The State of the Department of Quantitative Health Sciences (QHS) at 8 years of age

Catarina Kiefe, PhD, MD

October 17, 2017
State of QHS 2017: Overview

• Brief history and department overview
  – Vision, values and organizational structure: request for input regarding our future

• Research Funding Highlights

• Human capital
  – Highlight of newest QHS people
  – 5 QHS faculty talk about their work

• Highlights from educational programs

• Challenges for FY 18 and beyond
QHS History

• Founded in June 2009

• Moved into ~24,000 sq. ft. across 5 floors in new Sherman building, May 2013

• “Five-year” review report November 2015
  “QHS has been extraordinarily successful by any metric for success”
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
Dept. of Quantitative Health Sciences Organizational Chart

Chair (Kiefe)
Vice-Chair (Allison)

Admin Unit (Barrett)
Admin staff (Barrett)

Divisions

Biostatistics (Ash)
Epidemiology (Goldberg)
Health Informatics (Houston)
Outcomes Measurement (Ware)

Teaching Programs

Quantitative Methods Core (Barton, Mick)

CPHR (Lapane)
MSCI (Goldberg, Lapane)
CTRP (Kiefe, Corvera)

Federally funded Centers

NIH: Disparities (Allison)
NIH: CVD Outcomes (Kiefe)
VA: eHealthQUERI (Hogan)
Time to reassess?

• Strategic plan in 2010, updated 2014
• Have our mission, vision, or values changed?
• Does our organizational structure continue to support our goals?

Please let us know your opinion:
  – By email
  – Verbally
  – By anonymous comments in suggestion box on 7th floor
Research Portfolio

• Since its inception, QHS faculty have been PIs on 117 extramurally funded projects worth $94 million
  – 43 currently active (~$46 million)
  – Plus active VA grants and contracts (~$10 million)
• QHS faculty have been key on many others: CTSA, FORCE-TJR, PRISM, Hepatitis-C, …
  – Grant funding impact of QHS on UMMS ~$150+ million
  – FY17 non-QHS PI 29 active projects with QHS investigators, *annual* budgets $15+ million
• QMC has collaborated with *all* UMMS departments
  – 1600+ initial consults with 650+ investigators
  – 450+ grant applications (80% NIH)
New R01s awarded in FY 2017

- **NIMHD**: A System of Safety (SOS): Preventing Suicide through Healthcare System Transformation: 9/5/2016 – 6/30/2021; Kiefe/Boudreaux, MPIs
- **NHLBI**: Community Surveillance of Coronary Heart Disease: 12/15/2016 – 11/30/2020; Goldberg/Yu, MPIs
- **NIMHHD**: COnmuNity-engaged SimULation Training for Blood Pressure Control (CONSULT-BP) 5/19/2017-1/31/2022; Tjia, PI
- **NIH Fogarty**: Quit-Smoking Vietnam! (mHealth motivational intervention): 7/1/2017- 6/30/2022; Houston, PI
- **Non-malignant Pain in Nursing Home Residents** 9/25/2017-6/30/2022; Lapane, PI
Other major new grants in FY 2017

- VA IIR: Improving Diabetes Care through Effective Personalized Patient Portal Interactions: 02/01/2017-01/31/2020; Shimada, PI

- NHLBI U01: Đưỡng đầu với bệnh Tăng huyết áp ở Việt Nam: Giải pháp từ Y tế cơ sở (Conquering Hypertension in Vietnam: Solutions at Grassroots level) 09/01/2017 – 05/31/2022; Allison, UMMS PI

- NCATS U01: Strengthening Translational Research in Diverse Enrollment (STRIDE): 9/8/2016 – 6/30/2021; Allison/Lemon, MPIs

- PCORI: Smoker-to-Smoker Peer Marketing and Messaging to Disseminate Tobacco; 3/2017 – 2/2020; Sadasivam, PI

- NHLBI K12: Cardiopulmonary implementation science scholars program; 8/1/2017 – 7/30-2022; Houston/Lemon MPIs
First- time PIs in FY 2017

- Christine Ulbricht - NIA R21: Variations in nursing home residents' depression by level of cognitive impairment 9/1/2017-5/31/2019

