

Nursing approach to the characteristics of patients with glaucoma at an ophthalmological institute

Enfoque de enfermería sobre las características de los pacientes con glaucoma en un instituto oftalmológico

Abordagem de enfermagem sobre as características dos pacientes com glaucoma em um instituto de oftalmologia

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ABSTRACT

Objetivo: Determinar las características sociodemográficas y clínicas de los pacientes diagnosticados con glaucoma durante el período 2018-2022 en un instituto oftalmológico de Lima desde un enfoque de enfermería. **Materiales y métodos:** Estudio cuantitativo, descriptivo y retrospectivo. Las muestras probabilísticas fueron de 383 historias clínicas del área de Glaucoma del Instituto Nacional de Oftalmología (INO). El instrumento que se empleó fue una ficha de recolección de datos creada por los investigadores y validada mediante la prueba binomial. **Resultados:** La edad promedio de la población fue de 61,92 años, registrándose una mayor prevalencia del grupo femenino (53,26 %). Con respecto a las características clínicas, el 62,14 % presentó enfermedades concomitantes, entre las cuales destaca la hipertensión arterial (36,55 %) y la diabetes mellitus (16,97 %). Adicionalmente, se encontró que el tipo de glaucoma más común fue el primario de ángulo abierto (58,20 %). Los signos que más se presentaron en ambos ojos fueron enrojecimiento y disminución de la agudeza visual; en cuanto a los síntomas, los más frecuentes fueron dolor ocular y visión borrosa. Sin embargo, el 89,56 % presentó una presión intraocular normal. **Conclusiones:** Los pacientes con glaucoma, en su mayoría, pertenecían al grupo poblacional de adultos mayores y presentaban un estado de salud deficiente, que perjudicaba su autocuidado. Se resalta la importancia de realizar diagnósticos completos y regulares, dado que el glaucoma puede evolucionar sin signos evidentes de aumento de la presión ocular.

Palabras claves: enfermería; glaucoma; oftalmología; salud ocular.

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Scientific contribution:

The findings of this article help strengthen secondary prevention in glaucoma and provide nursing professionals with a report on the sociodemographic and clinical characteristics of patients with this condition. Furthermore, this information is key to enhancing education on ocular health and optimizing patient follow-up to improve treatment adherence and promote self-care.

INTRODUCTION

Glaucoma is an optic neuropathy primarily characterized by optic disc cupping and thinning of the neuroretinal rim (1, 2), which increases intraocular pressure and causes progressive visual field loss (3). This condition is often very difficult to diagnose in its early stages. Moreover, it is recognized as the second leading cause of blindness worldwide, surpassed only by cataracts (1). In most cases, patients are asymptomatic in the initial stages, and the disease progresses silently until vision loss occurs. Therefore, those who receive medical or surgical treatment in the early stages have a high probability of preserving their vision (4)

This pathology particularly affects older adults, African Americans, individuals with high myopia, and those with a history of pathologies such as hypertension pressure and diabetes mellitus, among other risk factors such as ocular trauma or previous surgery (5). Globally, nearly 4.14 million people (8.39% of all cases of blindness) had visual impairment due to glaucoma in 2020 Regionally, the highest proportion of blindness related to this disease was observed in high-income countries, while the region with the highest age-standardized prevalence of glaucoma-related blindness was sub-Saharan Africa (6).

In 2022, at least 1 billion people suffered from severe or moderate visual impairment, with 7.7 million cases attributed to glaucoma (7) In Peru, 2% of the population over the age of 40 suffers from glaucoma, a pathology that causes irreversible blindness in 10% of those affected, according to a 2023 report by the Peruvian Glaucoma Society (8). In Europe, the prevalence of this disease is 2.93% among individuals aged 40 to 80. This figure increases with age, reaching 10% in individuals over 90 years old, according to a study conducted in 2024 (9).

A study conducted in India reported that, out of 89,725 patients, 449 had glaucoma with a prevalence of 0.50%, where the most common type was primary open-angle glaucoma (POAG), followed by primary angle-closure glaucoma (PACG). Men were predominant, with a male-to-female ratio of 2:1. Similarly, the most common comorbidities were hypertension and diabetes (10).

