The State of the Department of Quantitative Health Sciences (QHS) at 7 years of age

Catarina Kiefe, PhD, MD

January 10, 2017

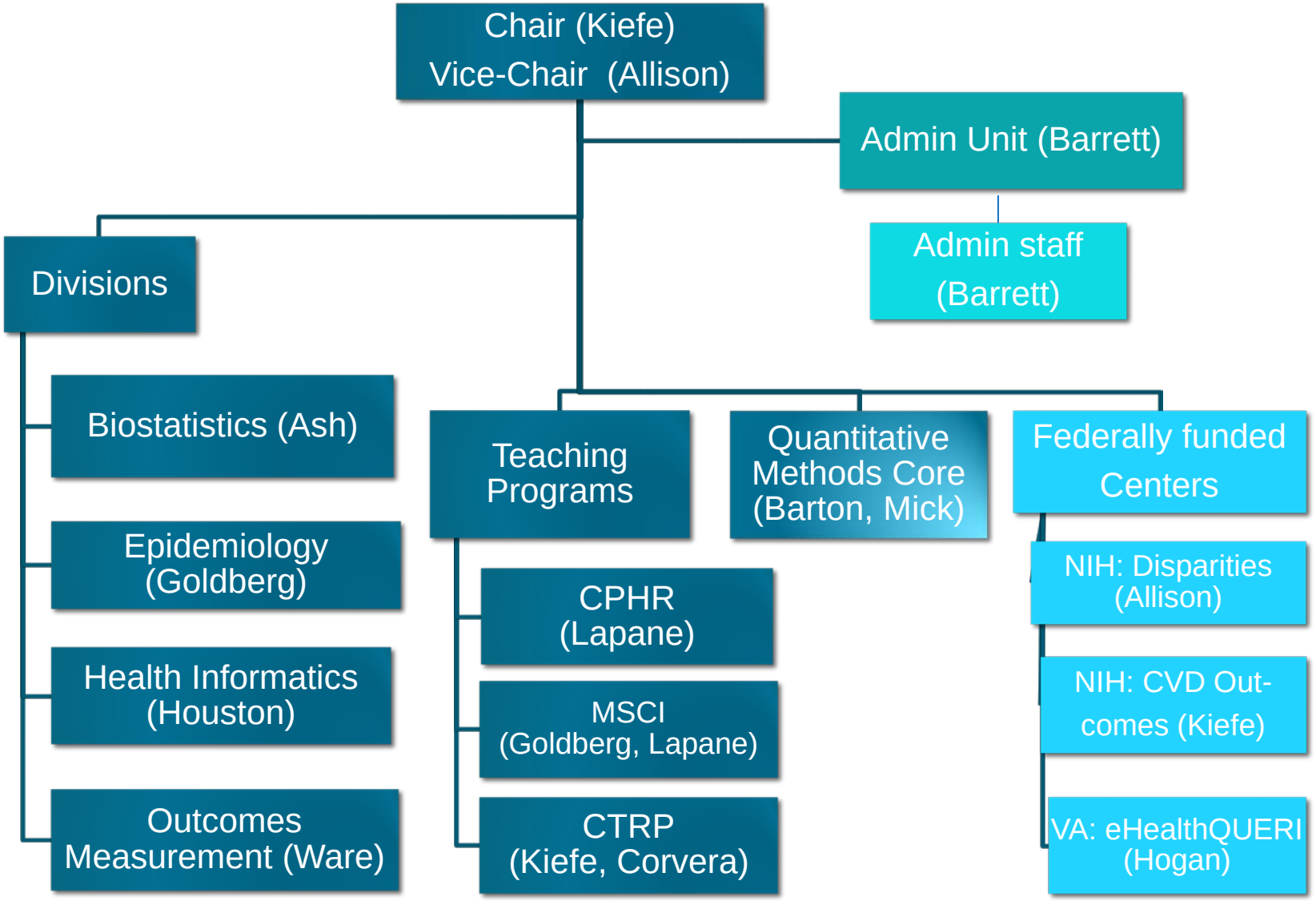
State of QHS 2016: Overview

- Brief history and department overview
  - “Five-year” review
- Research Highlights
  - Funding
  - Publications
  - Two non-senior faculty stories
- Highlights from educational programs
  - A student story
- Challenges for FY 17 and beyond

QHS History

- Founded in June, 2009
- Strategic Plan developed by June, 2010
  - Revised June, 2012; September 2014
  - Revision 2017 in process: plan for QHS 2.0 encouraged by Provost
- “Five-year” review report November, 2015
- Moved into ~24,000 sq. ft. across 5 floors in new Sherman building, May 2013

Dept. of Quantitative Health Sciences Organizational Chart



QHS: Our People

- 34 primary faculty
- 25 secondary faculty
- 16 voluntary faculty
- 24 doctoral students, 7 post-docs
- 37 staff
  - 11 administrative
  - 26 research

QHS staff: the glue that holds us together

- 10 administrative staff under Barrett:
  - 4 financial: Thompson, Yeboah, Wiggin, O'Reilly
  - 6 other: Saber, Ludy, Stankus, Baron, McDonald, Schulz
- 26 research staff
  - Quantitative Methods Core technical staff
    - Statistical computing: Flahive, Kroll-Desrosiers, Kini, Lessard, Varma, Williams
    - Data architecture and management: Lazar, Netherton, Orvek, Rosenberg
  - Major research program staff leads (PI):
    - Chiriboga (Allison)
    - Amante (Houston)
    - Gigliello (Kiefe)
    - Freund (Yu)

Faculty Changes on the Horizon

- Feifan Liu, PhD
  - Assistant Professor, Health Informatics and Implementation Science
  - Joining Hong Yu's group effective January, 2017
  - Joint recruitment with Dept of Radiology
- Senior statistician/methodologist
  - Reactivated search underway
- Junior collaborative statistician
  - Content area Emergency Medicine
  - Joint recruitment with Dept of Emergency Medicine
- Julia Fang, PhD
  - Joint appointment with UMass Dartmouth

QHS Vision

We will be leaders in the science of moving from discovery to improving individual and population health:

- by transforming healthcare delivery through methodological innovation
- by becoming a nationally and internationally recognized resource for translational research

QHS Values

- Social justice through improved health
- Collective creativity
- Integrity and excellence
- Diversity and mutual respect
- Science that makes a difference

Collective creativity…

Five-Year Review: Reviewer Feedback

- "QHS has been extraordinarily successful by any metric for success"
- Gaps in scientific expertise, as recognized by leadership
  - Statistical methodology research
  - Health economics
  - Social epidemiology
  - Statistical genetics
- Issues to work on:
  - Sense of faculty isolation, reinforced by space
  - Junior faculty sense of job insecurity
  - More faculty diversity desirable, as recognized by leadership

Five-Year Review: Selected Recommendations

- Develop 5-year visions for each Division
  - In process
- Develop strategies to increase junior faculty well-being
  - Some faculty with demonstrated potential for independent funding were moved to tenure track
- Modify core allocation model from central administration to provide QHS some funding for NTT faculty
  - Significant progress has been made

Five-Year Review: Further Recommendations

- Enhance research opportunities with Health System
  - UMMHC as “laboratory for health services research”
    - As part of UMMS/UMMHC strategic plan
    - E.g., NIH 5-year suicide prevention grant (Kiefe, Boudreaux MPIs)
- Strengthen ties with Commonwealth Medicine
  - Continues to be actively pursued
- Capitalize on faculty across Univ, e.g. Amherst
  - Collaborations with SPH in context of new Baystate campus underway
  - Collaborations with Amherst College of Computer Science
    - Yu, Houston
    - Master’s in CS – Health Data Track (Lapane, Goldberg)

