Clinic-Based Glaucoma Care in the Era of Surgical Subspecialization

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• PURPOSE: To evaluate the impact of surgeon practice profile on clinic-based glaucoma care.

• DESIGN: Population-based study of glaucoma care patterns in Ontario, Canada from 2000-2010.

• METHODS: Using comprehensive physician services data from the Ontario Health Insurance Plan database, ophthalmologists were divided into 5 surgical practice subgroups. The role of each subgroup in the provision of glaucoma care was evaluated. Consultations and office visits were used to assess nonsurgical care, while laser trabeculoplasty procedures were used to assess clinic-based procedural care.

• RESULTS: Between 2000 and 2010, the population rate of glaucoma consultations and follow-up visits provided by ophthalmologists who do not perform incisional glaucoma surgery increased at average annual rates of 1.6% ($P < .0002$) and 3.3% ($P < .0001$), respectively. In contrast, no significant growth in the rate of glaucoma consultations or follow-up visits provided by glaucoma surgeons was observed (0.8%/year [$P = .2$] for consultations; 0.2%/year [$P = .6$] for follow-up visits). Between 2000 and 2010, the rate of laser trabeculoplasty procedures provided by ophthalmologists who do not perform incisional glaucoma surgery increased 19.3% annually ($P < .0001$), while growth among glaucoma surgeons was more modest (annual growth of 9.2% [$P = .0002$]).

• CONCLUSIONS: While subspecialization is a growing reality in most areas of medicine, we found that the provision of clinic-based glaucoma care remains dependent on ophthalmologists who do not perform incisional glaucoma surgery. With increasing focus on integrated care, these findings will have important implications for residency education programs and their accrediting bodies and will inform decisions of health care policymakers, hospitals, and academic departments. (Am J Ophthalmol 2014;157:631–639. © 2014 by Elsevier Inc. All rights reserved.)

GLAUCOMA IS THE LEADING CAUSE OF IRREVERSIBLE blindness in the world, and it underlies a large portion of the population eye disease burden, trailing only cataract and refractive error in public health need and demand for health services.[1,2] Further, because the risk of glaucoma grows exponentially with age, many nations will face accelerating growth in glaucoma prevalence as their populations age.[3] This has focused attention on the need for health human resource strategies to meet the challenges ahead.[4–6] While facing a future of growing demand for most health services, the delivery of health care has steadily shifted toward greater levels of subspecialization in recent years.[7,8] Consequently, the American Board of Medical Specialties (ABMS) now recognizes more than 150 specialties and subspecialties.[9]

We have previously shown that surgical glaucoma care has increasingly become the purview of a shrinking number of high-volume subspecialists.[10] The surging need for interventional care for diseases such as cataract and acute conditions such as neovascular age-related macular degeneration raise the specter of diminishing access to nonsurgical aspects of care in the management of chronic diseases such as glaucoma.[11,12] However, little is known about how the delivery of clinic-based aspects of glaucoma care is distributed among ophthalmologist subtypes. Such evidence is not only important to the process of aligning health human resources with population needs, but it is also critical in implementing efficient models of care that incorporate the realities of front-line practice. Such information will also inform decisions regarding the competencies to be attained in residency, and in rationally planning the specific types of training positions to be offered to meet population needs.[13,14] In particular, certification and accreditation organizations including the ABMS, the American Board of Ophthalmology (ABO), the Accreditation Council for Graduate Medical Education (ACGME), and the Royal College of Physicians and Surgeons of Canada (RCPSC) use such

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data to inform policies.[8,14,15] Hence, we carried out a population-based study to evaluate the relative roles of glaucoma surgeons and other ophthalmologists in the provision of clinic-based glaucoma care.

METHODS

WE CONDUCTED A POPULATION-BASED RETROSPECTIVE study of glaucoma care in Ontario, Canada between January 1, 2000, and December 31, 2010. Ontario is Canada's most populous province, with a population of about 13 million individuals during the study period. The study protocol was approved by the Research Ethics Board at Queen's University, Kingston, Ontario, Canada. Patient confidentiality was maintained via encrypted health care identification numbers and strict adherence to privacy protocols.

