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FOCUS ON EYE HEALTH NATIONAL SUMMIT

VISION TO ACTION: Collaborating Around a National Strategy

Wednesday, July 13, 2016

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Preventing Vision Loss: Accessing Care

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University of Michigan

Conflicts of Interests Disclosure

- AAO Foundation – Hoskins Center for Quality and Safety
- American Board of Ophthalmology
- Centers for Disease Control and Prevention
- American Glaucoma Society
- American University Professors of Ophthalmology
- Private investment
  - Vital Spring Health Technologies
- Consultant and Research funding
  - National Eye Institute
  - Kellogg Foundation
- University of Michigan
- Duke University
- Intellectual property
  - Statins for glaucoma
  - EMR decision support and data entry

Themes

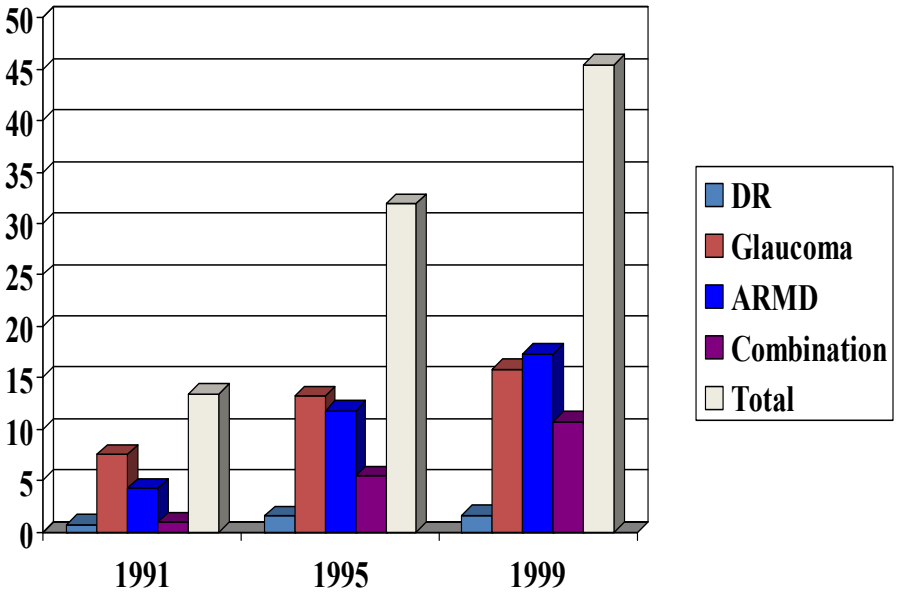
- Vision is important
- Progress is being made in reducing vision loss, but …
- Access to care remains a public health issue
- Current and future efforts can enable us to address the challenges

Why Does Eye Care Matter ?

Impacts Almost Everyone

Prevalence (%) of Chronic Eye Diseases in Cohort Panel in Medicare Population

Lee PP et al, Arch Ophth 2003



Vision Care is Cost Savings to Society

LXIII Edward Jackson Memorial Lecture: Eye Care: Dollars and Sense

HUGH R. TAYLOR, AC, MD

• PURPOSE. The development of health economic data for vision loss and eye disease is described.
• DESIGN. Data from population-based epidemiologic studies of eye disease, studies of the impact of vision loss on daily living, Australian national health-care costs, census, and demographic projections were combined to develop a model of the economic impact of vision loss in Australia.
• METHODS. Data were considered to assess the current magnitude and costs of vision loss and to make projections as to future costs. Further analysis investigated the costs and economic benefits of various interventions to address avoidable vision loss.
• RESULTS. The amount of vision loss increases threefold and the number with vision loss will double in 20 years. Vision loss cost Australia a total of AU $9.85 billion in 2004. Vision loss ranks seventh in causes of loss of well-being. An intervention package to address avoidable vision loss would cost AU $190 million or AU $5,591/Quality Adjusted Life Year (QALY) and give lifetime savings of AU $911 million.
• CONCLUSIONS. Although specific for Australia, these data can help guide health care policy debate and the priority given to eye care in other developed economies. For each dollar spent on the prevention of vision loss and eye care, there is a 5 dollar return to the community. (Am J Ophthalmol 2007;143:1–8. © 2007 by Elsevier Inc. All rights reserved.)

IT IS A GREAT HONOR TO BE INVITED TO GIVE THE LXIII Edward Jackson Memorial Lecture. Since my first Academy meeting I have enjoyed and learned much from the giants of ophthalmology who have been selected to receive this recognition over the years by the American Ophthalmic Publishing Company and the Academy.[1] I am proud to be the ninth International Jackson Lecturer and the first from Australia.

Accepted for publication Oct 2, 2006.

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Previous Jackson lecturers including Paul Lichter and Dan Albert have given wonderful descriptions of Edward Jackson's life and contributions.[2–4] For those of you who are not familiar with these may I recommend strongly these reviews as being of high interest.

THE PRIORITY GIVEN TO VISION LOSS

LIKE ALL OPHTHALMOLOGISTS, JACKSON INSTINCTIVELY knew the importance of good vision and eye health. The treatment of eye disease and the prevention of blindness is our highest priority; it is our calling. As ophthalmologists, we all accept the importance of good vision without question.

In 1980, the World Health Organization (WHO) asked me to review eye services in Pakistan at the request of the Pakistani government. When I presented my report to the Pakistani Minister of Health, he received the report, but then he stated vision loss was just not a priority for him. As Health Minister, he was faced with many problems; infant mortality, maternal deaths, the provision of primary health care. He had expensive hospitals to run, and also the health problems of a million Afghani refugees present in Pakistan at that time.

The problem I faced was how to convince others of the importance of eye care services and to prioritize them relative to other pressing health demands. This is a challenge we all face, both as individual ophthalmologists and as a profession, whether we are working in our own hospitals, or lobbying politicians and policy makers. On every side, there is competition for health dollars.

POPULATION-BASED EVIDENCE

EPIDEMIOLOGIC FIELD STUDIES CAN PROVIDE A WIDE range of information. In ophthalmology, they have given us great information about the prevalence and incidence of eye diseases and disease risk factors. In 1991, there were no coherent data on the magnitude or causes of vision loss in Australia. At best, only fragmented reports were available. To address this gap, the "Melbourne Visual Impairment Project" (VIP) was started. It was a large, population-based

0002-9394/07/$32.00
doi:10.1016/j.ajo.2006.10.003

Outcomes of Eye Care – Why Regular Eye Care is Important Sloan FA, et al, JAGS, 2005

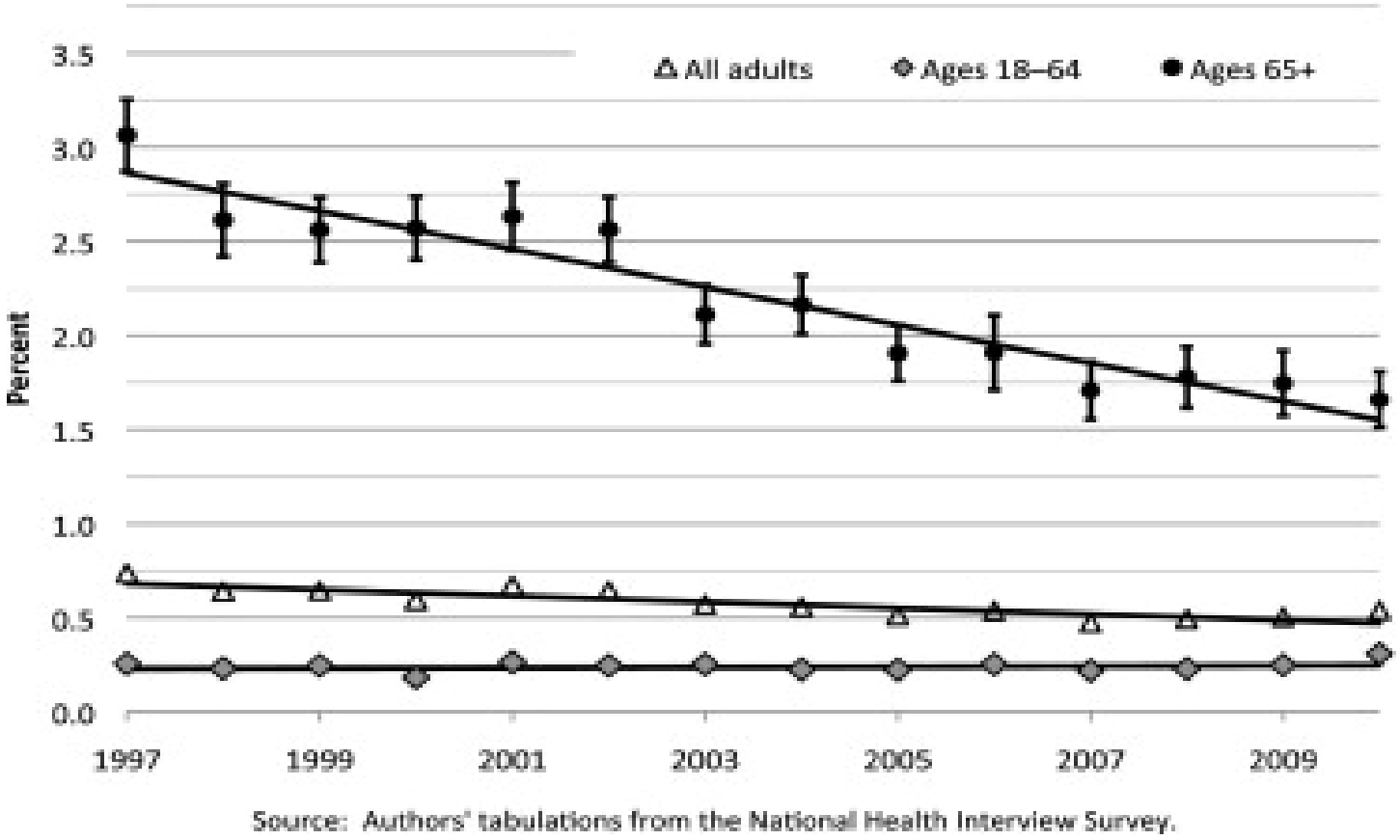
- 21% of population (NLTCS) developed increase in IADL limitations between 1994 and 1999
- Effect of moving from 1.64 annual eye exams to 2.64 annual exams (mean of 2.14)

  = decrease from 27.5% to 14.5% ($p = 0.041$)

- DM / Cataract / AMD /Age / Female / Yrs. of education / DxCG / Less HMO / Dementia increased risk

Themes

- Vision is important
- Progress is being made in reducing vision loss, but …
- Access to care remains a public health issue
- Current and future efforts can enable us to address the challenges



Prevalence of activity-limiting visual impairment among adults in the United States, age-adjusted by age group, 1997–2010.

Trends in Self-reported Visual Impairment in the United States: 1984 to 2010

Angelo P. Tanna , H. Stephen Kaye

Ophthalmology, Volume 119, Issue 10, 2012, 2028 - 2032

http://dx.doi.org/10.1016/j.ophtha.2012.04.018

When diabetic retinopathy is detected early, treatment is 95% effective in preventing severe vision loss.

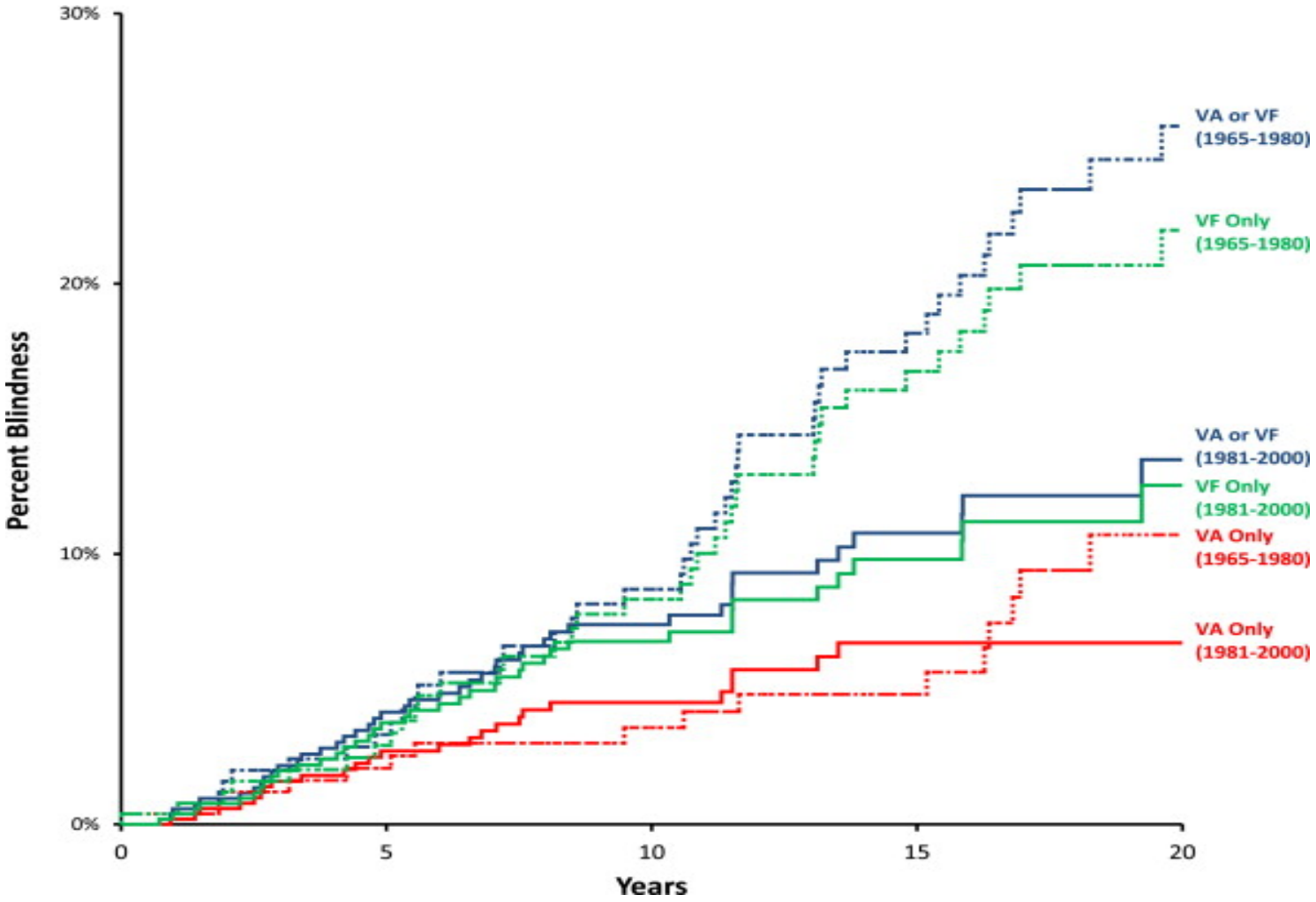
National Eye Health Education Program
NEHEP

