
- Cataract;
- Opacification of the posterior lens capsule;
- Vitreoretinal diseases (includes posterior vitreous detachment; epiretinal membrane; and unspecified maculopathies);
- Retinal vascular diseases (includes venous occlusion; arterial occlusion; and hypertensive retinopathy);
- Eye inflammation (includes anterior, intermediate and posterior uveitis; retinitis; and panuveitis);
- Heredodegenerative diseases of the retina, choroid and optic nerve (includes retinitis pigmentosa; Stargardt's disease; coloboma; neurofibromatosis; and other genetic disorders);
- Diseases of the lacrimal system (includes epiphora and recurrent dacryocystitis).
- Eyelid diseases (includes dermatochalasia; blepharochalasia; ptosis; xanthelasma; entropion; ectropion; blepharitis; chalazion and warts);
- Diseases of the conjunctiva (includes conjunctivitis; pterygium; pingecula and melanosis);
- Corneal diseases (includes corneal foreign body; corneal ulcer or erosion; keratitis; corneal dystrophy; and leukoma);
- Suspected tumor (when only the term "tumor" was mentioned in P1, without further specification);
- Choroid nevus (when only "nevus" was referred).
- Benign tumors of the conjunctiva and eyelid (when the benignity of the tumor and its location were mentioned).;
- Post corneal transplant;
- Autoimmune systemic diseases;
- Systemic toxicity (pharmacotherapy side effects);
- Keratoconus;
- "Suspected glaucoma" – patients who had ocular hypertension, a suspicious cupping (greater than 0.6), narrow angle, or were using hypotensive drugs to control intraocular pressure were classified as "suspected glaucoma". Still regarding this group, a subdivision was made between patients with "controlled glaucoma" (if they did not have ocular hypertension), and "uncontrolled glaucoma" (if they had ocular hypertension).
- Diabetic retinopathy - patients were classified as having: "non-severe non-proliferative diabetic retinopathy (NSNPDR)"; "severe non-proliferative diabetic retinopathy (SNPDR)"; "Non-proliferative diabetic retinopathy" (NPDR) (when there was no reference to the severity of the disease); "proliferative diabetic retinopathy" (PDR); "unspecified diabetic retinopa-

thy" (USDR) (when the type of diabetic retinopathy was not specified); and "unclassifiable diabetic retinopathy" (UCDR) (when screening for diabetic retinopathy performed in primary care was inconclusive);
- Age-related macular degeneration (AMD) – patients were classified as having: "exudative AMD"; "non-exudative AMD" and "unspecified AMD" (when AMD type was not specified).

Statistical analyses were performed using SPSS software, version 22 (IBM®, Chicago, IL), with $p<0.05$ considered as significant.

The distribution of continuous variables was evaluated based on visual analysis of the histogram and the Kolmogorov-Smirnov test. Continuous variables were described using the mean and standard deviation – if they were normally distributed – or the median and interquartile range – if they were not normally distributed.

Categorical variables were described using their absolute value and their relative frequencies. Associations between categorical variables were evaluated using the chi-square test or Fisher's exact test, depending on the presence or absence of expected counts below 5 in an excessive number (greater than 20% of the cells). In the case of concordance analyses – between signs/symptoms and diagnoses described in the P1 and in the Ophthalmology consultation – Cohen's kappa statistics were also used. A kappa value <0.0 was considered as no agreement, values from 0.00 to 0.20 as slight agreement, from 0.21 to 0.40 as reasonable agreement, from 0.41 to 0.60 as moderate agreement, from 0.61 to 0.80 as substantial agreement and from 0.81 to 1 as almost perfect agreement.

Possible bias factors such as age and gender were also analyzed in relation to the type of priority. Three age groups were created for comparison purposes: group 1 – 18 to 39 years old; group 2 – 40 to 59 years old; group 3 – 60 to 99 years old. Thus, it was investigated whether there would be a statistically significant difference in the distribution of age and gender between the two types of priority (using Mann-Whitney's U test and Pearson's Chi-square test, respectively).

