Conflicts of Interests Disclosure

- AAO Foundation – Hoskins Center for Quality and Safety
- NAEVR / AEVR
- Centers for Disease Control and Prevention
- American Glaucoma Society
- American University Professors of Ophthalmology
- Consultant /Research
  - Alcon Research Institute
  - Kellogg Foundation
  - National Eye Institute
- University of Michigan
- Intellectual property
  - Statins for glaucoma
  - EMR decision support and data entry

Stephen J Munz, MD Lecture: Workforce Planning in the 21st Century and Quality of Care – Eye Care Models

Paul P. Lee, MD, JD
University of Michigan
Kellogg Eye Center

KAISER PERMANENTE

Stephen J Munz, MD, Lecture

- Champion of evidence-based medicine
- Commitment and excellence in coaching and developing our next generation
- Courage in beliefs and actions to implement needed change
- Clarity of reality

Addressing our Opportunities

Plans are Limited
Planning is Essential

Dwight Eisenhower

What is our "Goal" ?

Prevent (and restore) vision loss in patients and populations

Questions for Discussion

- What have we learned from our past analyses of workforce needs ?
- How will (likely) changes in society affect the demand (and public health need) for eye care services and workforce supply ?
- What will the roles of eye care providers look like in the future and how will this impact care ?

Potential Approaches

- Financial / Cost target
- Service / utilization targets
- Supply models (Population ratios)
- Requirements models – microanalyses of time and tasks
  - Demand
  - (Public health need)
- Econometric models

Ratios – Managed Care

Weiner J, JAMA, 1994

- US ratio – 1994 1 MD : 18,030
- GMENAC target 1 MD : 20,833

- Managed Care Approach

  Adjusted midpoint of 1 MD : 27,777

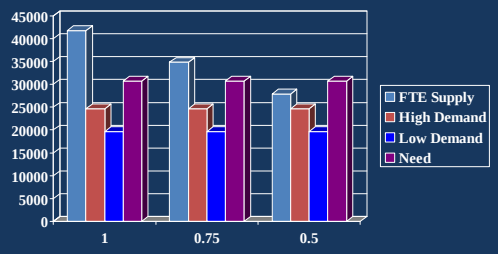
  (range of 23,000 to 45, 000)

  Adjusted midpoint of 1 OD : 13, 889

Detailed Requirements (Task and Time) Models

- GMENAC - 1981
  - Surplus of 4700 by 1990
- AAO (Ruiz / Reinecke) – 1978 to 1984
  - Shortage of 3000 by 2000
- RAND Eye Care Workforce – 1994
  - Surplus in 1994
  - Variable results in 2000 and 2005
  - No estimates past 2010

RAND Results – 1994 Different OD Work Levels

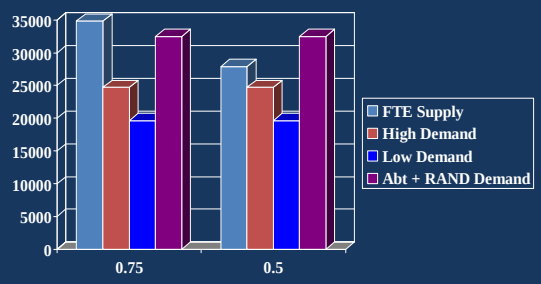


Optometric Data – Abt Study

White, et al, Optometry, 2000; Lee, et al, Arch, 2007

- Women work 13% fewer hours
- 14,000 FTE's extra demand from using AOA well eye exam standards instead of practice
- FTE equivalence of work productivity is 0.62
- Greater utilization (demand) of
  - Routine care – 5800 optometric FTE
  - Contacts lens visits – 5300 optometric FTE

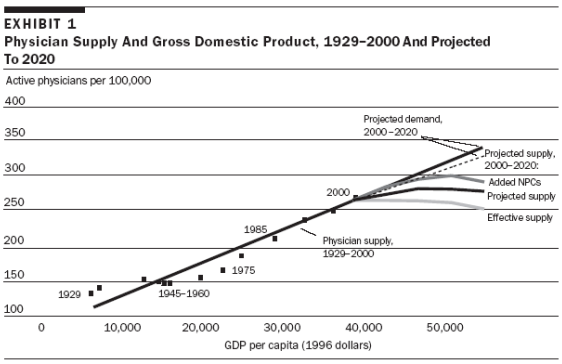
RAND + Abt Results - 1997



Adjusted Ratios / Trend Approach

Cooper RA et al, Health Affairs, 2002

- Simplified model for projections
- Focus on four key variables
  - Economic growth drives increasing demand for health care services
  - Population growth increases demand
  - Work effort of physicians declining
  - Non-physician clinicians increasing