The province of Ontario provides government-funded universal health care insurance to all citizens through the Ontario Health Insurance Plan (OHIP). Physician services data were obtained from the OHIP database, which has excellent reliability for recording medical and surgical procedures.[16] Ontario physicians receive payment for insured services only through OHIP, and cannot bill patients directly. All of the physician encounters, laser procedures, and surgical interventions evaluated in this study are insured under the OHIP program. Hence, the OHIP database contains complete data for all Ontario physicians regarding the procedures and physician encounters analyzed in this study.

• **PHYSICIAN ENCOUNTERS AND LASER PROCEDURES FOR GLAUCOMA:** To investigate developments in clinic-based glaucoma care, we evaluated glaucoma office visits and outpatient laser trabeculoplasty procedures but excluded incisional glaucoma surgery. Specifically, in separate analyses, we evaluated physician-requested glaucoma consultations (OHIP code A235 associated with International Statistical Classification of Diseases and Related Health Problems, Ninth Revision [ICD-9] code 365) and follow-up or optometrist-requested ophthalmology clinic visits for glaucoma ("specific assessment" [OHIP code A233] or "partial assessment" [OHIP code A234] or "optometrist-requested assessment" [OHIP code 253] associated with ICD-9 code 365). In Ontario, physician-requested and optometrist-requested consultations are coded distinctly in the OHIP database, and optometrist-requested assessments cannot be billed as regular physician-requested assessments. Optometrist-requested assessments were given their own OHIP physician billing code in 2009, but prior to that date, such assessments had to be coded as regular office visits ("specific" or "partial" assessments). Thus, in order to allow longitudinal evaluation of trends we grouped these 3 types of assessments together to provide a consistent measure of glaucoma care distinct from physician-requested consultations. During the study period, glaucoma therapies could only be prescribed by physicians and not by optometrists. Hence all patients requiring therapy were referred to and treated by ophthalmologists. Finally, in addition to these evaluations of clinic-based medical glaucoma care, we examined nonincisional glaucoma procedural care by evaluating clinic-based laser trabeculoplasty procedures (OHIP code E134).

Notably, our population-based study evaluated data for all ophthalmologist office visits and laser trabeculoplasty procedures. In the US system, this would correspond to capturing all office visits and laser trabeculoplasty procedures regardless of provider, patient demographics, or insurance carrier.

• **SURGICAL PRACTICE PROFILES:** We investigated the influence of ophthalmologists' surgical practice profiles (mix of procedures provided) on the provision of clinic-based glaucoma care by dividing ophthalmologists into mutually exclusive categories based on the types of ocular surgery they perform (if any). With the aim of identifying clinically relevant groupings, we categorized ophthalmologists as: (1) glaucoma surgeons, defined as those providing incisional glaucoma surgery with or without cataract surgery; (2) nondiversified cataract surgeons, defined as those providing cataract surgery but no other forms of ocular surgery (glaucoma, vitreoretinal, corneal, or strabismus surgery); (3) diversified cataract surgeons, defined as those providing both cataract surgery and other forms of nonglaucoma ocular surgery (vitreoretinal, corneal, or strabismus surgery); (4) non–glaucoma/non–cataract surgeons, defined as those doing vitreoretinal, corneal, or strabismus surgery but neither glaucoma surgery nor cataract surgery; and (5) ophthalmologists who do not perform incisional ocular surgery, defined as those not providing incisional glaucoma, cataract, vitreoretinal, corneal, or strabismus surgery. These groupings were created for each year of the study, based on procedures performed between January 1 and December 31 of that year.

• **ANALYSIS AND DATA SOURCES:** We divided the study period into yearly intervals and, within each interval, evaluated the number of ophthalmologists providing each glaucoma service and the number of glaucoma services provided by each physician. Poisson regression was used to estimate the average annual change in glaucoma service rates. Data regarding each ophthalmologist were obtained from the Institute for Clinical Evaluative Sciences (ICES) Physician Database, which comprises information from the OHIP Corporate Provider Database, the Ontario Physician Human Resource Data Centre database, and the OHIP database of physician billings. The ICES Physician Database is validated through telephone interviews with all physicians practicing in Ontario and has been used in previous studies of physician practice.[10,17,18] Yearly