Collaboration…

Research Portfolio

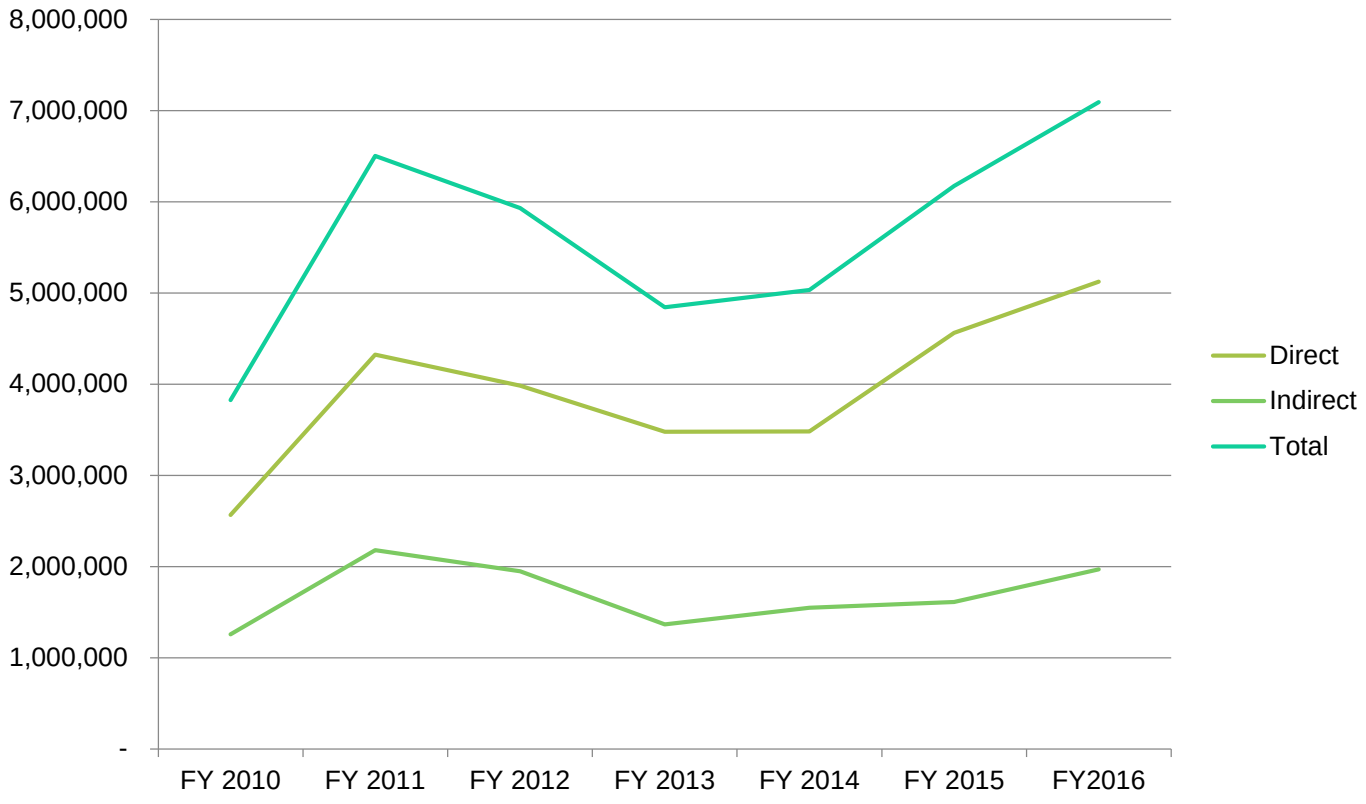
- Since its inception, QHS faculty have been PIs on 103 extramurally funded projects, over $86 million total
  - 36 currently active
  - Also, 13 active VA grants, $1.5 million total (FY 16)
  - In FY16 alone, total annual funding $7.1 million in UMass-based grants with QHS PIs

- And QHS faculty have been key on many others: CTSA, FORCE-TJR, PRISM, Hepatitis-C, …
  - Estimated grant funding impact of QHS on UMMS > $140 million
  - FY16 non-QHS active projects with QHS investigators, annual budget $10.3 million
  - Quantitative Methods Core has provided statistical collaboration for ALL UMMS departments: 1400+ initial consults in 6+ years with over 650 investigators; worked on over 450 grant applications (80% NIH)

University of Massachusetts Center for Clinical and Translational Science (UMCCTS): the UMass instantiation of a CTSA

- Funded by NIH in 2010 @ $4 million/yr, competitively renewed for 4 years in 2015
- QHS leads 3 core components:
  - BERD (statistics and research design)
    - Some support for Quantitative Methods Core
  - Informatics Core
  - Special Populations Resource Center
- New TL1 co-lead by QHS (Lapane) added this year, extending our educational presence (MSCI, CTRP)
- QHS (Allison) new co-leader of KL2

QHS sponsored project funding, by fiscal year: FY10 – FY16



Major new grants awarded in FY 2017

- VA IIR: A Technology-Assisted Care Transition Intervention for Veterans with Chronic Heart Failure or Chronic Obstructive Pulmonary Disease; 7/2016 - 6/2020; Hogan, PI
- NIMHD R01: A System of Safety (SOS): Preventing Suicide through Healthcare System Transformation: 9/5/2016 – 6/30/2021; Kiefe/Boudreaux, MPIs
- NCATS U01: Strengthening Translational Research in Diverse Enrollment (STRIDE): 9/8/2016 – 6/30/2021; Allison/Lemon, MPIs;
- NHLBI R01: Community Surveillance of Coronary Heart Disease: 12/15/2016 – 11/30/2021; Goldberg/Yu, MPIs;
- NIHNR56 to R01: Pain Management for Older Adults Living in Nursing Homes: 8/02/2016 - ??/2021; Lapane, PI
- PCORI: Smoker-to-Smoker Peer Marketing and Messaging to Disseminate Tobacco ; 3/2017 – 2/2020; Sadasivam

Grant writing is like a roller-coaster ride: it’s only fun if you just throw up your hands and enjoy it

QHS FY16 Budget and Sources

- Annual QHS FY 16 expenditures $9.05 million
- UMMS base allocation to QHS 15.5%
- Grant direct funding 56%
- Other sources:
  - Indirect cost recovery
  - Teaching
  - QMC billing
  - Endowments

Major QHS accomplishments FY 2016 - I

- Initiated dialogue with non-senior faculty to address concerns
- Sharply increased presence of post-docs in QHS
- Held successful 1st annual Cutler lecture
  - Sir Michael Marmot
  - 2nd annual lecture “under construction”
- Life in QHS is not about work alone…

Volleyball champions!!!

QHS vacation spot of the year:

visited independently by 4 members of QHS and their families..

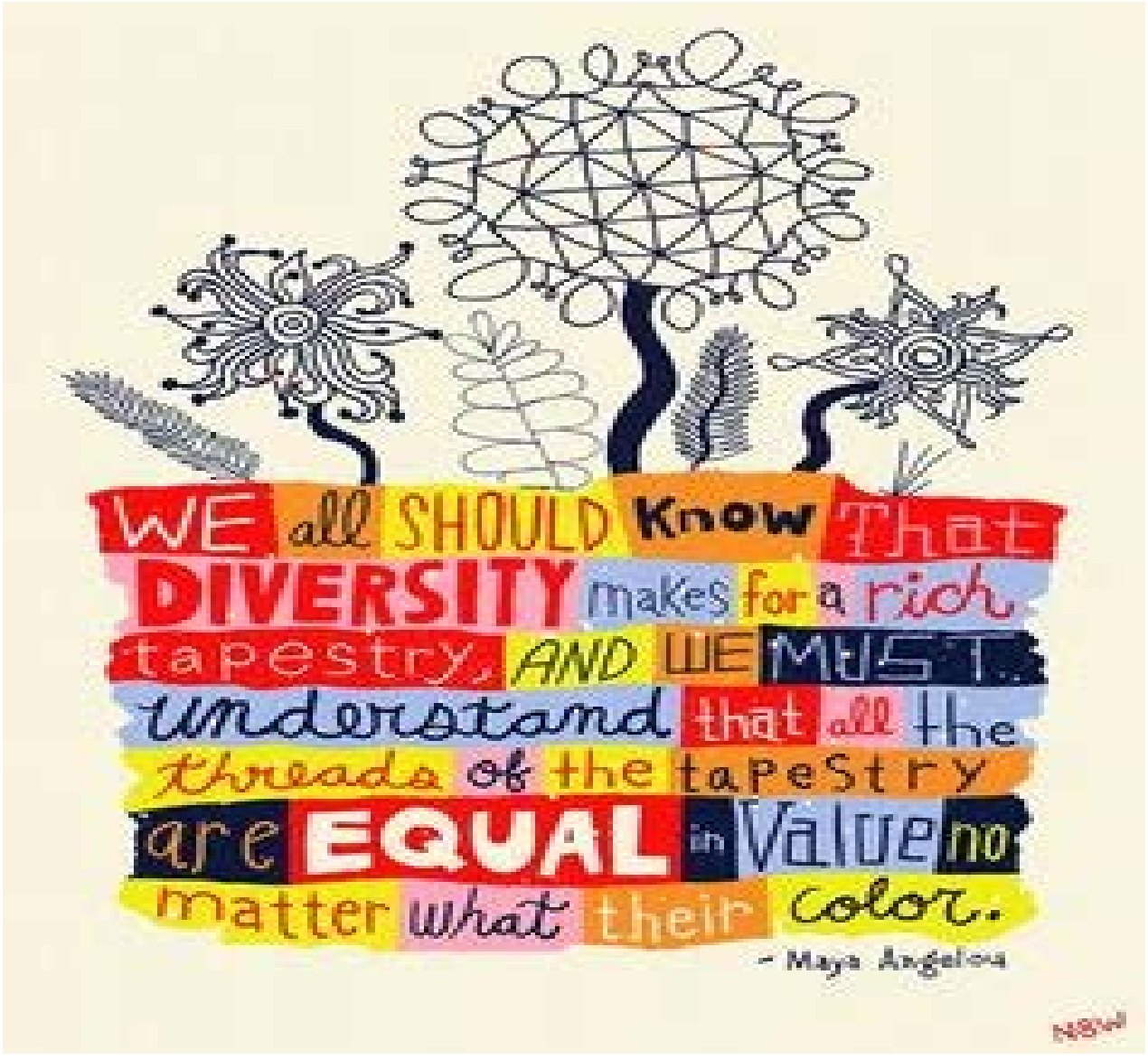
Major QHS accomplishments FY 2016 - II

- Submitted 33 new grant applications: 9 already funded, 10 not funded, 14 pending (success rate to date 47.4%)
- 59% of all QHS faculty salaries supported on grants (generally more for senior faculty)
- Over 1,000 peer-reviewed publications by QHS faculty since 2010 (over 240 in FY16), some in very high profile journals

Other FY 16 Highlight: Supporting Payment and Care Delivery Reform in MassHealth

- Arlene Ash, Eric Mick, and Melissa Clark worked with CWM to help the State develop a "bundled payment" methodology that accounts for the excess resource needs of people at social risk of poorer health
  - First such payment formula nationwide to explicitly include determinants of health variables such as:
    - Housing instability (homelessness, 3+ addresses in a year)
    - Neighborhood deprivation
  - **Our State has been using this for payment since October 2016**

Science that makes a difference….



