Strategies to Achieve Alignment, Collaboration, and Synergy across Delivery and Financing Systems

The Economics of Aligning Medical, Social, and Public Health Delivery Systems: Implications for Medicare Spending

Research-in-Progress Webinar
Wednesday, November 14, 2018
12:00-1:00 pm ET/ 9:00 am-10:00 am PT

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Agenda

Welcome: CB Mamaril, PhD
Research Faculty
RWJF Systems for Action National Coordinating Center
University of Kentucky College of Public Health

Presenters: Glen P. Mays, PhD, MPH
Director
RWJF Systems for Action National Coordinating Center
Scutchfield Endowed Professor of Health Services & Systems Research
University of Kentucky College of Public Health

Q & A: Moderated by CB Mamaril, PhD
Glen P. Mays, PhD, MPH
Director
Systems for Action National Program Office
Economics of Aligning Medical, Social and Public Health Systems: Implications for Medicare Spending

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University of Kentucky

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Questions of interest

- How strongly aligned are the delivery systems that support population health improvement activities?
- How do these delivery systems change over time? Recession | Recovery | ACA implementation
- How do these delivery systems influence medical spending for seniors in Medicare?
Losing ground in population health

American exceptionalism

Life expectancy at birth, selected OECD countries

<table>
<thead>
<tr>
<th>Year</th>
<th>Australia</th>
<th>France</th>
<th>Canada</th>
<th>Finland</th>
<th>U.K.</th>
<th>U.S. (2016)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1960</td>
<td>70.1</td>
<td>73.7</td>
<td>73.7</td>
<td>73.7</td>
<td>75.6</td>
<td>78.6</td>
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<tr>
<td>1970</td>
<td>73.7</td>
<td>76.7</td>
<td>76.8</td>
<td>76.8</td>
<td>78.7</td>
<td>78.6</td>
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<td>1980</td>
<td>77.7</td>
<td>79.7</td>
<td>79.8</td>
<td>79.8</td>
<td>81.7</td>
<td>78.6</td>
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<td>1990</td>
<td>80.7</td>
<td>81.7</td>
<td>81.8</td>
<td>81.8</td>
<td>82.7</td>
<td>78.6</td>
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<td>2000</td>
<td>81.7</td>
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<td>82.8</td>
<td>82.8</td>
<td>83.7</td>
<td>78.6</td>
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<tr>
<td>2015</td>
<td>81.7</td>
<td>82.7</td>
<td>82.8</td>
<td>82.8</td>
<td>83.7</td>
<td>78.6</td>
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</tbody>
</table>

Source: OECD, U.S. Census Bureau
Geographic & socioeconomic inequities in population health

Chetty et al.  JAMA 2016
Multiple systems & sectors drive health...

Proportional Contribution to Premature Death

- Genetic predisposition: 30%
- Behavioral patterns: 40%
- Social circumstances: 15%
- Environmental exposure: 5%
- Health care: 10%

...But existing systems often fail to connect

Medical Care ↔ Social Services & Supports ↔ Public Health

- Fragmentation
- Duplication
- Variability in practice
- Limited accessibility
- Episodic and reactive care
- Insensitivity to consumer values & preferences
- Limited targeting of resources to community needs

- Fragmentation
- Variability in practice
- Resource constrained
- Limited reach
- Insufficient scale
- Limited public visibility & understanding
- Limited evidence base
- Slow to innovate & adapt

Waste & inefficiency
Inequitable outcomes
Limited population health impact
Challenge: overcoming collective action problems across systems & sectors

- Incentive compatibility → public goods
- Concentrated costs & diffuse benefits
- Time lags: costs vs. improvements
- Uncertainties about what works
- Asymmetry in information
- Difficulties measuring progress
- Weak and variable institutions & infrastructure
- Imbalance: resources vs. needs
- Stability & sustainability of funding

Ostrom E. 1994
Widely recommended activities to support multi-sector initiatives in population health

- Engage stakeholders
- Assess needs & risks
- Identify evidence-based actions
- Develop shared priorities & plans
- Commit shared resources & responsibilities
- Coordinate Implementation
- Monitor, evaluate, feed back

Foundational Capabilities for Population Health

Measuring the strength of multi-sector work

Comprehensive Delivery Systems

Proportion of Activities Contributed

1998 vs 2014

Mays GP et al. Health Affairs 2016
Motivation: Health effects attributable to strong multi-sector networks

Models also control for racial composition, unemployment, health insurance coverage, educational attainment, age composition, and state and year fixed effects.