A program of the National Institutes of Health

www.nei.nih.gov/diabetes

Long-Term Trends in Glaucoma-Related Blindness in Olmsted County, Minnesota,

Ophthalmology 2014, Mehrdad M et al http://dx.doi.org/10.1016/j.ophtha.2013.09.003



From: **Geographic Variation in the Rate and Timing of Cataract Surgery Among US Communities (Kauh CY, et al)** JAMA Ophthalmol. 2016;134(3):267-276. doi:10.1001/jamaophthalmol.2015.5322

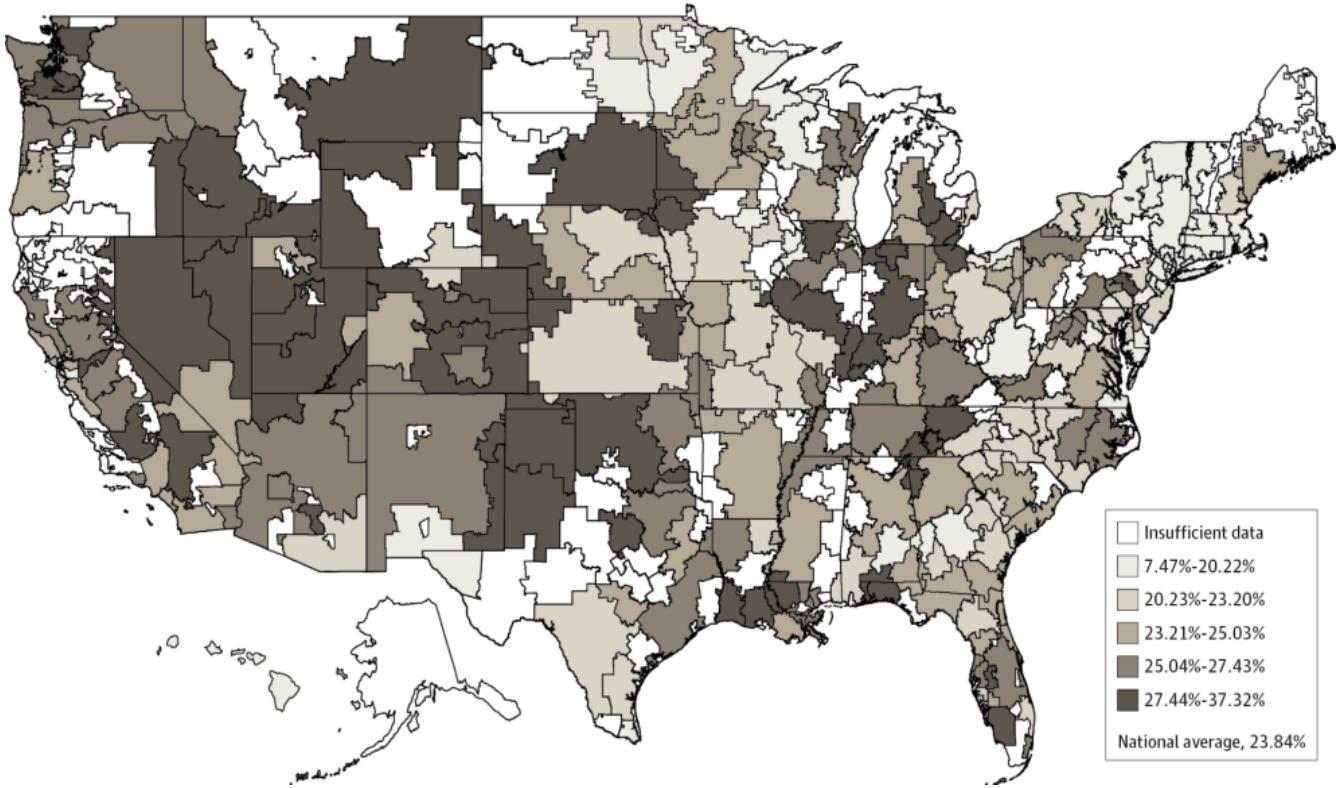


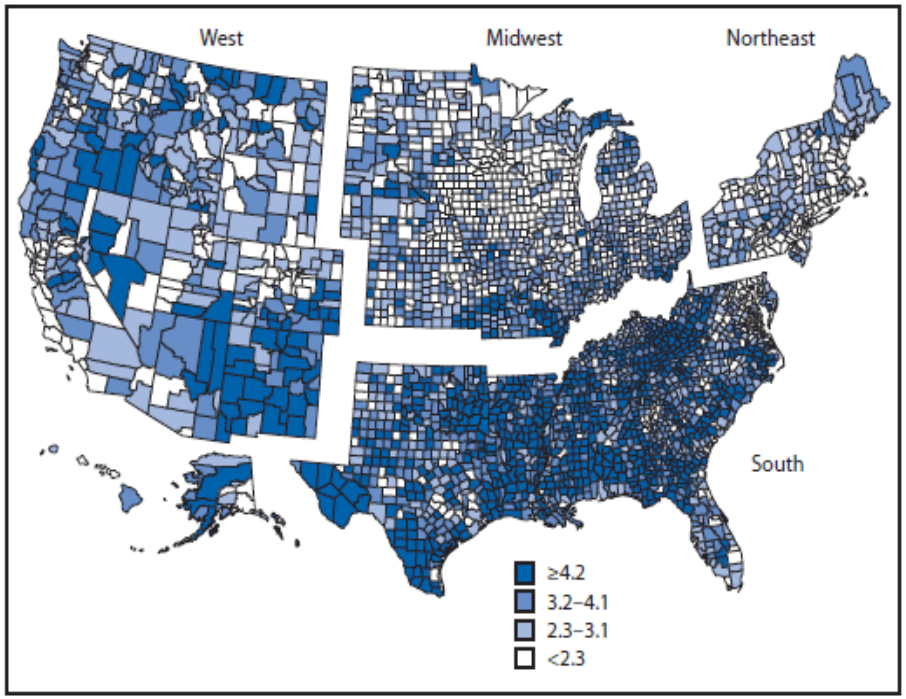
Figure Legend:

Geographic Variation in the Age-Standardized Cataract Surgery Rate Throughout the United States. Communities with a lower age-standardized rate of initial cataract surgery are shaded lighter in color, while those a higher age-standardized rate of initial cataract surgery are shaded with darker colors.

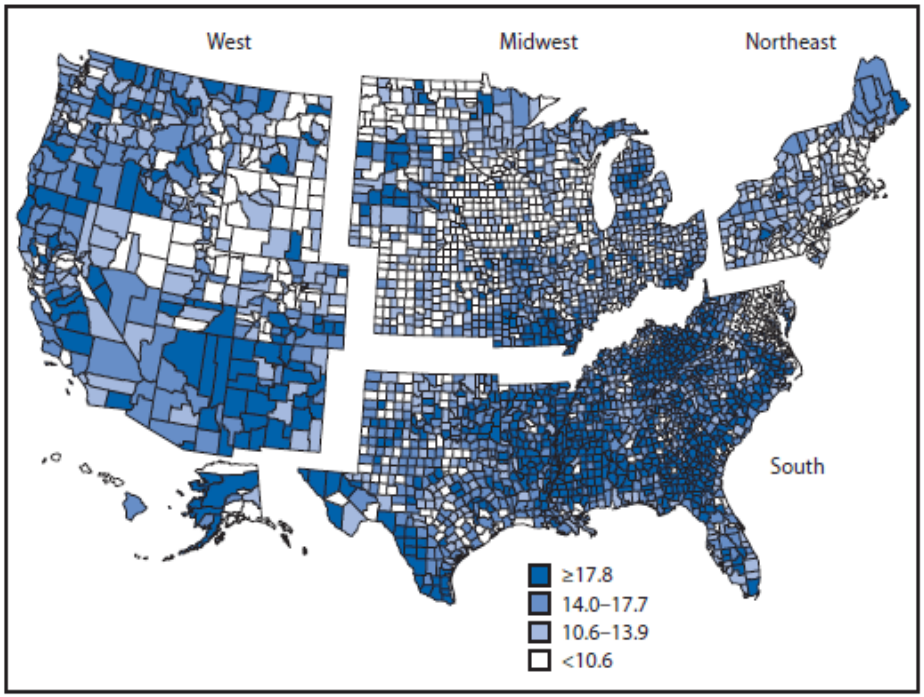
Geographic Disparity (by County) of Poverty and Vision Loss

Kirtland KA, et al, MMWR, 2015

Percentages ≥ 18 with severe vision loss (blind or serious difficulty seeing even with glasses)

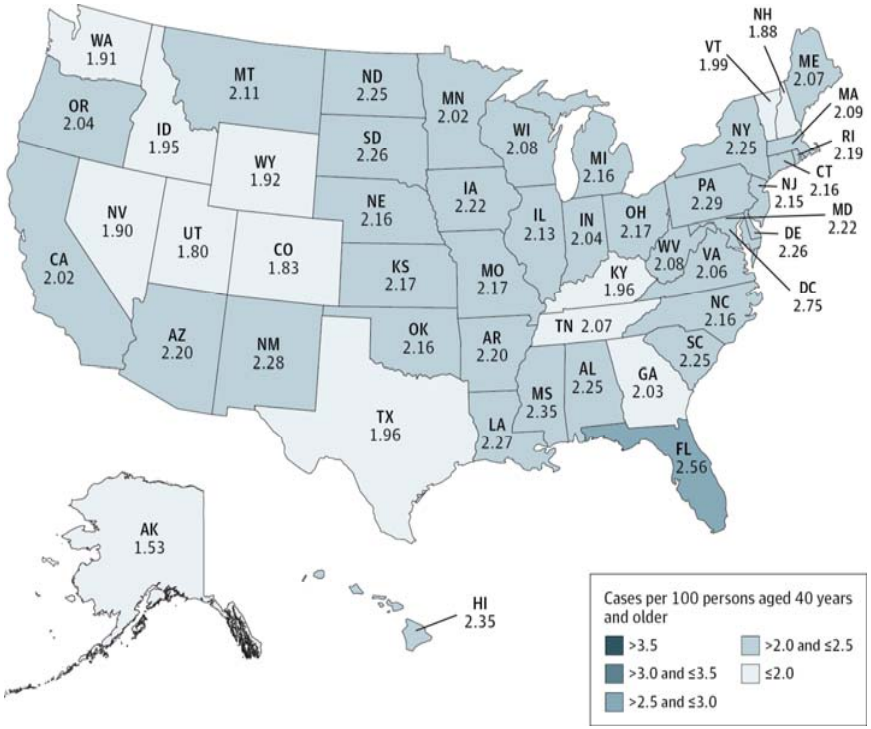


Percentages ≥ 18 with family income below poverty

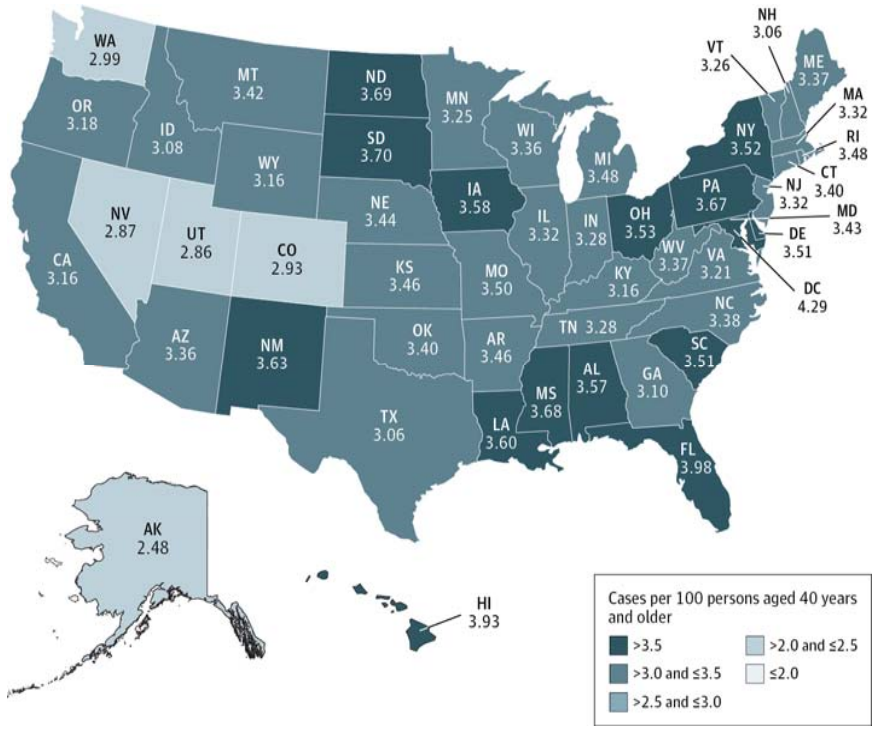


From: **Visual Impairment and Blindness in Adults in the United States: Demographic and Geographic Variations From 2015 to 2050 (Varma R, et al)**