Featured QHS FY 16 publications - I

- **Kroll-Desrosiers AR**, Skanderson M, Bastian LA, Brandt CA, Haskell S, Kerns RD, **Mattocks KM**. Receipt of Prescription Opioids in a National Sample of Pregnant Veterans Receiving Veterans Health Administration Care. *Women's Health Issues* 2016; 26(2):240-246.
- **Ulbricht CM**, Rothschild AJ, **Lapane KL**. Functional impairment and changes in depression subtypes for women in STAR*D: A latent transition analysis. *J Womens Health* 2016 May;25(5):464-72.
- **Waring ME**, McManus DD, Lemon SC, Gore JM, **Anatchkova MD, McManus RH, Ash AS, Goldberg RJ, Kiefe CI**, Saczynski JS. Perceiving one's heart condition to be cured following hospitalization for acute coronary syndromes: Implications for patient-provider communication. *Patient Educ Couns* 2016;99:455-461.
- **Cutrona S, Sadasivam R, DeLaughter K, Kamberi A**, Volkman J, Cobb, N, Gilbert G, Ray M, **Houston TK**, National Dental PBRN Collaborative Group. Online tobacco websites and online communities – who uses them and do users quit smoking? The quit-primo and national dental practice-based research network Hi-Quit studies. *Translational Behavioral Medicine*. 2016 Dec;6(4):546-557

Featured QHS FY 16 publications - II

- **Chen J**, Zheng J, **Yu H**. Finding Important Terms for Patients in their Electronic Health Records: A Learning-to-Rank Approach Using Expert Annotations. H. *JMIR Medical Informatics*, 4(4): e40. November 2016.

- **Allison JJ**, Nguyen HL**,** Ha DA, **Chiriboga G**, Ly HN, Tran HT, Phan NT, Vu NC, Kim M, **Goldberg RJ**. Culturally adaptive storytelling method to improve hypertension control in Vietnam –"we talk about our hypertension"**.** *Trials* 2016;17:26

- **Ware JE, Gandek B**, Guyer R and Deng N. Standardizing Disease-specific Quality of Life Measures Across Multiple Chronic Conditions: Development and Initial Evaluation of the QOL Disease Impact Scale (QDIS®), *Health and Quality of Life Outcomes* 2016; 14: 84.

State of QHS 2016: Overview

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- Highlights from educational programs
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JENNIFER TJIA, MD, MSCE

Authentic, goal-oriented healthcare
for older adults with advanced illness

Department of Quantitative Health Sciences
Division of Epidemiology of Vulnerable
Populations and Chronic Diseases

Mission Statement

I seek authentic relationships with stakeholders committed to bettering the lives of older adults with advanced illness so that, together, we can work to generate rigorous and actionable evidence, and integrate evidence into practice.

Invited Commentary

LESS IS MORE

Guideline-Based Prescribing in Frail Elders
When Less May Be More

Jennifer Tjia, MD, MSCE; Kate Lapane, PhD

Cool things I got to say…

…in reality, many older adults reach a point when quality of life is more important than extension of life.

We do not know how long β-blocker therapy should be continued after AMI.

As clinicians, we must remember that the spectrum of good prescribing practices spans initiation to discontinuation of therapy.

We need randomized controlled trials …

…for frail older adults to examine guideline-recommended medications for AMI

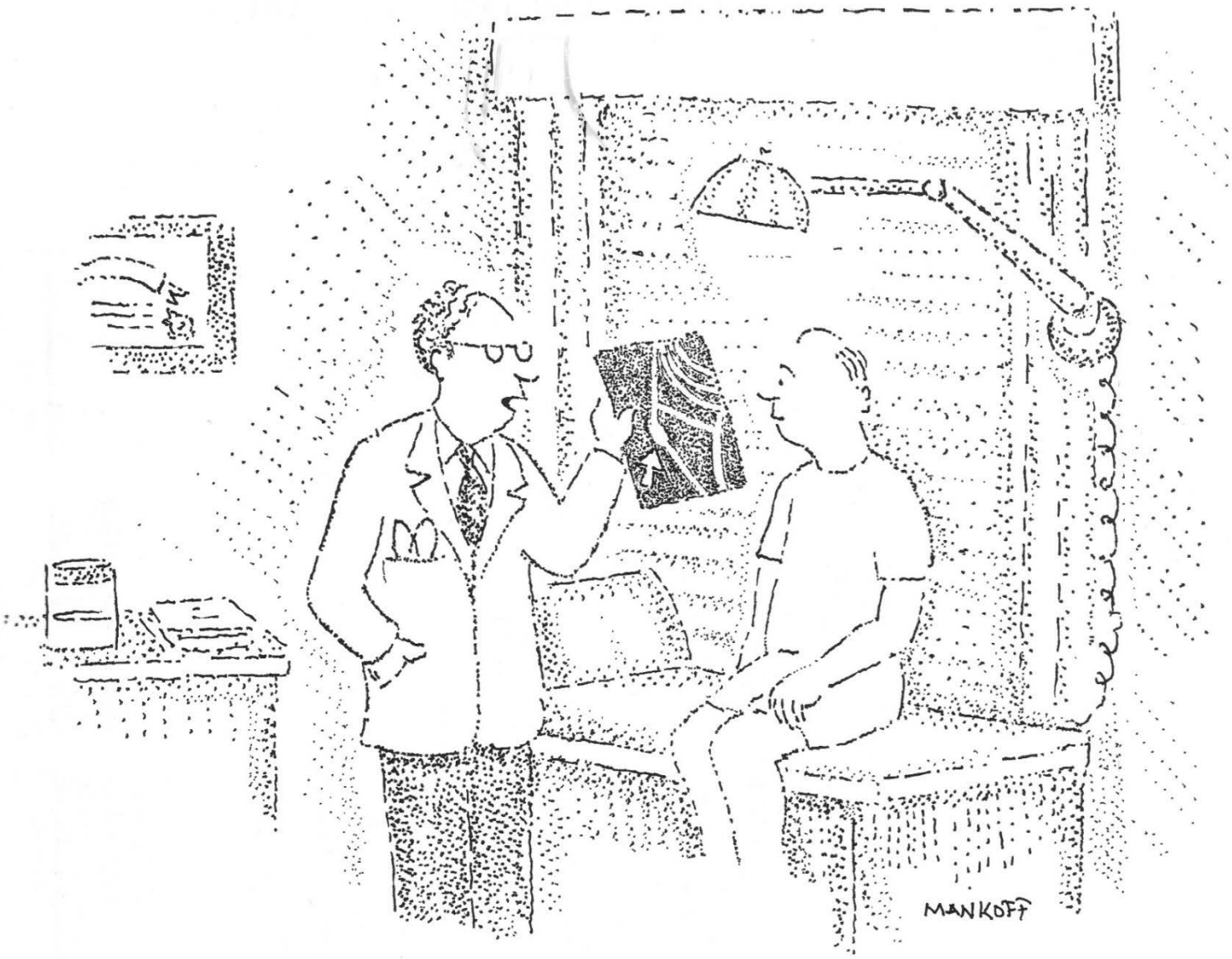
…for discontinuation of β-blocker therapy in elders with life-limiting illness

ACC/AGS/NIA U13 Workshop on Pharmacotherapy in Older Adults with CVD
Washington DC, February 5-7, 2017

February 6

Session I: Polypharmacy: Strategies for Reducing Overuse of Medications

9:40-10:00 Drug deprescribing: rationale and implementation
Jennifer Tjia



"That's the racist bone in your body you claimed you didn't have."

COmuNity-engaged SimULation Training for Blood Pressure Control (CONSULT-BP)

NIMHD R01
MD011532-01

"An *awareness*, *exposure* and *skill-building* intervention to mitigate bias and improve clinical interaction skills with minority and poor patients."