RESULTS

Patient's gender and age, reason for referral, and P1 priority type were described in Table 1. The median age of the sample was 67 years, and 900 patients (60%) were female. The vast majority (90.5%) of the P1 requests had a "Normal" priority and the three most frequent reasons for referral were "Patient's complaint" (71.7%), "Diabetic Retinopathy Screening" (10.5%), and "Reassessment" (6.3%).

Regarding the prevalence of each P1 sign/symptom among the 3 age groups defined, only 5 classifications presented significant differences (Table 2). Headache and nystagmus were more prevalent in the 18-39 age group, progressive vision loss was more frequently reported in the 40-59 age group, and floaters and the absence of signs/symptoms' information were more common in the 60-99 age group.

Concerning the distribution of P1 diagnoses (Table 2), existing strabismus, refractive error, keratoconus and eyelid diseases were significantly more prevalent in the 18-39 age group, while corneal diseases and the absence of a formal diagnosis was more common in the 40-59 age group. Cataract and diabetic retinopathy were more prevalent in the 60-99 group.

Table 1. Distribution of gender; age; reason for referral; and type of priority of P1.

	n =1500
Gender (female) n (%)	900 (60)
Age (years) median (interquartile range)	67 (54-76)
Reason for referral n (%)	
Patient complaint	1075 (71.7)
Screening for diabetic retinopathy	158 (10.5)
Reassessment	94 (6.3)
Indication by an ophthalmologist	81 (5.4)
Indication by optometrist	43 (2.9)
Loss of follow-up	26 (1.7)
Refractive surgery	15 (1.0)
Renewal of driver's license	8 (0.5)
P1 priority n (%)	
Normal	1357 (90.5)
Urgent	143 (9.5)

Categorical variables were described according to their absolute value and relative frequency. The continuous variable, age, was described using the median and its interquartile range as it did not show a normal distribution.

Table 3 summarizes the distribution of every symptom and diagnosis across the sample comparing the information from the P1 against that of the ophthalmology consultation. The concordance between the two information sources is also displayed. Regarding the signs and symptoms described in P1, progressive vision loss was the most frequent complaint, being present in 810 patients (54%). It should be noted that in 560 P1 (37.3%) there was no reference of any sign or symptom. Considering the diagnoses in the P1, the most prevalent were cataract and refractive error (18.4% and 13.6%, respectively). No diagnoses were mentioned in the majority (52.5%) of P1s. In most consultations performed by ophthalmologists there was no record of any symptom or sign (48.5%), and the most frequent complaint, when present, was progressive vision loss (38.0%). Regarding the prevalence of each diagnosis pointed out by the ophthalmologists, the most prevalent diagnoses were also cataract and refractive error (48.3% and 47.8%, respectively). No diagnoses were selected in 11.8% of patients. Regarding the agreement between signs/symptoms pointed out by the GP in P1 and those described in the ophthalmology appointment records (Table 3), nystagmus was the one with the highest agreement (k=0.666, p=0.001), while no other sign/symptom had a kappa value >0.41 (moderate or greater agreement). In terms of diagnoses, benign tumors of the conjunctiva and eyelid, and post-cornea transplant state were the only ones that showed perfect agreement (kappa=1). Existing strabismus; heredodegenerative dis-

Table 2. Prevalence per age group of each sign/symptom and diagnosis of P1.