JAMA Ophthalmol. Published online May 19, 2016. doi:10.1001/jamaophthalmol.2016.1284



Per Capita Prevalence of Visual Impairment in the United States in 2015



Per Capita Prevalence of Visual Impairment in the United States in 2015

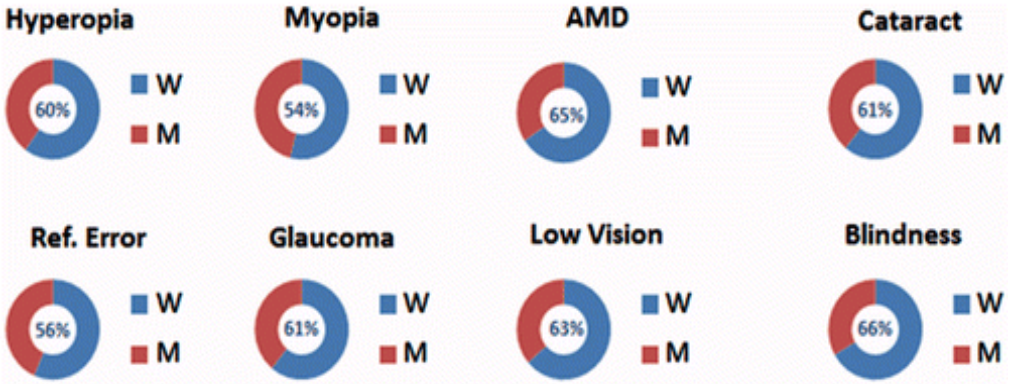
Themes

- Vision is important
- Progress is being made in reducing vision loss, but …
- Access to care remains a public health issue
- Current and future efforts can enable us to address the challenges

Disparities in Vision Loss and Eye Care

Zambelli-Weiner, Crews & Friedman, AJO Supp, 2012 Elam & Lee, Survey, 2013; Clayton & Davis, Curr Eye Res 2015

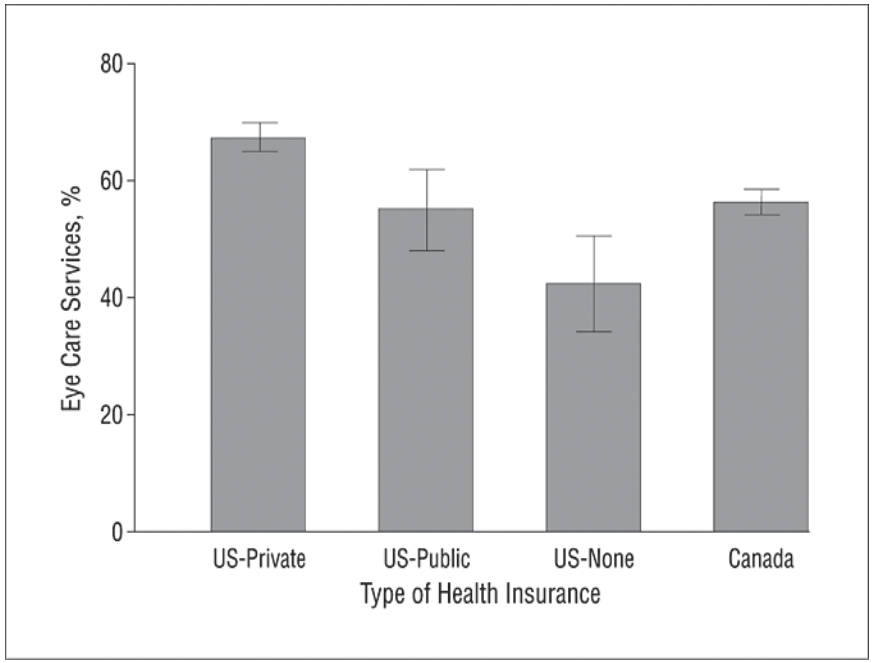
- Age
- Race
- Gender
- SES (Education/Income)
- Culture

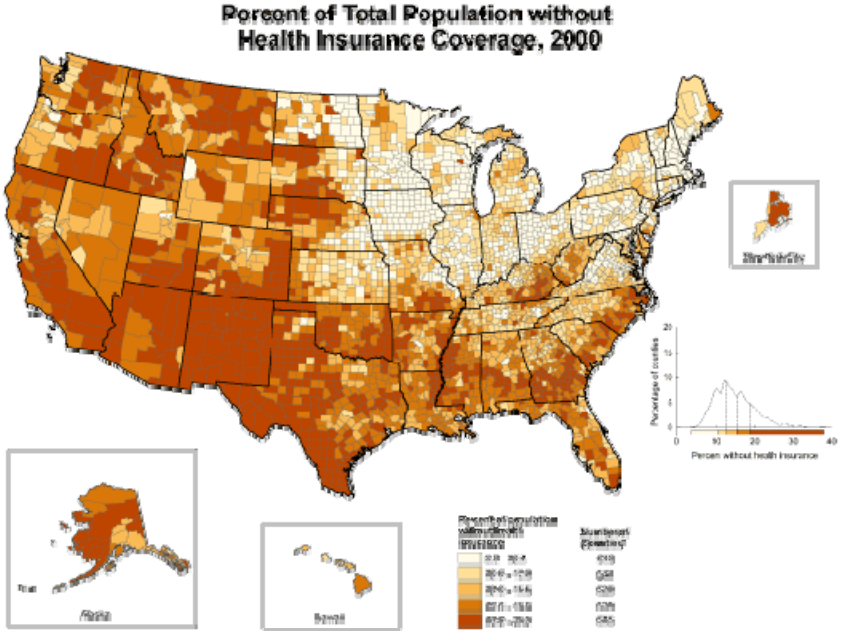


	Age	Race			Gender	Socio-demographic Variables		
	Older	Black	Hispanic	White	Female	Rural	Lower Education	Lower Income
Age-related Macular Degeneration								
Diabetic Retinopathy								
Glaucoma								
Cataracts								
Refractive Error								
Visual Impairment								

