

New Screening Approach for Ocular Diseases

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Abstract

Objective: Present a new screening approach for ocular diseases. **Method:** Transversal, retrospective, single center study that analyzed medical records of patients from a social project on the prevention of blindness and amblyopia, which aimed at: 1) Detect the main ocular disorders such as amblyopia, primary angle-closure suspect (PACS); glaucoma suspect (GS); predisposing retinal detachment lesions (PRDL); age-related macular degeneration (AMD), and diabetic retinopathy (DR); 2) Perform cataract diagnosis; 3) Provide guidance and treatment for allergic conjunctivitis. 4) Prescribe glasses for children until 14 years of age. Participants were examined by a single specialist, holder of a post-doctoral degree in ophthalmology, with 36 years of experience and a sub-specialization in retina and vitreous. All data were analyzed in 2022. **Results:** The examiner diagnosed 42 cases of PACS, 21 of GS, 8 of PRDL, 14 of AMD, 3 of DR, 40 of cataract and 31 cases of allergic conjunctivitis. Thirty-three participants younger than 14 were prescribed glasses. Other pathologies included retinal detachment, papilledema, corneal ulcer, suspected conjunctival squamous cell carcinoma, retinal vasculitis, strabismus, uveitis, bilateral papilla paleness and lacrimal duct obstruction. Out of the 297 cases examined, 168 participants presented some type of alteration that could compromise their vision. **Conclusion:** The examiner's experience and knowledge were decisive factors for the quick diagnosis, advice, screening and/or treatment of several ocular diseases. The social project results reveal that the primary care and/or the screening performed by a specialist are likely to reduce blindness cases.

Keywords

Screening, Ocular Diseases, Primary Prevention, Secondary Prevention, Health Care Quality, Access, Evaluation, Amaurosis

1. Introduction

Access to specialized ophthalmic services has been observed in several countries, including in developed ones [1]. In Brazil, the situation is not different, despite the huge effort of associated specialized clinics within the National Health System (Sistema Único de Saúde, SUS), the only public health system that serves a population of over 190 million people, with 80% of them totally reliant on the system for any health care support [2], and on the several projects encouraged and sponsored by the Brazilian Council of Ophthalmology (CBO) and other philanthropic entities. One research commissioned by CBO revealed that one third of the Brazilian population has never been to an ophthalmology clinic and 10% had an ophthalmic exam only once [3]. At the same time, the legislation, which demands SUS to schedule consultations with health professionals within 15 days [4], does not guarantee fast specialized service [5]. When low-income patients present ophthalmic complaints, they seek the services of a Basic Health Unit (Unidade Básica de Saúde, UBS), which, in turn, refers the patients to an Ophthalmology Reference Center. An ophthalmic evaluation may take more than 6 months to happen [5]. It is important to point out that those who perform the screening at UBSs do not have enough knowledge or equipment to detect ocular pathologies. Consequently, many times the patients who present severe eye diseases need to wait several months for a specialized service and are likely to experience a worsening in their condition.

To improve the ophthalmic service deficiencies, a blindness and amblyopia prevention project was carried out in a population under extreme poverty, with the objective to diagnose some of the main pathologies responsible for visual impairment [6] [7]. This project, to the extent possible, aimed to address both the primary and secondary prevention measures of these eye diseases. It is important to point out that the ultimate objective in the prevention of diseases is to avoid, or at least reduce, by means of appropriate interventions, the exposure of individuals and the community to known and avoidable “causes”, preventing thus the onset of the disease (primary prevention). The other objective is to favorably modify the disease development path by detecting and treating it at an early pre-clinical stage, reducing the risks for the development of a clinically advanced manifestation of the disease (secondary prevention) [8].

Hence, this study aims to, from the medical records of the social project analyzed, propose a new screening approach of patients with ocular complaints, in which the screener is a specialist, who will appropriately perform the basic exams of ophthalmic propedeutics, such as anterior biomicroscopy, posterior biomicroscopy, tonometry, gonioscopy and retinal mapping.