Project Implicit®

CHEIR
The UMass Center for Health Equity Intervention Research

Special Population Resource Center

Special Population Consultation

Community and Patient Participation

Cultural Competency Training

UNIVERSITY of WASHINGTON

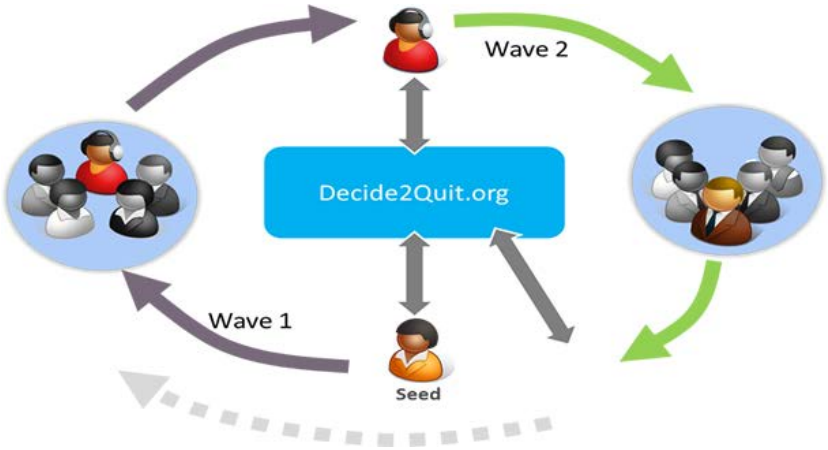
iCELS interprofessional Center for Experiential Learning and Simulation

RAJANI SADASIVAM, PHD

Research Goal:
Create a new generation of persuasive smoking cessation systems that will reduce the rates of smoking-related cancer deaths

Department of Quantitative Health Sciences
Division of Health Informatics and
Implementation Science

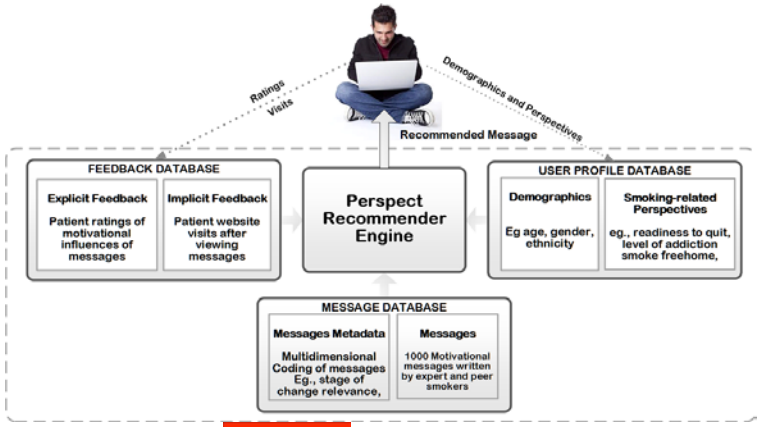
Peer Recruitment on Social Networks



facebook

NIH R21 (R21CA158968)

Use of collective-intelligence to enhance personalization



NETFLIX

amazon.com

Frequently Bought Together

Customers Who Bought This Item Also Bc

NIH K07 (K07CA172677)

Current (rule-based) Tailoring

Behavioral experts write if-then-else rules to select messages

```
if
        patient = female
then
        send message x
else
        send message y
```

Collective Intelligence Tailoring

Machine learning algorithms are used to select messages **learning from, and adapting to, user feedback**

- Implicit – Clicking on a webpage, purchasing your product
- Explicit – Liking a message (example Facebook like)

Pilot Randomized Experiment (120 Smokers)

Comparison (n=46)

- Smokers received messages from current rule-based tailoring that was demonstrated to be effective in a prior RCT with 900 smokers

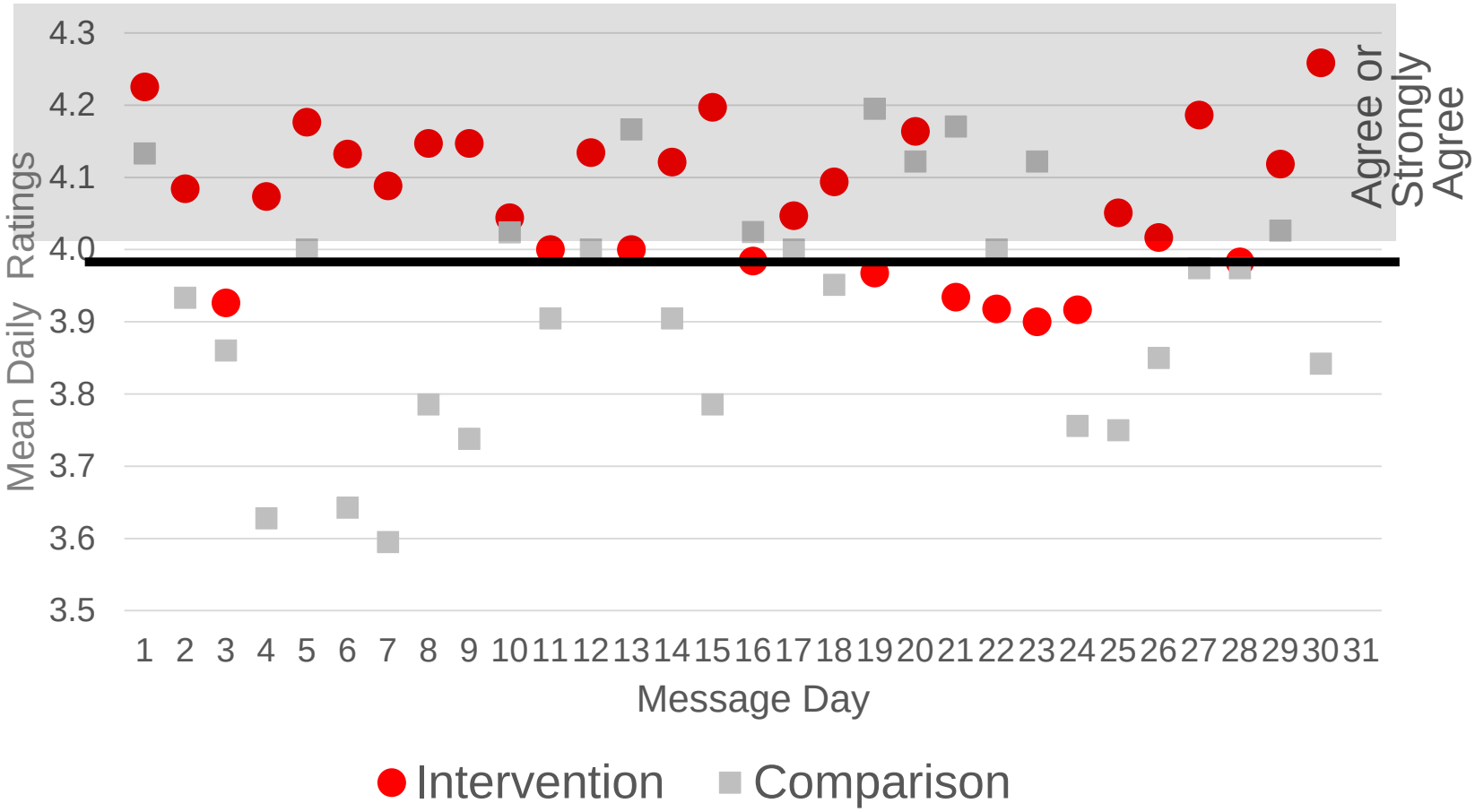
Intervention (n=74)

