

Use of Various Glaucoma Surgeries and Procedures in Medicare Beneficiaries from 1994 to 2012

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Purpose: Determine how procedural treatments for glaucoma have changed between 1994–2012.

Design: Retrospective, observational analysis.

Participants: Medicare Part B beneficiaries.

Methods: We analyzed Medicare fee-for-service paid claims data between 1994–2012 to determine the number of surgical/laser procedures performed for glaucoma in the Medicare population each year.

Main Outcome Measures: Number of glaucoma-related procedures performed.

Results: Trabeculectomies in eyes without previous scarring decreased 52% from 54 224 in 1994 to 25 758 in 2003, and a further 52% to 12 279 in 2012. Trabeculectomies in eyes with scarring ranged from 9054 to 13 604 between 1994–2003, but then decreased 48% from 11 018 to 5728 between 2003–2012. Mini-shunts done via an external approach (including ExPRESS [Alcon Inc, Fort Worth, TX]) increased 116% from 2718 in 2009 to 5870 in 2012. The number of aqueous shunts to the extraocular reservoir increased 231% from 2356 in 1994 to 7788 in 2003, and a further 54% to 12 021 in 2012. Total cyclophotocoagulation procedures increased 253% from 2582 in 1994 to 9106 in 2003, and a further 54% to 13 996 in 2012. Transscleral cyclophotocoagulations decreased 45% from 5978 to 3268 between 2005–2012; over the same period, the number of endoscopic cyclophotocoagulations (ECPs) increased 99% from 5383 to 10 728. From 2001 to 2005, the number of trabeculoplasties more than doubled from 75 647 in 2001 to 176 476 in 2005, but since 2005 the number of trabeculoplasties decreased 19% to 142 682 in 2012. The number of laser iridotomies was fairly consistent between 1994–2012, increasing 9% over this period and ranging from 63 773 to 85 426. Canaloplasties increased 1407% from 161 in 2007 to 2426 in 2012. Between 1994–2012, despite a 9% increase in beneficiaries, the total number of glaucoma procedures and the number of glaucoma procedures other than laser procedures decreased 16% and 31%, respectively.

Conclusions: Despite the increase in beneficiaries, the number of glaucoma procedures performed decreased. Glaucoma procedures demonstrating a significant increase in use include canaloplasty, mini-shunts (external approach), aqueous shunt to extraocular reservoir, and ECP. Trabeculectomy use continued its long-term downward trend. The continued movement away from trabeculectomy and toward alternative intraocular pressure-lowering procedures highlights the need for well-designed clinical trials comparing these procedures. *Ophthalmology* 2015;122:1615-1624 © 2015 by the American Academy of Ophthalmology.



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The American population is aging, and given the significant increase in glaucoma prevalence with advanced age,¹ the number of persons with glaucoma is expected to increase.^{2–4} These demographic changes are expected to increase the overall demand for glaucoma treatments. The relative use of specific glaucoma treatments depends in part not only on demographic changes but also on the therapeutic options available to physicians and patients, and the extent to which these options are embraced by the ophthalmic community.

A previous report summarized both the expansion of therapeutic options that became available for treating glaucoma since 1990 and the effect that this had on the number and

type of different glaucoma procedures performed between 1995 and 2004.⁵ Since that time, no new classes of intraocular pressure (IOP)-lowering medications have been made commercially available. However, the concept of using nonbleb-forming procedures to decrease IOP has gained considerable traction, and changes in Medicare billing codes have made the use of these procedures more amenable for study (Fig 1). Endoscopic cyclophotocoagulation (ECP), canaloplasty, ExPRESS (Alcon Inc, Fort Worth, TX) external mini-shunt implantation, and other new potentially “minimally invasive” glaucoma surgeries have significantly broadened the number of surgical options available for treating glaucoma, and studies documenting the efficacy of