- Jake Hunnicutt - NIA F31: Opioid Use and Safety in US Nursing Homes 9/22/2017-9/21/2020

- Apurv Soni - Trends, Predictors, and Consequences of Child Undernutrition 9/22/2017-9/21/2021

- Jomol Mathew – UMMS Presidents Award: Center for Data Driven Discovery and HealthCare (D3 Health) 5/1/2017-4/30/2019
  Mathew, McManus, Corvera, MPIs
QHS: Our People

- 36 primary faculty
- 28 secondary faculty
- 20 voluntary or adjunct faculty
- 20 doctoral students, 7 post-docs
- 39 staff
  - 11 administrative
  - 28 research
QHS Staff: the glue that holds us together

• 10 administrative staff under Barrett:
  – 4 financial: O’Reilly, Thompson, Wiggin, Yeboah
  – 6 other: Baron, Falla, Manning, McDonald, Saber, Stankus

• 28 research staff
  – Quantitative Methods Core technical staff
    • Statistical computing: Flahive, Kroll-Desrosiers, Lessard, Williams, Ayturk, Baek (just accepted)
    • Data architecture and management: Lazar, Netherton, Orvek, Rosenberg
  – 18 project managers, research associates and assistants
    • New since last year: Aboujaoude, Beckman, Nagawa, Seward
    • Current program managers: Chiriboga, Gigliello, Yarzebski
New Primary Faculty in 2017

- Bo Wang, PhD
  - Associate Professor, Biostatistics and HSR since June 2017
  - Joint recruitment with Emergency Medicine
- Bo Zhang, PhD
  - Assistant Professor, Biostatistics and HSR since June 2017
- Jonggyu Baek, PhD
  - Assistant Professor, Biostatistics and HSR starting November 2017
- Feifan Liu, PhD
  - Assistant Professor, Health Informatics and Implementation Science
  - Joint recruitment with Department of Radiology since January 2017
- Shao-Hsien Liu, PhD
  - Instructor, Epidemiology, since June 2017
- Dan Amante, PhD
  - Instructor, Health informatics and Implementation Science, since August, 2017
QHS also grows in other ways....

Vivian May Tran, born 9/27/2016

Adelaide June and Isabelle Cerise Desrosiers, born 1/31/2017

Prince Freddie Yeboah, born 3/26/2017

Darren Vincent Gigliello, born 8/15/2017
State of QHS 2017: Overview

- Brief history and department overview
- Research Funding Highlights
- Human capital
  - Highlight of newest QHS people
    - 5 QHS faculty talk about their work: Bo Zhang, Hong Yu, Arlene Ash, Melissa Clark, Kristin Mattocks
      - Range from newest to most senior
      - Work illustrates diversity of our scientific contributions
- Highlights from educational programs
- Challenges for FY 18 and beyond
State-of-the-art statistics can make a big difference in health policy and health services research.
Career Trajectory

• B.S. and M.S. in China
• Ph.D. in statistics (biostat minor) from U of Minnesota
• 2 years of post-doctoral training in NIH/NICHD
• 2.5 years at Oregon State
• 3 years at FDA
• From July 2017, tenure-track Assistant Professor
Mission Statement

Mission #1
Develop extramurally-funded research program on statistical methodologies to advance *health policy and health services research*.

Mission #2
Conduct collaborative research with our PIs, and provide high-level statistical support to maintain their success.
Research Interests & Current Projects

Research Interests:
Statistical methodologies in *interrupted time-series study design and analysis*, healthcare costs and utilization, risk adjustment, hospital readmission rate.

Current projects:
- Biostatistician in U01 “Strengthening Translational Research in Diverse Enrollment” (STRIDE), PIs: Allison/Lemon. – Interrupted time-series analysis.
- Biostatistician in a resubmission of P01 proposal, led by Jennifer Tjia and Arlene Ash.
Hong Yu, PhD
Extracting and Mining Knowledge from Health Data
Natural Language Processing

Machine Learning

Data Mining and Health Applications

Deep Phenotyping

Biomedical Systems

ADE

AMI

AskHERMES

Figure Search

NoteAid

BioNOT

iBioNet
What are the side effects of a medication?
We Develop Innovative Deep Learning Models
Evaluating the Intelligence of Artificial Neural Network

- Define a task
  - Semantic entailment
- Identify the difficulty of each task
  - Apply item response theory
- Study how artificial neural network learns
Artificial Neural Network Learns Easy Items First!
Arlene Ash, PhD
Supporting MassHealth in 2017

Working with MassHealth to:

• Implement a $1.8 billion, 5-year Massachusetts Health Care Delivery and Payment Reform
• Conduct an independent evaluation:
  – What changes?
  – What happens to costs and patient outcomes?
  – Did any specific changes especially help?