- Smokers received messages from S4S

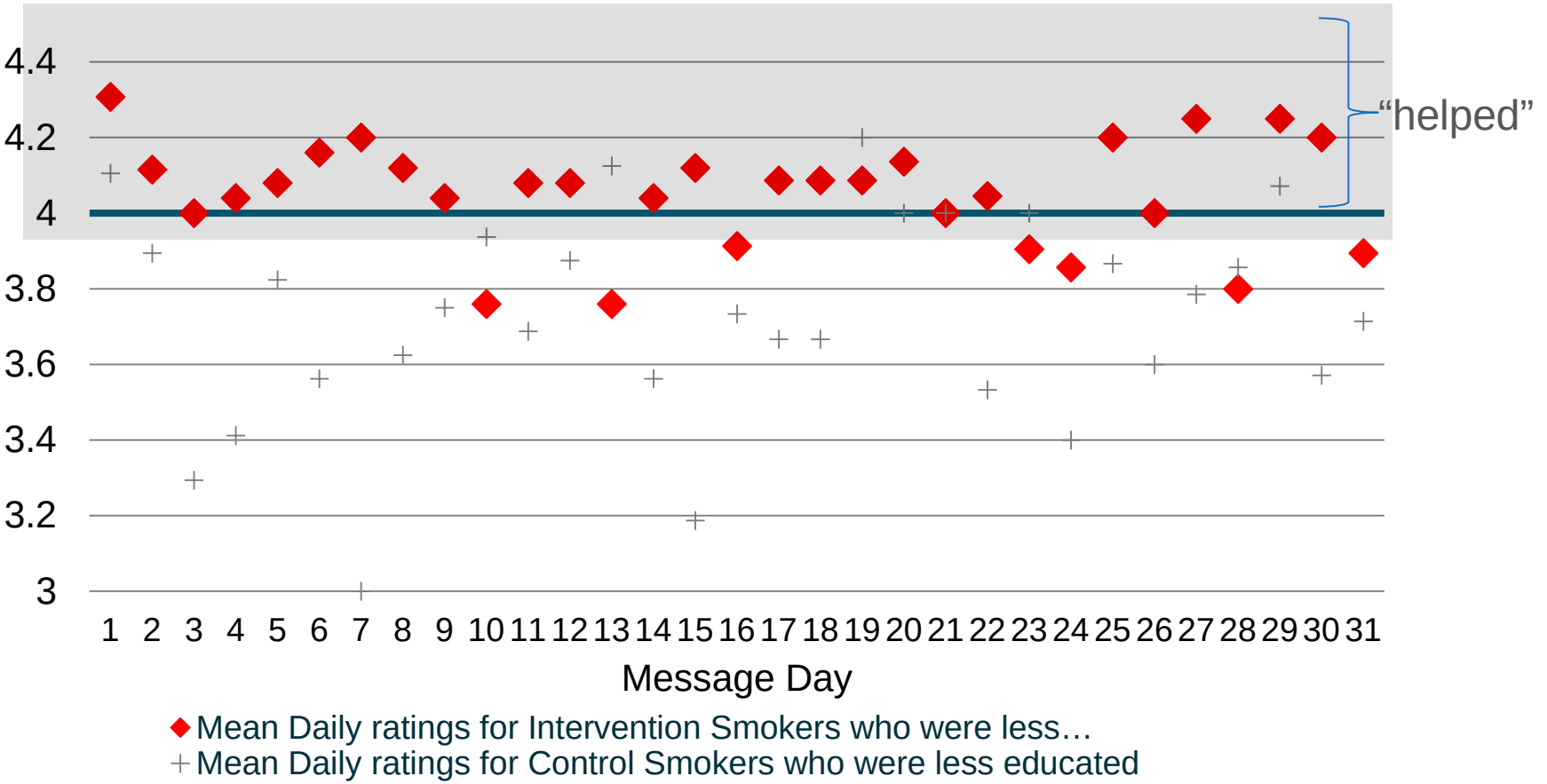
Smokers were sent emails daily and were given 65 days to rate up to 30 messages on the following influence scale

This message influences me to QUIT smoking.
(Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree)

Mean Ratings by Day (Intervention vs Comparison)



Mean Ratings by Day Among Less Educated Smokers (Intervention vs Comparison)



Current and Future Plans

1. New PCORI funded award
   Smoker-to-Smoker (S2S) Peer Marketing and Messaging to Disseminate Tobacco Interventions

2. Adapt2Quit - A Machine-Learning, Peer-driven, Adaptive Texting System: RCT for Smoking Cessation (R01 under review by NCI)

3. Currently developing an R01 proposal to adapt the messaging system to target the needs of Hispanic/Latino smokers

“Education is the most powerful weapon which you can use to change the world” *Nelson Mandela*

New Faces in QHS Educational Programs

Master's in Clinical Investigation

Jonathon Green, MD

PhD in Clinical and Population Health Research

First year class:

Hawa Abu, MD, MPH

Matt Alcusky, PharmD, MS

Ganga Bey, MPH

Dorcas Kadangs, MPH

Andrea Lopez, MS

Deborah Mack, MPH

Pathways to Graduate School Program

Maira Casteñada, MS

Institutional Training Grants

Funded:

- IMSD – Pre-doctoral diversity grant (Lewis / Lapane)
- NIH BEST – Pre-doctoral (Zamore / Fuhrman)
- MSTP – MD/PhD (Szabo)
- T32 CVD Clinical and Translational Science – Pre- and post-doctoral (Kiefe/Keaney)
- TL1 – Pre- and post-doctoral (Lapane / Corvera)
- NCI R25t Implementation Science – Post-doctoral (Lemon / Houston)
- KL2 – Post-doctoral and junior faculty (Keaney / Allison)

Pending:

- NIH PREP program – Pathway to graduate school (Lapane / Lewis)
- NHLBI K submission (Houston / Lemon)

Individual Training Grant Submissions

Apurv Soni – MD/PhD candidate (TL1 Fellow):
Understanding Trends, Predictors, and Consequences of Child Undernutrition in India Using Geospatial and Multilevel Models

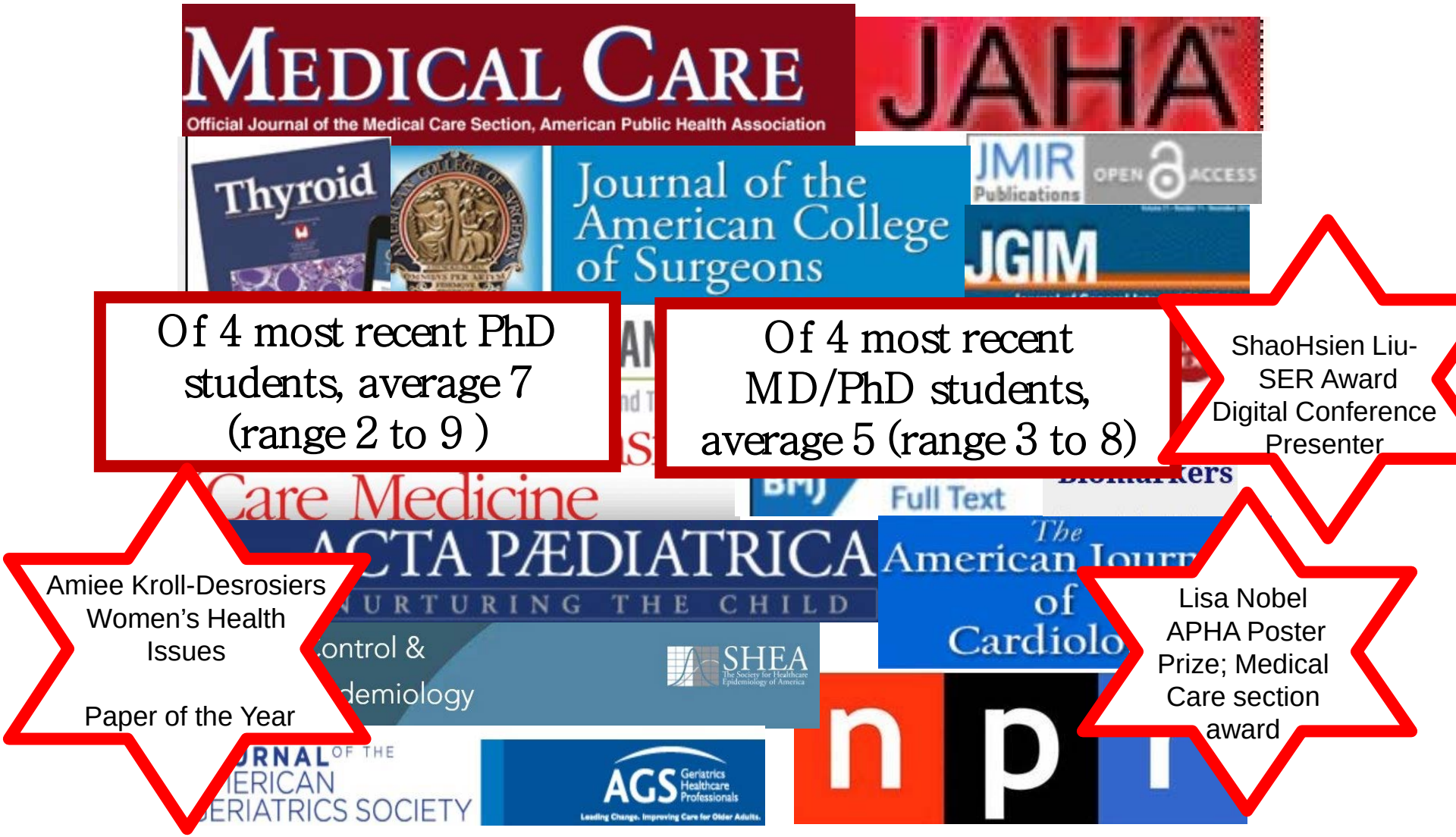
Lisa Nobel (former T32 fellow) – Funded NHLBI F30, CIHR

Jake Hunnicutt, MPH, PhD Candidate (TL1 Fellow):
Opioid Use and Safety in Nursing Homes

Christina Haughton, MPH, PhD candidate (T32 Fellow):
Home and Environment Factors Influencing Teen Sweetened Sugar Beverage Consumption

Nate Erskine MD/PhD Candidate (T32 Fellow)
Usual Source of Care and Patient Outcomes Following a Hospitalization for an Acute Coronary Syndrome

