



The Philadelphia Glaucoma Detection and Treatment Project

Detection Rates and Initial Management

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Purpose: To evaluate the detection rates of glaucoma-related diagnoses and the initial treatments received in the Philadelphia Glaucoma Detection and Treatment Project, a community-based initiative aimed at improving the detection, treatment, and follow-up care of individuals at risk for glaucoma.

Design: Retrospective analysis.

Participants: A total of 1649 individuals at risk for glaucoma who were examined and treated in 43 community centers located in underserved communities of Philadelphia.

Methods: Individuals were enrolled if they were African American aged ≥ 50 years, were any other adult aged ≥ 60 years, or had a family history of glaucoma. After attending an informational glaucoma workshop, participants underwent a targeted glaucoma examination including an ocular, medical, and family history; visual acuity testing, intraocular pressure (IOP) measurement, and corneal pachymetry; slit-lamp and optic nerve examination; automated visual field testing; and fundus color photography. If indicated, treatments included selective laser trabeculoplasty (SLT), laser peripheral iridotomy (LPI), or IOP-lowering medications. Follow-up examinations were scheduled at the community sites after 4 to 6 weeks or 4 to 6 months, depending on the clinical scenario.

Main Outcome Measures: Detection rates of glaucoma-related diagnoses and types of treatments administered.

Results: Of the 1649 individuals enrolled, 645 (39.1%) received a glaucoma-related diagnosis; 20.0% ($n = 330$) were identified as open-angle glaucoma (OAG) suspects, 9.2% ($n = 151$) were identified as having narrow angles (or as a primary angle closure/suspect), and 10.0% ($n = 164$) were diagnosed with glaucoma, including 9.0% ($n = 148$) with OAG and 1.0% ($n = 16$) with angle-closure glaucoma. Overall, 39.0% ($n = 64$ of 164) of those diagnosed with glaucoma were unaware of their diagnosis. A total of 196 patients (11.9%) received glaucoma-related treatment, including 84 (5.1%) who underwent LPI, 13 (0.8%) who underwent SLT, and 103 (6.2%) who were prescribed IOP-lowering medication.

Conclusions: Targeting individuals at risk for glaucoma in underserved communities in Philadelphia yielded a high detection rate (39.1%) of glaucoma-related diagnoses. Providing examinations and offering treatment, including first-line laser procedures, at community-based sites providing services to older adults are effective to improve access to eye care by underserved populations. *Ophthalmology* 2016;■:1–8 © 2016 by the American Academy of Ophthalmology.

Glaucoma is a chronic optic neuropathy representing a significant global public health issue as the leading cause of irreversible blindness in the world.¹ Estimates have projected that 60.5 million people worldwide had glaucoma in 2010, including 8.4 million people with bilateral blindness from the disease.² Furthermore, the worldwide prevalence of glaucoma is expected to increase to 111.8 million people by 2040, causing further economic and quality-of-life burdens.¹ In the United States alone, annual health care costs associated with treating glaucoma are estimated at approximately \$3 billion.³

Primary open-angle glaucoma (POAG) is believed to comprise the majority of cases worldwide, disproportionately affecting Africans, whereas primary angle-closure glaucoma (PACG) disproportionately affects Asians.¹ In the United States, POAG is the most common type of glaucoma, affecting approximately 2% of adults 40 years of age or older, or approximately 2.2 million US citizens.⁴ Risk factors for glaucoma include elevated intraocular pressure (IOP),^{5–7} advanced age,⁸ a family history of glaucoma,⁹ race (African American, Asian), and ethnicity (Hispanic/Latino).^{10,11} More specifically, among African Americans compared with white subjects, the prevalence of

POAG is 4 to 5 times as high; POAG may develop at a younger age, and the rate of glaucoma-related blindness is 6 to 8 times higher.^{12,13} The risk of glaucoma increases in all people with age, particularly in Hispanic¹⁰ and African-American adults; approximately one quarter of African Americans older than 75 years of age have glaucoma,¹⁴ making this population particularly high risk.

Despite available testing and effective treatment options to prevent vision loss, estimates suggest that 50% to 75% of people with glaucoma remain undiagnosed,^{7,11} in part because of barriers in reaching high-risk populations. Previous research on office-based screening programs for underserved populations showed that approximately half of patients found to be high risk through a vision screening do not return for an eye examination.^{15,16} Significant barriers preventing high-risk populations from obtaining regular eye examinations include insufficient knowledge about glaucoma and its progression, inadequate insurance, lack of trust, language barriers, difficulty obtaining transportation, need for multiple follow-up visits once glaucoma treatment is initiated, and cost of eye care co-payment.¹⁶

The Wills Eye Glaucoma Research Center initiated a 2-year demonstration project to develop and implement a community-based intervention to overcome these barriers to educate, detect, and treat individuals with glaucoma in high-risk, underserved populations in Philadelphia and to ultimately prevent the burden of further vision loss. The purpose of this report is to describe the results of the baseline examinations and initial treatments in this project.