From a nursing perspective, the emphasis is on prevention, education, treatment, and emotional support for patients with glaucoma. Therefore, this represents a challenge for the healthcare staff because patients struggle to comply with the necessary check-ups due to a lack of information and the high cost of treatment. In addition, blindness is almost four times more common among individuals living in poverty and in those residing in rural areas (11). In this context, the role of nursing professionals is to educate patients about the nature and progression of their disease, which involves informing them about their check-ups and adherence

to treatment. Furthermore, nursing professionals should provide patients with emotional support, as the diagnosis of this disease causes fear in most people due to the possibility of vision loss. Therefore, they should be responsible for facilitating better stress management and promoting coping strategies (12, 13).

Therefore, nursing professionals must be trained to recognize the signs and symptoms of glaucoma in its early stages, allowing for earlier detection and timely intervention. In nursing, it is essential to recognize the importance of ocular care, since one of their roles is to promote a healthy lifestyle for patients with risk factors for glaucoma, such as high blood pressure, diabetes mellitus, among others (14). In addition, they must perform a thorough assessment of the patient, consider their medical and family history, as well as provide adequate follow-up to ensure treatment adherence.

Therefore, the nursing professional is responsible for the initial assessment of the medical history, evaluation of signs and symptoms, measurement of intraocular pressure, etc. In addition, they are responsible for educating the patient regarding their pharmacological or surgical therapy, as they are actively involved in diagnostic procedures and perioperative preparation. In addition, they are responsible for preventive activities promoting the early diagnosis of glaucoma. However, this becomes a limitation due to the shortage of nursing professionals. Furthermore, secondary prevention care is not provided, which focuses mainly on the early detection of the disease before severe symptoms develop, but when risk factors are already present. This is essential because the ocular condition is known for its silent and progressive course (15).

In this context, secondary prevention of glaucoma focuses on early detection and timely treatment of the disease, which is why nursing plays a key role in identifying people at risk Through a preventive approach, nurses can encourage patients to adopt healthy habits, such as keeping a balanced diet to avoid high blood pressure, eating bananas, which help regulate blood pressure, and drinking orange juice, which has protective properties against oxidative damage to the eyes, and improves blood pressure. They should also promote preventive screening for the disease and regular eye examinations, which include intraocular pressure measurements, optic nerve assessments, and visual field evaluations (16).

Theories are fundamental in contributing to the prevention and control of glaucoma patients. Therefore, Dorothea Orem's self-care theory is fundamental in nursing, as it helps to provide interventions and preventive measures with the aim of improving quality of life in all physical, social, psychological, and spiritual areas (17-19). Similarly, Nola Pender, with her health promotion theory, focuses on the impor-

tance of promoting healthy behaviors that improve well-being and prevent disease, rather than focusing solely on prevention (20). This is a fundamental task that has been implemented by the National Institute of Ophthalmology (INO), as it includes nursing staff in promotional campaigns in Lima and rural areas of the provinces of Peru (21-23).

The objective of this study was to determine the sociodemographic and clinical characteristics of patients diagnosed with glaucoma during the 2018-2022 period at an ophthalmology institute in Lima, from a nursing perspective, to contribute to the strengthening of secondary prevention of this disease, considering the theories of self-care and ocular health promotion.

MATERIALS AND METHODS

This is a descriptive retrospective observational study that compiles the sociodemographic and clinical characteristics of patients diagnosed with glaucoma. The population consisted of 99,035 medical records of patients from the National Institute of Ophthalmology (INO) during the 2018-2022 period. Medical records of adult patients of both sexes diagnosed with glaucoma were included, while incomplete or inconclusive records were excluded.

Subsequently, a simple random sample of 383 medical records was obtained using the finite population formula, with a margin of error of 5% and a confidence level of 95%. Clinical records were reviewed as a data collection technique, and a data collection form developed by the authors based on the theoretical framework was used as an instrument. It was divided into two segments: sociodemographic characteristics and clinical characteristics.