Variability in Estimates: Cooper

- 1995 (JAMA) – requirements model
  - 5 % surplus of physicians in 2000 (n = 31,000)
  - 8 % surplus by 2010
  - Decreasing surplus thereafter
- 2002 (Health Affairs) – economic trends / econometrics model
  - Equilibrium in 2000
  - Shortage thereafter, growing with time

Lewin / AOA / ASCO Study

Released July 2014

- Workforce at start of 2012
  - 39,580 optometrist FTE's
    - 60% male (ave. age of 51 vs. 40 for women)
  - 16,404 ophthalmologist FTE's
  - Uses 1.36 optometrist FTE per ophthalmologist
- Base model (model 1) for 2025
  - 3100 optometrist FTE surplus (assume no surplus in 2012)
  - 5400 ophthalmologist FTE shortage

Lewin Optometry Findings

- 2 additional models using FTE equivalence and different assumptions yield varying results
- Additional schools will exacerbate any surplus
- Indicators that surplus may already exist
  - Survey results (capacity and $)
  - Younger OD's more likely to use multiple offices
  - Ratios of OD's per 100,000 population increased from 11.5 in 1997 to 12.8 in 2012 to as high as 15-17 in future

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.

Biggest Unstated Assumption of All

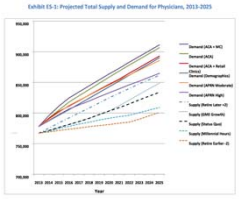
- If there's demand, someone will supply it
  - Geriatrics
  - Cardiothoracic surgery
  - Neurosurgery
- Why this isn't true – relative rewards
  - Within medicine
  - Across range of possible careers for young people
  - US Physician supply (Depression / Medicare) *

Questions for Discussion

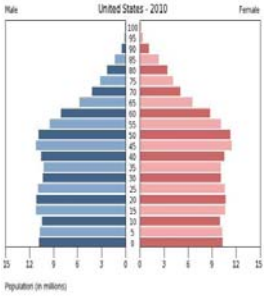
- What have we learned from our past analyses of workforce needs ?
- How will (likely) changes in society affect the demand (and public health need) for eye care services and workforce supply?
- What will the roles of eye care providers look like in the future and how will this impact care ?

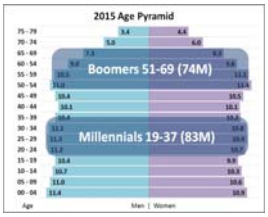
Current Estimates: AAMC, 2018

- Overall MD shortage of between 42,600 and 121,300 physician by 2030 (25th to 75th percentile)
- Surgical specialty shortfall of 20,700 to 30,500
- Aging population primary driver of demand
- Aging physician pool and retirement affects supply
- Achieving population health goals worsen shortage



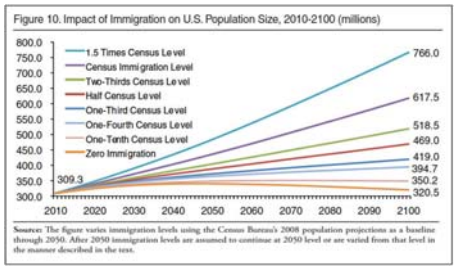
US Population Pyramid



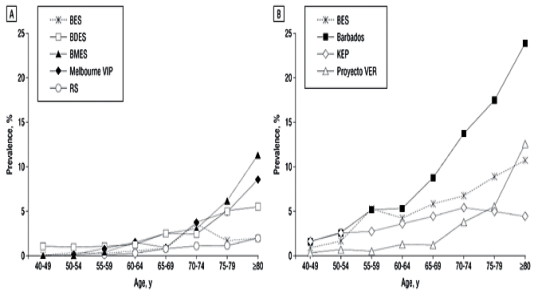


Impact of Immigration on Estimates

Source: Center for Immigration Studies



Prevalence of POAG
Eye Diseases Prevalence Research Group



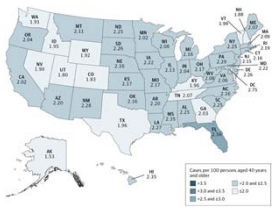
The Eye Diseases Prevalence Research Group, Arch Ophthalmol 2004;122:532-538.