Insurance and Use of Eye Care

Zhang X, et al, Arch 2008

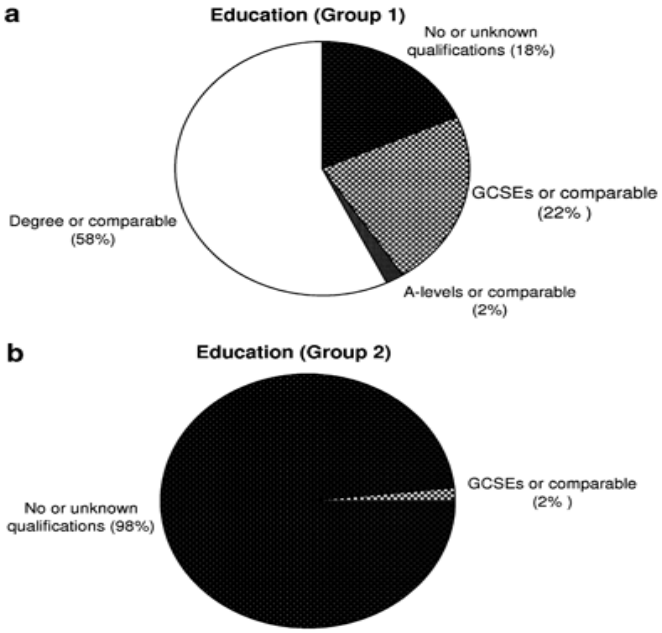


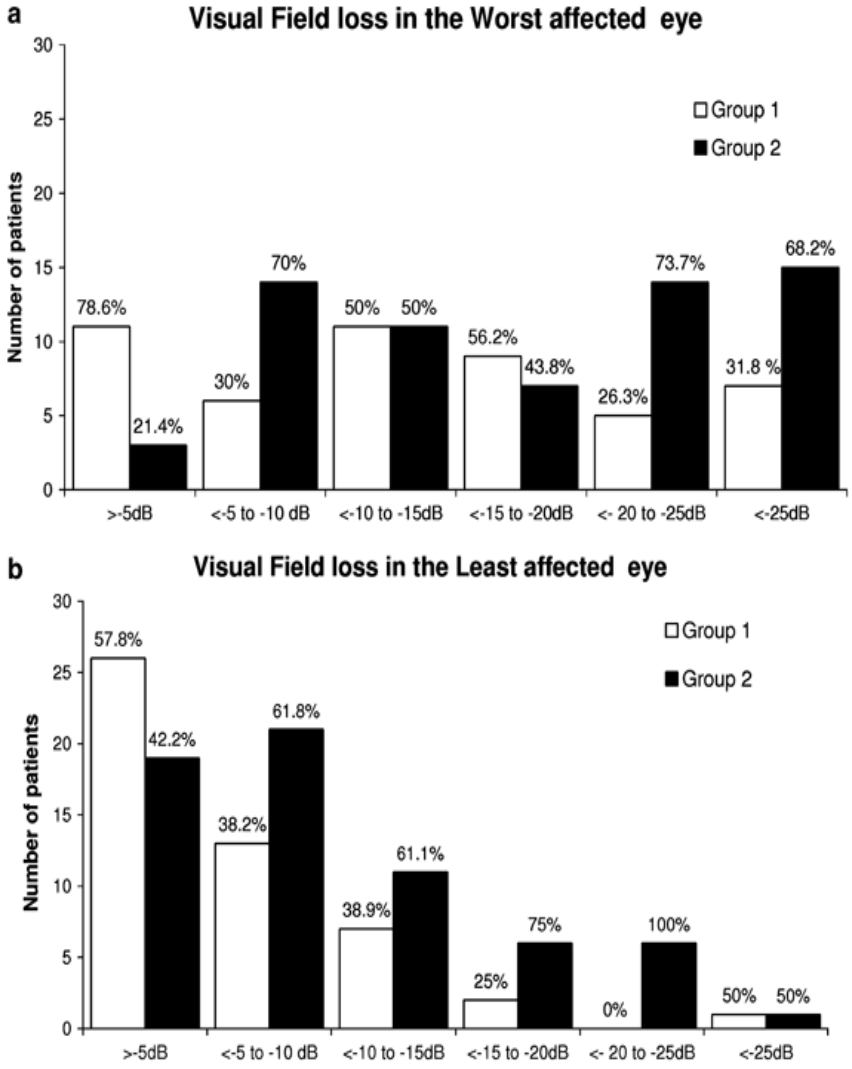


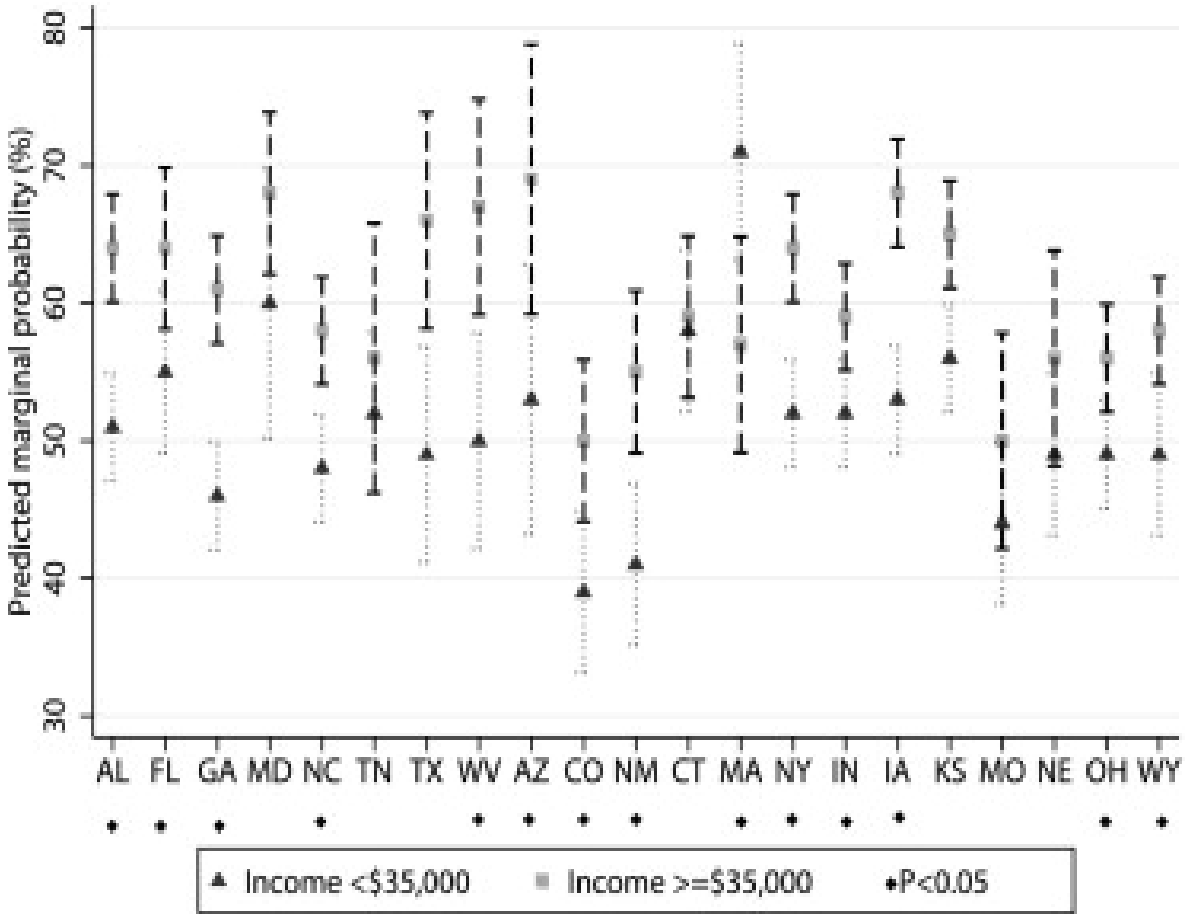
Socioeconomic Factors in First Presentation of VF Loss

Sukumar S, et al. Eye, 2009

- SES from ACORN index – 15 residences
- Clinical factors
  - Age
  - High IOP, Large C/D ratios, Worse VA
  - Family history
  - Increased # of systemic health issues







Proportions of adults with moderate to severe visual impairment having a yearly eye doctor visit, by state and income, represented by predicted marginal probabilities estimated from the logistic regression model adjusted for age, sex, race/ethnicity

Disparities in Eye Care Utilization Among the United States Adults With Visual Impairment: Findings From the Behavioral Risk Factor Surveillance System 2006-2009

Chou CF, et al, AJO, Volume 154, Supplement, 2012, S45 - S52.e1

http://dx.doi.org/10.1016/j.ajo.2011.09.025

Focus Groups: Why People Don't Use Services Owsley et al, IOVS, 2006

- Affordable and accessible transportation
- Cultural sensitivity
- Age-appropriate communications
- Trust-building
- Differing expectations

Perceived Barriers to Care and Attitudes about Vision and Eye Care: Focus Groups with Older African Americans and Eye Care Providers

Cynthia Owsley,[1] Gerald McGwin,[1,2,3] Kay Scilley,[1] Christopher A. Girkin,[1] Janice M. Phillips,[1] and Karen Searcey[1]

PURPOSE. To identify by using focus group methods the perceived barriers to eye care and attitudes about vision and eye care among older African Americans as well as among ophthalmologists and optometrists serving their communities.

METHODS. Seventeen focus groups of older African Americans residing in the Birmingham or Montgomery, Alabama, areas were led by an experienced facilitator. Discussion was stimulated by a semistructured script focused on their perceived barriers to eye care and attitudes about vision and eye care. Six focus groups of ophthalmologists and optometrists who practiced in this geographic region addressed the same topics. Discussion was audiotaped and transcribed. Comments were coded using a multistep content analysis protocol.

RESULTS. One hundred nineteen African Americans (age range, 59–97 years) and 35 eye care providers (51% ophthalmologists, 49% optometrists) participated. The barrier-to-care problem most frequently cited by both African Americans and eye care providers was transportation. The next most common problems mentioned by African Americans were trusting the doctor, communicating with the doctor, and the cost of eye care; and for eye care providers, the next most common problems were cost, trust, and insurance. With respect to older African Americans' comments on their attitudes about vision and eye care, these comments were predominantly positive (69%), highlighting the importance of eye care and behavior in their lives and attitudes that facilitated care. However, when eye care providers relayed their impressions of African Americans' attitudes about vision and eye care, their comments were largely negative (74%) centering on concerns and frustrations that older African Americans did not have attitudes or engage in behavior that facilitate eye care.

CONCLUSIONS. These results provide some guidance for the design of interventions to increase the use of routine eye care in this population. At a societal level, there is a need for affordable and accessible transportation services for older African Americans seeking eye care. For ophthalmologists, optometrists, and their staffs, there is a need for continuing education that imparts culturally sensitive and age-appropriate communication and trust-building skills for interactions with this population. In addition to reinforcing the generally positive attitudes of older African Americans toward the importance of eye care, community-based educational programs should be focused on strategies for overcoming the common barriers to care. (*Invest Ophthalmol Vis Sci.* 2006;47:2797–2802) DOI:10.1167/iovs.06-0107

Vision impairment and eye disease rates among older African Americans are two times higher than those of older whites, especially uncorrected refractive error, cataract, glaucoma, and diabetic retinopathy.[1–7] The public health challenge is that if these eye problems were detected early, much of this disease and vision impairment could be reversible and even preventable with currently available ophthalmic treatments. A factor underlying their higher eye disease and vision impairment rates may be that African Americans, including older adults, are less likely to receive routine comprehensive eye examinations, when newly emerging eye conditions could be detected and treated in a timely fashion.[7–9] This may be due at least in part to some African Americans' lower eye health literacy—that is, inadequate knowledge about basic symptoms, risk factors, and effective treatments available for common eye conditions. For example, although African Americans are more prone to development of glaucoma than are whites, Gasch et al.[10] reported that African Americans were less familiar with the disease. Other factors potentially contributing to reduced eye care utilization in this population are cost, transportation, social support, and other health problems competing for attention—especially acute medical conditions.[8,11–14] Lower eye care utilization rates in older African Americans may also be related to attitudes and actions on the part of ophthalmologists and optometrists, including the understanding and sensitivity of ophthalmologists and optometrists about successful communication strategies and interpersonal approaches that are culturally and age appropriate.

The purpose of the present study was to use focus group methodology to learn about the perceived barriers to eye care among older African Americans, as well as their attitudes about vision and eye care. Focus groups are viewed as a gold standard for capturing patients' perspectives and experiences, because this forum permits issues to be conceptualized and expressed in the target subjects' own words.[15,16] We also held focus groups with ophthalmologists and optometrists who serve the geographic areas where these older African Americans reside, to gather information on the providers' perspectives on older African Americans' barriers to care as well as their impressions about older African's Americans' attitudes about vision and eye care.

From the Departments of [1]Ophthalmology and [2]Surgery, School of Medicine, University of Alabama at Birmingham, Birmingham, Alabama; and the [3]Department of Epidemiology, School of Public Health, University of Alabama at Birmingham, Birmingham, Alabama.

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Disclosure: C. Owsley, None; G. McGwin, None; K. Scilley, None; C.A. Girkin, None; J.M. Phillips, None; K. Searcey, None

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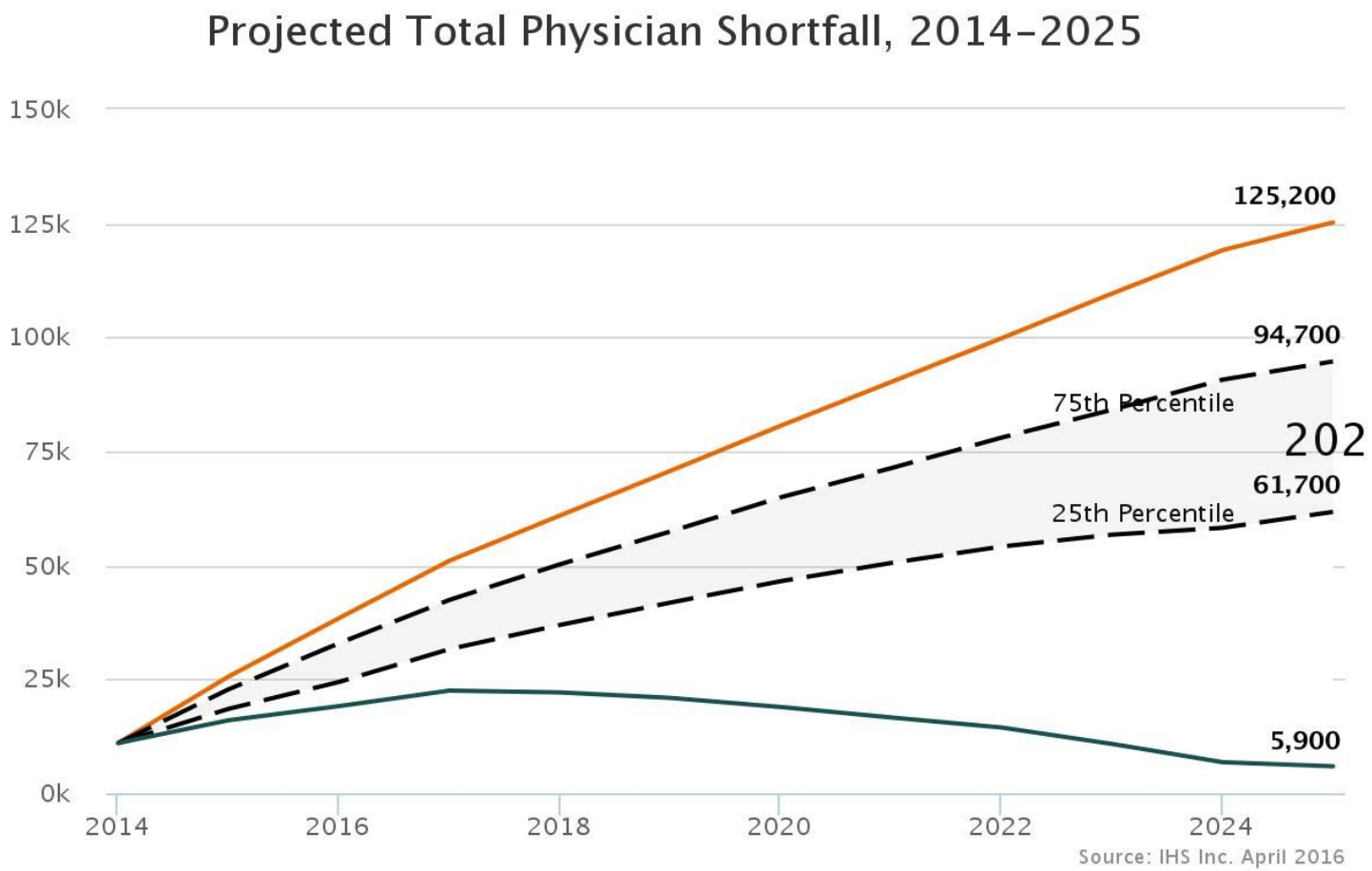
Addressing Patient Expectations – (Patient and Family Centered Care)

Dawn & Lee, Archives, 2003

- Communication
  - honesty (1);
  - diagnosis and prognosis (2);
  - clear language (3);
  - listening and addressing concerns (6)
- Interpersonal manner
  - empathy (5);
  - personal connection (7)

AAMC Workforce Projections

Updated – March 2016



Physician Workforce Discussion Revisited

Higginbotham E, Arch 2012

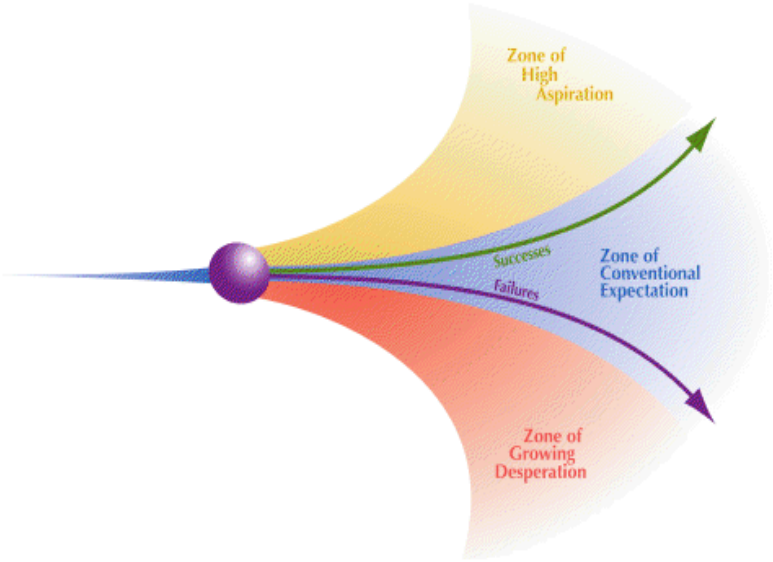
- …uncertainties in the assumptions that underlie any prediction will contribute to the difficulty in making any prediction related to the ophthalmic marketplace
- …ophthalmologists must navigate among specialists and primary care providers at a time when we are not significantly increasing in numbers, and depending on how one models the delivery of eye care, we may have an oversupply or an undersupply of ophthalmologists.
- We will need to participate in *team-based care*, a term that we will continue to hear more about because it is the type of care that engages nurse practitioners, social workers, and others in the continuum.