The validity of the instrument was evaluated by 10 experts in the field of ophthalmology, whose responses were subjected to a binomial test to assess agreement in content validity ($p = 0.0029$). No pilot test was conducted, as the reliability was evidenced through the source, which consisted of patient data

Following approval by the Ethics Committee of the Universidad Peruana Cayetano Heredia (Certificate No. 183-16-23), the Teaching and Research Department, and the Head of the Glaucoma Department of the institute, the medical records were reviewed weekly until the forms were completed with the corresponding information. It is worth noting that no personal patient information (such as names, ID numbers, addresses, cell phone numbers) was recorded. A database was created in Microsoft Excel using codes. The file was then kept by the researchers. For data analysis, frequency and percentages were used to describe the distribution of categorical variables using the statistical software STATA 16.

RESULTS

Table 1 shows a higher prevalence in the female group (53.26%), with a significant concentration in Lima (66.80%). In addition, the majority of patients were of mixed ethnicity (92.69%), and the most common marital status was married (48.04%). The most common educational level was secondary education (60.84%), and a considerable percentage of patients were covered by the Comprehensive Health Insurance (SIS) (53.0%).

Table 1. Sociodemographic data of patients diagnosed with glaucoma at the National Institute of Ophthalmology (INO) between 2018 and 2022.

| General data | n | % |
|------------------|-----|-------|
| Age | | |
| 18-36 | 26 | 6.79 |
| 37-55 | 88 | 22.98 |
| 56-72 | 174 | 45.43 |
| 73-90 | 95 | 24.80 |
| Sex | | |
| Male | 179 | 46.74 |
| Female | 204 | 53.26 |
| Place of origin | | |
| Lima | 256 | 66.80 |
| Others | 127 | 33.20 |
| Ethnicity | | |
| White | 21 | 5.48 |
| Mestizo | 355 | 92.69 |
| African American | 0 | 0.00 |
| Indigenous | 7 | 1.83 |
| Asian | 0 | 0.00 |
| Marital status | | |
| Single | 163 | 42.56 |
| Married | 184 | 48.04 |
| Widow | 23 | 6.01 |
| Divorced | 7 | 1.83 |
| Cohabitant | 6 | 1.57 |

Table 1. (Continuation).

| General data | n | % |
|--------------------------------------|-----|-------|
| Level of education | | |
| No studies | 9 | 2.35 |
| Elementary school | 48 | 12.53 |
| High school | 233 | 60.84 |
| Technical studies | 64 | 16.71 |
| University studies | 29 | 7.57 |
| Health insurance | | |
| Comprehensive Health Insurance (SIS) | 203 | 53.00 |
| Private | 48 | 12.53 |
| Social Health Insurance (EsSalud) | 122 | 31.85 |
| Others | 10 | 2.61 |

Table 2 shows that most patients had no family history of the disease (77.28%). In addition, conditions such as high blood pressure (36.55%), diabetes (16.97%), myopia (3.92%), and astigmatism (3.39%) were highlighted.

Table 2. Clinical data of patients diagnosed with glaucoma at the National Institute of Ophthalmology during the 2018-2022 period.

| General data | n | % |
|------------------------|-----|-------|
| With family history | 87 | 22.72 |
| Without family history | 296 | 77.28 |
| Previous illnesses | | |
| Healthy | 145 | 37.86 |
| High blood pressure | 140 | 36.55 |
| Diabetes | 65 | 16.97 |
| Myopia | 15 | 3.92 |
| Astigmatism | 13 | 3.39 |
| Others | 5 | 1.31 |

Table 3 shows that 95.75% of patients had the same type of glaucoma. On the other hand, 4.25% had different types of glaucoma in their eyes.

Table 3. Characteristics of glaucoma types in both eyes in patients with glaucoma at the National Institute of Ophthalmology (INO) during the 2018-2022 period.

| Datos generales | n | % |
|-----------------------------|-----|-------|
| Same types of glaucoma | 180 | 95.75 |
| Different types of glaucoma | 8 | 4.25 |

Concerning clinical data for the right eye, 48.56% of cases corresponded to primary open-angle glaucoma (POAG) and 20.89% to primary angle-closure glaucoma (PACG). At the same time, 37.34% of patients presented more than one symptom as the predominant finding. Similarly, more than one symptom was reported in 51.96%. Finally, intraocular pressure levels were normal at 89.56% (Table 4).

