Visual Field Testing in Glaucoma Medicare Beneficiaries before Surgery

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Objective: The standard of care for progressive glaucoma that requires medical or surgical intervention includes visual field (VF) testing at least annually. This study aims to assess how commonly ophthalmologists perform VF testing before planned glaucoma surgery in the Medicare population, and whether variations in conformance occur across demographic and clinical subgroups.

Design: Retrospective, observational, population-based analysis.

Participants: Thirteen thousand seven hundred fifty-three Medicare beneficiaries.

Methods: Data were obtained from a 5% random sample of Medicare beneficiaries undergoing glaucoma surgery in the United States from 1995 to 1999. The proportion of patients with evidence of at least 1 VF examination in the year before glaucoma surgery was determined.

Main Outcome Measure: Rate of VF testing in the year before glaucoma surgery.

Results: Overall, 70% of patients had at least 1 VF test in the year preceding glaucoma surgery. This rate was significantly lower ($P<0.001$) in patients ≥85 years (56%), blacks (64%), patients with race other than white or black (66%), patients with diabetic retinopathy (60%), and patients with bilateral blindness (47%).

Conclusions: The use of VF testing before surgery in glaucoma Medicare beneficiaries is suboptimal relative to the recommended standard of care. Underutilization is of particular concern in blacks, who are at increased risk of glaucomatous damage. Quality-of-care initiatives are needed to facilitate appropriate preoperative evaluations of glaucoma Medicare beneficiaries for glaucoma surgery. *Ophthalmology 2005;112:401–406 © 2005 by the American Academy of Ophthalmology.*

Glaucoma is the second leading cause of blindness in the United States, and the leading cause of blindness among black Americans. The disease affects approximately 2.2 million people in the U.S. over the age of 40 years,[1] 80 000 of whom are blind.[2] Glaucoma is generally more prevalent in blacks, Hispanics, and older individuals.[1] According to recent reports, ophthalmologists performed 3.1 million surgical procedures on glaucoma Medicare beneficiaries in the U.S. annually, at an estimated total direct cost of $2.6 billion (1991 dollars).[3]

The diagnosis of glaucoma is determined by progressive optic nerve damage and/or visual field (VF) loss, the latter of which is generally assessed by serial standardized VF testing.[2,4,5] The need for treatment is determined mainly by VF loss, or the inference that VF loss will occur according to the clinician's judgment. In general, glaucoma surgery is reserved for patients with progressive VF loss despite prior medical treatment.[2] Thus, repeated VF evaluation is critical to establishing the diagnosis of glaucoma and to identifying progressive optic nerve damage indicating treatment failure.[2] Visual field testing is reimbursed by the Centers for Medicare & Medicaid Services for Medicare beneficiaries, and early disease detection, including VF testing, has been demonstrated to be cost-effective on a societal level.[6]

According to the 1996 American Academy of Ophthalmology preferred practice patterns, VF testing for progressive glaucoma is recommended every 3 to 12 months, whether treated medically, surgically, or both.[2] However, studies have demonstrated that adherence to these guidelines may vary widely among different practice settings.[7,8] Other studies suggest that some of the variation in treatment patterns may be explained by race or by socioeconomic factors.[9–11] In this study, a Medicare claims database was used to estimate the use of VF testing in the year before glaucoma surgery in an effort to assess adherence to American Academy of Ophthalmology recommendations. This study also aimed to elucidate whether care pattern variations exist among different demographic and clinical subgroups with respect to performance of this valuable preoperative assessment.

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Materials and Methods

A 5% random sample of Medicare beneficiaries in the Physician/Supplier Part-B files maintained by the Health Care Financing Administration (HCFA), since renamed the Centers for Medicare & Medicaid Services, was reviewed retrospectively to select all procedural claim records for argon laser trabeculoplasty (ALT) and trabeculectomy from 1995 to 1999. Procedural claims were identified by means of the HCFA Common Procedural Coding System, which is based upon the *Physicians' Current Procedural Terminology* (CPT) coding system.[12] Specifically, ALT was defined by CPT code 65855, and trabeculectomy was defined by CPT codes 66170 and 66172.

Records associated with these glaucoma surgery claims were then merged with HCFA demographics files to determine their eligibility. Records meeting the following criteria were excluded: (1) patients younger than 65 years; (2) patients not residing in the U.S. in the year of surgery; (3) patients without Part-B coverage or with health maintenance organization coverage that was not processed by HCFA; (4) patients whose underlying diagnosis code did not correspond with open-angle glaucoma, defined by International Classification of Diseases 9 (ICD9)[13] diagnostic codes 365.10, 365.11, and 365.15; (5) claims coded as a service other than surgery; and (6) claims with either modifier code 55 or modifier code 56, indicating postoperative care or preoperative care, respectively.