ARCHIVES OF OPHTHALMOLOGY

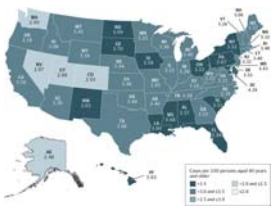
The JAMA Network

From: **Visual Impairment and Blindness in Adults in the United States: Demographic and Geographic Variations From 2015 to 2050**

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



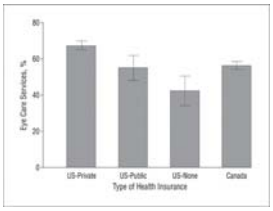
Per Capita Prevalence of Visual Impairment in the United States in 2015

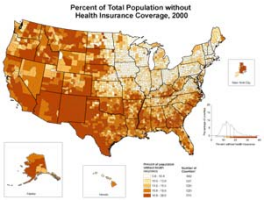


Per Capita Prevalence of Visual Impairment in the United States in 2050

Insurance and Use of Eye Care

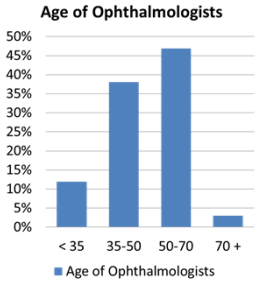
Zhang X, et al, Arch 2008





Generational Differences in Work

- Millennials
  - Tech savvy / Multitaskers
  - No job loyalty
  - Immediate feedback / short attention span
- X'ers
  - Entrepreneurial
  - Work-life balance
  - Skeptical / cynical
- Boomers
  - Hard working / workaholic
  - Self-centered
  - Idealistic
  - Long-term commitment

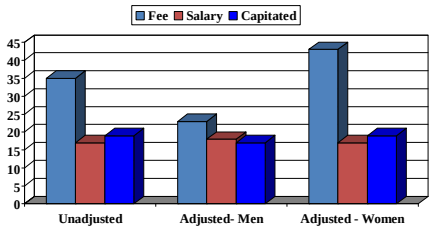


Physician Workforce - Key Factors

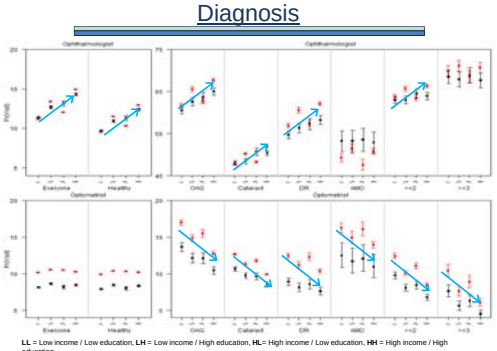
- Population growth in older segments (Aging)
- Health care financing impacts on demand
- Workforce demographics
  - Gender and generational / age
  - Retirement timing
- New demand / need for care
  - Previously untreatable / new indications - e.g., AMD
  - Increase in population RATES of disease (e.g., obesity / DM)
- Roles of different health care providers
  - MD's and OD's
  - NP's and PA's
  - "New classes" of workers

Cataract Extraction Rates – So Cal

Lubick, et al, JAMA, 1997



Likelihood of Visit Based on Ocular Diagnosis



LL = Low income / Low education, **LH** = Low income / High education, **HL**= High income / Low education, **HH** = High income / High education

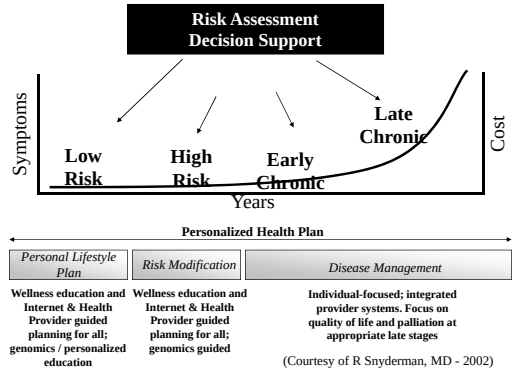
Questions for Discussion

- What have we learned from our past analyses of workforce needs ?
- How will (likely) changes in society affect the demand (and public health need) for eye care services and workforce supply ?
- What will the roles of eye care providers look like in the future and how will this impact care ?

