How Models That Use Medical and Social Risk Can Advance Health Equity

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Risk Adjustment (RA) and Me (AA) …

- Math PhD and Health Services Researcher at BU/BMC (1984 – 2009)
  - Developed *models that use medical diagnoses to predict population-based total cost* (with Randy Ellis) for US Medicare (CMS)
  - Founded DxCG, Inc, 1996*; RA consulting in Germany, 2000 – 2008
  - We received 2008 AcademyHealth Impact Award**

- Professor of Population and Quantitative Health Sciences and Division Chief at UMMS since 2009 https://www.umassmed.edu/PQHS

- *Worldwide use of medical risk models*: State and commercial health care payers and managers use DxCG and similar models (CMS-HCC, HHS-HCC) to summarize medical complexity from ICD codes, age and sex

Goal: Allocate health care budgets fairly and efficiently

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Language conventions for this talk

- We seek equity for *under-resourced* (not "vulnerable") *vs. more privileged* groups – generically, in the US, *B vs. W*
- If race is not a biological reality, can "race" be a risk factor?
  - In the US, *black race is a marker for the effects of racism*
    - Micro-inequities, discrimination in housing, jobs, etc.
  - Just as "living in a deprived neighborhood" is a marker for
    - Community-wide deficits: eg, pollution, poor schools, unsafe streets, crime
    - Greater chance of individual risk: eg, bad housing, poor food
- We seek input from community advisors (not "stakeholders")
  - Encourage focus on solving the problem* (not protecting turf)
- An accountable care organization (*ACO, "plan"*) manages a budget to care for its population

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How do we advance health equity?

- Requires improving health for under-resourced groups
- My view of what is needed:
  - *Convene advisory groups* to
    - Identify key problems (eg, black maternal mortality)
    - Brainstorm solutions
    - Get community buy-in
  - *Develop and evaluate interventions*
    - Could include designing real-time RCTs (“learning laboratories”)
  - *Disseminate successful strategies*

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Since 2014: Measure social risk, focus on equity

- We work with MassHealth* to *model medical and social risk*

- We also participate in initiatives to encourage systems to
  - *Collaborate* across and beyond health care delivery “silos”
  - *Use better data and models* to
    - Pay fairly
    - Judge quality fairly
    - Evaluate system performance
    - Evaluate interventions (understand ROI)
  - *Promote health equity*

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Common goals of RA-based payment and quality measures

- Set normative benchmarks
  - Don’t punish plans that care for sicker (more complex) populations
  - Don’t reward plans that avoid sick people

- Encourage interventions that improve quality
  - Support investments in evidence-based interventions (eg, medically tailored meals for people with diabetes)
  - Don’t punish plans for problems they don’t control (eg, not enough mental health providers in a region)

- New focus on *health equity*
  - Monitor systems to identify problems and opportunities to improve
  - Support, measure and reward positive change

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Data for understanding health care and health

- *Individual-level factors*
  - Age, sex and medical risks (diagnoses)
  - SDOH: Social risks, eg, homelessness, hunger
  - Services received within and beyond the health care delivery system
  - Service costs
- *Neighborhood-level factors*
  - Socio-economic deprivation
    - Eg, joblessness, poverty, poor housing stock
  - Environmental or direct threats to health
    - Eg, pollution, crime, food deserts
- Individual- and neighborhood-level factors *complement* each other

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MassHealth's 2016 SDOH payment model

- Predicts concurrent total annual cost from:
  - Age, sex
  - Medical morbidity, summarized in a DxCG score
  - Disability markers (client of DMH, client of DDS, other disabled)
  - SMI
  - SUD
  - Housing problems (homelessness or unstably housed)
  - NSS, a neighborhood stress score
- Concurrent R^2 = 57.2%
- See: Ash AS, Mick EO, Ellis RP, Kiefe CI, Allison JJ, Clark MA. *Social Determinants of Health in Managed Care Payment Formulas*. JAMA Intern Med. 2017;177(10):1424–1430. doi:10.1001/jamainternmed.2017.3317

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What is the Neighborhood Stress Score?