Christine Motzkus, MPH, MD/PhD candidate
Trends in Sepsis Treatment and Outcomes


MEDICAL CARE
Official Journal of the Medical Care Section, American Public Health Association
JAHA
Thyroid
Journal of the American College of Surgeons
JMIR Publications
OPEN ACCESS
JGIM
Of 4 most recent PhD students, average 7 (range 2 to 9)
Of 4 most recent MD/PhD students, average 5 (range 3 to 8)
ShaoHsien Liu-SER Award Digital Conference Presenter
Care Medicine
Full Text
ACTA PÆDIATRICA
NURTURING THE CHILD
The American Journal of Cardiology
Amiee Kroll-Desrosiers Women's Health Issues
Paper of the Year
SHEA
The Society for Healthcare Epidemiology of America
Lisa Nobel APHA Poster Prize; Medical Care section award
AGS
Geriatrics Healthcare Professionals
Leading Change. Improving Care for Older Adults.
npt

QHS Faculty receive awards for teaching and mentoring

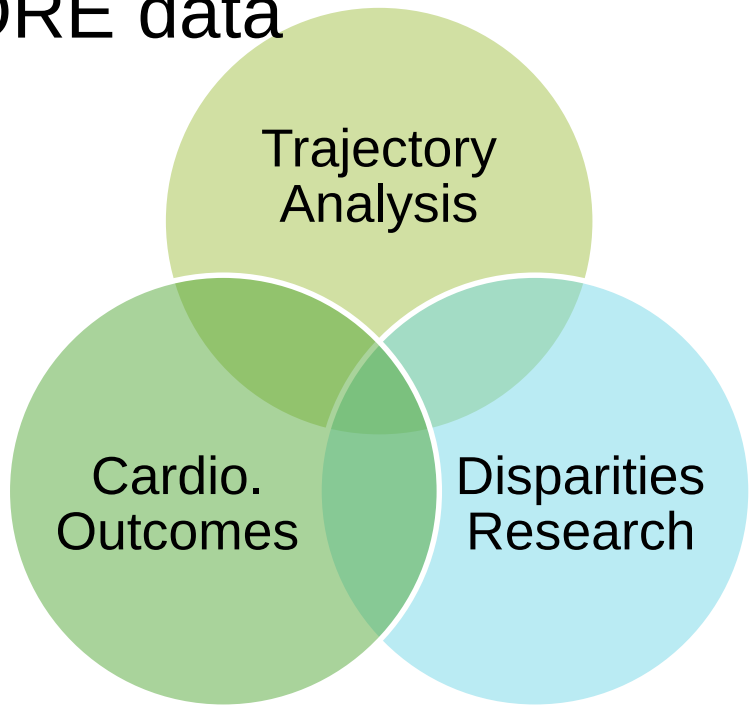
- Tom Houston: 2016 David M. Worthen Award for Educational Excellence for career-long achievements in education of healthcare professionals – national award from VA Office of Academic Affiliations
- Tim Hogan: 2016 Dean's Award for outstanding contribution to curricular development in GSBS
- Rob Goldberg: Educational Recognition Award from the GSBS

LISA NOBEL

Department of Quantitative Health Sciences
MD/PhD Candidate

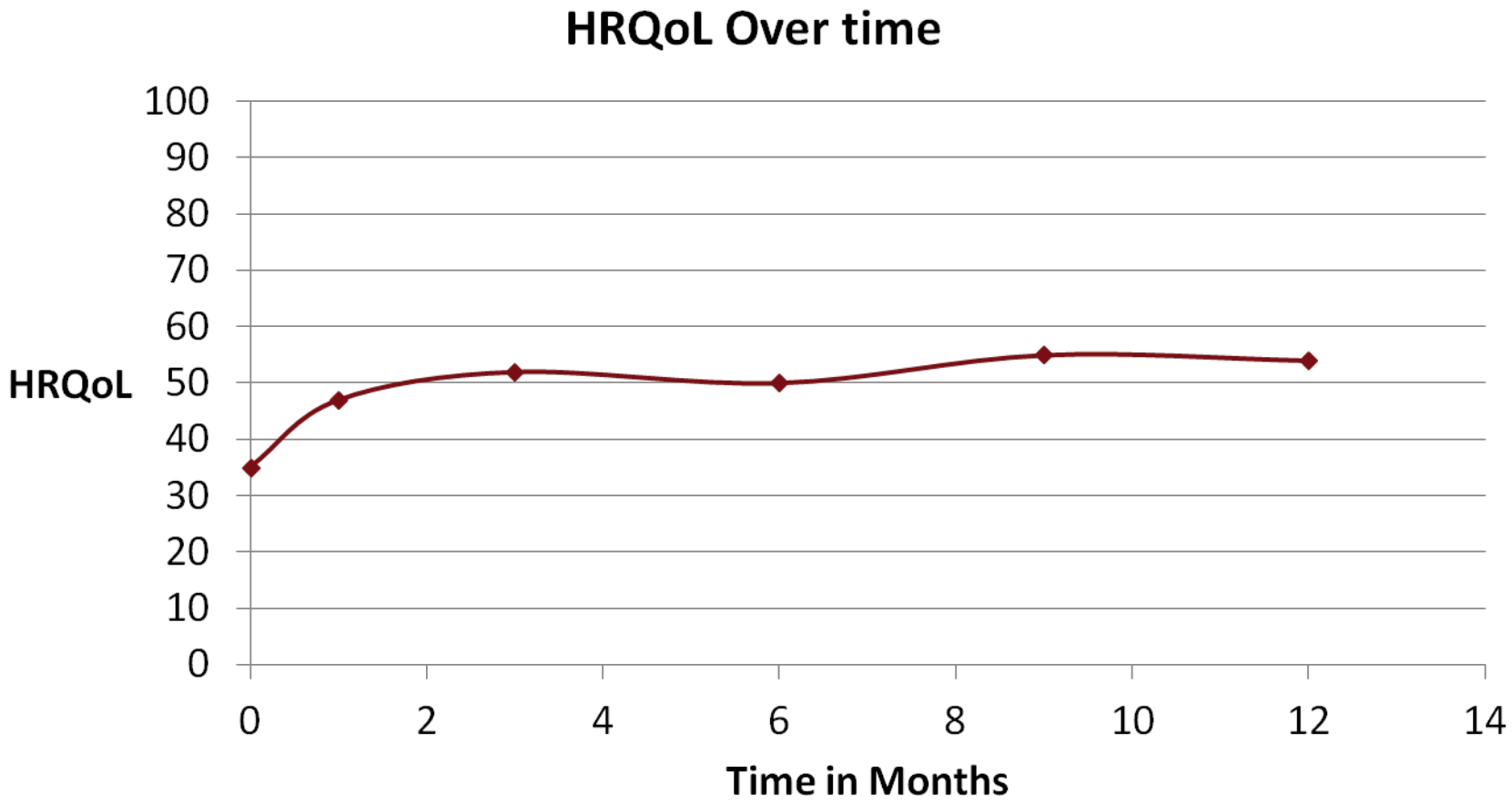
Research Interests

- MD/PHD Candidate
  - 4th year of graduate studies
  - Completed first three years of clinical rotations
- Funded F30 from NHLBI
- Dissertation uses TRACE-CORE data
- Research focuses on:
  - Cardiovascular outcomes
  - Advanced Statistical Analysis
  - Socio-economic disparities