QHS/CWM personnel:
• Arlene Ash
• Deborah Gurewich
• Jay Himmelstein
• Eric Mick
• Melissa Clark
• Jeff Williams
MassHealth (Massachusetts Medicaid)

- The Affordable Care Act (ACA) was modeled after Massachusetts legislation, which uses MassHealth to achieve near universal coverage
- MassHealth now serves ~1.9 million people (state pop. ~6.8 million)
  - Children's Health Insurance Plan (1997)
  - Commonwealth Care (subsidized private insurance offered via Health Connector, 2006)
  - Expanded eligibility for working poor (2006)
- MassHealth pays for health care for:
  - ~40% of all children
  - ~25% of all non-elderly adults
  - ~60% of all nursing home residents

- Idea: restrain costs and improve quality through accountable care organizations (ACOs) and community partners (CPs)
Massachusetts’ Delivery System Reform Incentive Program (DSRIP)

5-year funding allocation:

<table>
<thead>
<tr>
<th>Objective</th>
<th>Funding (% of DSRIP $s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACO Development</td>
<td>$1,065M (60%)</td>
</tr>
<tr>
<td>Community Partners (CPs)</td>
<td>$546M (30%)</td>
</tr>
<tr>
<td>Statewide Investments</td>
<td>$115M (6%)</td>
</tr>
<tr>
<td>State Operations &amp; Implementation</td>
<td>$73M (4%)</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>$1.8 Billion</strong></td>
</tr>
</tbody>
</table>

Funding phases down (more in year 1 than in year 5)
Our role(s): to help MassHealth

- **Risk Adjusted Payment**: Pay ACOs more when they care for people with greater medical and “social” risks
  - E.g., Mean cost of “homeless” people is about 9 times average!
- **Risk Adjusted Quality Assessment**: Judge “quality” fairly when ACOs take on people with different risks
  - E.g., Hospitalization rate is expected to be higher for sicker people
- **Program Evaluation**:  
  - Understand how delivery system reform money is being spent  
  - Identify barriers (and potential solutions) to effective reform  
  - Learn which programs “are worth it”
Melissa Clark, PhD
Collaboration with the Massachusetts Coalition for Serious Illness Care

- More than 80 Massachusetts-based organizations

- Mission: To ensure that health care for everyone in Massachusetts is in accordance with their goals, values and preferences at all stages of life and in all steps of their care.
Our Role as Research Partner

Conduct state-wide surveys

March-April 2016:
RDD sample of 1,851 residents ≥ 18 years

February-March 2017:
Follow-back sample of 346 respondents

March-April 2018:
RDD sample of residents ≥ 18 years

Melissa Clark
Julie Flahive
Stephen Kurtz
Sharina Person

Clay Daniel
David Dutwin
Tim Pokalsky
Susan Sherr
Goal: Everyone in Massachusetts, 18 or older, has designated a health care decision-maker (health care proxy).

Named a Health Care Proxy, 2016

- Total: 45
- Serious health condition: 58
- No serious health condition: 40

↑ Significantly higher than comparison group at 95% confidence level
Racial and Ethnic Disparities in Naming a Health Care Proxy, 2016

- Hispanic: 23% (aOR = 0.4, 95% CL=0.2, 0.7)
- Black or African American: 34% (aOR = 0.8, 95% CL=0.4, 1.3)
- Non-Hispanic Other: 26% (aOR = 0.6, 95% CL=0.4, 0.9)
- Non-Hispanic White: 49% (Reference)

Model adjusted for: age, gender, marital status, education, household income, serious health condition

Clark et al., under review
Goal: Everyone in Massachusetts, 18 or older, has had a conversation with their proxy to communicate their goals, values and preferences for care at the end of life.