	18-39 age group (n=166)	40-59 age group (n=329)	60-99 age group (n=1005)	*p* value
Sign/Symptom n (%)				
Scotoma	0 (0)	0 (0)	1 (0.1)	1#
Transient vision loss	0 (0)	1 (0.3)	3 (0.3)	1#
Nystagmus	**2 (1.2)**	0 (0)	0 (0)	**0.012#**
Chronic dry eye	1 (0.6)	0 (0)	9 (0.9)	0.224#
Diplopia	1 (0.6)	2 (0.6)	5 (0.5)	0.877#
Photophobia	1 (0.6)	0 (0)	3 (0.3)	0.536#
Ocular pain	1 (0.6)	4 (1.2)	14 (1.4)	0.880#
Acute vision loss	2 (1.2)	1 (0.3)	3 (0.3)	0.191#
Discomfort and red eye	5 (3.0)	10 (3.0)	50 (5.0)	0.216*
Floaters	2 (1.2)	8 (2.4)	**63 (6.3)**	**0.001***
Blurred vision	2 (1.2)	15 (4.6)	52 (5.2)	0.075*
Progressive vision loss	88 (53.0)	**209 (63.5)**	513 (51.0)	**<0.001***
Headache	**8 (4.8)**	3 (0.9)	6 (0.6)	**<0.001#**
No signs/symptoms	63 (38.0)	99 (30.1)	**397 (39.5)**	**0.009***
Diagnosis n (%)				
Existing strabismus	**6 (3.6)**	1 (0.3)	1 (0.1)	**<0.001#**
Refractive error	**64 (38.6)**	64 (19.4)	76 (7.6)	**<0.001***
Cataract	2 (1.2)	10 (3.0)	**264 (26.3)**	**<0.001***
Posterior capsule opacification	0 (0)	0 (0)	7 (0.7)	0.33#
Vitreoretinal diseases	0 (0)	2 (0.6)	7 (0.7)	0.772#
Retinal vascular diseases	0 (0)	4 (1.2)	14 (1.4)	0.373#
Ocular inflammation	1 (0.6)	1 (0.3)	1 (0.1)	0.256#
Heredodegenerative diseases of the retina, choroid and optic nerve	0 (0)	2 (0.6)	1 (0.1)	0.157#
Lacrimal apparatus disease	1 (0.6)	2 (0.6)	**35 (3.5)**	**0.004***
Eyelid disease	**10 (6.0)**	19 (5.8)	26 (2.6)	**0.007***
Conjunctival disease	1 (0.6)	5 (1.5)	7 (0.7)	0.344#
Corneal disease	1 (0.6)	**4 (1.2)**	2 (0.2)	**0.042#**
Tumors	1 (0.6)	0 (0)	0 (0)	0.111#
Nevus	0 (0)	2 (0.6)	0 (0)	0.06#
Benign tumors of the conjunctiva and eyelid	0 (0)	0 (0)	1 (0.1)	1#
Post corneal transplant	1 (0.6)	1 (0.3)	0 (0)	0.109#
Autoimmune diseases	0 (0)	1 (0.3)	0 (0)	0.331#
Keratoconus	**4 (2.4)**	1 (0.3)	1 (0.1)	**0.002#**
Glaucoma	3 (1.8)	15 (4.6)	39 (3.9)	0.228#
Controlled glaucoma	1 (0.6)	13 (4.0)	30 (3.0)	0.111*
Uncontrolled glaucoma	2 (1.2)	2 (0.6)	9 (0.9)	0.825#
Diabetic retinopathy	0 (0)	6 (1.8)	**59 (5.9)**	**<0.001***
NSNPDR	0 (0)	1 (0.3)	5 (0.5)	1#
SNPDR	0 (0)	0 (0)	7 (0.7)	0.33#
NPDR	0 (0)	0 (0)	1 (0.1)	1#
PDR	0 (0)	0 (0)	2 (0.2)	1#
USDR	0 (0)	2 (0.6)	**31 (3.1)**	**0.004***
UCDR	0 (0)	3 (0.9)	13 (1.3)	0.391#
AMD	0 (0)	1 (0.3)	12 (1.2)	0.194#
Exudative AMD	0 (0)	0 (0)	1 (0.1)	1#
Non-exudative AMD	0 (0)	0 (0)	2 (0.2)	1#
Not classified AMD	0 (0)	1 (0.3)	9 (0.9)	0.415#
No diagnosis	80 (48.2)	**198 (60.2)**	510 (50.7)	**0.006***

Categorical variables, sign/symptom and diagnosis of P1 were described according to their absolute value and relative frequency.