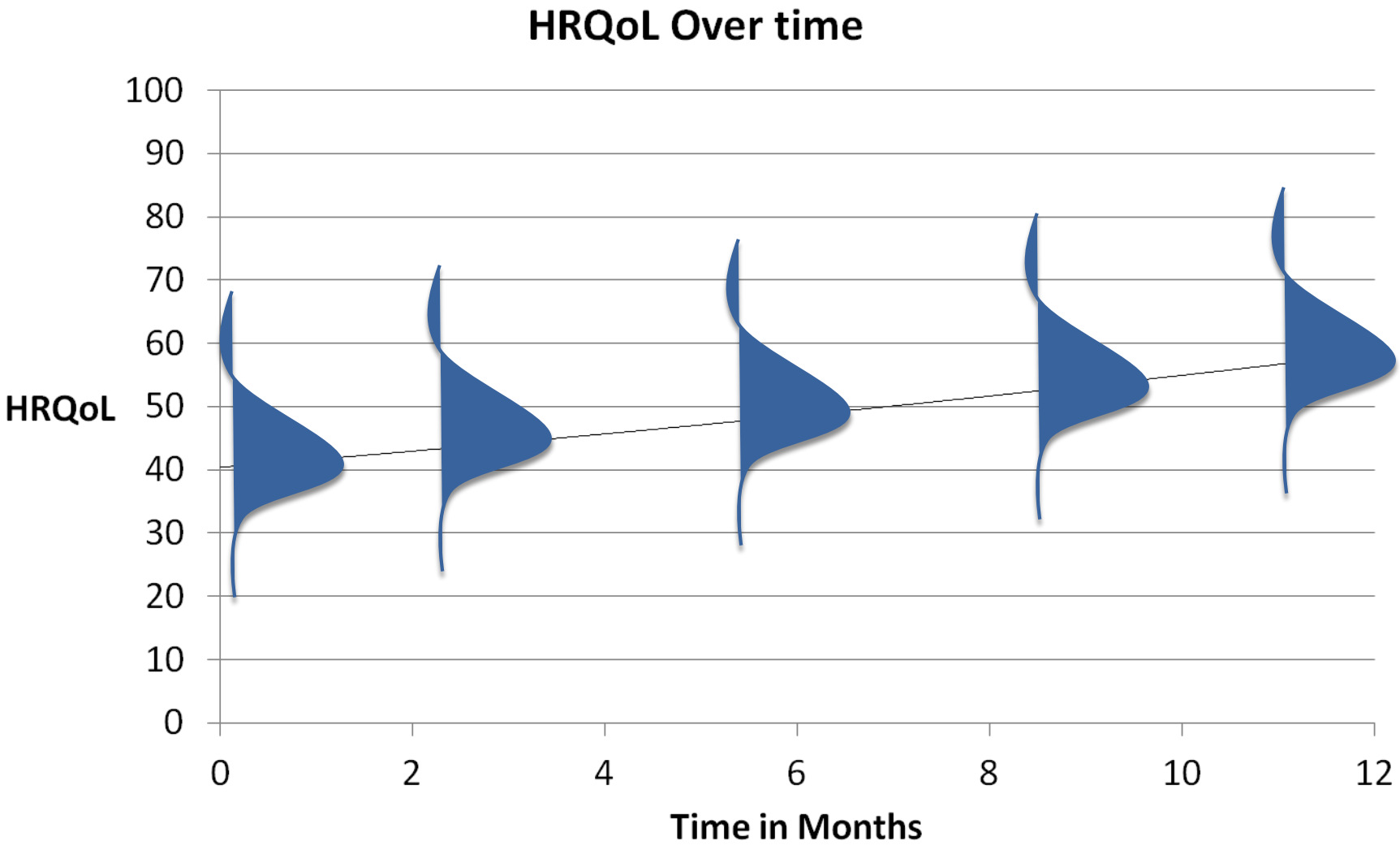


TRACE-CORE
Transitions, Risks, and Actions in Coronary Events - Center for Outcomes Research and Education

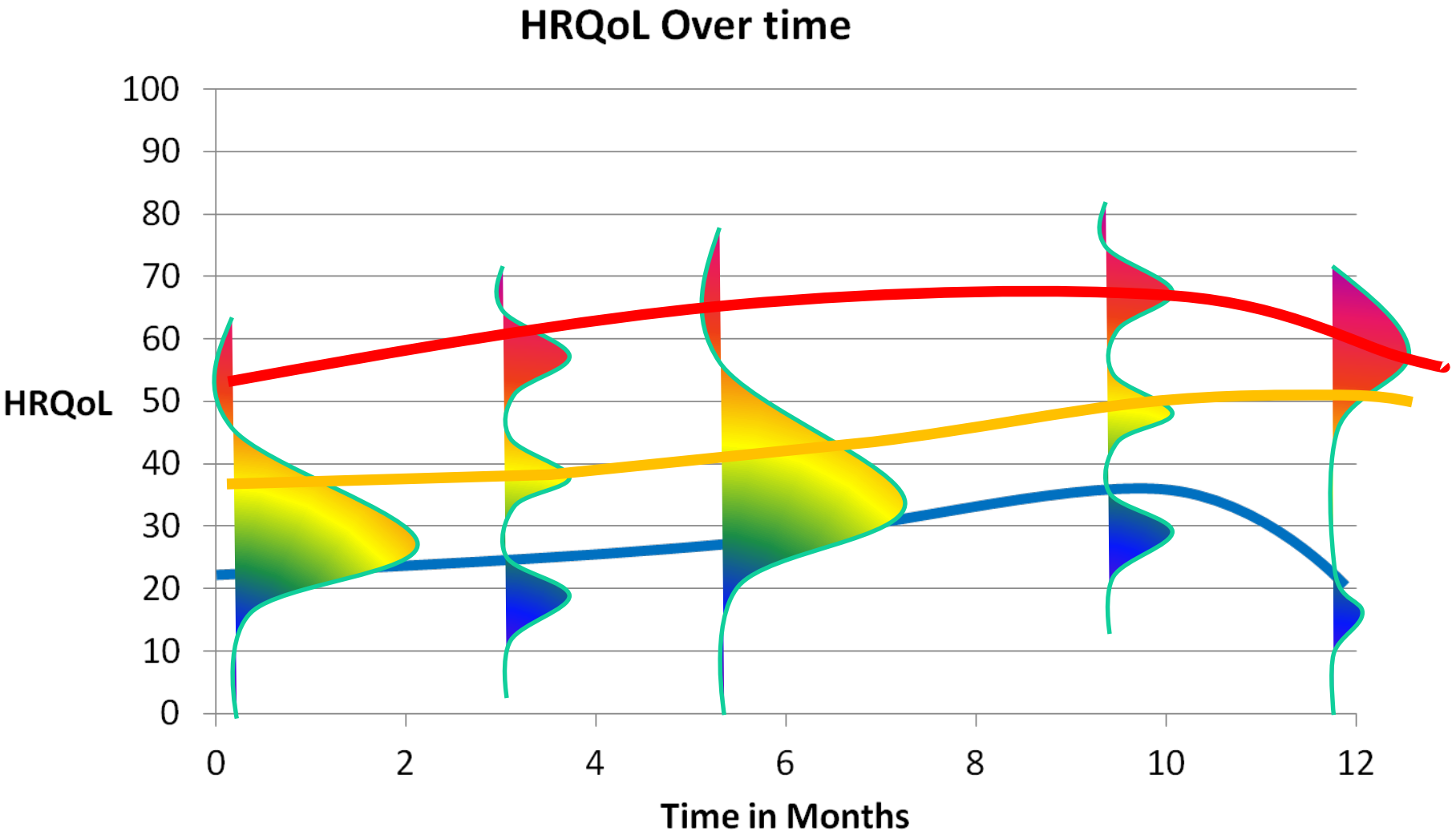
Average measures for everybody over time might look like this …



