



Review of risk factors in the identification of primary open angle glaucoma

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Vision Care

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Agenda

1. Introduction
2. Prevalence
3. Risk factors
4. Building an effective risk profile
5. Practical use of guidelines
6. Implementation of a primary open angle glaucoma risk tool
7. Conclusion



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Introduction

- Impact of disease on the optic nerve
- Primary open angle glaucoma (POAG)
 - Mechanism
 - Trabecular collagen meshwork becomes sclerotic with age
 - Inheritance pattern
 - Typically, familial
 - Onset
 - Typically starts in the 4th decade of life



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Prevalence



World Health Organization¹

- 3rd leading cause of blindness in the world
- 2.2 billion people have vision impairment
- 1 billion people living with reduced or absent eyesight due to preventable causes
 - Refractive error
 - Cataracts
 - Glaucoma



National Eye Institute (USA)²

- Cases detected by gender, race, ethnicity
 - Women (61%)
 - Caucasians (66%)
- 1.9% of people over age of 40 are diagnosed with glaucoma

¹ "Blindness and vision impairment" who.int/news-room/fact-sheets/detail/blindness-and-visual-impairment, October 2021; accessed April 2022

² "Glaucoma data and statistics" nei.nih.gov/learn-about-eye-health/outreach-campaigns-and-resources/eye-health-data-and-statistics/glaucoma-data-and-statistics, July 2019; accessed April 2022

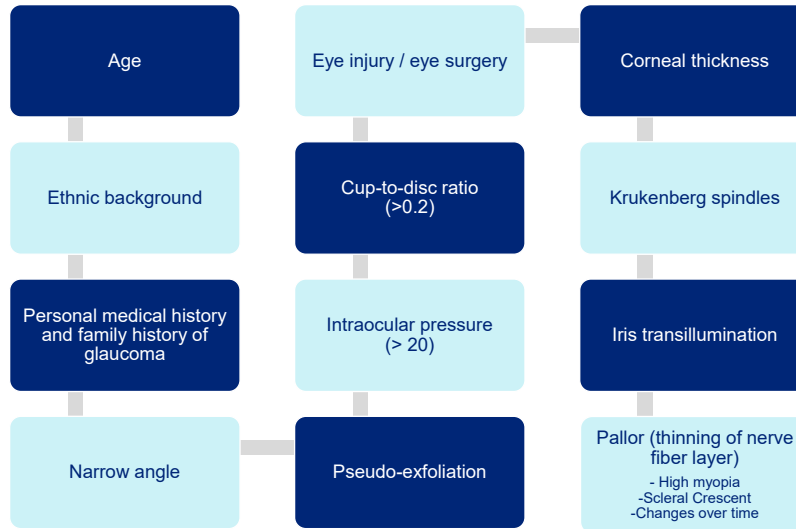


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Risk factors



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A tool to assess significant risk

- **UnitedHealthcare Vision's peer review committee**

- Optometry / ophthalmology
- Glaucoma risk tool pilot program

- **Based on a review of the literature**

- Each risk factor for glaucoma is weighted
- Combinations of factors increase risk
- Establishes level of risk to substantiate the diagnosis of "glaucoma suspect"
- Develops criteria for glaucoma work-up and testing

Risk factors for Glaucoma		Points
Age	40-70	2
Ethnicity	African	2
	Hispanic	2
Family history	1 parent	6
	2 parents	8
	Parent blind from GL	8
Medical history	Diabetes	2
	Cardiovascular disease	2
Eye injury		4
Eye exam	Thin cornea <535	4
	Krukenberg spindles	5
	Iris transillumination	5
	Narrow angle	4
	Pseudo-exfoliation	10
	IOP above 20	8
	C/D difference > than 0.2	4
Pallor/thinning of nerve head	8	



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Age

Age | 2 points

40-70 is statistically the age group at highest risk for primary open angle glaucoma

- Certain people have genetic predisposition to develop POAG
- Suggested mechanism
 - Age-related sclerosis of the trabecular meshwork impedes outflow of the aqueous humor



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Ethnic background

Ethnicity | 2 points

Certain ethnic backgrounds have statistically higher incidence of glaucoma



African Americans

- 6-8x more common than Caucasian population¹
- 7x more likely to go blind from glaucoma than Caucasians²
- Prevalence rate for primary open angle glaucoma (POAG) for African American individuals is 15%³
- Often occurs earlier than in other ethnic populations



Asian

- Increased risk for primary angle closure glaucoma (PACG)⁴
- Prevalence rate for primary open angle glaucoma (POAG) for Asian individuals is 5%³ Asian population has a 51% higher risk for POAG²
- Japanese population showed greatest risk for normal tension glaucoma⁴



Hispanic

- Equal to Caucasian populations however prevalence increases with age⁵
- Hispanic population has some of the highest rates of vision loss and blindness due to eye diseases and conditions like glaucoma⁵
- Prevalence rate for primary open angle glaucoma (POAG) for Hispanic individuals is 18%³



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Family history

One parent | 6 points
Two parents | 8 points

First-degree blood relatives with glaucoma have a significantly increased risk of developing glaucoma