*Pearson chi-square. #Fisher's exact test. AMD – Age macular degeneration; NPDR - non-proliferative diabetic retinopathy; NSNPDR – non-severe non-proliferative diabetic retinopathy; PDR - proliferative diabetic retinopathy; SNPDR - severe non-proliferative diabetic retinopathy; UCDR – unclassifiable diabetic retinopathy; USDR – unspecified diabetic retinopathy.

Table 3. Comparison of the prevalence of each sign/symptom and diagnosis in the P1 order and in the Ophthalmology consultation.

	GP's P1 n (%)	Ophthalmology consultation n (%)	K value	*p* value
Sign/Symptom				
Scotoma	1 (0.1)	0 (0)		
Transient vision loss	4 (0.3)	2 (0.1)	0.332	**0.005**
Nystagmus	2 (0.1)	1 (0.1)	0.666	**0.001**
Chronic dry eye	10 (0.7)	11 (0.7)	0.185	**0.002**
Diplopia	8 (0.5)	4 (0.3)	0.331	**<0.001**
Photophobia	4 (0.3)	3 (0.2)	0.284	**0.008**
Ocular pain	19 (1.3)	9 (0.6)	0.064	0.109
Acute vision loss	6 (0.4)	0 (0)		
Discomfort and red eye	65 (4.3)	83 (5.5)	0.276	**<0.001**
Floaters	73 (4.9)	45 (3.0)	0.261	**<0.001**
Blurred vision	69 (4.6)	11 (0.7)	0.139	**<0.001**
Progressive vision loss	810 (54)	570 (38.0)	0.314	**0.001**
Headache	17 (1.1)	4 (0.3)	0.187	**<0.001**
Does not report symptoms	559 (37.3)	785 (52.3)	0.000	0.961
Nyctalopia	0 (0)	1 (0.1)		
Diagnosis				
Optic nerve and neurological diseases	0 (0)	8 (0.5)		
Existing strabismus	8 (0.5)	8 (0.5)	0.499	**<0.001**
Refractive error	204 (13.6)	717 (47.8)	0.161	**<0.001**
Cataract	276 (18.4)	725 (48.3)	0.114	**<0.001**
Posterior capsule opacification	7 (0.5)	56 (3.7)	0.120	**<0.001**
Vitreoretinal diseases	9 (0.6)	72 (4.8)	0.069	**<0.001**
Retinal vascular diseases	18 (1.2)	5 (0.3)	0.17	**0.001**
Ocular inflammation	3 (0.2)	1 (0.1)	0.000	1
Heredodegenerative diseases of the retina, choroid and optic nerve	3 (0.2)	9 (0.6)	0.498	**<0.001**
Diseases of the lacrimal system	38 (2.5)	45 (3.0)	0.294	**<0.001**
Eyelid diseases	55 (3.7)	121 (8.1)	0.342	**<0.001**
Conjunctival diseases	13 (0.9)	43 (2.9)	0.24	**<0.001**
Corneal diseases	7 (0.5)	68 (4.5)	0.126	**<0.001**
Tumors	1 (0.1)	0 (0)		
Nevus	2 (0.1)	16 (1.1)	0.109	<0.21
Benign tumors of the conjunctiva and eyelid	1 (0.1)	1 (0.1)	1	**<0.001**
Post corneal transplant	2 (0.1)	2 (0.1)	1	**<0.001**
Autoimmune diseases	1 (0.1)	1 (0.1)	0.000	1
Keratoconus	6 (0.4)	11 (0.7)	0.409	**<0.001**
Suspected glaucoma	57 (3.8)	79 (5.3)	0.158	**<0.001**
Controlled glaucoma	44 (2.9)	42 (2.8)	0.19	**<0.001**
Uncontrolled glaucoma	13 (0.9)	37 (2.50)	0.19	**0.003**
IOP	13 (0.9)	37 (2.5)		**<0.001**
Excavation	0 (0)	32 (2.1)		
Hypotensive treatment	0 (0)	6 (0.4)		
Narrow angle	0 (0)	9 (0.6)		
Diabetic retinopathy	65 (4.3)	33 (2.2)	0.161	**<0.001**
NSNPDR	6 (0.4)	17 (1.1)	0.256	**<0.001**
SNPDR	7 (0.5)	13 (0.9)	0.689	**<0.001**
NPDR	1 (0.1)	0 (0)		
PDR	2 (0.1)	3 (0.2)	0.399	**0.004**
NSDR	33 (2.2)	0 (0)		
UCDR	16 (1.1)	0 (0)		
AMD	13 (0.9)	23 (1.5)	0.106	**<0.001**
Exudative AMD	1 (0.1)	4 (0.3)	0.001	1
Non-exudative AMD	2 (0.1)	9 (0.6)	0.362	**<0.001**
Not classified AMD	10 (0.7)	0 (0)		
Drusen	0 (0)	10 (0.7)		
Pharmacological toxicity	0 (0)	1 (0.1)		
No diagnosis	788 (52.5)	177 (11.8)	0.011	1