Considerations in Future Planning

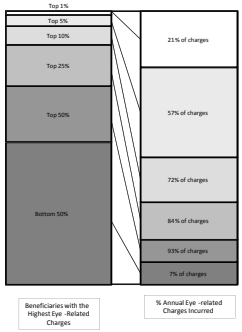
- Move to preventive care / population health
- Team-based care for diseases
- Leverage technology for new models of team care approaches
- Technology will complement and even supplant some functions of care providers
- Diversity is a need and an opportunity; improving quality decreases disparities in health

Future View - Prospective Health



(Courtesy of R Snyderman, MD - 2002)

Costliest Eye Care Recipients



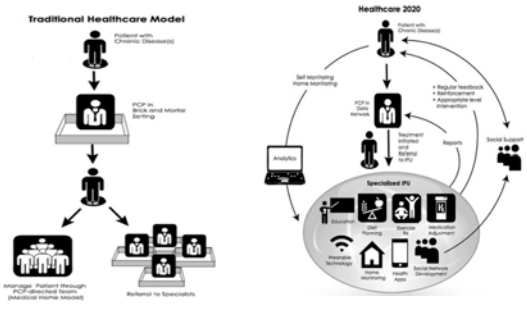
Courtesy of Josh Stein, MD, MPH

Optum Insight (United Healthcare) Datamart

Considerations in Future Planning

- Move to preventive care / population health
- Team-based care for diseases
- Leverage technology for new models of team care approaches
- Technology will complement and even supplant some functions of care providers
- Diversity is a need and an opportunity; improving quality decreases disparities in health

Reengineering Healthcare Delivery for Chronic Disease (Milani RV, Lavie CJ, Am J Med 2014)



Use of Ophthalmology-Optometry Teams for Glaucoma Care

- UK – Ratnarajan G, Newsom W, Vernon SA, et al. BMJ Open, 2013
  - Over-reliance on IOP
  - High risk findings on OD exam refer directly to secondary care
  - Lower risk can be seen by specialist trained optometrist
- UK – Wright HR, Diamond JP. Br J Opthalmol 2015
  - Optometrist with 3 technicians can triage by risks of blindness
  - Web based virtual review of records and images by glaucoma specialist reduces risks and enables overall control of process
- Scotland – Khan AA, Musftafa MZ, Sanders R. Pub Health, 2015
  - Electronic image referral system from community OD to HES
  - Effective in improving care process
- Multiple papers on sharing care between optometrists and ophthalmologists, including use of telemedicine

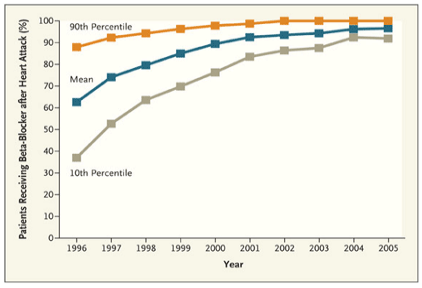
A Personalized Behavior Change Program for Glaucoma Patients with Poor Medication Adherence

Paula Anne Newman-Casey, MD, MS

Next Steps…. Integrate into clinic flow using operations engineering and pilot test impact on adherence

Adoption of Beta-Blockers after MI

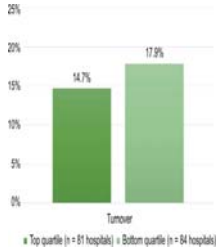
(TH Lee, NEJM)



Importance of CULTURE: Quantitative Analysis of Culture on Performance of System

Owens K, et al, J Healthcare Leadership 2017

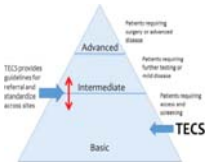
- Items for culture survey
  - Patients as valued customers
  - Values similar to yours
  - Rewarding to be member
  - Proud to be part of this organization
- Improved performance
  - Employee engagement
  - Physician engagement
  - Patient experience
  - Value-based purchasing metrics
  - Finance



Considerations in Future Planning

- Move to preventive care / population health
- Team-based care for diseases
- Leverage technology for new models of team care approaches
- Technology will complement and could supplant some functions of care providers
- Diversity is a need and an opportunity; improving quality decreases disparities in health

Aravind Eye Centers Innovations



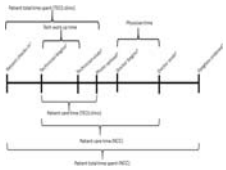


Figure 3. Distribution of eye care resources in the "pyramid model."