Table 4. Clinical data of the right eye in patients diagnosed with glaucoma at the National Institute of Ophthalmology (INO) during the 2018–2022 period.

| General data | n | % |
|-------------------------|-----|-------|
| Types of glaucoma | | |
| POAG | 186 | 48.56 |
| PACG | 80 | 20.89 |
| Phacolytic glaucoma | 9 | 2.35 |
| Neovascular glaucoma | 21 | 1.31 |
| Congenital glaucoma | 5 | 5.48 |
| No glaucoma | 74 | 19.32 |
| Others | 8 | 2.09 |
| Signs | | |
| Eye redness | 42 | 10.97 |
| Ocular edema | 9 | 2.35 |
| Decreased visual acuity | 103 | 26.89 |
| Others | 1 | 0.26 |
| More than one symptom | 143 | 37.34 |
| None | 85 | 22.19 |

Table 4. (Continuation).

| General data | n | % |
|-----------------------|-----|-------|
| Symptoms | | |
| Ocular pain | 44 | 11.49 |
| Headache | 11 | 2.87 |
| Blurred vision | 28 | 7.31 |
| Nausea and vomiting | 1 | 0.26 |
| Vision loss | 17 | 4.44 |
| Others | 6 | 1.57 |
| More than one symptom | 199 | 51.96 |
| None | 77 | 20.10 |
| Intraocular pressure | | |
| Normal | 343 | 89.56 |
| Elevated | 40 | 10.44 |

GPAA: glaucoma primario de ángulo abierto; GPAC: glaucoma primario de ángulo cerrado.

Regarding the clinical data of the left eye, POAG affected 43.86% of cases. Decreased visual acuity was predominant in 28.46%, followed by patients presenting more than one sign, at 26.89%. In addition, regarding symptomatology, more than one symptom was noted in 39.69% of patients. Finally, elevated intraocular pressure was observed in 13.32% of cases (Table 5).

Table 5. Clinical data of the left eye in patients diagnosed with glaucoma at the National Institute of Ophthalmology (INO) during the 2018–2022 period.

| General data | n | % |
|----------------------|-----|-------|
| Types of glaucoma | | |
| POAG | 168 | 43.86 |
| PACG | 68 | 17.75 |
| Phacolytic glaucoma | 5 | 1.31 |
| Neovascular glaucoma | 14 | 3.66 |
| Congenital glaucoma | 0 | 0.00 |
| No glaucoma | 119 | 31.07 |
| Others | 9 | 2.35 |

Table 5. (Continuation).

| General data | n | % |
|-------------------------|-----|-------|
| Signs | | |
| Eye redness | 40 | 10.44 |
| Ocular edema | 4 | 1.05 |
| Decreased visual acuity | 109 | 28.46 |
| Others | 2 | 0.52 |
| More than one symptom | 103 | 26.89 |
| None | 125 | 32.64 |
| Symptoms | | |
| Ocular pain | 42 | 10.97 |
| Headache | 5 | 1.31 |
| Blurred vision | 39 | 10.18 |
| Nausea and vomiting | 0 | 0.00 |
| Vision loss | 19 | 4.96 |
| Others | 4 | 1.04 |
| More than one symptom | 152 | 39.69 |
| None | 122 | 31.85 |
| Intraocular pressure | | |
| Normal | 332 | 86.68 |
| Elevated | 51 | 13.32 |

GPAA: glaucoma primario de ángulo abierto; GPAC: glaucoma primario de ángulo cerrado.

DISCUSSION

In terms of sociodemographic characteristics, it was found that most of the collected data correspond to the older adult population group and the mestizo ethnicity. Similar data were observed by Gómez et al. (23) and Molinet et al. (24), who reported that glaucoma is more common in adults over 60 due to decreased drainage capacity of the eye and cumulative damage to the optic nerve. This information is relevant because this population group, due to aging, faces significant challenges in the self-management of their ocular health, requiring more personalized nursing interventions. Therefore, nurses play a fundamental role in monitoring and supporting adherence to preventive treatment in older adults (20, 25).