Genetic tendency for:

- Sclerotic changes in the trabecular meshwork
- Stiffness of the lamina cribrosa

Tendency for narrow angles, larger crystalline lenses



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Medical history

Diabetes | 2 points
Vascular disease | 2 points

Overall health can affect the risk for glaucoma



Diabetes

- Patients with diabetes are twice as likely to develop glaucoma¹
- Risk of developing glaucoma increases every year and often has no symptoms²
- Tighter control of diabetes improves outcomes
- Vascular changes in optic nerve
- Disruption of trabecular meshwork



Vascular disease

- Patients with general vascular disease are at significant risk for developing glaucoma³
- Patients with peripheral vascular disease are more likely to develop normal tension glaucoma⁴
- Patients with carotid stenosis have a 1.5x greater risk for POAG⁵

¹How Diabetes Affect Your Eyes and Eye Care Tips WebMD. <https://www.webmd.com/diabetes/diabetes-eye-care>. May 2021; Accessed April 2022. ²Is There a Connection Between Glaucoma and Diabetes?, Healthline. <https://www.healthline.com/health/glaucoma-and-diabetes#diagnosis>. October, 2020; Accessed April 2022. ³Cardiovascular disease is a significant risk factor for glaucoma. American Academy of Ophthalmology. <https://www.aao.org/education-choice/cardiovascular-disease-is-significant-risk-factor>. May 2021; Accessed April 2022. ⁴Peripheral vascular disease. Journal of Medical Case Reports. [link to article](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5912741/), November 2020; Accessed April 2022. ⁵Nationwide cohort study. National Library of Medicine. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5912741/>. April 2018; Accessed April 2022



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Previous eye injury

With hyphema | 4 points
With angle recession | 8 points

Significant injuries to the globe that cause uveitis or cataract are associated with glaucoma

- Cellular debris in trabecular meshwork
- Peripheral anterior synechiae (PAS)
- Hyphema
- Angle recession



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Eye exam

Thin cornea (<535 μm) | 4 points
Krukenberg spindles | 5 points
Iris transillumination | 5 points



Thin cornea (<535 μm)

- Patients with thinner central corneal thickness tend to have a higher IOP than measured with applanation tonometry
- Patients with naturally thin cornea (i.e., without keratoconus or refractive surgery) may have collagen disorder than can affect the lamina cribrosa



Pigment dispersion syndrome

- **Krukenberg spindles**
 - Pigmentary dispersion syndrome
- **Iris transillumination**
 - Pigmentary dispersion syndrome



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Eye exam

Narrow anterior chamber angles | 4 points
Pseudo-exfoliation | 10 points



Narrow anterior chamber angles

- NAC angles should be considered at risk for occlusion with gonioscopy
- Primary angle closure risk concerns
- Mixed mechanism



Pseudo-exfoliation

- Pseudo-exfoliation syndrome vs pseudo-exfoliation glaucoma
- More common age > 60 years
- More common in women
- IOP at diagnosis
- Bilaterality



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Eye exam

IOP above 20 mmHg | 8 points
C/D difference > 0.2 | 2 points



IOP above 20 mmHg

- Historically significant risk factor
- Goldmann technique is the gold standard
- Multiple readings above 20 mmHg are more diagnostic
- Single reading above 23 mmHg are more diagnostic
- Low tension or normal glaucoma may never show readings above 20 mmHg
- Other risk factors and especially careful examination of the optic nerve head are critical



C/D difference > 0.2

- Glaucoma is a disease of the optic nerve
- Changes at the optic nerve head are a significant risk factor
- There are normal variants between the nerve head that are statistically 0.2 or less
- Age is an important correlated risk factor
- Asymmetry of the nerve head in a person under 20 years old with no other risk factors are often congenital
- Pallor of the larger cup, vertical elongation or notching are more diagnostic
- The most significant risk factor is change in nerve anatomy over time



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Building an effective risk profile

Score each factor based on assigned points

Cumulative point value of

**10+
points**

should have glaucoma work-up
on a separate office visit

Testing should include:

- ✓ Threshold visual field testing
- ✓ Optical coherence tomography
- ✓ Gonioscopy
- ✓ Additional testing may include:
 - Nerve head photos
 - Corneal pachymetry

If these tests are not available in-office, the patient should be referred to another location where these tests can be performed.



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Practical use of guidelines & Implementation of POAG risk tool



Practical use of guidelines

- An evidence-based tool to assist the provider on when additional testing would be appropriate for patients that may be suspicious for glaucoma
- Clinical judgement must be the deciding factor



Implementation of POAG risk tool

- This risk tool will be used by clinical reviewers to determine medical necessity for additional testing
- Variations from the tool based on clinical judgement should be well documented in the medical record



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Conclusion

- Glaucoma is a sight threatening disease with generally no signs or symptoms
- The annual comprehensive eye examination is the best place for the problem to be discovered
- The diagnosis of “glaucoma suspect” based on minor risk factors and over testing, however, places undue stress and anxiety on patients and their families
- This glaucoma risk tool should be helpful to providers in making the right determination for each patient



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