The Extent to Which Medicare Beneficiaries Receive Eye Care Services Exclusively By Ophthalmologists or Optometrists – A Comparison of All 50 States

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**Purpose:** Sight-threatening ocular diseases such as glaucoma, macular degeneration, diabetic retinopathy, and cataract are more prevalent with older age. These conditions often require laser or surgical interventions which, in most states, can only be performed by ophthalmologists. It is unclear whether older Americans are routinely receiving eye care services by ophthalmologists or optometrists and how this varies from state to state.

**Methods:** Using a health care claims database capturing a national 20% sample of all enrollees in Medicare, we identified enrollees who received ophthalmic care during the 2008-2012. For each enrollee, we determined whether they received exclusive eye care by an ophthalmologist, exclusive care by an optometrist, or ≥ 1 records of eye care by each provider type. For all 50 states, we calculated the ratio of patients who received ophthalmic care exclusively by ophthalmologists versus exclusively by optometrists.

**Results:** Among the 7,893,648 eligible Medicare enrollees, 2,632,738 (33.4%) persons received ophthalmic care exclusively by an ophthalmologist, 1,287,861 (16.3%) by an optometrist, and 1,344,887 (17.0%) by both eye provider types. In 9 of 50 states (18%) a greater proportion of older Americans were under the exclusive care of optometrists compared to ophthalmologists and in 41 states (82%) a greater proportion were under exclusive care by ophthalmologists. Nationally, the ratio of older Americans under the exclusive care of ophthalmologists versus optometrists was 2.04 to 1. The states with the lowest ratio of patients under the exclusive care of ophthalmologists versus optometrists were New York (0.24 to 1), South Dakota (0.49 to 1), and Kansas (0.59 to 1) and those with the highest ratio of patients under the exclusive care of ophthalmologists to optometrists were New Mexico (3.9 to 1), Maryland (4.8 to 1), and Delaware (16.0 to 1).

**Conclusions:** Although licensed optometrists practicing in the US greatly outnumber ophthalmologists, in most US states, a greater proportion of older Americans are receiving exclusive eye care by ophthalmologists compared to optometrists.
years, and 31% stated their current vision was fair or poor. 18% presented (habitual correction) with distance vision worse than 20/40 in at least one eye but with refraction, 96% achieved vision better than 20/40. 4% of participants had glaucoma (N=19), and half of these did not self-report glaucoma. An additional 10% (n=41) were glaucoma suspect, and only 2 of these self-reported. 17 (4%) had diabetic retinopathy (DR), and only 3 of these self-reported DR. 18 had AMD; 4 of whom self-reported. 196 (45%) had some degree of cataract. 351 completed a follow up questionnaire (81.4%). Of these, 93% said they were very satisfied with the exam experience, and 85% of these indicated willingness to pay an average of $84 for a similar exam in the future. The majority of those not willing to pay stated the reason was that they already had insurance to cover the exam.

**Conclusions:** There was significant interest in accessing a complimentary comprehensive eye exam among those becoming eligible for Medicare. Glaucoma and diabetic retinopathy were relatively common and frequently undiagnosed, and monitoring these diseases regularly can prevent vision loss. Prospective evaluation of the benefits of providing a free introductory eye exam at the time of entering Medicare in reducing visual impairment and blindness is needed.

**Commercial Relationships:** Emily W. Gower, None; David S. Friedman, None; Craig Greven, None; David J. Lee, None; Byron L. Lam, None; Amanda D. Henderson, None; Charles Chen, None; Cynthia Owseley, None; Gerald McGwin, None; Zachary Keenum, None; Julia A. Haller, None; Ann P. Murchison, None; Teresa Horan, None; Eric Shiuw, None


**Program Number:** 1616

**Presentation Time:** 11:30 AM–11:45 AM

**Telemedicine in Long-term Care of Glaucoma Patients**

**Jamie Odden, Muriel Schornack, Zhao Bingying, Clara Choo, Saumya M. Shah, Gina Stalboerger, Cheryl Khanna.**

**Medical School, University of North Dakota, Fargo, ND; Mayo Clinic, Rochester, MN.**

**Purpose:** Application of telemedicine to the care of patients with glaucoma could potentially reduce the frequency with which these patients require in-person care. This study evaluates agreement between in-person and non-visit assessment of glaucoma progression among masked glaucoma providers using data from two consecutive clinic visits.