Regarding the educational level, there were similarities with Roque-Choque et al. (26), highlighting the prevalence of secondary education combined with limited knowledge about the pathology. This is related to the location of the population and their socioeconomic status, since all these factors influence the acquisition of knowledge. This highly important aspect must be considered by nursing professionals when designing specific ocular health education strategies aimed at glaucoma patients, taking into account their educational level. According to Nola Pender's theory, patients with higher levels of education are more proactive in seeking information, which influences their health-related decisions. Therefore, nurses should facilitate access to clear information adapted to each patient's level of understanding (20).

At the same time, Moy (27) emphasizes that preventive and promotional programs should be prioritized to achieve timely diagnoses of different pathologies. In addition, Moy highlights the importance of promoting a standardized fee schedule and regularizing access so that all individuals who meet the requirements can obtain this type of health insurance. In this regard, nursing professionals play an essential role in promoting health policies that allow equitable access to preventive services, especially in vulnerable communities (25).

On the other hand, the relationship between health promotion in nursing and the data previously obtained and verified is fundamental for developing more effective and equitable health strategies, such as home visits, secondary prevention campaigns targeting vulnerable groups in health centers, preventive screening in nursing homes, and promoting healthy habits in glaucoma patients. Therefore, factors such as age, gender, socioeconomic status, and educational level can influence the prevalence and management of glaucoma, allowing nursing professionals to design more specific and personalized interventions that promote primary and secondary prevention, early detection, timely treatment, and continuous education, thereby contributing to ocular health (28).

In terms of clinical data, the main and most frequent comorbidities were high blood pressure and diabetes mellitus. These pre-existing medical conditions are similar to those found by Peña et al. (29), who reported high blood pressure as one of the main factors for developing glaucoma due to elevated systemic blood pressure, which causes damage to capillary circulation and deteriorates the optic disc. This finding highlights the need for nursing professionals to constantly monitor comorbidities in patients with glaucoma, since controlling condi-

tions such as hypertension and diabetes is crucial to prevent additional vision complications. Therefore, controlling comorbid diseases can influence the management of glaucoma (30). It is therefore vital that nurses provide educational and supportive strategies that enable patients to manage both their comorbidities and glaucoma effectively.

According to Dorothea Orem, it is essential to link a nursing theory to the treatment of this disease due to the complexity of its diagnosis in the early stages. This approach, which focuses on promoting patient self-care and self-sufficiency, is crucial for the management and progressive care of glaucoma, especially in the early stages, when the patient may not be aware of the symptoms (18). Therefore, it is a priority to lead a healthy lifestyle to prevent the progressive development and complications of other pathologies that may hinder patient self-care and health promotion.

In addition, relevant findings were identified regarding the most frequent types of glaucoma, among which primary open-angle glaucoma (POAG) was the most prevalent (31). This aligns with Nongrum et al. (10), who reported that the most common type of glaucoma is POAG, mainly associated with age, as it is more common in older adults due to ocular aging, followed by late diagnosis and the presence of comorbidities, such as high blood pressure and diabetes mellitus. This finding highlights the urgent need for a proactive nursing approach to the early detection of glaucoma, especially in older adults, who may be unaware of the disease due to the absence of early symptoms. Therefore, it is evident that older adults do not receive timely screening for this pathology, highlighting the importance of promoting ocular health education and awareness about prevalent comorbid conditions.

On the other hand, 95.75% of patients presented the same type of glaucoma in both eyes, a finding that is also highlighted in the study by Gómez et al. (23), who indicate that this symmetry is due to the fact that processes such as aqueous humor drainage, intraocular pressure, and optic nerve health tend to manifest similarly in both eyes. This suggests that nurses should emphasize the importance of regular ocular examinations and early detection of the pathology, since progression of the disease in one eye can lead to complications in the other eye, increasing the risk of total vision loss.

Regarding the clinical data obtained for both the right and left eye, it was found that patients presented more than one characteristic sign and symptom. Thus, consistent with findings from

other studies, ocular pain, decreased visual acuity, and headache are the most frequent signs and symptoms observed in patients at the time of glaucoma diagnosis (32, 33). Nursing professionals should be alert to these early signs and encourage self-observation in patients, as the early identification of these symptoms can significantly improve treatment outcomes.

In addition, the importance of intraocular pressure during the progression of the pathology is noteworthy. Regarding this aspect, these symptoms should be observed, as they can be used to educate the population on how to achieve a rapid identification of warning signs. Many patients reported that it is difficult to detect the pathology in its early stages due to the lack of knowledge about the symptoms, confusion with other diseases, and the lack of screening in their healthcare centers (9).