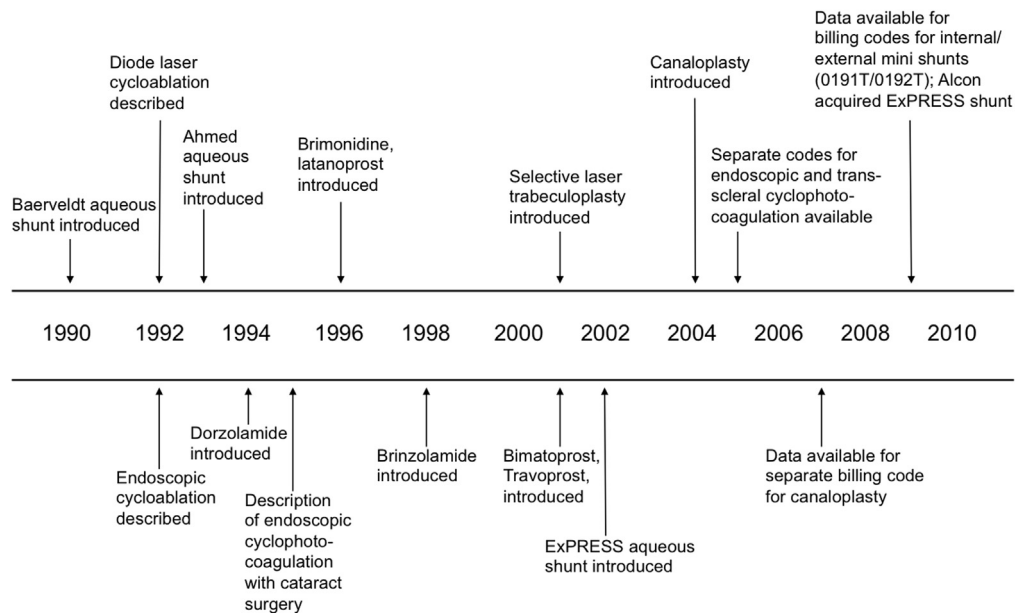


Figure 1. Timeline of new glaucoma therapeutics, 1990 to present.

these procedures with regard to IOP lowering have started to emerge. Studies have supported the wider use of aqueous shunting devices to the extraocular reservoir in the management of glaucoma^{6–8} and have more clearly defined the comparative outcomes of selective laser trabeculoplasty (SLT) with argon laser trabeculoplasty (ALT).^{9–13}

Although data regarding the efficacy of these procedures in lowering IOP have grown, it remains largely unknown to what extent these changes have affected which surgical or laser procedures ophthalmologists in the United States use to lower IOP. One report assessing the trends in Medicare expenditures for glaucoma surgical procedures between 1997 and 2006 included limited data on the use of some glaucoma procedures during this time period.¹⁴ Although others have attempted to assess these changes in the use of different procedures through other methods such as surveying physicians at the American Glaucoma Society meeting,¹⁵ to the best of our knowledge no other report has directly assessed the use of a wide range of glaucoma-related procedures in the United States using insurance data since 2006. We examine the trends in use of the most common glaucoma-related laser and surgical treatments for Medicare beneficiaries over the period 1994 to 2012, focusing more on recent changes occurring between 2004 and 2012.

Methods

Neither institutional review board approval nor application to Clinicaltrials.gov was required for this study because no personal health information was assessed. Data for this retrospective analysis were obtained from the files developed by the Centers for Medicare & Medicaid Services. Each file tabulates the number of paid claims to physicians by Current Procedural Terminology (CPT) code for Part B services provided to Medicare fee-for-service beneficiaries in a single year.

These data are in the public domain. In 2014, the most recent data available were for 2012. Data for Medicare beneficiaries enrolled in Part C, or Medicare Advantage, are unavailable and therefore not

included in this analysis. Likewise, use data for non-Medicare beneficiaries are not public and were not part of this analysis.

For this analysis, only those CPT codes used to report procedures of the anterior chamber, anterior sclera, iris, and ciliary body were tabulated. Those CPT codes begin with 65800 and continue through 66700 in sequential order. Several Category III CPT codes were also assessed, including canaloplasty with or without stent (0176T/0177T, used from 2007 to 2010); mini-shunts, internal approach (0191T, e.g., iStent [Glaukos Corp, Laguna Hills, CA]); and mini-shunts, external approach (0192T, e.g., ExPRESS, SOLX Gold Shunt [SOLX Inc, Waltham MA], and STAAR AquaFlow [STAAR Surgical, Monrovia, CA], not including aqueous tube shunts to a reservoir, which are coded as 66180). Particular attention was paid to glaucoma-related procedures.

To tabulate the number of times that different procedures were performed, the use of the CPT code for each procedure, along with its modifiers, was assessed. For instance, for laser trabeculoplasty (LTP), the data might appear as follows: 65855-RT, 65855-LT, 65855-50, 65855-79, 65855-51. 65855-RT indicates that LTP was performed in the right eye, 65855-LT indicates that the procedure was performed in the left eye, 65855-50 indicates that the procedure was performed bilaterally, 65855-79 indicates that the procedure occurred within the postoperative period of a prior procedure performed by the same physician but was not related to this prior procedure, and 65855-51 indicates that multiple procedures were performed on the same day. For all of these data elements, except for 65855-50, we counted the frequency as “1”, but for the bilateral modifier –50, we counted the frequency as “2.” In cases in which the payment for the procedure was disallowed, we did not count the procedure.

Results

A list of glaucoma and anterior segment procedures paid for by Medicare Part B from 2003 to 2012 spanning CPT codes 65800–66770, along with some temporary codes, is shown in [Table 1](#) (available at www.aajournal.org). This set of codes includes some procedures that may not be uniquely used in the care of glaucoma, and therefore the numbers of selected

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