2. Method

This transversal, retrospective, single center study, approved by the Ethics Commission of the Hospital Angelina Caron, Campina Grande do Sul/PR, under the number 5.950.170, analyzed 297 medical records of patients from a social project

on the prevention of blindness and amblyopia. This project, involving patients in social vulnerability conditions, aimed to: 1) Detect the main ocular disorders such as amblyopia; primary angle closure suspect (PACS); glaucoma suspect (GS), characterized by the optical disk presenting a suggestive aspect of glaucomatous optic neuropathy or ≥ 21 mmHg intra-ocular pressure; predisposing retinal detachment lesions (PRDL) that include lattice degeneration, holes and tears of the retina; age-related macular degeneration (AMD) with monocular central vision loss due to advanced AMD (geographical atrophy of the choroid, or macular disciform scar, or active choroidal neovascular membrane and/or choroidal soft drusen in the foveal region; and diabetic retinopathy (DR). 2) Perform cataract diagnosis (+++/IV or higher). 3) Provide guidance and treatment for allergic conjunctivitis. 4) Detect refractive alterations and prescribe optical correction whenever necessary for children until 14 years of age. This project was not for profit and did not receive any financial aid from third parties. The screener himself covered all the costs of the services provided. The participants were referred by the Christian Institutions Dikaion, Pequeno Cotolengo and Pastoral da Saúde of Curitiba's Archdiocese and were examined between March 2015 and December 2019. Pregnant patients and children younger than 3 months of age were excluded from this project.

2.1. Procedures

Children between 3 months and 3 years of age underwent cycloplegia, sciascopy, and retinal mapping. Patients between 4 and 14 years of age underwent cycloplegia, refraction test, anterior biomicroscopy, posterior biomicroscopy and retinal mapping. An oral survey was conducted with the underaged children's guardians to verify whether the children presented low school performance and/or any ocular itching. Adolescents older than 14 also underwent anterior biomicroscopy, gonioscopy and tonometry. Those who did not present PACS underwent pupil dilation with mydriatics eyedrops, followed by posterior biomicroscopy and retinal mapping. During the ophthalmic evaluation patients were asked whether they presented ocular itching and/or diabetes mellitus. The participants were examined by a specialist in Ophthalmology, holder of post-doctoral degrees, with 36 years of experience and a sub-specialization in retina and vitreous.

Patients with PACS were prescribed pilocarpine 1% and referred to public health service centers (PHSC), specialized in ophthalmology, to undergo YAG laser peripheral iridectomy. Participants with glaucoma suspect, predisposing retinal detachment lesions and diabetic retinopathy were also referred to PHSCs, specialized in ophthalmology. Those with AMD received guidance, were prescribed antioxidants, and referred to PHSCs, specialized in ophthalmology, for treatment and/or follow-up procedures. Patients who reported ocular itching received guidance, were prescribed lubricant and allergy eyedrops. Patients, with diseases not included among the project objectives, were also informed and re-

ferred to PHSCs, specialized in ophthalmology, for the assessment of the identified pathology. Patients until 14 years of age were prescribed glasses, when necessary. Despite the several exams performed on each patient, the referrals and even the prescriptions of glasses and eye drops, the approach with each patient was extremely fast, with objective exams and little anamnesis.

2.2. Statistical Analysis

The age results were described by the statistical functions of mean, standard deviation, median, minimum, and maximum values. Categorical variables were described by absolute frequency and percentage. Data were entered in the Excel® spreadsheet and analyzed with IBM SPSS Statistics v.20.0 program. All data were analyzed in 2022.

3. Results

Table 1 shows gender and age range of the social project participants, whereas **Table 2** presents mean age, standard deviation, median, minimum and maximum. The analysis of 297 medical records revealed: 7 cases (2.4%) of amblyopia in participants over 8 years of age; 42 cases (14.1%) of PACS; 21 cases (7.1%) of glaucoma suspect; 8 cases (2.7%) of predisposing retinal detachment lesions (PRDL); 14 cases (4.7%) of AMD; 3 cases (1.0%) of diabetic retinopathy (DR); 40 cases (13.5%) of cataract; and 31 cases (10.4%) of allergic conjunctivitis. **Figure 1** shows these results. The other found pathologies included: retinal detachment (RD), papilledema, corneal ulcer, a suspected conjunctival squamous cell carcinoma, retinal vasculitis, strabismus, uveitis, bilateral papillary paleness, and obstruction of the tear ducts (1 case each/0.3%). Of the 297 examined cases, 168 participants (56.5%) presented some type of alteration which could lead to vision

Table 1. Gender and age range of the social project participants.