N=1019 community-years

Mays GP et al. Health Affairs 2016
Measuring the strength of multi-sector networks

National Longitudinal Survey of Public Health Systems

- Cohort of 360 communities with at least 100,000 residents
- Local public health officials report:
  - **Scope**: availability of 20 recommended population health activities
  - **Network**: types of organizations contributing to each activity
  - **Perceived effectiveness** of each activity in meeting community needs

* Stratified sample of 500 communities with <100,000 residents added beginning in 2014 wave
Network analytic approach

Two-mode networks (organization types X activities) transformed to one-mode networks with **tie strength** indicated by number of activities jointly produced

<table>
<thead>
<tr>
<th>Organization Type/Sector</th>
<th>Activities</th>
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<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Local public health agency</td>
<td>X</td>
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<tr>
<td>State public health agency</td>
<td></td>
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<tr>
<td>Hospitals</td>
<td>X</td>
</tr>
<tr>
<td>Physician practices</td>
<td></td>
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<tr>
<td>CHCs</td>
<td>X</td>
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<tr>
<td>Insurers</td>
<td></td>
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<tr>
<td>Employers</td>
<td>X</td>
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<tr>
<td>Social service organizations</td>
<td>X</td>
</tr>
<tr>
<td>Schools</td>
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<td>.....</td>
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</table>
Average network structure in 2016

Node size = degree centrality
Line size = % activities jointly contributed (tie strength)
Classifying multi-sector delivery systems for population health

% of recommended activities implemented

- 1998
- 2006
- 2012
- 2014

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<tr>
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<tbody>
<tr>
<td>Cluster 1</td>
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<td>Cluster 2</td>
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<tr>
<td>Cluster 3</td>
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<tr>
<td>Cluster 4</td>
<td>Mod</td>
<td></td>
<td>Mod</td>
<td>Mod</td>
</tr>
<tr>
<td>Cluster 5</td>
<td>Mod</td>
<td>High</td>
<td>Mod</td>
<td>Mod</td>
</tr>
<tr>
<td>Cluster 6</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Mod</td>
</tr>
<tr>
<td>Cluster 7</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
</tbody>
</table>

**Scope**
- High
- High
- High
- Mod
- Mod
- Low
- Low

**Density**
- High
- High
- High
- Mod
- Mod
- Low
- Mod

**Centrality**
- Mod
- Low
- High
- High
- Low
- High
- Low

Comprehensive (High System Capital)

Conventional

Limited

Data linkages expand analytic possibilities

- **Area Health Resource File**: health resources, demographics, socioeconomic status, insurance coverage
- **NACCHO Profile data**: public health agency institutional and financial characteristics
- **CMS Impact File & Cost Report**: hospital ownership, market share, uncompensated care
- **Dartmouth Atlas**: Area-level medical spending (Medicare)
- **CDC Compressed Mortality File**: Cause-specific death rates by county
- **Equality of Opportunity Project (Chetty)**: local estimates of life expectancy by income
- **National Health Interview Survey**: individual-level health
- **HCUP**: area-level hospital and ED use, readmissions
Design and Methods

- Follow cohort of 300 urban communities over 18 years
- Measure strength of delivery system supporting population health activities
- Panel regression estimation with fixed and random effects to account for repeated measures and clustering of communities within states
- Two-stage IV model to estimate effect of system changes on Medicare spending

\[
\text{Prob}(\text{System}_{ijt}=\text{Comprehensive}) = f(\text{Governance}, \text{Agency}, \text{Community})_{ijt} + \text{State}_j + \text{Year}_t
\]

\[
\ln(\text{Spending}_{ijt}) = f(\text{System+resid}, \text{Agency}, \text{Community})_{ijt} + \text{State}_j + \text{Year}_t + \varepsilon_{ijt}
\]