Themes

- Vision is important
- Progress is being made in reducing vision loss, but …
- Access to care remains a public health issue
- Current and future efforts can enable us to address the challenges

Health and Health Care in 2032:

RWJ Foundation / Institute for Alternative Futures, 2012



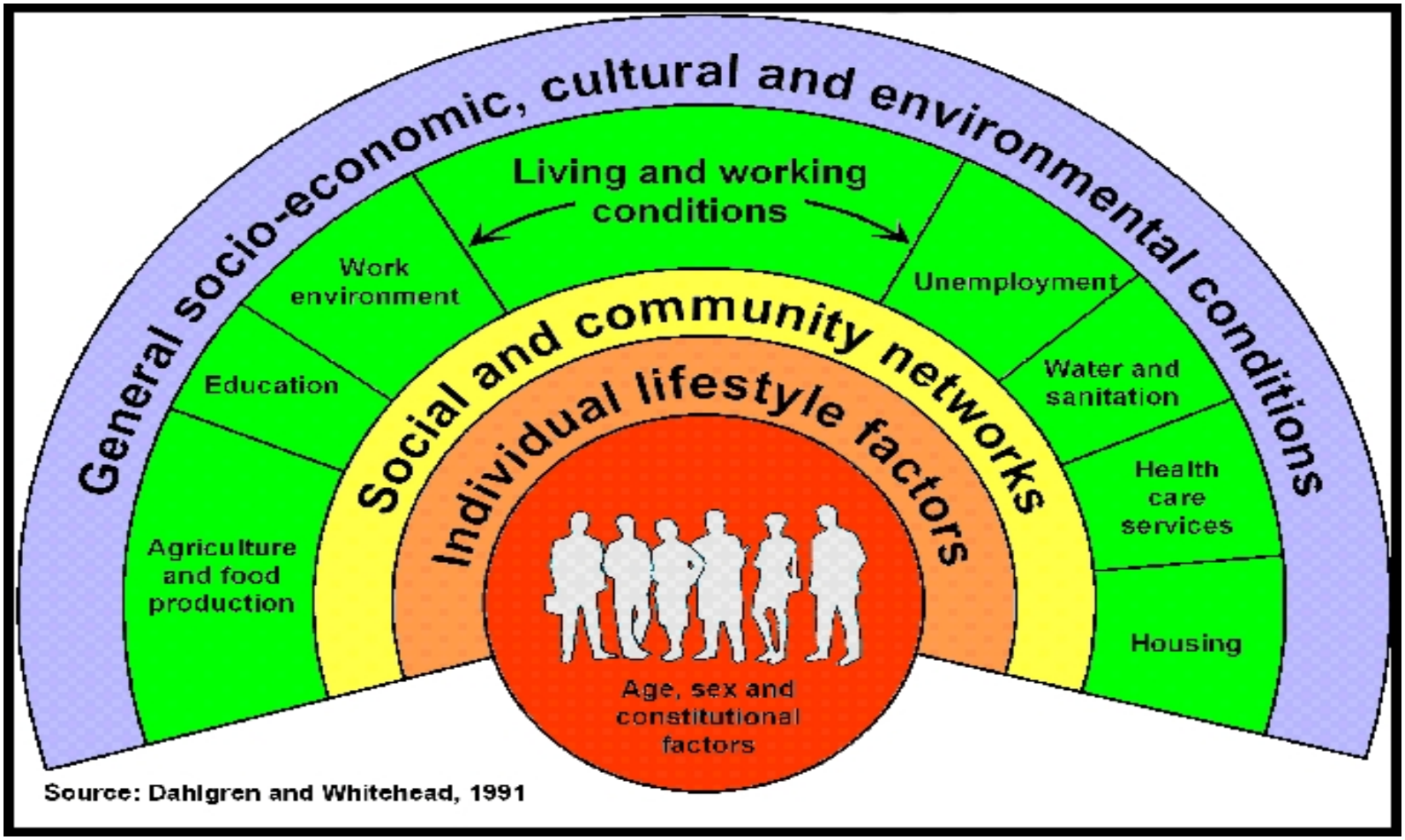
- 4 scenarios for next 20 years for USA

- Culture of health
- Big data, big health gains

- Slow reform, better health

- Health if you can get it

Social Determinants of Health

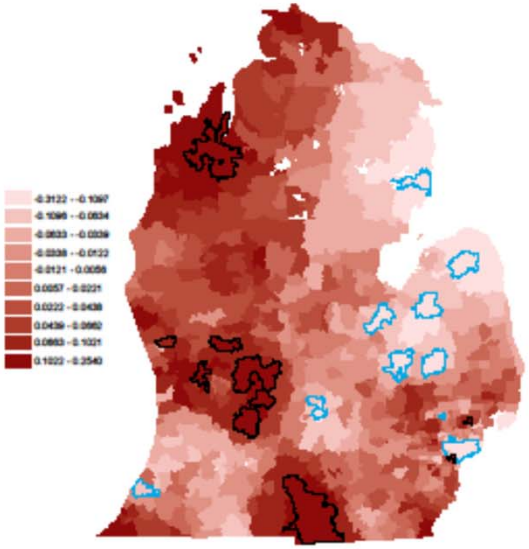


Common Features Across RWJ Scenarios: "Must do's"

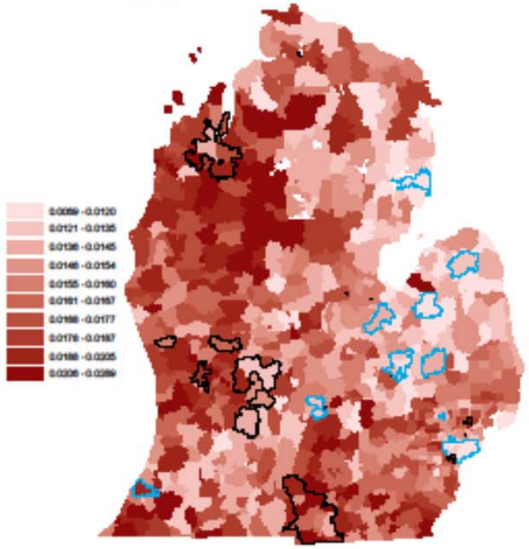
- Continued technological innovation in our therapies and diagnostics
- Personalized care approaches
- Greater efficiency and value
- Alternative means of providing care
- Greater use of data (but in different ways)

- Emphasis on preventing disease development in more advanced scenarios

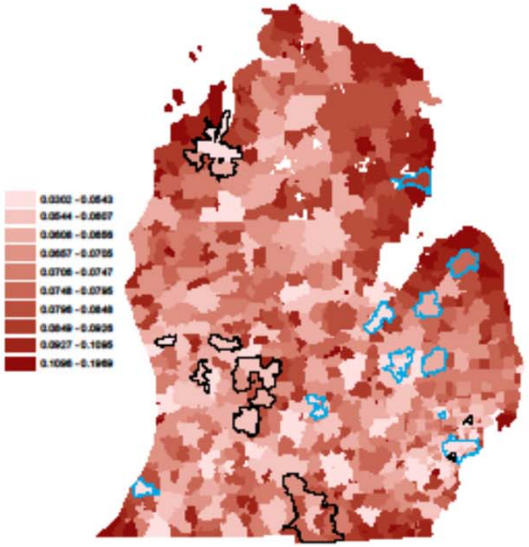
Posterior mean



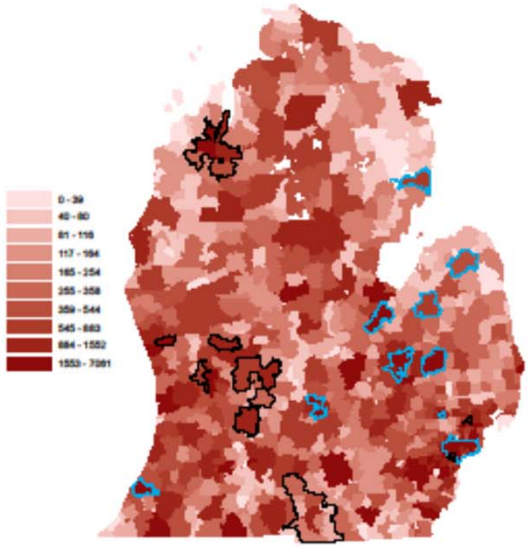
Average predicted risk

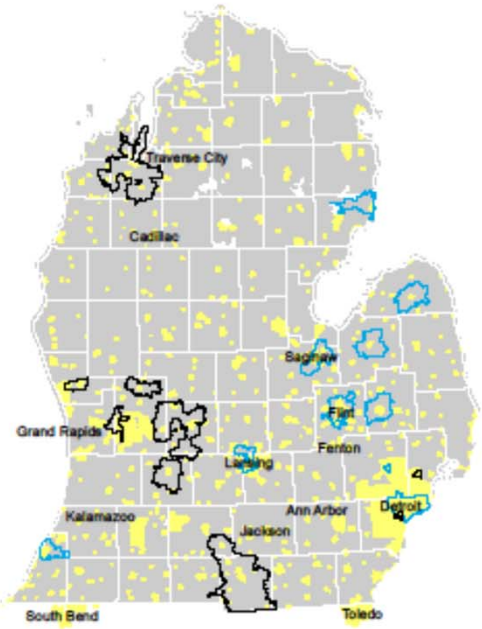


Posterior standard deviation



Count of children





USA Census Populated Place

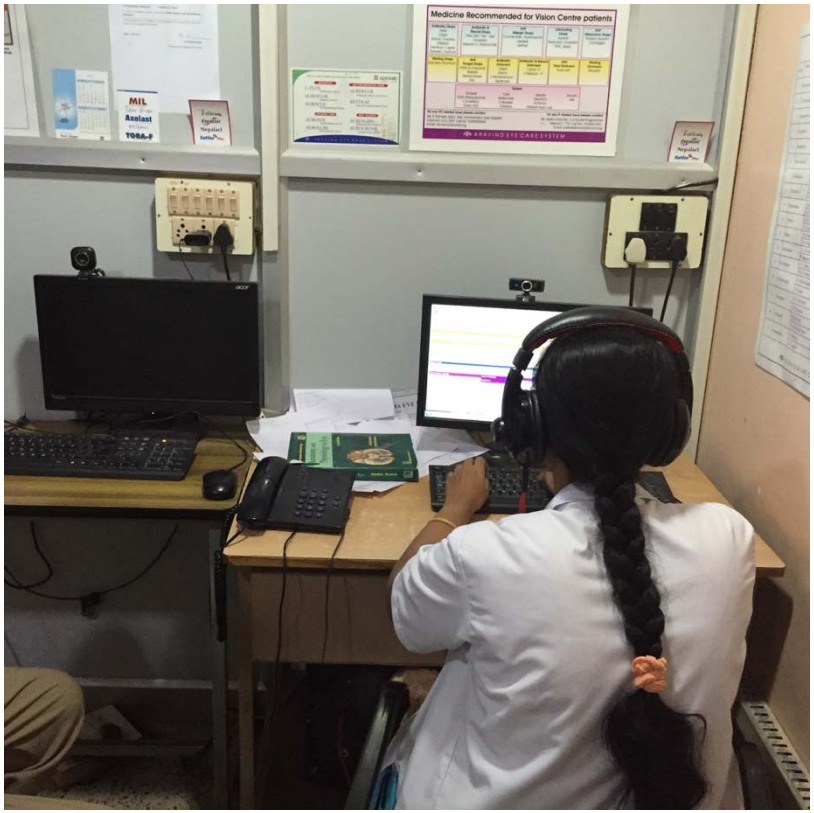
Significant increase in risk

Significant decrease in risk

Expanded Opportunities for Care

- CDC Efforts
  - Walmart – UAB
  - Community Groups – Wilmer
  - Senior Housing / Vans – Wills
  - FQHC's