Variable	Classification	n	%
Gender	Female	189	63.6%
	Male	108	36.4%
Age (years)	<14	67	22.6%
	14 to 19	34	11.4%
	20 to 29	18	6.1%
	30 to 39	25	8.4%
	40 to 49	45	15.2%
	50 to 59	48	16.2%
	60 to 69	37	12.5%
	70 to 79	12	4.0%
	≥80	11	3.7%

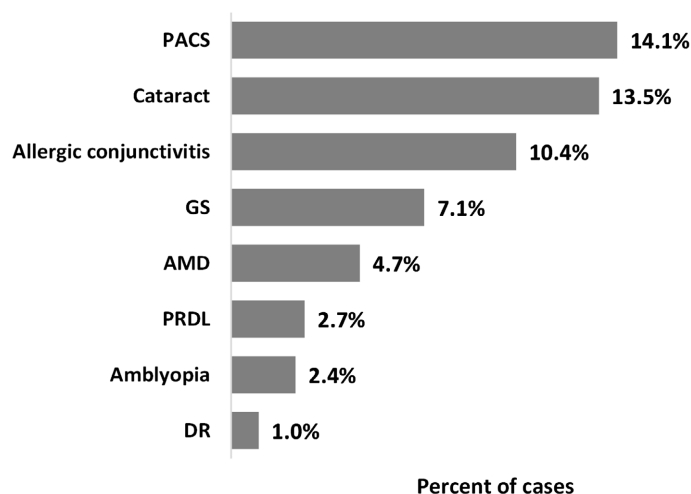


Figure 1. The main ocular alterations identified in the project participants. PACS, Primary angle-closure suspect; GS, Glaucoma suspect; AMD, Age-related macular degeneration; PRDL, Predisposing retinal detachment lesions; DR, Diabetic retinopathy.

Table 2. Mean age, standard deviation, median, minimum and maximum values.

	n	Mean	Standard Deviation	Median	Minimum	Maximum
Age (years)	297	37.7	22.7	41	0.7 (8 months)	91

impairment. Among these alterations were: PACS, GS, PRDL, AMD, DR, cataract, allergic conjunctivitis, retinal detachment, papilledema, corneal ulcer, most likely a conjunctival squamous cell carcinoma, retinal vasculitis, uveitis, and bilateral papillary paleness. Thirty-one patients younger than 14 (46.2%) were prescribed glasses.

4. Discussion

The result analysis of the 297 medical records of participants in a social project for the prevention of blindness and amblyopia served as the basis for a new screening approach to ocular diseases.

The blindness and amblyopia prevention project lasted about 5 years and included fortnightly services to as many people as possible. Despite the great promotion [9], there was poor adherence on the part of the parents and population in general, the total number was lower than 300, revealing a lack of interest in the prevention of eye diseases. Unfortunately, prevention of diseases is still far from becoming a normal fact in most countries, as identified in a study that analyzed adherence to child screening exams [10], of extreme importance for the well-being of the children [11]. The findings of this project also corroborate those of other studies which claim that the lack of culture in general, the lack of information about the several diseases, poverty, the absence or small number of trained professionals and the scarce financial resources for public health are the main reasons that make the population neglect their own health or refrain from

assessing it in an appropriate way [10] [12] [13] [14] [15].

In Ophthalmology, the complementary exams are of utmost importance for the diagnosis of pathologies and should be part of the any patient's routine assessment. In the present study, the gonioscopy exam revealed primary angle-closure suspect in 14.1% of the patients. This condition is associated with closed angle glaucoma [16]. According to estimates based on epidemiologic studies, closed angle glaucoma represents one third of all cases of primary glaucoma in the world. Despite being less prevalent, the number of blind people due to closed angle glaucoma is similar when compared with the number of blind people due to open angle glaucoma (3.9 vs. 4.5 million people) [17] [18] [19]. Consequently, the participants who presented primary angle-closure suspect were preventively prescribed pilocarpine 1% and were referred to a PHSC specialized in ophthalmology for YAG Laser peripheral iridectomy.

A suggestive aspect of glaucomatous optic neuropathy and/or intra-ocular pressure ≥ 21 mmHg was diagnosed in 7% of the patients. An important fact to be mentioned is that, in 2013, in the global context, the prevalence of glaucoma was 3.54%, with 64.3 million people affected, and a projected number of 111.8 million for 2040 [20] [21]. As a preventive measure, the glaucoma suspect patients were referred for complementary exams and treatment in a PHSC.