**Methods:** Fifty adult glaucoma patients seen by a care team (2 glaucoma specialists and 2 optometrists) were enrolled at a single institution at an in-person evaluation with a glaucoma provider. The in-person assessment at time of enrollment was used as the gold standard for defining progression. A masked observer not involved in patient care abstracted all data related to the patient’s glaucoma care from the medical record (demographics, visual acuity, target intraocular pressure (IOP), IOP, cup/disc ratio, medications, surgical history, visual fields, OCT). Collated clinical data were then independently reviewed by four masked providers who classified glaucoma as progression or non-progression in each eye by comparing data from enrollment visit to data from the visit immediately prior to enrollment. Agreement of glaucoma progression between the masked observer and the in-person assessment was determined using Kappa statistics. Intra-observer agreement was calculated using Kappa to compare in-person to non-visit assessment when both assessments were performed by the same provider (n=70 eyes).

**Results:** One hundred eyes of 50 subjects were analyzed. Agreement between in-person vs. non-visit assessment for the determination of glaucoma progression was 65%, 71%, 72%, and 74% for each reader 1-4 (kappa values = 0.20, 0.33, 0.39, and 0.44 respectively).

**Conclusions:** Agreement between in-person vs. non-visit assessment of glaucoma progression was fair to moderate for each glaucoma team provider. Intra-observer agreement was similar to the agreement for each provider who did not see the patient in-person. This similarity suggests that telemedicine may be equally effective at identifying glaucomatous disease progression, regardless of whether the same provider performed both in-clinic and non-visit assessments. However, fair to moderate agreement levels highlight the limit of using only tele-medicine data to determine progression compared to clinical detail available during in-patient assessment.

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**Program Number:** 1619

**Presentation Time:** 11:45 AM–12:00 PM

**Costs of a Community-Based Glaucoma Detection Program:**

**Analysis of the Philadelphia Glaucoma Detection and Treatment Project**

**Laura Pizzi, Michael Waisbourd, Lisa A. Hark, Katherine M. Prioli, L. Jay Katz.**

**Center for Health Outcomes, Policy, and Economics, Rutgers University, Piscataway, NJ; Ophthalmology Division, Tel Aviv Sourasky Medical Center, Tel Aviv, Israel; Thomas Jefferson University, Philadelphia, PA; Research, Wills Eye Hospital, Philadelphia, PA; Glaucoma, Wills Eye Hospital, Philadelphia, PA.**

**Purpose:** Glaucoma is the foremost cause of irreversible blindness in the world, and more than 50% of glaucoma cases remain undiagnosed. The prevalence of glaucoma and its costs of treatment are rapidly increasing. Previous studies reported the cost-effectiveness of treating glaucoma, but few examine the costs of community-based examination programs. The objective of this project is to report the costs of a six-step, community-based glaucoma detection program delivered to at-risk individuals through senior centers, senior housing, and churches in Philadelphia.

**Methods:** A cost analysis was performed using a health care system perspective in SUS2013 and included costs of the six-step examination and educational workshops. Measures were total program costs, cost per case of glaucoma detected, and cost per case of any ocular disease detected (including glaucoma). Diagnoses were reported at the individual level and therefore represent a diagnosis made in one or both eyes. Staff time costs were captured during site visits to 15 of the 43 sites and included the time to deliver the examinations and workshops, supervision, training, and travel. Staff time was converted to costs by applying wage and fringe benefit costs obtained from the U.S. Bureau of Labor and Statistics (BLS). Non-staff costs (equipment and mileage reimbursements) were collected using study logs.

**Results:** 1,649 participants received a glaucoma examination. The mean total examination time was 56 (SD 4) minutes per participant, including all six steps. The mean total cost per participant to deliver the examination was $139. The cost per case of glaucoma newly identified (open angle or angle closure) was $420 and cost per case for any ocular disease identified was $273.