In summary, it was identified that the most significant sociodemographic and clinical characteristics in glaucoma reveal important aspects to consider in this population sample, such as age, ethnicity, comorbidities, type of glaucoma, signs, symptoms, and intraocular pressure levels. Understanding these elements allows for the provision of appropriate nursing care aimed at promoting, preventing, and treating the pathology.

The main limitation of this study was the scarcity of nursing studies focused on ocular health or glaucoma.

CONCLUSIONS

The most notable sociodemographic characteristics were an age range of 56 to 72 years, mestizo ethnicity, married marital status, and coming from Lima. At the same time, the level of education was secondary school, and most patients were covered by the Comprehensive Health Insurance (SIS). Regarding clinical characteristics, the majority of patients presented previous medical conditions. Similarly, the type of glaucoma was primary open-angle glaucoma (POAG), occurring in one eye as well as in both eyes. Additionally, patients presented more than one sign and symptom, along with intraocular pressure levels within the normal range.

The importance of nursing in research lies in health education and promotion regarding self-care, as highlighted by Dorothea Orem and Nola Pender. This is because nursing is responsible for providing educational services for prevention and promotion to older adults in the care of their ocular health. In the same way, it promotes self-care and adaptation to their new lifestyle.

Conflict of Interest:

The authors declare no conflict of interest.

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Ethics Approval:

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Authorship Contribution:

KOCO, ABGM: conceptualization, data curation, formal analysis, research, methodology, project administration, validation, visualization, writing of original draft, writing - review & editing.

CCMM: formal analysis, research, methodology, validation, writing - review & editing.