Categorical variables, sign/symptom and diagnosis of P1 were described according to their absolute value and relative frequency. Cohen's kappa (k) represents the inter-rater agreement between the GP and the ophthalmologist and is displayed accompanied by its respective p-value for each sign/symptom and diagnosis. As such, the p value presented is for the significance of the concordance presented by Cohen's kappa. In bold are the statistically significant values.

AMD – age macular degeneration; NPDR - non-proliferative diabetic retinopathy; NSNPDR – non-severe non-proliferative diabetic retinopathy; PDR - proliferative diabetic retinopathy; SNPDR - severe non-proliferative diabetic retinopathy; UCDR – unclassifiable diabetic retinopathy; USDR – unspecified diabetic retinopathy.

Table 4. Gender and age distribution between both types of priority of P1.

	Normal priority (n=1357)	Urgent priority (n=143)	*p* value
Gender (female) n (%)	810 (59.7)	90 (62.9)	0.451*
Age (years) median (IQR)	63.4 (54.0-76.0)	68.0 (54.0-78.0)	0.365#

Categorical variables were described according to their absolute value and relative frequency. Continuous variables are described using the median and its interquartile range, as they are not normally distributed.

*Pearson's chi-square ($p< 0.05$). #Mann-Whitney U test ($p<0.05$). IQR – interquartile range.

Table 5. Type of referral, signs/symptoms and diagnoses of P1 distribution between both types of priority of P1.