**Conclusions:** Glaucoma examinations delivered through the Philadelphia Glaucoma Detection and Treatment Project provided...
significant health benefit to hard-to-reach communities in terms of ocular diseases identified. On a per-person basis, the examinations were fairly low cost, though opportunities exist to improve efficiency. Findings serve as an important benchmark for planning future community-based glaucoma examination programs.

**Commercial Relationships:** Laura Pizzi, None; Michael Waisbourd, None; Lisa A. Hark, None; Katherine M. Prioli, None; L. Jay Katz, None

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**4634**

*Age-related cataract is a leading cause of vision impairment in older adults and providing timely access to surgery is an ongoing challenge. This study investigated preferences for cataract surgery services amongst adults with cataract in two urban public hospitals in Australia.*

**Lisa J. Keay**1, **Vu Q. Do**1, **Anna Palagyi**2, **Peter J. McCluskey**3, **Andrew J. White**1,3, **Nicole Carnot**1, **Fiona Stapleton**1, **Tracey-Lea Laba**1. 1Save Sight Institute, University of Sydney, Sydney, NSW, Australia; 2Ophthalmology, The University of Sydney, Sydney, NSW, Australia; 3School of Optometry and Vision Science, University of New South Wales, Sydney, NSW, Australia; 4The Westmead Institute for Medical Research, University of Sydney, Sydney, NSW, Australia; 5The George Institute for Global Health, The University of Sydney, Sydney, NSW, Australia.

**Purpose:** Age-related cataract is a leading cause of vision impairment in older adults and providing timely access to surgery is an ongoing challenge. This study investigated preferences for cataract surgery services amongst adults with cataract in two urban public hospitals in Australia.

**Methods:** Key attributes considered when selecting a cataract surgery service were determined by semi-structured patient interviews and these informed the design of a discrete choice experiment (DCE). Patients at cataract clinics of Sydney Eye and Westmead Hospitals in Sydney, Australia were administered the DCE survey which involved choices between two hypothetical services (8 sets). A multinomial logit model was used to estimate the odds ratios (OR) for preferring a surgical service and willingness to pay for a unit change in non-cost attributes.

**Results:** Five key service attributes were identified from the qualitative interviews: out-of-pocket cost, waiting time, institutional reputation, surgeon experience and travel time. A total of 74 patients completed the DCE: 33 (45%) were female and average age was 68±9 years (range 47-82). The majority of patients were retired and on a government pension (48, 66%) and spoke English at home (51, 70%). Thirteen patients (18%) had private health insurance. Surgical service preference increased with an experienced surgeon (OR 1.76, 95% CI 1.50-2.08) and at an institution with a good reputation (OR 1.53, 95% CI 1.38-1.71), but decreased with every month longer wait for surgery (OR 0.93, 95% CI 0.90-0.97) and $100 increase in out-of-pocket cost (OR 0.92, 95% CI 0.87-0.97). Travel time did not influence preference (OR 0.94, 95% CI 0.77-1.15 per hour). Respondents were willing to pay AUS$30 [US$38] (95% CI 34-76) to reduce their wait time by 6 months, AUS$60 [US$75] (95% CI 52-150) for an experienced surgeon and AUS$40 [US$48] (384-1180) to receive surgery at an institution with a good reputation.

**Conclusions:** This study provides insight into public hospital patient preferences for cataract surgery services in Australia. Surgeon experience, institutional reputation and waiting time were all valued by patients, and cost was a major consideration. Patients were willing to pay for these attributes, however projected figures were modest and most likely reflect limited financial resources, explaining the reliance on public hospital services which are provided at no cost.

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**Commercial Relationships:** Lisa J. Keay, None; Vu Q. Do, None; Anna Palagyi, None; Peter J. McCluskey, None; Andrew J. White, None; Nicole Carnot, None; Fiona Stapleton, None; Tracey-Lea Laba, None

**Support:** Australian Post Graduate Award (VD), New South Wales Ministry of Health Agency for Clinical Innovation

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**1621**

*The changing face of the Canadian ophthalmology workforce: an analysis of practice patterns and associations over two decades.*

**Tina Felfeli, Yaping Jin, Yvonne M. Buys.** Ophthalmology and Vision Sciences, Faculty of Medicine, University of Toronto, Toronto, ON, Canada.