As patients may have had multiple ALT or trabeculectomy procedures during the study period, only the first occurrence of either procedure was used as a marker to identify prior VF testing, because this provides a clear outcome measure and avoids the possibility of a single VF test being associated with multiple procedures. In addition, to ensure that at least 1 year of information before glaucoma surgery was available, all glaucoma surgeries performed in 1995 were excluded. Institutional review board approval was obtained before initiation of this study.

The primary outcome of the study was to assess the rate of VF testing within 1 year before surgery. Visual field testing was defined by claims associated with CPT code 92081, 92082, or 92083. Records were reviewed for VF testing occurring within 360 days before the claim for a glaucoma surgery. Potential factors that could influence the rate of VF testing were also extracted. These factors included ocular comorbidities such as diabetic retinopathy (ICD9: 362.0) and bilateral blindness (ICD9: 369.0–4), as well as demographic data including age, gender, and race. In addition, data were also reviewed based on glaucoma surgery type: ALT, trabeculectomy alone, or trabeculectomy combined with extracapsular cataract extraction (ECCE). Combined trabeculectomy with ECCE was defined based on a claim for ECCE (CPT: 66840, 66940, or 66984) occurring on the same day as a claim for trabeculectomy.

The overall rate of VF testing within 360 days of an ALT or trabeculectomy was then established. Specified 1-year preoperative VF testing rates based on age (grouped into 5 categories: 65–69, 70–74, 75–79, 80–84, or ≥85 years), gender, race (white, black, or other), and geographic regions were also established. Depending on the state of residence, subjects were placed into 1 of the 10 geographic regions defined by the headquarters of HCFA regional offices (Table 1). Similar rates were calculated for subgroups with and without diabetic retinopathy, subgroups with and without bilateral blindness, and the various glaucoma surgery types. Chi-square tests were used to assess statistical significance of differential VF testing rates among various demographic and clinical subgroups. Logistic regression models were then applied to estimate the effects of the potential influencing factors, including age group, race–gender interaction, HCFA region, glaucoma surgery type, diabetic retinopathy, and bilateral blindness.

Table 1. Composition of Health Care Financing Administration (HCFA) Regions by State

Headquarters of HCFA Regional Offices	States Included
Boston	Conn., Me., Mass., NH, RI, Vt.
New York	NJ, NY
Philadelphia	Del., DC, Md., Pa., Va., WVa.
Atlanta	Ala., NC, SC, Fla., Ga., Ky., Miss., Tenn.
Chicago	Ill., Ind., Mich., Minn., Ohio, Wis.
Dallas	Ark., La., NM, Okla., Tex.
Kansas City	Iowa, Kan., Mo., Neb.
Denver	Colo., Mont., ND, SD, Utah, Wyo.
San Francisco	Ariz., Calif., Hawaii, Nev.
Seattle	Alaska, Idaho, Ore., Wash.

Results

A total of 13 753 patients ≥65 years old were identified as having had at least 1 glaucoma surgery between 1996 and 1999. Demographic and clinical characteristics of the study population are listed in Table 2. The majority of the study population were female (64%), and 17% of the population studied were black. Relative to the overall 5% random sample of Medicare beneficiaries, females and blacks were both found in higher proportions in the study population (64% vs. 57% and 17% vs. 9%, respectively). Argon laser trabeculoplasty was the most common type of glaucoma surgery performed (71% of all glaucoma surgeries), and nearly two thirds of patients who underwent trabeculectomies had combined trabeculectomy/ECCE procedures. Seven percent (7.2%) of patients had a diagnosis of diabetic retinopathy, and 1.7% had a diagnosis of bilateral blindness.

Table 2 also lists the VF test rate within 360 days of surgery (i.e., the preoperative VF test rate) for the study population and its subgroups. Overall, only 70% of glaucoma Medicare beneficiaries had a VF test in the year before glaucoma surgery. Based on subgroup analysis, preoperative VF testing rates varied significantly ($P<0.001$) by race and age (Table 2). Whites were significantly more likely to get tested than blacks and other nonwhites, at rates of 71% versus 64% and 66%, respectively ($P<0.001$). Patients 85 years or older were tested less frequently than younger patients, with 56% of those ≥85 receiving a VF test, as compared with 75% of those aged 70 to 74. A modest difference in preoperative VF testing rates among males and females (71% vs. 69%) was also found to be statistically significant ($P = 0.002$) but is not likely to be clinically meaningful.

Preoperative VF testing rates also varied significantly ($P<0.001$) by HCFA region, glaucoma surgery type, and certain ocular comorbidities (Table 2). Patients residing in the Atlanta and Chicago HCFA regions had the highest preoperative VF rates (72%), whereas the lowest rates were found in the Denver HCFA region (64%). Patients undergoing ALT were tested more frequently than patients undergoing trabeculectomy alone or trabeculectomy combined with ECCE (72% vs. 67% or 64%, respectively). Patients with diabetic retinopathy were tested less frequently: 60% of cases, as opposed to 70% in patients without this underlying condition. Patients with bilateral blindness also were tested significantly less frequently (47% vs. 70%) than patients without blindness.

Preoperative VF testing rates, adjusted for possible influencing