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REFERENCES

1. Organización Mundial de la Salud. Ceguera y discapacidad visual [Internet]. OMS; 2023, 10 de agosto. Available from <https://www.who.int/es/news-room/fact-sheets/detail/blindness-and-visual-impairment>
2. Romero AD. Glaucoma: un reto para la salud pública [trabajo de grado en Internet]. Bogotá: Universidad Antonio Nariño; 2020. Available from <http://repositorio.uan.edu.co/handle/123456789/2342>
3. Vargas AJ, Sojo JR. Glaucoma: aspectos relevantes. *Rev Méd Sinerg* [Internet]. 2022; 7(8): e880. Available from <https://doi.org/10.31434/rms.v7i8.880>
4. Wu Y, Szymanska M, Hu Y, Fazal MI, Jiang N, Yetisen AK, et al. Measures of disease activity in glaucoma. *Biosens Bioelectron* [Internet]. 2022; 196: 113700. Available from <https://doi.org/10.1016/j.bios.2021.113700>
5. Jaumandreu L, Antón A, Pazos M, Rodriguez-Uña I, Rodriguez Agirretxe I, Martinez de la Casa JM, et al. Progresión en glaucoma. Guía de práctica clínica. *Arch Soc Esp Oftalmol* [Internet]. 2023; 98(1): 40-57. Available from <https://doi.org/10.1016/j.oftal.2022.05.002>
6. Vision Loss Expert Group of the Global Burden of Disease Study, GBD 2019 Blindness and Vision Impairment Collaborators. Global estimates on the number of people blind or visually impaired by glaucoma: a meta-analysis from 2000 to 2020. *Eye* [Internet]. 2024; 38(11): 2036-2046. Available from <https://doi.org/10.1038/s41433-024-02995-5>
7. National Eye Institute. Glaucoma [Internet]. NEI-NIH; December 10, 2024 [last updated]. Available from <https://www.nei.nih.gov/espanol/aprenda-sobre-la-salud-ocular/enfermedades-y-afecciones-de-los-ojos/glaucoma>
8. Redacción Perú21. Glaucoma: El 2% de peruanos mayores de 40 años padece esta enfermedad [Internet]. Perú21; 2024, 15 de marzo. Available from <https://peru21.pe/vida/salud/glaucoma-el-2-de-peruanos-mayores-de-40-anos-padece-esta-enfermedad-noticia/>
9. Schuster AK, Erb C, Hoffmann EM, Dietlein T, Pfeiffer N. The diagnosis and treatment of glaucoma. *Dtsch Arztebl Int* [Internet]. 2020; 117(13): 225-234. Available from <https://di.aerzteblatt.de/int/archive/article/213268>
10. Nongrum B, Thangkhiew L, Natung T, Pandey I, Shullai W, Wahlang JB, et al. Glaucoma burden and its profile in a tertiary care centre of North-East India: a retrospective hospital-based study. *J Family Med Prim Care* [Internet]. 2024; 13(9): 3766-3772. Available from https://doi.org/10.4103/jfmpc.jfmpc_1908_23
11. Arroyo D. Factores e intervenciones relacionados con la adherencia terapéutica en el paciente glaucomatoso. Revisión bibliográfica [trabajo de fin de grado en Internet]. Valladolid: Universidad de Valladolid; 2020. Available from <https://uvadoc.uva.es/handle/10324/51869>
12. Montero YY, Vizcaíno MC, Gutiérrez D, Montero Y. Habilidades profesionales en afecciones oftalmológicas del adulto mayor en licenciados de Enfermería [Internet]. XIII Jornada Científica Internacional de la SOCECS; 2024, 20 de noviembre-30 de diciembre. Holguín: Universidad de Ciencias Médicas de Holguín; 2025. Available from <https://edumedholguin.sld.cu/index.php/edumedholguin24/2024/paper/viewFile/801/975>
13. Ministerio de Salud (PE). Plan de la Estrategia Sanitaria Nacional de Salud Ocular y Prevención de la Ceguera (2014-2020) [Internet]. Lima: Minsa; 2015. Available from https://cdn.www.gob.pe/uploads/document/file/373715/Plan_de_la_estrategia_sanitaria_nacional_de_salud_ocular_y_prevenci%C3%B3n_de_la_ceguera_2014_-_202020190925-31433-xidutl.pdf
14. Farfán AP, López FR, López RJ, Navia RA. Factores de riesgo asociado a glaucoma en pacientes de 40 a 65 años, hospital IEES Portoviejo. *RECIAMUC* [Internet]. 2022; 6(1): 72-84. Available from [https://doi.org/10.26820/reciamuc/6.\(1\).enero.2022.72-84](https://doi.org/10.26820/reciamuc/6.(1).enero.2022.72-84)
15. Díez-Álvarez L, Beltrán-Agullo L, Loscos J, Pazos M, Ponte-Zúñiga B, Pinazo-Durán MD, et al. Glaucoma avanzado. Guía de práctica clínica. *Arch Soc Esp Oftalmol* [Internet]. 2023; 98(1): 18-39. Available from <https://doi.org/10.1016/j.oftal.2022.05.006>
16. Menéndez GL. Intervención de enfermería en el adulto mayor con complicaciones visuales por diabetes mellitus [tesis de licenciatura en Internet]. Manta: Universidad Laica Eloy Alfaro de Manabí; 2024. Available from <https://repositorio.ulead.edu.ec/handle/123456789/5832>
17. Resolución Directoral n.º 149-2023-INO-D, que aprueba la Guía Técnica: Guía de Procedimientos Asistenciales de Enfermería del Instituto Nacional de Oftalmología – INO «Dr. Francisco Contreras Campos». Lima: Minsa, Instituto Nacional de Oftalmología; August 22, 2023. Available from <https://www.gob.pe/institucion/ino/normas-legales/5502986-149-2023-ino-d>
18. Raile M, Marriner A. Modelos y teorías en enfermería. 9.a ed. Barcelona: Elsevier Health Sciences; 2018.
19. Agudelo-Cuéllar LM, Lancheros-López FN. Entorno familiar, social y estado de salud de los adultos mayores: una revisión sistemática desde el cuidado de enfermería. *Bol Sem Inv Fam* [Internet]. 2021; 3(1): e-807. Available from <https://doi.org/10.22579/27448592.807>
20. Aristizábal-Hoyos GP, Blanco-Borjas DM, Sánchez-Ramos A, Ostiguín-Meléndez RM. El modelo de promoción de la salud de Nola Pender. Una reflexión en torno a su comprensión. *Enferm Univ* [Internet]. 2011; 8(4): 16-23. Available from <https://doi.org/10.22201/eneo.23958421e.2011.4.248>
21. Jaarsma T, Westland H, Vellone E, Freedland KE, Schröder C, Trappenburg JC, et al. Status of theory