**Purpose:** In response to demographic changes of the ophthalmology workforce in Canada, an analysis of the practice patterns of ophthalmologists over the past two decades will provide a valuable reference for physician resource management.

**Methods:** The Institute for Clinical Evaluative Sciences (ICES) database was used to determine the yearly headcount, gender, median yearly OHIP billings and patient visits of Ontario-licensed ophthalmologists from 1992 to 2014 for the following age groups; <35, 35-39, 40-44, 45-49, 50-54, 55-59, 60-64, 65-70, 70-74, ≥75. All billing data were adjusted to 2014 dollars to account for inflation.

**Results:** Female representation of ophthalmologists in Ontario has steadily increased from 11.1% in 1992 to 19.2% in 2014. Ophthalmologists within the 35-55 age groups represented the highest billing cohort throughout the study period. Early-career ophthalmologists in the <35 years of age group had the greatest variability in their yearly median billings, with the largest pay discrepancy between males and females of 89.1% in 1992 and smallest of 9.15% in 2014. The later-career ophthalmologists in the 40-44 age group showed a 72.2% billing difference between males and females in 1992 compared to 19.9% in 2014, while showing the smallest changes in billing patterns over time. Gender differences in billing within the 35-39, 40-45 and 50-54 age groups continued to narrow, such that in 2014, females earned 26.6%, 19.9% and 27.8% less than males, respectively. Despite narrowing gaps seen in these age groups, women of 45-49 years of age earned 49.9% less than males in 2014. Male ophthalmologist had 2.7% more patient visits than female patients in the <35 age group, however greater discrepancies were seen in later-career ophthalmologists, where females in 35-39, 40-44, 45-49, 50-54 age groups saw 8.8%, 28.3%, 39.8% and 10.8% fewer patients, respectively.

**Conclusions:** Gaps in billing trends continue to exist across all age groups and gender with women billing less than their male counterparts. Complex differences in practice patterns of ophthalmologists by age groups affect both workforce planning and highlight the need for a better understanding of changing characteristics relating to aspects of work–life balance and access to resources.

**Commercial Relationships:** Tina Felfeli, None; Yaping Jin, None; Yvonne M. Buys, None

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**1622**

*The changing face of the Canadian ophthalmology workforce: an analysis of practice patterns and associations over two decades.*

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**Commercial Relationships:** Tina Felfeli, None; Yaping Jin, None; Yvonne M. Buys, None

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**Purpose:** To estimate the prevalence of patients with low vision who obtain low vision rehabilitation (LVR) services and compare their characteristics to individuals who do not access services.

**Methods:** Electronic medical record (EMR) data was obtained for 104,668 patient encounters at the Wilmer Eye Institute main campus and all 8 satellite locations with at least one visit in 2014. Low vision status at each visit was categorized as visual acuity (VA) worse than 20/40 in the better-seeing eye. Best-corrected VA was the primary variable used, and if not recorded, the better of the pinhole or habitual VA was relied upon. A “low vision index appointment” was classified as the first visit in 2014 where the patient fit these criteria for low vision. Utilization of LVR services at Wilmer was determined using EMR over the 12 months following this index date. Based on this data, patients with low vision were classified as “users” or “non-user” of LVR over this period. Demographic and clinical data obtained from the EMR were used to compare the characteristics of LVR “users” and “nonusers”.

**Results:** A total of 93,455 patients had visual acuity data, of which 9,772 (10.5%) were classified as having low vision in 2014. Of these patients with low vision, 1,568 (16.3%) utilized low vision services over the 12 months following the low vision index appointment.

The mean time from the low vision index appointment and the initial LVR appointment was 221 days. LVR users were more likely to be older (67 vs 60 years old) and female (60% vs 56%) (p<0.01 for all comparisons) than non-users of LVR. The majority of low vision patients attending LVR had at least one retina (33.3%), glaucoma (10.9%), anterior segment (9.2%), or comprehensive eye (6.8%) visit over this period.

**Conclusions:** This study indicates that up to 85% of low vision patients seeking ophthalmic care may not be obtaining LVR services. Estimating the magnitude of LVR service underutilization is important for health care planning and for developing interventions aimed at improving LVR utilization to enhance visual ability and quality of life.

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