	Normal priority (n=1357)	Urgent priority (n=143)	*p* value
Reason for referral, n (%)			
Patient complaint	977 (72.0)	98 (68.5)	0.382#
Screening for diabetic retinopathy	145 (10.7)	13 (9.1)	0.555#
Reassesment	83 (6.1)	11 (7.7)	0.460#
Recommended by an ophthalmologist	70 (5.2)	11 (7.7)	0.202#
Indication by optometrist	36 (2.6)	7 (4.9)	0.179*
Loss of follow-up	25 (1.8)	1 (0.7)	0.505*
Refractive surgery	15 (1.1)	0 (0)	0.386*
Renewal of driving license	6 (0.4)	2 (1.4)	0.173*
Sign/Symptom, n (%)			
Scotoma	1 (0.1)	0 (0)	1*
Transient vision loss	4 (0.3)	0 (0)	1*
Nystagmus	2 (0.1)	0 (0)	1*
Chronic dry eye	10 (0.7)	0 (0)	0.612*
Diplopia	5 (0.4)	3 (2.1)	0.33*
Photophobia	4 (0.3)	0 (0)	1*
Ocular pain	13 (1.0)	6 (4.2)	**0.06***
Acute vision loss	1 (0.1)	5 (3.5)	**<0.001***
Discomfort and red eye	54 (4.0)	11 (7.7)	**0.038#**
Floaters	61 (4.5)	12 (8.4)	**0.039#**
Blurred vision	59 (4.3)	10 (7.0)	0.151#
Progressive vision loss	749 (55.2)	61 (42.6)	**0.004#**
Headache	15 (1.1)	2 (1.4)	0.673*
Does not report symptoms	504 (37.1)	55 (38.5)	0.756#
Diagnosis, n (%)			
Existing strabismus	5 (0.4)	3 (2.1)	**0.033***
Refractive error	191 (14.1)	13 (9.1)	0.098#
Cataract	242 (17.8)	34 (23.8)	0.081#
Posterior capsule opacification	7 (0.5)	0 (0)	1*
Vitreoretinal diseases	7 (0.5)	2 (1.4)	0.209*
Retinal vascular diseases	14 (1.0)	4 (2.8)	0.084*
Ocular inflammation	3 (0.2)	0 (0)	1*
Heredodegenerative diseases of the retina, choroid and optic nerve	2 (0.1)	1 (0.7)	0.26*
Lacrimal apparatus disease	31 (2.3)	7 (4.9)	0.084*
Eyelid disease	49 (3.6)	6 (4.2)	0.723#
Conjunctival disease	11 (0.8)	2 (1.4)	0.626*
Corneal disease	6 (0.4)	1 (0.7)	0.505*
Tumors	0 (0)	1 (0.7)	0.095*
Nevus	0 (0)	2 (1.4)	**0.009***
Benign tumors of the conjunctiva and eyelid	0 (0)	1 (0.7)	0.095*
Post corneal transplant	1 (0.1)	1 (0.7)	0.182*
Autoimmune diseases	1 (0.1)	0 (0)	1*
Keratoconus	5 (0.5)	1 (0.7)	0.452*
Suspected glaucoma	42 (3.1)	15 (14.5)	**<0.001***
Controlled glaucoma	35 (2.6)	9 (6.3)	**0.031***
Uncontrolled glaucoma	7 (0.5)	6 (4.2)	**<0.001***
Diabetic retinopathy	51 (3.8)	14 (9.8)	**<0.001#**
NSNPDR	4 (0.3)	2 (1.4)	0.105*
SNPDR	4 (0.3)	3 (2.1)	**0.022***
NPDR	1 (0.1)	0 (0)	1*
PDR	2 (0.1)	0 (0)	1*
USDR	26 (1.9)	7 (4.9)	**0.032***
UCDR	14 (1.0)	2 (1.4)	0.66*
AMD	11 (0.8)	2 (1.4)	0.356*
Exudative AMD	0 (0)	1 (0.7)	0.095*
Non-exudative AMD	2 (0.1)	0 (0)	1*
Not classified AMD	9 (0.7)	1 (0.7)	1*
No diagnosis	729 (53.7)	59 (41.2)	**0.005#**

The absolute value and its relative frequency were used to describe the categorical variables.

#Pearson's Chi-square. *Fisher's exact test. AMD – age macular degeneration; NPDR - non-proliferative diabetic retinopathy; NSNPDR – non-severe non-proliferative diabetic retinopathy; PDR - proliferative diabetic retinopathy; SNPDR - severe non-proliferative diabetic retinopathy; UCDR – unclassifiable diabetic retinopathy; USDR – unspecified diabetic retinopathy.

eases of the retina, choroid and optic nerve; keratoconus; and SNPDR showed moderate or greater agreement.

No significant correlations were found between the priority of the P1 and the patients' gender or age (Table 4).

Table 5 shows the comparison of the reason for referral, the signs/symptoms, and the diagnoses of P1, with the type of priority of P1.

Regarding referral reasons, none of them showed a significant association with any P1 priority type. As for the P1 signs/symptoms, ocular pain, acute vision loss, discomfort and red eye, floaters, and progressive vision loss showed a statistically significant difference between priority types. All of the abovementioned were more frequent in requests with "Urgent" priority, except for progressive vision loss, which was more frequently associated with requests labelled as "Normal" priority. Regarding the diagnoses, existing strabismus, nevus, suspected glaucoma, controlled glaucoma, uncontrolled glaucoma, DR, SNPDR, USDR, and the non-reference to diagnosis showed a statistically significant difference between the P1 priority types. Among these, the absence of diagnosis was the only one that was significantly more frequent in "Normal" priority requests, with all the others presenting a higher prevalence of requests with "Urgent" priority.