April Y. Maa, Barbara Wojciechowski, Kelly J. Hunt, Clara Dismuke, Jason Shyu, Rabeea Janjua, Xiaoqin Lu, Charles M. Medert, Mary G. Lynch

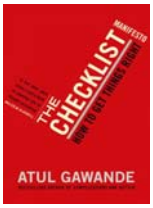
Early Experience with Technology-Based Eye Care Services (TECS) : A Novel Ophthalmologic Telemedicine Initiative

Ophthalmology, 2017

http://dx.doi.org/10.1016/j.ophtha.2016.11.037

Standardization / Checklists

- Underlying concept = **Reduce variation**
  - Applying variation and decision making research knowledge in larger context
  - Implement "best practices" under routine care conditions
  - Guidelines to improve care



Considerations in Future Planning

- Move to preventive care / population health
- Team-based care for diseases
- Leverage technology for new models of team care approaches
- Technology will complement and could supplant some functions of care providers
- Diversity is a need and an opportunity; improving quality decreases disparities in health

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."

Refractive Error Correction

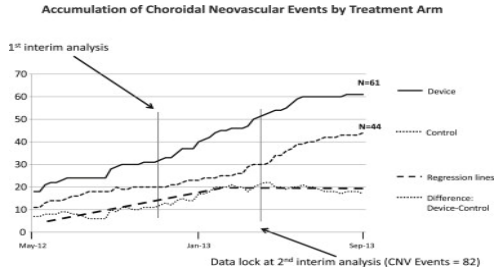
Enhanced Traditional Approach

Technology-centric Approaches

Management of Glaucoma Suspects Through OCT Monitoring

Modjtahedi B, Chu K, Luong TQ, Hsu C, Nakla ML, Fong DS

- AAO Poster 87, Kaiser Permanente, 2015
- Following suspects (discs or risk factors, but normal VF and RNFL thickness)
- First 100 at one year results
  - 9 patients with $\geq$ 10 micron loss in any quadrant
  - Average RNFL loss was 1.1 microns



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

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

E-Health / Tele-health

Kaiser-Permanante - AAPC, 2017

- 52 percent of the more than 100 million patient encounters at Kaiser take place remotely.
- 95 percent of its nearly 12 million members are covered on a capitated basis.
- invests about 25 percent of it annual capital spending on IT

Additional Kaiser Programs

- "House calls" for e-health visits
- Secure e-mail usage increases HEDIS scores
- E-health saves $ for Kaiser due to capitated state

50

Mobile Health Will be Used More

MobleSmith, 2018

- 73% US adults use internet for health and wellness
- 5% of Google searches are for health-related information
- Millennials are high-information consumers
- 71% would like providers to use mobile e-health platforms
- Millennials are 7 x more likely to give personal info to trusted vs non-trusted brand
- 42% more likely adhere to rx if receive coaching and encouragement between visits
- Greatest growth in mobile apps (87%) vs mobile web (13%)

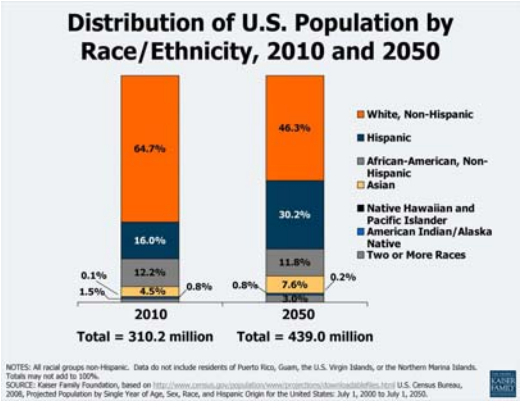
Considerations in Future Planning

- Move to preventive care / population health
- Team-based care for diseases
- Leverage technology for new models of team care approaches
- Technology will complement and could supplant some functions of care providers
- Diversity is a need and an opportunity; improving quality decreases disparities in health