The indirect binocular ophthalmoscopy, which assesses the retinal periphery, detected PRDL (lattice degeneration, holes, and tears of the retina) in 2.6% of the patients. Prevalence of these alterations may vary from 1.9% to 8.7% [22] [23] [24] and is associated with rhegmatogenous retinal detachment [25], an important cause of blindness [26]. It is estimated that prevalence of rhegmatogenous retinal detachment is approximately 0.3% in the general population, reaching 5% in high myopia, 2% to 3% in aphakia, and even 10% when there is vitreous loss (a type of surgical complication) during cataract surgery [27]. With the objective of preventing RD, the patients with PRDL were referred to PHSCs specialized in ophthalmology for a preventive photocoagulation procedure [28].

Regarding AMD, 4.7% of the participants, who presented monocular central vision loss due to the progression of the disease or those who presented choroidal soft drusen in the foveal region, were prescribed antioxidants and were referred to a PHSC specialized in ophthalmology for the control and treatment of age-related macular degeneration (AMD), known to be one of the main causes of irreversible vision loss in the elderly [29], with a prevalence estimated to increase by 40% in 2040 [30].

Similarly, diabetic retinopathy, also known to be among the main causes of irreversible vision loss in the world, is considered the major cause of blindness among people between 16 and 64 years of age [31]. In the present study, 1.0% of the patients presented DR. As important as the treatment of diabetic retinopathy is the information to be provided to patients about the glycemic control, blood pressure, lipid profile and lifestyle for the overall survival and preservation of vision. Patients who presented diabetes, and mainly those diagnosed with diabetic

retinopathy, received additional information about the disease and were referred to the PHSCs for treatment and control.

Unlike the visual loss due to glaucoma, retinal detachment, macular degeneration and diabetic retinopathy, cataract is almost always a curable disease. However, this pathology is still one of the most common visual disorders in the world [6]. Studies reveal that of the 36 million blind people worldwide, cataract accounts for the vision loss in 12 million [6]. In the present study, 13.5% of patients presented cataract, and were referred to public health service centers specialized in ophthalmology for phacoemulsification and intra-ocular lens implant.

A large-scale population study in the United States, between 1988 and 1994, revealed that 40% of the population older than 17 presented ocular allergic symptoms and were diagnosed with allergic conjunctivitis [32]. In the present study, 10.4% of the patients fit this category. It is known that repetitive and prolonged eye rubbing is associated with the progression of keratoconus [33]. These patients with ocular itching were advised and treated for allergic conjunctivitis.

Out of the patients younger than 14, 46.2% presented refractive errors and were prescribed glasses. They certainly did not present any risk of blindness and the improvement in their visual acuity must have positively influenced their school performance. On the other hand, the cases identified as amblyopia were not subject to treatment. Patients with other eye diseases, not included in the project objectives, were also informed, and referred to PHSCs specialized in ophthalmology.

Unlike the proposal of this social project, some authors oppose prevention and consider that preventive activities may: offer benefit to an individual in detriment of the group; be of an unequal value for all; mistakenly take priority over treatment; divert the health-related resources for those most in need and increase the risk of iatrogenic damage in healthy people [34] [35]. Other studies suggest that the increase in the demands of the health systems for the adoption of preventive and therapeutic clinical interventions may be disconnected from the narratives of the patients' illnesses (in the cases of prevention), consuming a significant amount of time of the health professionals [36] [37]. Additionally, several adopted preventive measures lack high standards of quality scientific evidence, with a potential to cause damage to both the health systems (due to the inappropriate use of public resources) as well as to the population's health [34].

The present study aimed to approach the diagnosis of the main eye diseases that can potentially induce blindness or reduce vision, which contribute to a loss in the people's life quality and represent a substantial increase in the public expenses to meet the needs of a visually impaired patient. It was a volunteer-driven project, had no financial purpose and served a low-income population. Additionally, the project included the treatment or the instructions and paths to receive treatment. The exams performed are part of the basic ophthalmic semiology that provides scientific support for the diagnosis of a large number of eye diseases, mainly those that formed the object of this study. Consequently, expensive and/or sophisticated equipment was not used.