Aravind Eye Center Innovations



Impact of Refractive Error

Varma R, et al, JAMA Ophthalmology, 2016

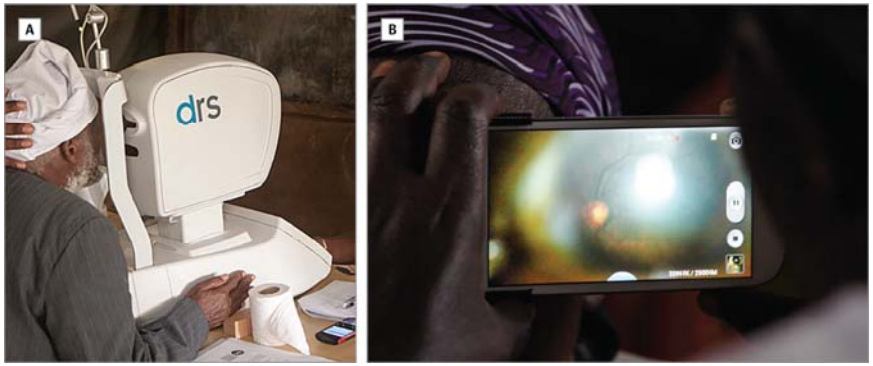
- 71.9% of US individuals with visual impairment could be clinically better with vision assessment and proper refractive correction
- 22.1% of those blind could also experience clinical improvement

Lurie N, et al. Am J Public Health, 1989

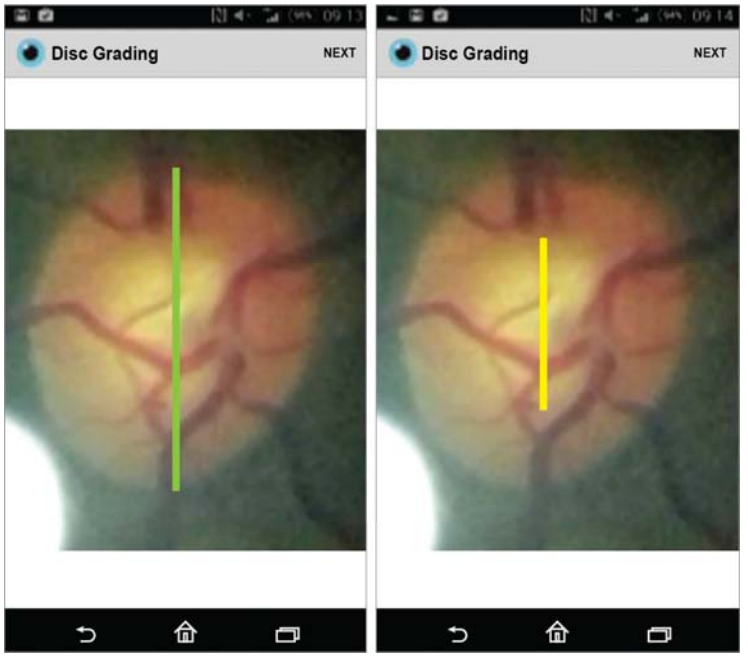
- RAND Health Insurance Experiment demonstrated free care improved vision (one of only 3 indicators to improve with free care)
- “Free care resulted in improved vision by increasing the frequency of eye examinations and lens purchases.”

From: **Clinical Validation of a Smartphone-Based Adapter for Optic Disc Imaging in Kenya**

JAMA Ophthalmol. 2016;134(2):151-158. doi:10.1001/jamaophthalmol.2015.4625



Examination Using the Reference Desktop Retinal Camera (A) and the Smartphone-Based Adapter (B)



Peek Grader Being Used to Measure Vertical Cup-Disc Ratio on the Telephone

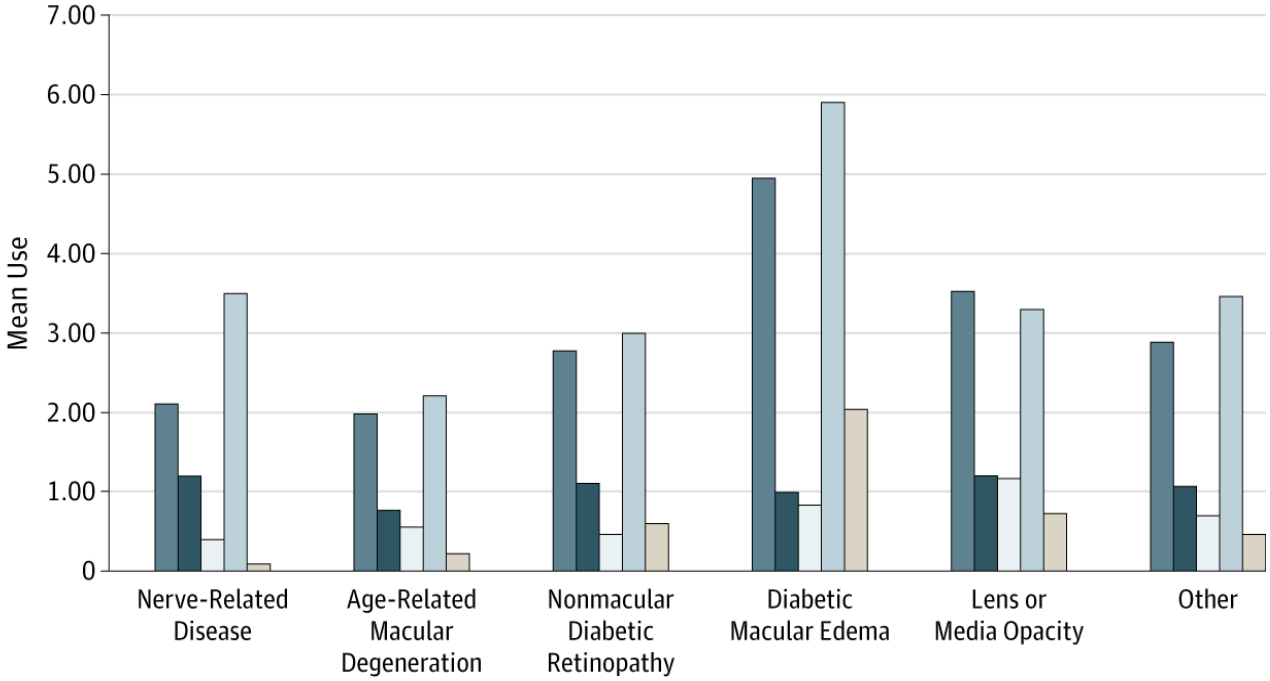
Telemedicine Improves Access

Mansberger SL, et al, Telemedicine and e-Health, 2013

- RCT of diabetes patients
  - Telemedicine with non-mydriatic camera
  - Traditional surveillance
- Results
  - Telemedicine more likely (94% vs 56%) to have screening exam in first year
  - 21% needed further evaluation, 86% of these due to poor quality digital images

Eye Care Use for 260 Patients Seen in Clinic for 2 Years after Teleretinal Screening by Disease

(Chasan JE, et al, JAMA Ophthal 2014)

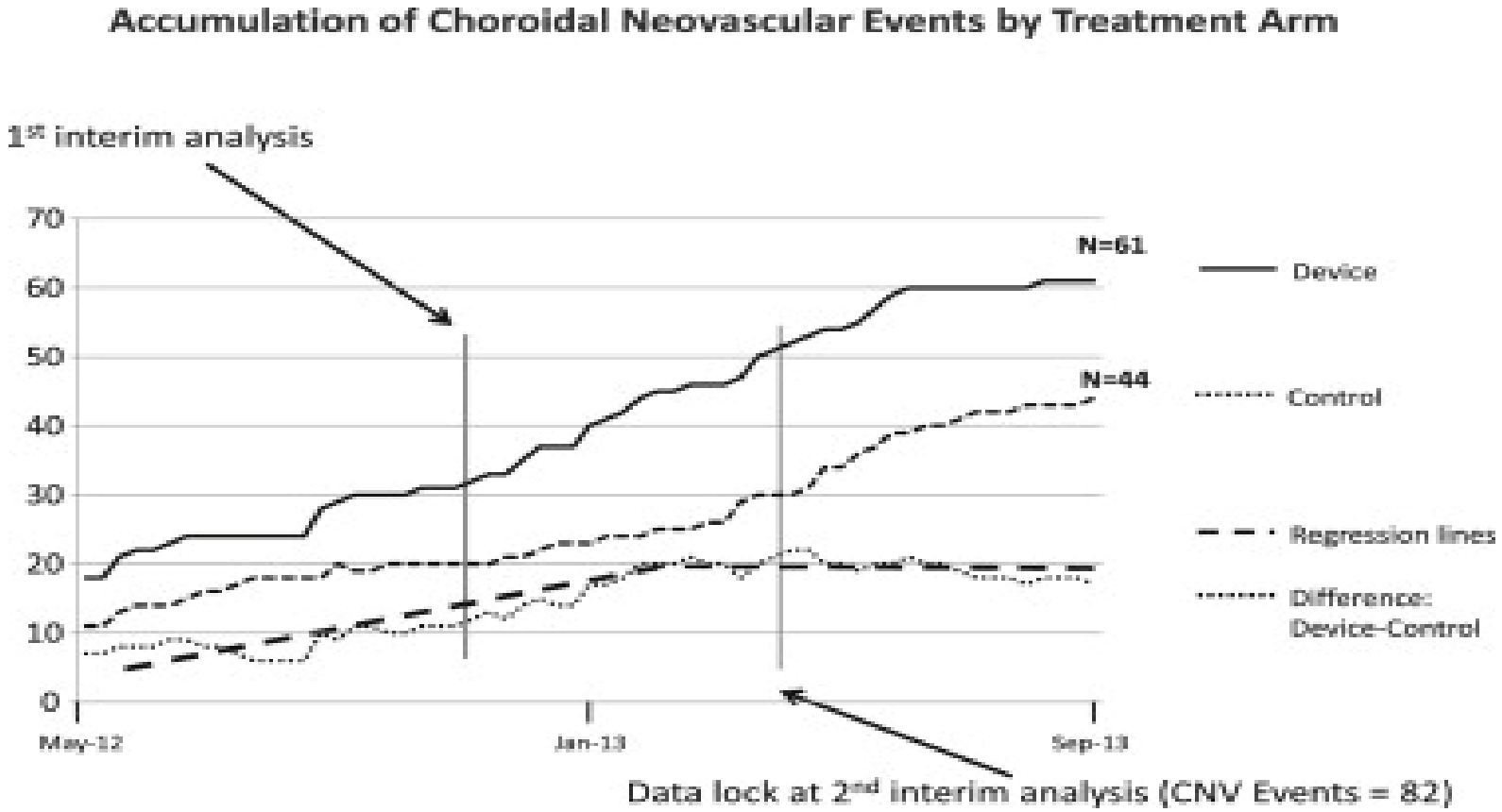


	Nerve-Related Disease	Age-Related Macular Degeneration	Nonmacular Diabetic Retinopathy	Diabetic Macular Edema	Lens or Media Opacity	Other
Cumulative No. of visits	2.11	2.03	2.79	4.96	3.52	2.89
Total No. of spectacles	1.20	0.78	1.10	0.96	1.22	1.07
Total No. of prescriptions	0.39	0.57	0.46	0.84	1.18	0.69
Total No. of diagnostic procedures	3.50	2.22	3.01	5.88	3.29	3.46
Total No. of surgical procedures	0.11	0.24	0.59	2.04	0.74	0.47

Thinking about E-Health

- Estimates are that up to 25% of outpatient visits will be shifted to e-health by 2025

- Kaiser-Permanente had 2 Million e-health visits last year
  - Greater satisfaction
  - Significant efficiencies
  - High quality



Emily Y. Chew , Traci E. Clemons , Susan B. Bressler , et al, ; Ophthalmology, Volume 121, Issue 2, 2014, 535 - 544

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Randomized Trial of a Home Monitoring System for Early Detection of Choroidal Neovascularization Home Monitoring of the Eye (HOME) Study