Impact of Millennials

(MobileSmith, 2018)

- Most diverse generation to date
- 43% non-white
- 25% speak language other than English at home
- Challenge traditional structures and processes
- Disruption is a way of life
- Highly peer-influenced and social responsibility
- 2014 - $1.3 trillion in purchasing power
- 2016 – largest generation in US history
- 2018 - $3.4 trillion purchasing power, most of any generation
- 2020 – make the majority of health care decisions in US
- 2025 – 75% of workforce



The JAMA Network

From: **Current and Future Status of Diversity in Ophthalmologist Workforce**

JAMA Ophthalmol. 2016;134(9):1016-1023. doi:10.1001/jamaophthalmol.2016.2257

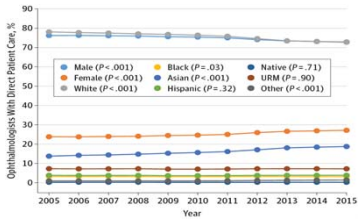


Figure Legend:

Proportions of Ophthalmologists With Direct Patient Care Stratified by Sex, Race, and Ethnicity From 2005 Through 2015The data source is the American Medical Association Physician Masterfile, 2005-2015 (December 31 snapshot), and the data are from ophthalmologists with direct patient care who graduated from US medical schools in 1980 or later. URM indicates underrepresented in medicine.

The JAMA Network

From: **Current and Future Status of Diversity in Ophthalmologist Workforce**

JAMA Ophthalmol. 2016;134(9):1016-1023. doi:10.1001/jamaophthalmol.2016.2257

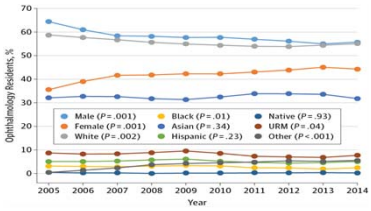
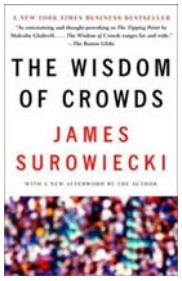


Figure Legend:

Proportions of Ophthalmology Residents Stratified by Sex, Race, and Ethnicity From 2005 Through 2014The data source is GME Track, 2005-2014 (December 31 snapshot). Please note that the 2015 data are not available. URM indicates underrepresented in medicine.

Value of Diversity for Complex Tasks

Scott Page, Center for the Study of Complex Systems, Univ. of Michigan



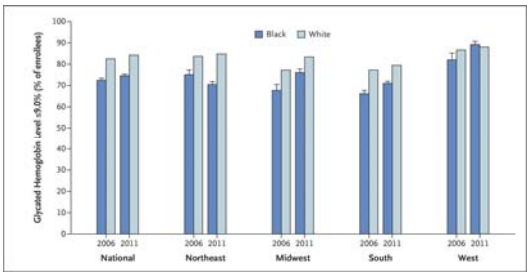
- Different perspectives based on different experiences (multi-disciplinary team)
- Use different heuristics and methods (schema)
- Diverse group outperforms best individuals in complex tasks (like challenging patients)
- Key is "atypical" connections

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

Estimated Age-and-Sex-Adjusted Proportions of Black Enrollees and White Enrollees with Diabetes in Medicare Advantage HMOs in Whom Glycated Hemoglobin [OUTCOME] Was Controlled, Overall and According to Region.



Ayanian JZ et al. N Engl J Med 2014;371:2288-2297

The NEW ENGLAND JOURNAL of MEDICINE

Additional Points

- The longer you project out, the less certain you can be (projections more than 5 to 10 years out are hazardous)
- Supply availability is not same as demand
- Changes in how we work will affect models
- Changes in what we do as a society as well
  - Impact of PPACA – financing / workforce regulations
- Regional areas vs. national analysis
- We don't know what we don't know
- Be optimistic – we've always figured it out

Impact of Improbable Events and Human Knowledge

- Nicholas Taleb – "The Black Swan"
  - Improbable events occur more frequently than we think
  - Huge effects in changing the course of history
  - Believe they're apparent in hindsight
  - (Experts are over-rated)
- Donald Rumsfeld
  - "… there are things we know we know. We also know there are known unknowns, that is to say we know there are some things we don't know. *But there are also unknown unknowns – the ones we don't know we don't know*."