The number of the eye alterations found, which have the potential to induce blindness or represent an important vision limitation, was significant, and the results obtained inspired the authors to suggest a new screening approach to treat patients with ocular complaints. In the present study, the specialist performed the pre-screening, and then referred the patients to a screening process, so they would further be referred to a health service center specialized in ophthalmology. The objective is for the pre-screening to be performed by a lay person. Provided there is some ocular complaint, the patients are then immediately referred to a screener, specialized in ophthalmology, who would perform the primary ophthalmic exams: anterior biomicroscopy, posterior biomicroscopy, tonometry, gonioscopy and retinal mapping. Hence, this proposal shall not be viewed as an excessively demanding and costly approach, but as a basic and necessary ophthalmic assessment, which provides no ophthalmological and clinical risks.

Regarding infrastructure, these exams may be performed at UBSs, only requiring a small room with the necessary equipment for the ophthalmic assessment, such as a chair, a slit lamp and an indirect ophthalmoscope. The applanation tonometer, the Goldmann- and/or Zeiss-type lenses practically do not take up much space, but it might imply the hiring of a specialist to carry out the primary service. A fundamental step to evaluate the implementation of this screening approach would be to assess the economic impact of this screening approach for the public health system. This goal is beyond the scope of our study. We showed the potential of an approach to detect predisposing conditions or diseases at their early stages. With the adequate treatment, many diseases that could achieve advanced stages would be interrupted or delayed. For example, an early case diabetic retinopathy treated with retinal photocoagulation and adequate guidance may never need any complex and costly surgery as they could without any preventive approach. Furthermore, the presence of a senior ophthalmologist as screener is very likely to increase diagnostic precision, which may cause a cascade of benefits not only for vision health but also from the financial standpoint. Therefore, we also estimate there could be reduction of costs allocated to provide basic care for visually impaired individuals.

Limitations of this study include the fact that the data are from one hospital in Brazil, and that the age structure of the analyzed population varied, resulting in a smaller number of people in one age group.

Our project results revealed an important demand to see and treat low-income people affected by relevant eye alterations. The prevention and/or treatment of these alterations, besides preserving the people's vision health and life quality, may also reduce public health costs.

5. Conclusion

The examiner's experience and knowledge were decisive factors for the quick diagnosis, advice, screening and/or treatment of several ocular diseases. The ob-

tained social project results reveal that the primary care and/or the screening performed by specialists may represent an impactful decrease in the cases of blindness.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

- [1] Moir, M. and Barua, B. (2021) *Waiting Your Turn: Wait Times for Health Care in Canada, 2021 Report*. Fraser Institute. <https://www.fraserinstitute.org/studies/waiting-your-turn-wait-times-for-health-care-in-canada-2021>
- [2] (2023) Portal do Governo Brasileiro. https://conselho.saude.gov.br/web_sus20anos/sus.html
- [3] Agência Brasil (2020) Oftalmologia—Pesquisa mostra que 10% dos brasileiros nunca foram ao oftalmologista—Universo Visual. <https://universovisual.com.br/pesquisa-mostra-que-10-dos-brasileiros-nunca-foram-ao-oftalmologista/>
- [4] (2023) PL 4431/2020—Portal da Câmara dos Deputados. <https://www.camara.leg.br/https://www.camara.leg.br/propostas-legislativas/2261945>
- [5] Maynard, R. (2019) Fila para consulta com oftalmologista pelo SUS tem mais de 11 mil pessoas em Porto Alegre. <https://federacaors.org.br/fila-para-consulta-com-oftalmologista-pelo-sus-tem-mais-de-11-mil-pessoas-em-porto-alegre/>
- [6] Flaxman, S.R., Bourne, R.R.A., Resnikoff, S., Ackland, P., Braithwaite, T., Cicinelli, M.V., *et al.* (2017) Global Causes of Blindness and Distance Vision Impairment 1990-2020: A Systematic Review and Meta-Analysis. *The Lancet Global Health*, **5**, e1221-e1234. [https://doi.org/10.1016/S2214-109X\(17\)30393-5](https://doi.org/10.1016/S2214-109X(17)30393-5)
- [7] Feizi, S., Javadi, M.A., Alemzadeh-Ansari, M., Arabi, A., Shahraki, T. and Kheirkhah, A. (2021) Management of Corneal Complications in Vernal Keratoconjunctivitis: A Review. *The Ocular Surface*, **19**, 282-289. <https://doi.org/10.1016/j.jtos.2020.10.005>
- [8] Döbrössy, L. (1994) *Prevention in Primary Care: Recommendations for Promoting Good Practice*. World Health Organization Regional Office for Europe. <https://apps.who.int/iris/handle/10665/259811>
- [9] Arquidiocese de Curitiba (2018) Pastoral da Saúde está com projeto para prevenção da cegueira entre pessoas em vulnerabilidade social. <http://arquidiocesedecuritiba.org.br/pastoral-da-saude-esta-com-projeto-para-prevencao-da-cegueira-entre-pessoas-em-vulnerabilidade/>
- [10] Amit Aharon, A. (2022) Parents' Adherence to Childhood Screening Tests and Re-