DISCUSSION AND CONCLUSION

The analysis carried out in this study allowed the identification of numerous strengths, but also gaps, at various stages of the referral system.

According to our data, we found that out of a universe of 1500 patients, only 10.5% were referred for screening for diabetic retinopathy. This low proportion of cases is due to the existence of the Diabetic Retinopathy Screening Program at the level of primary health care, parallel to this process, which absorbs the vast majority of patients from the referral area of CHUSJ, thus reducing the pressure on hospital care.

Furthermore, the lack of congruence between the various P1s regarding the priority assigned to each sign/symptom or diagnosis is quite evident. In fact, the relationship seems to be random, except for occasional cases. It was also found that there are signs/symptoms, such as recent floaters, acute vision loss, new-onset diplopia, ocular pain, and transient vision loss, which led to a request for an outpatient consultation. However, due to their urgent nature, these cases should have been referred to an ophthalmology emergency department.

This points to the need to create guidelines to aid GPs in decision-making, regarding referrals to outpatient consultations or emergency ophthalmology services and the priority assigned to requests.

It also became evident that there was little agreement between the signs/symptoms of the patients indicated by the GPs and the signs/symptoms resulting from the evaluation by the ophthalmologists, for the same patient. These data support the idea that it would be useful for the clinical practice of GPs not only to provide norms to support referrals to Ophthalmology, but also to provide training for the evaluation of ophthalmological problems, since different signs/symptoms and diagnoses also entail different priorities/reference locations. It should be noted that much of the ophthalmologic pathology requires the use of specific instruments and differentiated training in them, which is not part of the GPs armamentarium. However, there are several signs/symptoms indicative of greater severity/urgency that deserve training at the Primary Care level, in order to improve the healthcare provided to the population.

Moreover, almost 50% of the ophthalmology consultations did not mention patient's complaints. It is essential to improve ophthalmology records, so other physicians can understand the particular clinical picture, if needed.

Regarding the limitations of the study, the retrospective nature of the data and the exclusive use of data available in the aforementioned electronic systems stand out, which is invariably associated with loss of information. In addition, of the 9340 episodes of first consultations obtained, only 1500 were analyzed, which may not be completely representative of the total sample. Furthermore, in P1, only the signs/symptoms and diagnoses that motivate the request for consultation are usually mentioned, which does not prevent the patient from presenting other signs/symptoms or diagnoses that are not expressly denied. Finally, it should also be noted that the specificity of the language applied in ophthalmology, not always an easy domain for other specialties, leads to an incomplete or inadequate characterization of patients' complaints.

With this work, we were able to objectively perceive the need to create practical guidelines to aid GP doctors in decision making when referring patients to Ophthalmology, with regard to the priority of requests, as well as to the place of referral (outpatient consultation or emergency department). Likewise, the data obtained also point to the importance of creating training programs in the assessment of ophthalmological pathologies at the level of primary health care.

In short, referral to Ophthalmology healthcare by GPs is a demanding process from a clinical point of view and must be based on well-established guidelines, in order to make the most of available resources.[1] To standardize the referral criteria for hospital health units, thus minimizing the interpersonal variability of this process, referral algorithms should be instituted, with well-defined priority criteria, that are simple, informative and that can be used by the attending physician in daily practice. (9, 10)

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MLF and TBR: Prepared the material, collected data, analysed and wrote the first draft of the manuscript

All authors contributed to the study conception and design, commented on previous versions of the manuscript. All authors read and approved the final manuscript.

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Corresponding Author/
Autor Correspondente:

Mário Lima-Fontes
Department of Ophthalmology,
Centro Hospitalar Universitário São João
Alameda Prof. Hernâni Monteiro,
4200-319 Porto, Portugal
marioruifontes@gmail.com

ORCID: 0000-0002-9126-3505