Methods

The methods of this project have been described in detail in a previous report.¹⁷ In brief, a 2-year community outreach initiative, funded by the US Centers for Disease Control and Prevention, was performed between January 1, 2012, and May 31, 2014. Wills Eye Hospital partnered with multiple organizations, in particular those serving African Americans, Hispanics, and older adults in Philadelphia, to establish community-based sites. Partners included governmental agencies, nonprofit organizations, faith-based organizations, human services organizations, and various senior housing and senior centers, which were selected on the basis of their willingness to participate.

Initially, a Wills Eye community health educator led a glaucoma awareness workshop for individuals at risk for glaucoma at each community-based site. Informational materials were distributed in English, Spanish, Cantonese, and Mandarin. Workshop participants were then encouraged to sign up for a glaucoma detection examination, if eligible. Individuals were enrolled if they were African American aged ≥ 50 years, were any other adult aged ≥ 60 years, or had a family history of glaucoma.

The Wills Eye team consisted of 5 members: an ophthalmologist, a project manager, an ophthalmic technician, a community health educator, and a mobile unit coordinator. The team performed free glaucoma examinations approximately 1 week after the workshop. Walk-ins also were accepted. The team and all equipment were transported via the Wills Eye van to the community-based sites to eliminate patient transportation barriers.

The glaucoma examination consisted of a medical, ocular, and family history; visual acuity testing; corneal pachymetry; slit-lamp biomicroscopy of the anterior segment; IOP measurement by Goldmann applanation tonometry; indentation gonioscopy;

undilated funduscopy with additional dilated fundoscopic examination if deemed necessary by the examining ophthalmologist; automated visual field testing (Octopus 300 Visual Field Analyzer; Haag-Streit Inc., Bern, Switzerland); and fundus-color photography¹⁸ (Volk Pictor; Optomed Oy Ltd., Oulu, Finland) (Fig 1). All patient information was entered into the Wills Eye electronic medical record system. Participants also were asked to complete satisfaction surveys after their eye examinations.

Patients diagnosed with new open-angle glaucoma (OAG) were offered selective laser trabeculoplasty (SLT) as an option for first-line treatment for elevated IOP. Patients who were previously diagnosed with glaucoma and required an IOP-lowering intervention also may have been offered SLT at the physician's discretion. Patients diagnosed with angle closure, including primary angle-closure suspect, primary angle-closure, and PACG, were recommended for laser peripheral iridotomy (LPI). Angle closure was defined as >180 degrees of iridotrabecular contact in primary gaze on gonioscopy. All laser procedures were performed at the community site without charge, either on the same day or at a subsequent follow-up visit at the same site, using the Selecta Duet laser platform (Lumenis Inc., San Jose, CA). Same-day bilateral treatments were encouraged.¹⁹ Patients with OAG who declined laser therapy and patients with PACG or secondary angle-closure glaucoma received a prescription for appropriate IOP-lowering medications as determined by the treating ophthalmologist.

Patients who were diagnosed with glaucoma and received SLT, LPI, or glaucoma medications were scheduled for a follow-up appointment at the community location 4 to 6 weeks and 4 to 6 months from the baseline visit. Follow-up and adherence outcomes will be reported separately. The OAG suspects also were scheduled for community-based follow-up visits in 4 to 6 months. The community health educator contacted all patients to confirm follow-up visits to improve adherence. Patients who did not have glaucoma-related conditions were advised to follow up with their own eye-care provider within 1 year. If other eye diseases were detected, patients were notified and referred to local ophthalmologists or the Wills Eye Hospital Ophthalmology Clinic. Patients without insurance were directed to a "patient navigator," who assisted them in obtaining care through charity resources, Medicaid, or other programs. After the 6-month follow-up visit, all patients were offered future follow-up eye care with the Wills Eye Primary Eye Care Clinic or Glaucoma Service, or other local ophthalmologists in private practice or health centers in Philadelphia.

Baseline characteristics of all patients examined, including demographics, clinical measurements, and diagnosis, are summarized with frequency and percentage for categorical data or with mean and standard deviation for continuous variables. SAS software version 9.4 (SAS Institute, Inc., Cary, NC) was used for all analyses. The institutional review board at Wills Eye Hospital approved the study procedure. The study was Health Insurance Portability and Accountability Act compliant and adhered to the tenets of the Declaration of Helsinki.

Results

The Philadelphia Glaucoma Detection and Treatment Project enrolled 1649 individuals at risk for glaucoma. Figure 2 illustrates a flow chart of patient enrollment and attendance at initial examinations across the 43 community sites. Because of walk-ins ($n = 598$), more patients were examined than originally scheduled.

Baseline demographic and clinical characteristics of participants are shown in Table 1. The majority of enrolled patients were

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