- ferrals: A Retrospective Cohort Study with Randomized Sampling. *International Journal of Environmental Research and Public Health*, **19**, Article 6143. <https://doi.org/10.3390/ijerph19106143>
- [11] Oláh, L.S. (2015) Changing Families in the European Union: Trends and Policy Implication. *The United Nations Expert Group Meeting of the Family Policy Development: Achievements and Challenges*, New York, 14-15 May 2015, 1-41.
- [12] Chung, P.J., Lee, T.C., Morrison, J.L. and Schuster, M.A. (2006) Preventive Care for Children in the United States: Quality and Barriers. *Annual Review of Public Health*, **27**, 491-515. <https://doi.org/10.1146/annurev.publhealth.27.021405.102155>
- [13] Silverstein, M., Grossman, D.C., Koepsell, T.D. and Rivara, F.P. (2003) Pediatricians' Reported Practices Regarding Early Education and Head Start Referral. *Pediatrics*, **111**, 1351-1357. <https://doi.org/10.1542/peds.111.6.1351>
- [14] Lam, M.Y.Y., Wong, E.C.M., Law, C.W., Lee, H.H.L. and McPherson, B. (2018) Maternal Knowledge and Attitudes to Universal Newborn Hearing Screening: Reviewing an Established Program. *International Journal of Pediatric Otorhinolaryngology*, **105**, 146-153. <https://doi.org/10.1016/j.ijporl.2017.12.021>
- [15] Wolf, E.R., Donahue, E., Sabo, R.T., Nelson, B.B. and Krist, A.H. (2021) Barriers to Attendance of Prenatal and Well-Child Visits. *Academic Pediatrics*, **21**, 955-960. <https://doi.org/10.1016/j.acap.2020.11.025>
- [16] Flores-Sánchez, B.C. and Tatham, A.J. (2019) Acute Angle Closure Glaucoma. *British Journal of Hospital Medicine*, **80**, C174-C179. <https://doi.org/10.12968/hmed.2019.80.12.C174>
- [17] Foster, P.J. (2002) The Epidemiology of Primary Angle Closure and Associated Glaucomatous Optic Neuropathy. *Seminars in Ophthalmology*, **17**, 50-58. <https://doi.org/10.1076/soph.17.2.50.14718>
- [18] He, M., Foster, P.J., Johnson, G.J. and Khaw, P.T. (2005) Angle-Closure Glaucoma in East Asian and European People. Different Diseases? *Eye*, **20**, 3-12. <https://doi.org/10.1038/sj.eye.6701797>
- [19] Foster, P.J. and Johnson, G.J. (2001) Glaucoma in China: How Big Is the Problem? *British Journal of Ophthalmology*, **85**, 1277-1282. <https://doi.org/10.1136/bjo.85.11.1277>
- [20] Quigley, H.A. and Broman, A.T. (2006) The Number of People with Glaucoma Worldwide in 2010 and 2020. *British Journal of Ophthalmology*, **90**, 262-267. <https://doi.org/10.1136/bjo.2005.081224>
- [21] Tham, Y.C., Li, X., Wong, T.Y., Quigley, H.A., Aung, T. and Cheng, C.Y. (2014) Global Prevalence of Glaucoma and Projections of Glaucoma Burden through 2040: A Systematic Review and Meta-Analysis. *Ophthalmology*, **121**, 2081-2090. <https://doi.org/10.1016/j.ophtha.2014.05.013>
- [22] Foos, R.Y. (1974) Postoral Peripheral Retinal Tears. *Annals of Ophthalmology*, **6**, 679-687.
- [23] Byer, N.E. (1967) Clinical Study of Retinal Breaks. *Transactions—American Academy of Ophthalmology and Otolaryngology*, **71**, 461-473.
- [24] Barraquer, C., Cavelier, C. and Mejia, L. (1994) Incidence of Retinal Detachment following Clear-Lens Extraction in Myopic Patients. *Archives of Ophthalmology*, **112**, 338-339. <https://doi.org/10.1001/archophth.1994.01090150066025>
- [25] Kansky, J.J. (1975) The Classification and Terminology of Peripheral Retinal Degenerations. *Modern Problems in Ophthalmology*, **15**, 103-111.
- [26] Feltgen, N. and Walter, P. (2014) Rhegmatogenous Retinal Detachment—An Ophthalmologic Emergency. *Deutsches Ärzteblatt International*, **111**, 12-21.