Leading us to envision normal distributions…



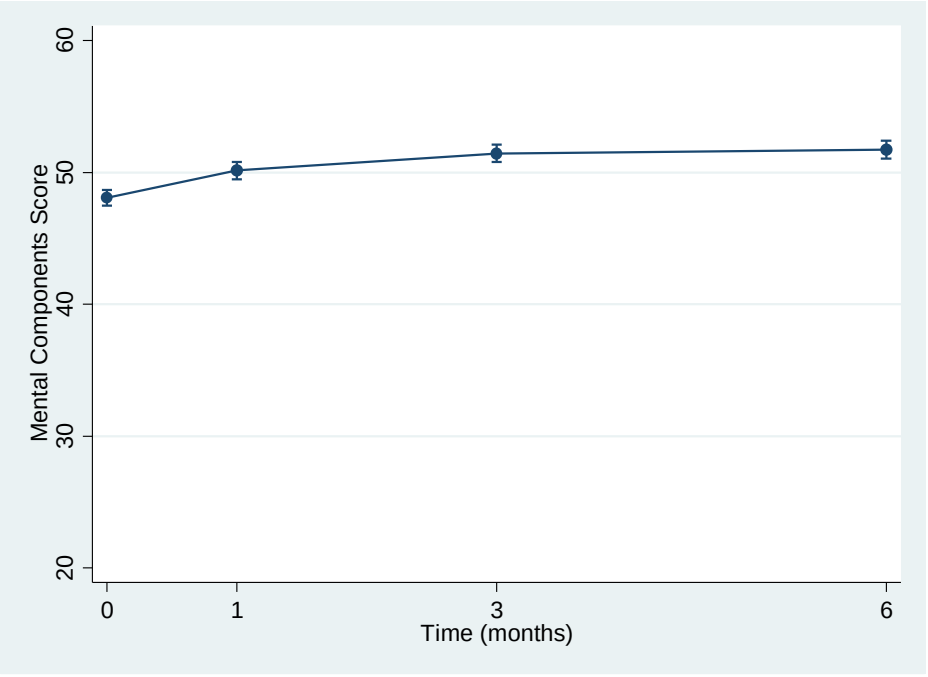
Maybe like this…



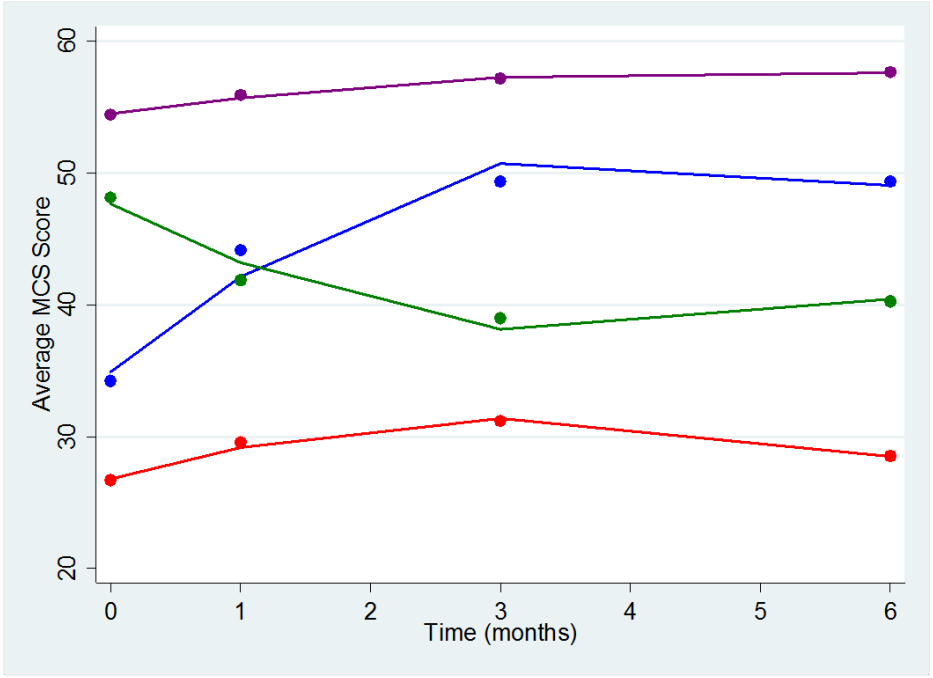
Traditional Analysis vs. Trajectories

- Among patients who were Discharged for an Acute Coronary Syndrome
- The Mental Components Subscale of the SF-36
- Measured at Discharge, 1-, 3-, and 6-months post-discharge

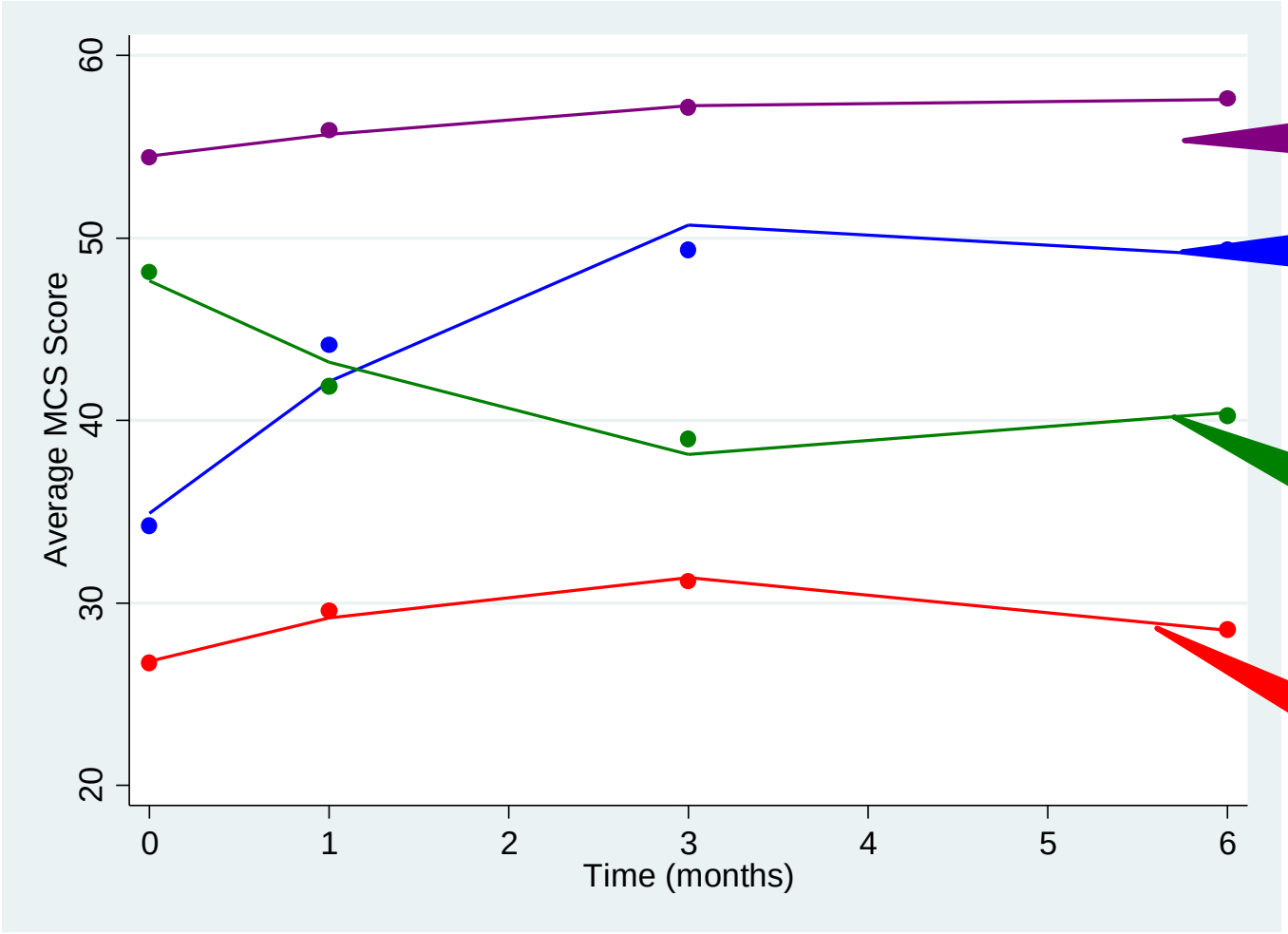
Traditional Longitudinal Analysis



Group-Based Trajectory Analysis



Trajectories of **MCS** at 6 Months Post Discharge



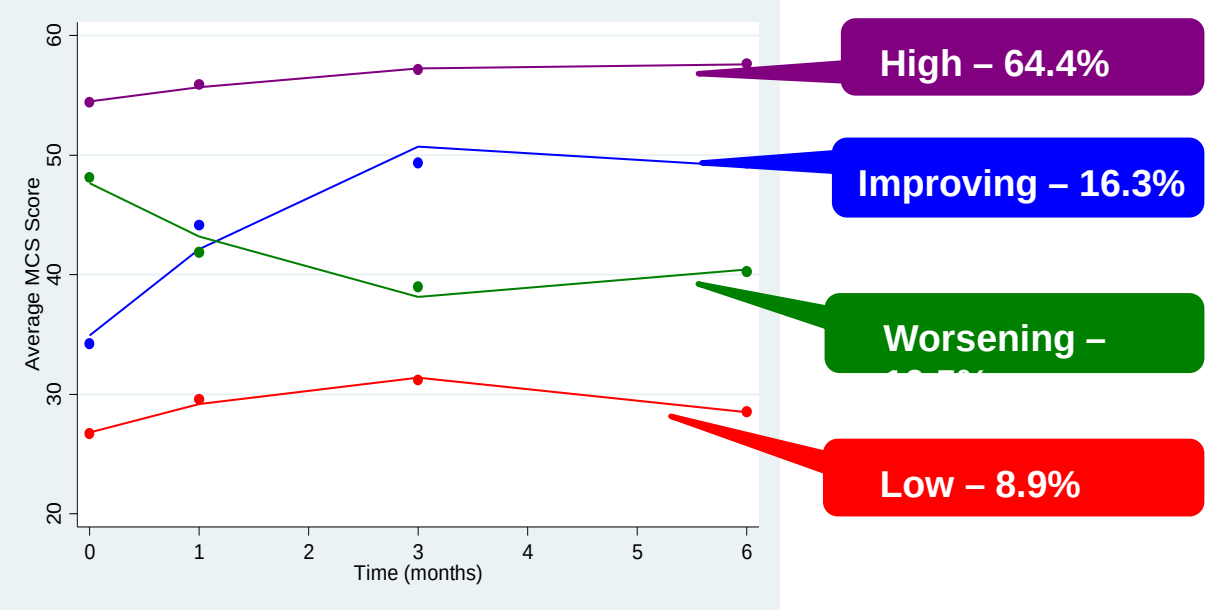
High – 64.4%

Improving – 16.3%

Worsening – 10.5%

Low – 8.9%

Results – Lower Neighborhood SES Increases Probability of Being in Worse Trajectories



Neighborhood SES	OR for worse trajectory	95% CI
Highest SES	Referent	
Middle SES	**1.67**	**(1.24-2.26)**
Lowest SES	**1.92**	**(1.41-2.63)**

*Adjusted for age, sex, race, individual-level SES, living alone, co-morbidity and length of stay.

QHS Challenges/Opportunities for FY 17

- Maintain stability and some growth with constrained resources
- Improve communications and collaborations
  - Within QHS
  - With others
- Preserve and expand vibrancy of science
  - Continue to produce “science that makes a difference”

QHS is on its way…

QUESTIONS?