We use American Community Survey Census Block Group (or Tract) data:

- % of families with incomes < 100% of US Federal Poverty Level (FPL)
- % < 200% of FPL
- % of adults who are unemployed
- % of households receiving public assistance
- % of households with no car
- % of households with children and a single parent
- % of people age 25 or older who have no HS degree

- We standardize each score and average them
- There are many similar “area-level scores” in the US and in Europe

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Learn more from area-level data?

- *Improve the NSS*
  - Use more variables, consider interactions among variables
    - Eg, (% of households with vehicle) × (public transit density)
- *Develop scores for distinct SDOH dimensions,* eg,*
    - Demographics, including race and ethnicity
    - Economic status
    - Social and neighborhood characteristics
    - Housing and transportation
- *Link stressors to health and suggest interventions,* eg,
  - Pollution → close the coal-fired power plant, asthma interventions
  - Unemployment → job assistance interventions, develop a CHW workforce**

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More on using data and models for policy

- Need coherent longitudinal data to
  - Understand program performance and evaluate interventions
- What is the problem? Eg,
  - Is it something a plan can fix?
  - Is it due to a community-wide undersupply of key resources*
- How can it be fixed? Eg,
  - Coordinate across existing organizations?
  - Change laws, eg, medical licensure**
  - Change policies, eg, allow for virtual visits
  - Fund workforce development?

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Limitations of data for RA

- We *at most* know when people get services
  - Not necessarily what services were needed
  - Some services may not have codes, or be recorded

- We at *most* know what health problems were coded
  - Adequately precise codes may not exist, such as codes for functional issues (eg, toileting) and social risks (eg, isolation)
  - Existing codes may be underused (eg, stigmatized problems, trouble sleeping, housing problems)

- So, be thoughtful (and humble)

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Cost is a powerful, flawed proxy for "severity" or need

- Many RA models are built to predict cost
  - Their risk scores predict other outcomes (eg, mortality, hospitalization) well
  - They behave like generic "medical morbidity" measures – so have been used to decide which patients are referred for special attention (ie, case management)

- Discrimination → less access, less apparent disease AND less use than needed
  - Ziad Obermeyer, Brian Powers, Christine Vogeli and Sendhil Mullainathan. *Dissecting racial bias in an algorithm used to manage the health of populations. Science* 366 (6464), 447-453. DOI: 10.1126/science.aax2342

- In our MassHealth models, *higher NSS scores are associated with*
  - Greater recorded morbidity (higher DxCG scores), and
  - *Excess cost, even after accounting for DxCG scores**

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Does risk adjusting a quality measure either "hide" or "forgive" discriminatory care?

- All *risk scores "hide" differences*
  - Whether a model uses or leaves out "race," scores hide differences by race.
- Modeling *with race* doesn't "expect" the same outcomes for B vs. W
  - It doesn't penalize plans with normative outcomes for Bs (even when worse than for Ws)*
  - However, the more a plan improves outcomes for Bs, the better its performance is judged
- *Learning about differences for subgroups requires looking at subgroups!*
- RA modeling alone does not reveal mechanisms of inequity
  - Understanding inequity requires distinct analyses
  - Modelers can explore potential mechanisms driving inequitable outcomes

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Modeling with longitudinal data

- Key policy work is to evaluate data over time – but it's tricky!
- Requires great data management
  - With stable data capture, RA can compare outcomes even when the population changes
  - Without this, does the population look sicker because
    - Better data capture makes similar people look sicker?
    - The population is older?
    - The population really is sicker?*

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Beyond risk-adjusted payment

- RA payments and quality measures encourage plans to care for sick people
  - We must *also* invest in interventions designed to remedy health deficits for under-resourced groups
  - Neither substitutes for the other

- *Risk modeling* > *risk adjustment*
  - Risk modeling should be used to
    - Reveal issues and potential mechanisms for addressing them
    - Enable system monitoring and evaluation
    - Support real-world RCTs of interventions

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A few innovative SDOH Interventions

- NOWPOW, https://www.nowpow.com
  - Multi-sided self-care referral platform

- SIREN, https://sirenetwork.ucsf.edu
  - Social Interventions Research & Evaluation Network, Center for Health and Community at the University of California, San Francisco
  - improve health and health equity by advancing high quality research on health care sector strategies to improve social conditions

- COMMUNITY SERVINGS, https://www.servings.org
  - Home-delivered, “medically tailored,” meals and nutrition services to individuals and families living with critical and chronic illnesses

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THANK YOU

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