All models control for type of jurisdiction, population size and density, metropolitan area designation, income per capita, unemployment, poverty rate, racial composition, age distribution, physician and hospital availability, insurance coverage, and state and year fixed effects.
Analytical approach: IV estimation

- Identify exogenous sources of variation in system strength that are unrelated to outcomes
  - Governance structures: local boards of health
  - Decision-making authority: agency, board, local, state

- Controls for unmeasured factors that jointly influence systems and outcomes
Variation and change in comprehensive systems
Variation in network structure in 2016

- Network Density: 14.1x
- Network Centrality: 2.6x
- Hospital Centrality: 7.6x
- Employer Centrality: 29.2x
## Predictors of Comprehensive Systems

### First Stage Probit Results

<table>
<thead>
<tr>
<th>Variable</th>
<th>Marginal Effect</th>
<th>S.E.</th>
<th>IVs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population size (10,000s)</td>
<td>0.033</td>
<td>0.009</td>
<td>***</td>
</tr>
<tr>
<td>Poverty rate (10%)</td>
<td>-0.033</td>
<td>0.016</td>
<td>**</td>
</tr>
<tr>
<td>Policy-making local BOH (0,1)</td>
<td>0.046</td>
<td>0.016</td>
<td>***</td>
</tr>
<tr>
<td>Centralized local health agency (0,1)</td>
<td>-0.087</td>
<td>0.036</td>
<td>**</td>
</tr>
<tr>
<td>Local control of health budget (0,1)</td>
<td>0.043</td>
<td>0.022</td>
<td>*</td>
</tr>
<tr>
<td>Local health tax/fee authority (0,1)</td>
<td>0.028</td>
<td>0.011</td>
<td>**</td>
</tr>
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</table>

Models also control for racial composition, unemployment, health insurance coverage, educational attainment, age composition, and year fixed effects.
Economic effects attributable to network structure

Impact of Comprehensive Systems on Medicare Spending

Models also control for racial composition, unemployment, health insurance coverage, educational attainment, age composition, and state and year fixed effects. N=1019 community-years. Vertical lines are 95% confidence intervals.
Conclusions

- Population health activities are produced through highly inter-organizational and multi-sectoral efforts (62% of contributions from outside governmental public health sector).

- Structure of population health networks varies widely and changes over time.

- Stronger networks are associated with improved health and lower Medicare spending.

- Network structure is endogenous – ignoring this can understate its relationship with health & economic outcomes.
In order to follow large numbers of community networks over long periods of time:

- Single respondent in each community
- Low-resolution measures of population health activities
- Networks defined by organization sectors, not individual organizations
Coming up next…

- Data for 2018
- Rural-urban differences
- State-specific estimates & state initiatives
- Heterogeneity in trajectories
- Deeper dives into sector dynamics: hospitals, insurers, employers, schools
For More Information

Systems for Action
National Coordinating Center
Systems and Services Research to Build a Culture of Health

Supported by The Robert Wood Johnson Foundation

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Blog: publichealtheconomics.org

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Systems & Services Research
<table>
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<tr>
<th>Date</th>
<th>Time</th>
<th>Event</th>
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<tr>
<td>December 5, 2018, 12 p.m.</td>
<td>ET</td>
<td>Systems for Action Collaborating Research Center</td>
<td>William J. Riley, PhD, School for the Science of Health Care Delivery, and Michael Shafer, PhD, Center for Applied Behavioral Health Policy, School of Social Work, Arizona State University</td>
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<tr>
<td>December 19, 2018, 12 p.m.</td>
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<td>Systems for Action Intramural Research Project</td>
<td>John Poe, PhD, Systems for Action National Program Office, University of Kentucky College of Public Health</td>
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<td>January 09, 2019, 12 p.m.</td>
<td>ET</td>
<td>Systems for Action Collaborating Research Center Project</td>
<td>Joshua R. Vest, PhD, MPH, Health Policy and Management, Indiana University Richard M. Fairbanks School of Public Health</td>
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Questions?

www.systemsforaction.org
Acknowledgements

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