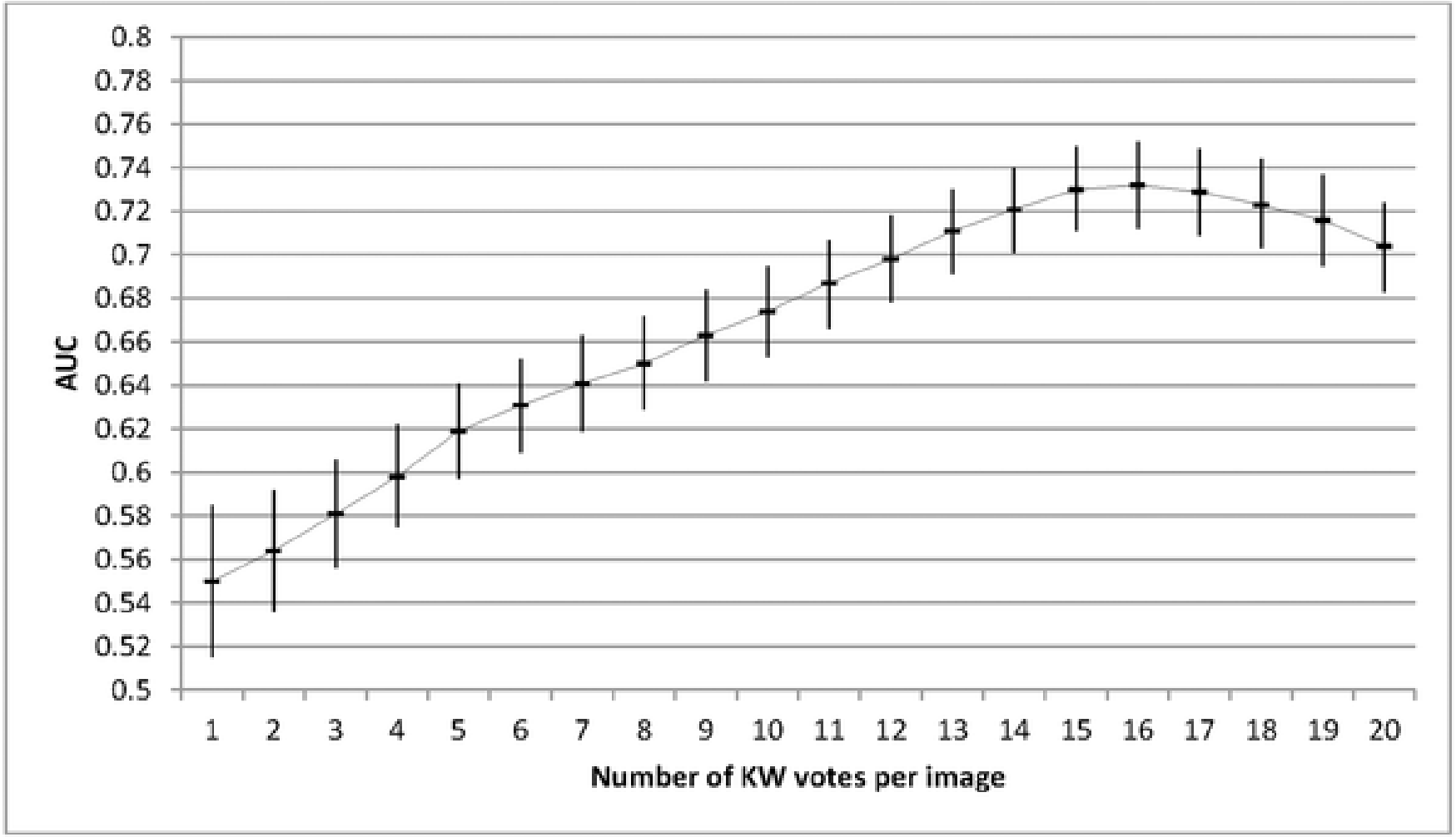
http://dx.doi.org/10.1016/j.ophtha.2013.10.027

Diabetic Retinopathy Analysis Using Maching Learning (DREAM)

Roychowdhury S, et al, IEEE J Biomed Halth Informatics, 2014; 18: 1717-28

Method	SEN (%)	SPEC (%)	AUC
MESSIDOR Data			
Sanchez et.al.[27]	92.2	50	0.876
Agurto et.al.[8]	92	54	0.84
Antal et.al.[33]	96	51	0.875
Esnaashari et.al.[32] ($\leq$ 300 images)	95	89.29	-
Barriga et.al.[34](400 images)	98	67	0.86
DREAM	100	53.16	0.904
Local Data			
Agurto et.al.[35](2247 images)	92	51	0.89
Acharya et.al.[36](300 images)	82	88	-
Acharya et.al.[37](331 images)	82	86	-
Usher et.al.[38](1273 images)	94.8	52.8	-

Figure 2. The AUC and associated 95%CI for trial 1 (0.03c) as a function of the number of KW gradings per image.



Mitry D, Peto T, Hayat S, Morgan JE, Khaw KT, et al. (2013) **Crowdsourcing as a Novel Technique for Retinal Fundus Photography Classification:** Analysis of Images in the EPIC Norfolk Cohort on Behalf of the UKBiobank Eye and Vision Consortium. PLoS ONE 8(8): e71154. doi:10.1371/journal.pone.0071154
http://journals.plos.org/plosone/article?id=info:doi/10.1371/journal.pone.0071154

Using Filtered Forecasting Techniques to Determine Personalized Monitoring Schedules for Patients with Open-Angle Glaucoma

Greggory J. Schell, Mariel S. Lavieri, Jonathan E. Helm, Xiang Liu, David C. Musch, Mark P. Van Oyen, Joshua D. Stein

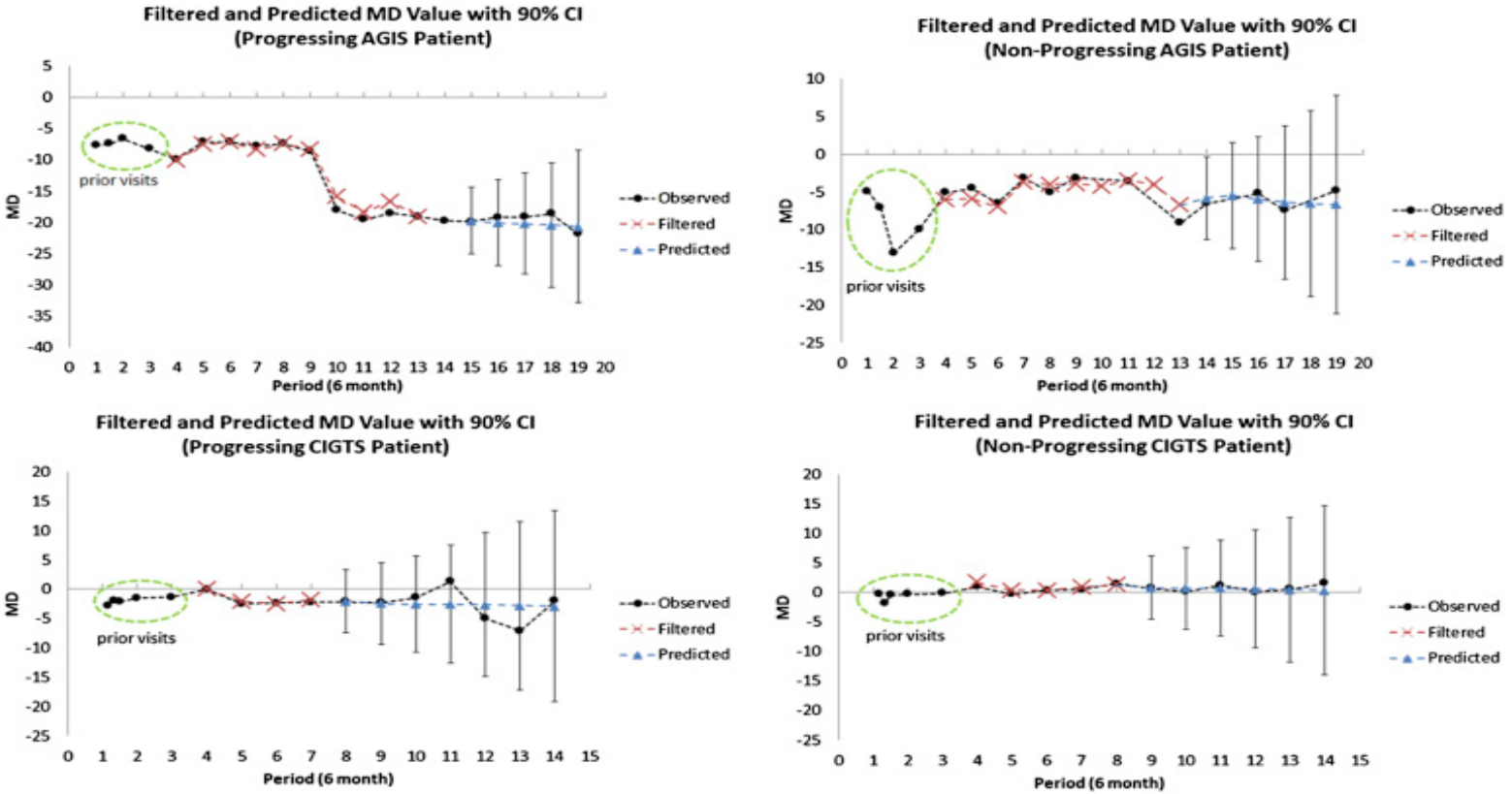


Figure 3. Kalman filter trajectories of mean deviation (MD). The figures illustrate the Kalman filter's ability to accurately forecast MD. The Kalman filter requires 3 visits to calculate initial values of velocity and acceleration for MD.

http://dx.doi.org/10.1016/j.ophtha.2014.02.021

Ophthalmology, Volume 121, Issue 8, 2014, 1539–1546

Play

Tailored on barrier to glaucoma medication adherence

It was hard to keep track of all my drops

When my doctor told me I would need to take two different kinds of glaucoma drops at two different times during the day, I didn't think I could do it. I was worried that I wouldn't be able to manage all of the different drops I had to take every day.

But the doctor explained that taking all of these doses will keep my eye pressure from bouncing around throughout the day. The doctor explained that when the eye pressure changes a lot, it puts my optic nerve at risk of being damaged faster. Learning that all of the drops are necessary to help protect my vision made me realize how important it is to take my drops multiple times a day.

Over time I figured out a system that works for me.

I use the alarm on my smartphone to remind me to take my medications. If I can't take the drops right away, I "snooze" the alarm until I take them. I also use the calendar on my phone to remind me when my refills are due. It also helped to set up automatic medication refills at the pharmacy, so when my prescription is ready they call and remind me to pick it up.

Linking my medication to something I do every day helps me remember to take it. I leave the bottle next to my toothbrush and take it right after brushing my teeth. A friend told me she likes to have it on the nightstand next to her bed so she can put the drops in while she's lying down.

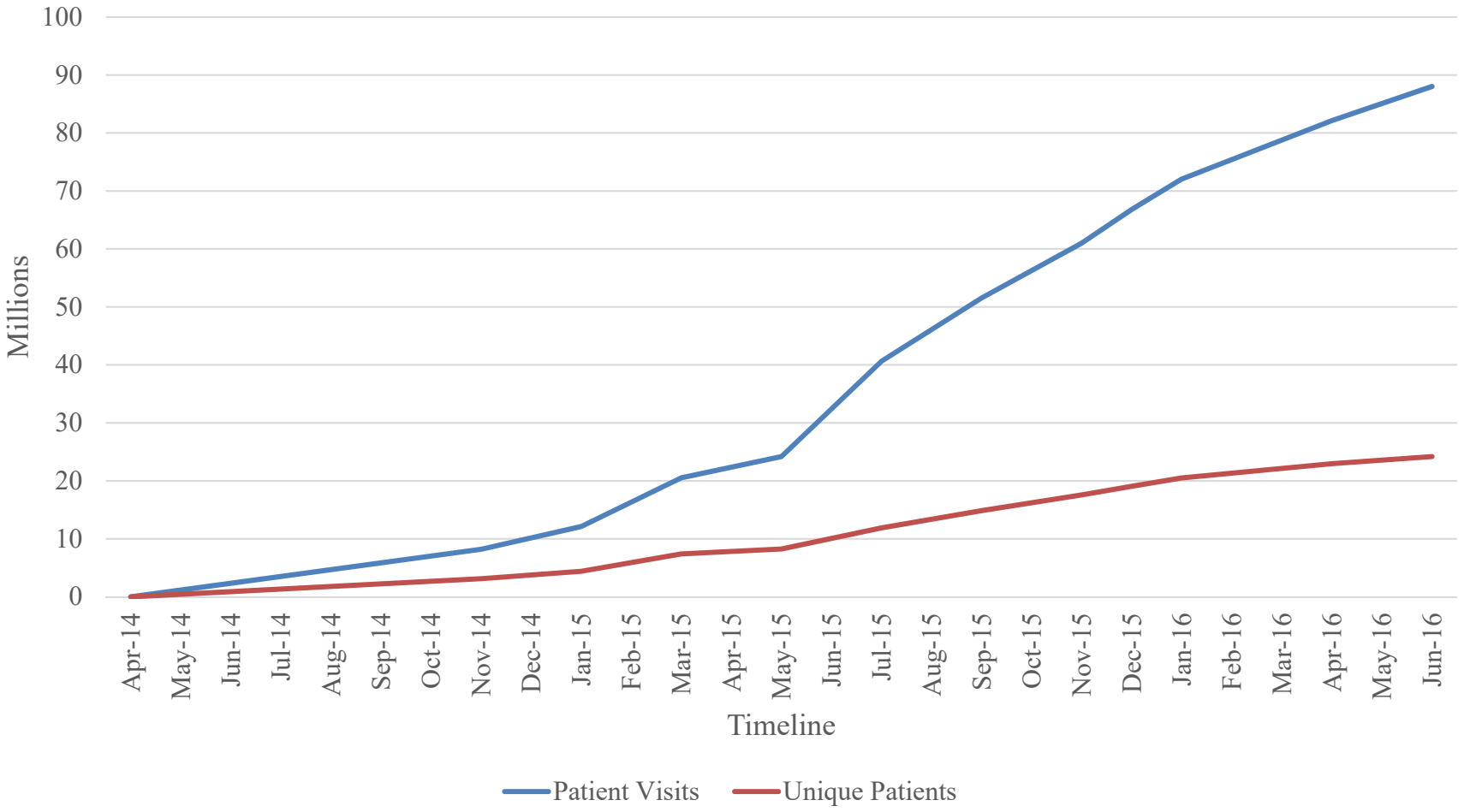
The dose I have the most trouble remembering is the one I have to take in the middle of the day when I'm not home. I asked my doctor to prescribe me a three-month supply so that I can leave one of the bottles in my purse. That way I always have my medication with me for my mid-day dose. My doctor also told me that I don't have to worry about the order that I put my eye drops in, so that makes it easier.