- <https://doi.org/10.3238/arztebl.2014.0012>
- [27] Lavinsky, J. (2002) Doenças prevalentes da retina e vítreo. *Cultura Médica*, Rio de Janeiro.
- [28] Blindbaek, S. and Grauslund, J. (2015) Prophylactic Treatment of Retinal Breaks—A Systematic Review. *Acta Ophthalmologica*, **93**, 3-8. <https://doi.org/10.1111/aos.12447>
- [29] Friedman, D.S., O'Colmain, B.J., Muñoz, B., Tomany, S.C., McCarty, C., de Jong, P.T. and Eye Diseases Prevalence Research Group (2004) Prevalence of Age-Related Macular Degeneration in the United States. *Archives of Ophthalmology*, **122**, 564-572
- [30] Wong, W.L., Su, X., Li, X., Cheung, C.M., Klein, R., Cheng, C.Y., *et al.* (2014) Global Prevalence of Age-Related Macular Degeneration and Disease Burden Projection for 2020 and 2040: A Systematic Review and Meta-Analysis. *The Lancet Global Health*, **2**, E106-E116. [https://doi.org/10.1016/S2214-109X\(13\)70145-1](https://doi.org/10.1016/S2214-109X(13)70145-1)
- [31] Solomon, S.D., Chew, E., Duh, E.J., Sobrin, L., Sun, J.K., VanderBeek, B.L., *et al.* (2017) Diabetic Retinopathy: A Position Statement by the American Diabetes Association. *Diabetes Care*, **40**, 412-418. <https://doi.org/10.2337/dc16-2641>
- [32] Singh, K., Axelrod, S. and Bielory, L. (2010) The Epidemiology of Ocular and Nasal Allergy in the United States, 1988-1994. *Journal of Allergy and Clinical Immunology*, **126**, 778-783.E6. <https://doi.org/10.1016/j.jaci.2010.06.050>
- [33] Torres-Netto, E.A., Abdshahzadeh, H., Abrishamchi, R., Hafezi, N.L., Hillen, M., Ambrósio Jr, R., *et al.* (2022) The Impact of Repetitive and Prolonged Eye Rubbing on Corneal Biomechanics. *Journal of Refractive Surgery*, **38**, 610-616. <https://doi.org/10.3928/1081597X-20220715-03>
- [34] Gérvas, J., Starfield, B. and Heath, I. (2008) Is Clinical Prevention Better Than Cure? *The Lancet*, **372**, 1997-1999. [https://doi.org/10.1016/S0140-6736\(08\)61843-7](https://doi.org/10.1016/S0140-6736(08)61843-7)
- [35] Tesser, C.D. and Norman, A.H. (2016) Differentiating Clinical Care from Disease Prevention: A Prerequisite for Practicing Quaternary Prevention. *Cadernos de Saúde Pública*, **32**, e00012316. <https://doi.org/10.1590/0102-311X00012316>
- [36] Starfield, B., Hyde, J., Gérvas, J. and Heath, I. (2008) The Concept of Prevention: A Good Idea Gone Astray? *Journal of Epidemiology & Community Health*, **62**, 580-583. <https://doi.org/10.1136/jech.2007.071027>
- [37] Heath, I. (2007) In Defense of a National Sickness Service. *The BMJ*, **334**, Article 19. <https://doi.org/10.1136/bmj.39066.541678.B7>