**Talked to Health Care Proxy, 2016**

- Among those who named a proxy: Talked to proxy about wishes
  - Total: 86%
  - Serious health condition: 86%
  - No serious health condition: 87%

- Among those who named a proxy: Shared copy of health care proxy form with doctor
  - Total: 64%
  - Serious health condition: 64%
  - No serious health condition: 49%

† Significantly higher than comparison group at 95% confidence level
Goal: Everyone in Massachusetts facing a serious illness has had a high-quality, informed goals and values conversation with their care team.

Ever talked to healthcare provider about end-of-life care wishes, 2016

<table>
<thead>
<tr>
<th>%</th>
<th>Total</th>
<th>Serious health condition</th>
<th>No serious health condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td></td>
<td>↑</td>
<td></td>
</tr>
<tr>
<td>11</td>
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† Significantly higher than comparison group at 95% confidence level
Goal: All Massachusetts clinicians have appropriate training to facilitate high-quality communication with patients on advance care planning and serious illness.

Massachusetts Medical Schools initiative to teach medical students how to have goals of care conversations with patients

- Boston University
- Harvard University
- Tufts University
- University of Massachusetts

Our role: Assisting with curriculum development and the evaluation of the initiative
Examining Patterns of Mental Health Care Utilization among Pregnant and Postpartum Veterans: The COMFORT Study

Kristin M. Mattocks, Ph.D., M.P.H.
Rebecca Baldor, M.P.H.
On behalf the COMFORT study team

VA Central Western Massachusetts Healthcare System
Northampton, Massachusetts
COMFORT Study Sites
Maternity Care for Women Veterans

- Maternity benefits included in VHA medical benefits package since 1996.
  - However, benefit package didn’t include coverage for newborns.
- **Public Law (PL) 111-163** amended VHA's medical benefits package to include up to 7 days of medical care for newborns delivered by eligible women Veterans (May 2010). (Current legislation proposing extending to 14 days)
- **Note**: All VA-paid prenatal care is provided by community-based providers, through the Veterans Choice Program (VCP) or fee care
Overall COMFORT Study Aims

- To examine pregnant and postpartum women Veterans experiences with pregnancy and community-based obstetrical care, and to begin to understand the degree to which this care is coordinated with ongoing VA care.

- **Sub-aim:** To examine women’s experiences with mental health care during pregnancy, and to understand how mental health care is coordinated during the pregnancy and postpartum periods.
### Mental health conditions of COMFORT participants (N=427)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depression</td>
<td>55%</td>
</tr>
<tr>
<td>Anxiety Disorder</td>
<td>42%</td>
</tr>
<tr>
<td>PTSD</td>
<td>37%</td>
</tr>
<tr>
<td>Mood Disorder</td>
<td>13%</td>
</tr>
<tr>
<td>Bipolar Disorder</td>
<td>6%</td>
</tr>
<tr>
<td>Schizophrenia</td>
<td>0.2%</td>
</tr>
</tbody>
</table>
Mental Health Care Utilization During Pregnancy and Postpartum

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seeing a MH provider at time of pregnancy diagnosis</td>
<td>36%</td>
</tr>
<tr>
<td>• Provider was VA MH provider</td>
<td>90%</td>
</tr>
<tr>
<td>Currently taking medications for MH condition during pregnancy</td>
<td>10%</td>
</tr>
<tr>
<td>(Postpartum) Received mental healthcare during pregnancy</td>
<td>21%</td>
</tr>
<tr>
<td>• Received MH care from VA provider</td>
<td>74%</td>
</tr>
<tr>
<td>(Postpartum) Needed mental healthcare during pregnancy but could not get it</td>
<td>13%</td>
</tr>
<tr>
<td>Received ANY VA care during pregnancy (including primary, mental health, PT)</td>
<td>30%</td>
</tr>
</tbody>
</table>
The Babies
(n=285 and counting by the day)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Born at &lt;37 weeks gestation</td>
<td>12%</td>
</tr>
<tr>
<td>Low birth weight (&lt;5 lbs, 8 oz)</td>
<td>10%</td>
</tr>
<tr>
<td>Required NICU care at birth</td>
<td>17.8%</td>
</tr>
<tr>
<td>NICU hospitalization &gt; 1 week</td>
<td>7.8%</td>
</tr>
<tr>
<td>Health insurance at 3 months of age</td>
<td>92%</td>
</tr>
</tbody>
</table>
“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 New Class:

Essa Hariri, MD
(TL1 Fellow)

Ryan Hendrix, MD

Patric Gibbons, MD student

Robert McLoughlin, MD

PhD in Clinical and Population Health Research First Year Class:

Ariel Becca, MS

Maira Casteñada, MS

Eric Ding, MS
(MD/PhD)
T32 Fellow

Anny Li, MPH, MS

Grace Masters
(MD/PhD)
TL1 Fellow

Yiyang, Yuan, MPH
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 R25 Implementation Science – Post-doctoral (Lemon / Houston)
- KL2 – Post-doctoral and junior faculty (Keaney / Allison)
- NHLBI K12 Implementation Science (Houston / Lemon)
- INTPart (University of Oslo collaboration)

Pending:

- NIH PREP program – Pathway to graduate school (Lapane / Lewis); Score: 11
Post-doctoral Fellows Funded by Institutional Training Grants

Sarah Forrester, PhD (TL1)

Essa Hariri, MD (TL1)

Matt Alcusky, PharmD, MS, PhD candidate (TL1)

Lin Li, PhD (T32)

Amanda Blok, PhD, MSN (R25, VA Special Scholar)

Jinying Chen, PhD (T32)

Theodore McDade, MD, MPH (R25)

Vijaya Daniel, MD, MPH (TL1)

Minjin Kim, PhD (R25)
Pre-doctoral Fellows Funded by Institutional Training Grants

PhD students

Karen Ashe, MS (TL1)
Ganga Bey, MPH (IMSD, T32)
Maira Casteñada, MS (IMSD)
Jake Hunnicutt, MPH (T32)
Andrea Lopez, MS (IMSD, TL1)
Deb Mack, MPH (TL1)

MD/PhD students

Eric Ding, MS (T32)
Nate Erskine (T32)
Grace Masters (TL1)
Meera Sreedhara, MPH (TL1)
Our International Superstars

Hoang Tran, MD, MPH

Hawa Abu, MBBS, MPH, CPH
Funded Individual Training Grants

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

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

Christina Haughton, MPH, PhD candidate (Former T32 Fellow):
Home and Environment Factors Influencing Teen Sweetened Sugar Beverage Consumption
Mentor: Stephenie Lemon
Individual Training Grants Under Review

Karen Ashe, MS, PhD Candidate
Factors Affecting Weight Management Counseling during Primary Care Clerkships
Mentor: Judy Ockene

Meera Sreedhara, MPH, PhD Candidate
Local health departments and inclusion of evidence-based healthy eating and physical activity policies in their community health improvement plans
Mentor: Stephenie Lemon
recent PhD students, average 7 (range 2 to 11)

recent MD/PhD students, average 7 (range 5 to 10)

Hawa Abu, MD MPH  
PCORI

Andrea Lopez  
Outstanding Young Scientist Travel Award

Ariel Becca, MS  
PCORI

Apurv Soni  
Global Health Award

Deb Mack  
ICPE Travel Award

Maira Castenada  
AACR Scholar-in-Training Award
QHS Faculty receive awards for teaching and mentoring

Catherine Dubé, EdD

2017 Graduate School of Biomedical Sciences faculty award for outstanding contributions in the lecture and classroom settings
A distant reminder......
QHS Challenges/Opportunities for FY 18

- Maintain stability and some growth with constrained resources

- Improve communications and collaborations
  - Within QHS
  - With others

- Preserve and expand scientific vibrancy
  - Continue to produce “science that makes a difference”
Service Awards

20 Years
• Darleen Lessard

10 Years
• Robert Goldberg

5 Years
• Catherine Dubé
• Kate Lapane
• Peter Lazar
• Kayla McKay
• Sandra Stankus
• Deborah Wiggin
• Hong Yu
Thursday, November 16 at 12:00
QUESTIONS?