Tailored on gender and race/ ethnicity

Tailored on use of technology

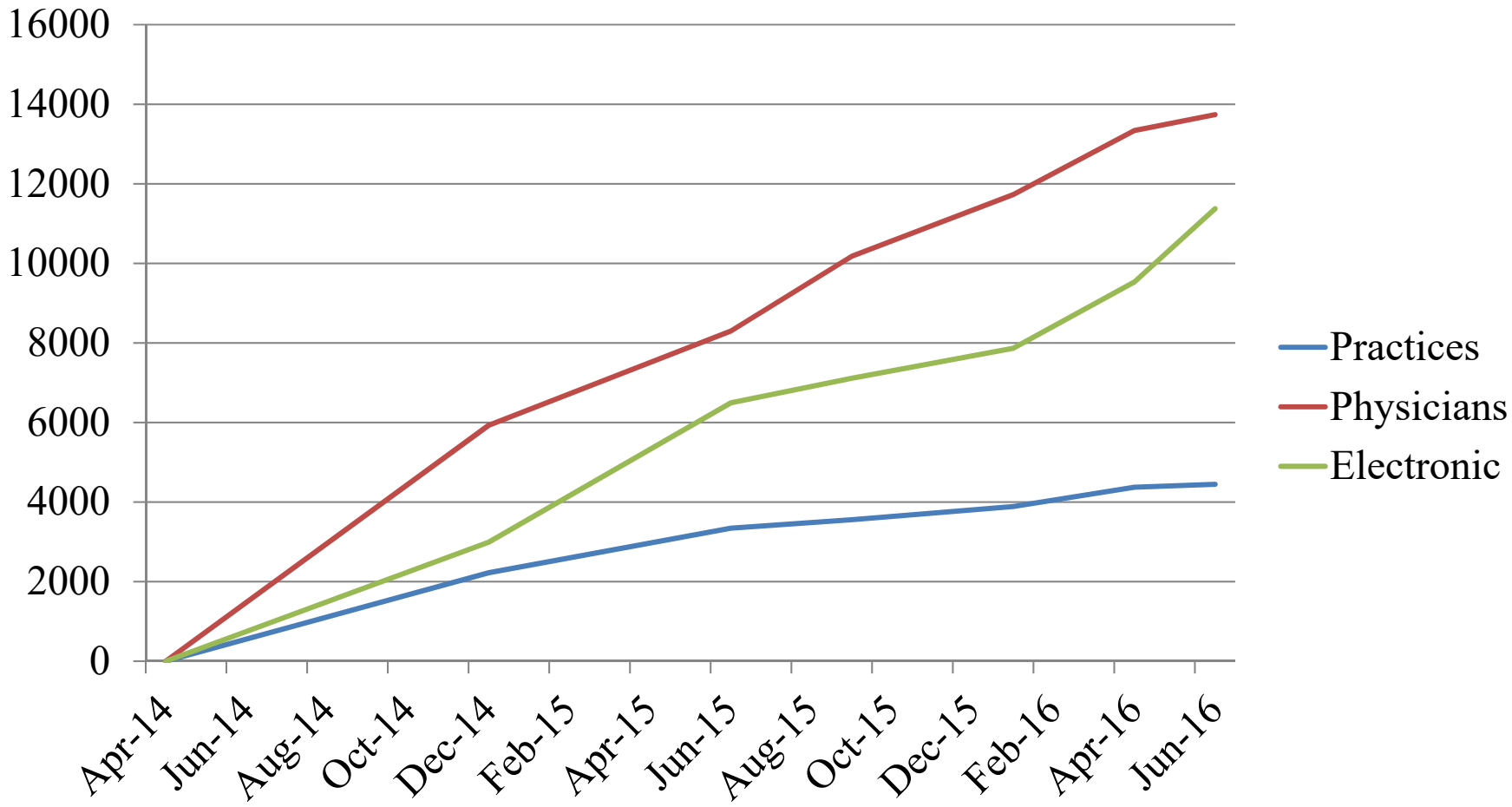
Courtesy of Paula Anne Newman-Casey, MD

AAO IRIS: Unique Patients and Visits



Courtesy of Flora Lum, MD, AAO

Participation in IRIS Registry



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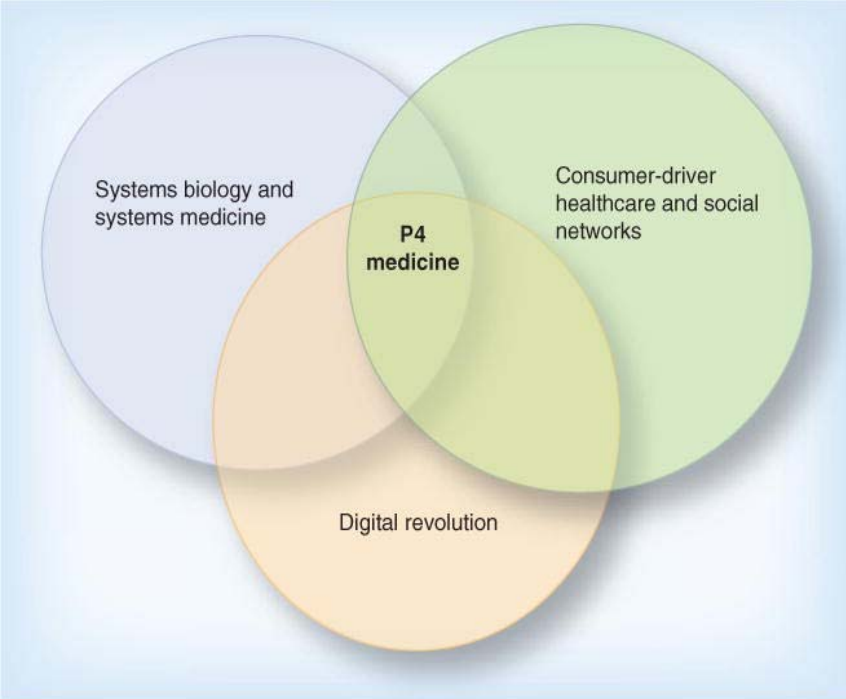
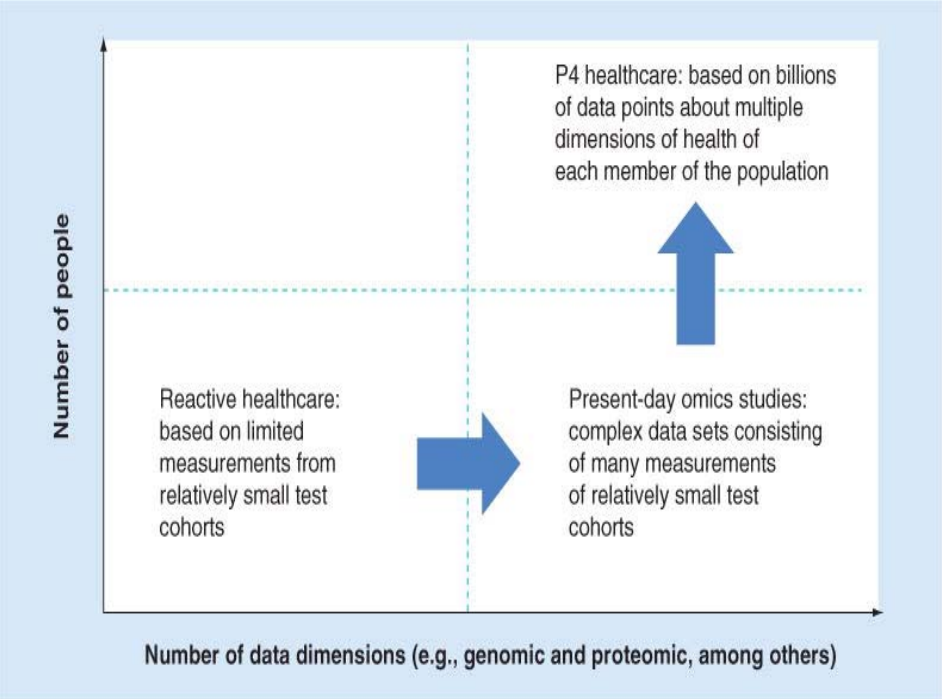
Courtesy of Flora Lum, MD, AAO

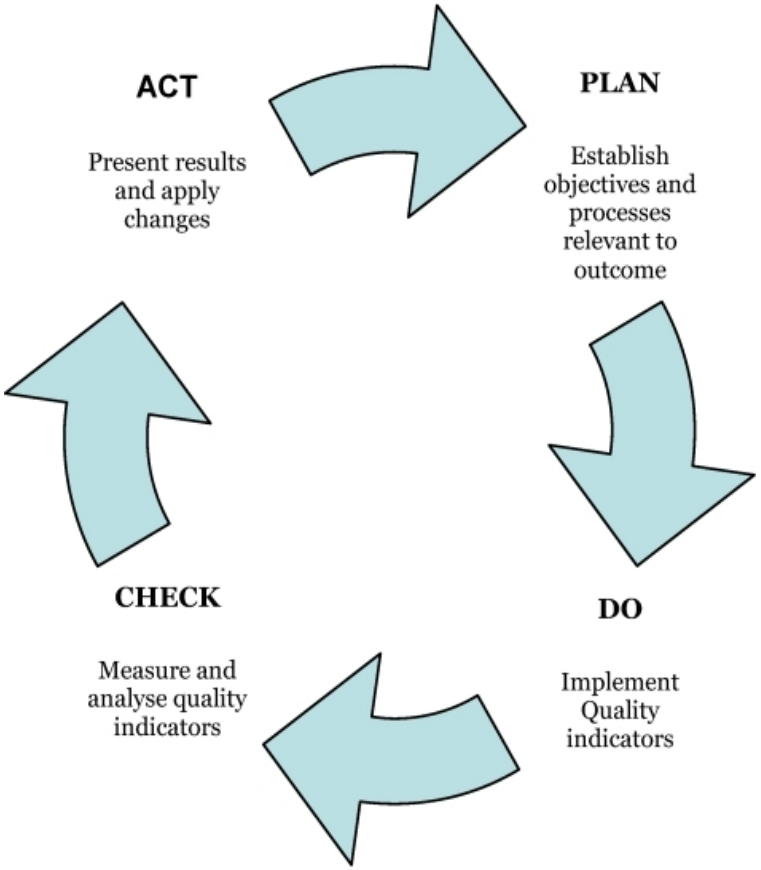
Systems Medicine: Predictive, Preventive, Personalized and Participatory

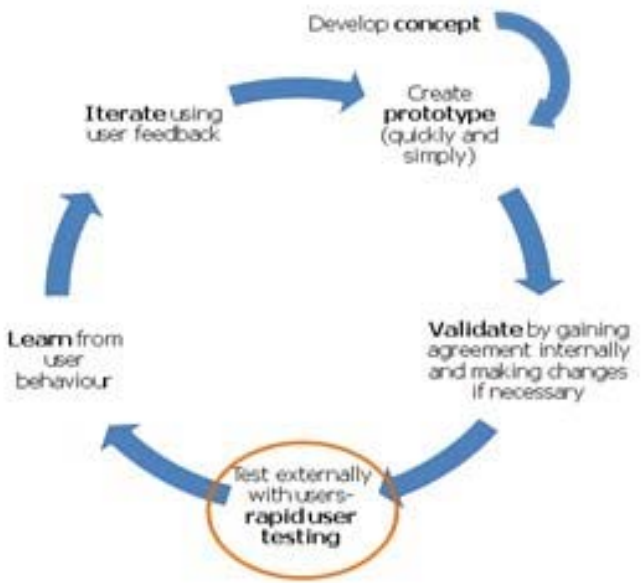
Flores M, Glusman G, Brogaard K, Price ND, Hood L. Per Med 2013

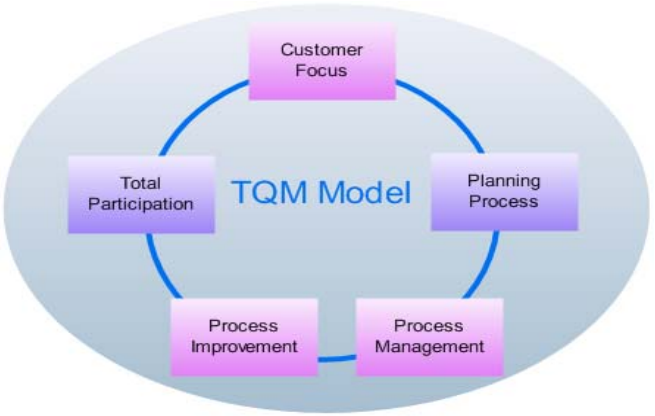




Learning Culture(s) – CQI, Lean, TQM





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