- use in self-care research. *Int J Environ Res Public Health* [Internet]. 2020; 17(24): 9480. Available from <https://doi.org/10.3390/ijerph17249480>
22. Naranjo-Hernández Y. Modelos metaparadigmáticos de Dorothea Elizabeth Orem. *Rev Arch Med Camaguey* [Internet]. 2019; 23(6): 814-825. Available from <https://www.redalyc.org/articulo.oa?id=211166534013>
 23. Gómez N, Gómez N, Santander R, Robaina R. El glaucoma primario de ángulo abierto, caracterización clínica en Pinar del Río. *Rev Ciencias Médicas* [Internet]. 2019, 23(6): 810-816. Available from http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S1561-31942019000600810
 24. Molinet LM, Pérez AI, Sablón R, Morell Z, Castillo C. Indicadores epidemiológicos, sociales y clínicos del glaucoma en el hospital «Enrique Cabrera». *Arch Hosp Univ «Gen Calixto García»*. 2022; 10(1): 126-138. Available from <https://revcalixto.sld.cu/index.php/ahcg/article/view/e910>
 25. Zhou Q, Wufuer A, Guo J. Efficacy of evidence-based nursing for senile cataract complicated with primary angle-closure glaucoma. *Altern Ther Health Med* [Internet]. 2024; 30(10): 257-261. Available from <http://alternative-therapies.com/oa/index.html?fid=9686>
 26. Roque-Choque E, Noriega-Cerdán J, Sánchez-Espinoza J, Alvarado-Villacorta R. Factores asociados al nivel de conocimiento sobre glaucoma primario de ángulo abierto en un centro de referencia nacional en Perú. *Rev Mex Oftalmol* [Internet]. 2022; 96(5): 213-219. Available from <https://www.scielo.org.mx/pdf/rmof/v96n5/2604-1731-rmo-96-5-213.pdf>
 27. Moy L. Análisis de la gestión del seguro integral de salud y su impacto en el desarrollo humano, 2014-2018 [tesis de doctorado en Internet]. Lima: Centro de Altos Estudios Nacionales; 2021. Available from <https://hdl.handle.net/20.500.13097/75>
 28. Zárate UE. Caracterización epidemiológica del glaucoma en la población del Servicio de Oftalmología del Hospital Nacional Arzobispo Loayza: enero-diciembre 2012. *Acta Med Per* [Internet]. 2013; 30(4): 74-79. Available from <http://www.scielo.org.pe/pdf/amp/v30n4/a04v30n4.pdf>
 29. Peña Y, García Y, Peña N. Factores de riesgo en el glaucoma primario de ángulo abierto en Bayamo. *Multimed* [Internet]. 2020; 24(2): 324-337. Available from <https://www.medigraphic.com/pdfs/multimed/mul-2020/mul202f.pdf>
 30. Li W, Feng A, Solís L, Fernández-Britto JE. Influencia del tabaquismo, la hipertensión arterial y la diabetes mellitus en las enfermedades oftalmológicas. *Rev Cuba Oftalmol* [Internet]. 2017; 30(3). Available from <http://scielo.sld.cu/pdf/oft/v30n3/oft10317.pdf>
 31. Zhang N, Wang J, Li Y, Jiang B. Prevalence of primary open angle glaucoma in the last 20 years: a meta-analysis and systematic review. *Sci Rep* [Internet]. 2021; 11: 13762. Available from <https://doi.org/10.1038/s41598-021-92971-w>
 32. González Y, Silva TY, Quiala L, Reynoso M, Quintana Y. Características epidemiológicas y clínicas de pacientes con glaucoma crónico simple. *MEDISAN* [Internet]. 2023; 27(4): e4503. Available from <http://scielo.sld.cu/pdf/san/v27n4/1029-3019-san-27-04-e4503.pdf>
 33. McMonnies CW. Glaucoma history and risk factors. *J Optom* [Internet]. 2017; 10(2): 71-78. Available from <https://doi.org/10.1016/j.optom.2016.02.003>