A Framework and Analysis of Hospital Investment and Interaction in Public Health Systems

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Presenter Disclosures

• There are no relationships to disclose
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Background

- Growing number of national initiatives that call for greater integration of public health and hospital systems
  - IRS requirements for nonprofit hospitals
  - Public Health Accreditation
  - Accountable Care Organizations, Patient-Centered Medical Homes
Background

- We expect that these changes have resulted in:

  - Increased **Investment** by Hospitals in PH Systems (e.g. Community Benefits Spending)

  - Increased **Involvement/Interaction** by Hospitals in PH Systems (e.g. Community Health Needs Assessments and Improvement Plan)
What We Mean By Public Health System
Questions Driving the Study

1. What indicators inform successful Hospital-PH partnerships (interactions)?
2. What indicators inform increased Hospital contributions to “Community Benefit” (investments)?
Analytical Strategy

1. Develop a conceptual framework that identifies hypothesized indicators of increased hospital interaction and investment in public health systems

2. Create a database of available indicator data for hospitals represented in the data

3. Analyze relationships between the indicators and data on 2 outcomes: hospital interaction with PH systems and hospital investment in PH systems
Conceptual Framework

• Review of the peer reviewed and grey literature
• Drafted conceptual model
• Convened expert panel to review, further narrow, and refine the conceptual model
  • Expert panel consisted of 9 people representing hospitals (N=4), public health (N=2), and other national expertise (N=3)
• Revised the framework based on panel feedback
Conceptual Framework

COMMUNITY DEMOGRAPHICS

LEGAL/POLICY ENVIRONMENT

MARKET CONDITIONS

HOSPITAL ORGANIZATION AND SYSTEM
- Organizational Type
- Leadership and Commitment
- Organizational Culture
- Data Capability and Use

PUBLIC HEALTH ORGANIZATION AND SYSTEM
- Organizational Type
- Leadership and Commitment
- Organizational Culture
- Data Capability and Use

PARTNERSHIP CHARACTERISTICS (INTERACTION)

HOSPITAL INVESTMENT IN PUBLIC HEALTH SYSTEMS
Database

• Three secondary datasets
  1. IRS 990 Schedule H Community Benefit Data
  2. Program to Analyze Record and Track Networks to Enhance Relationships (PARTNER) PH-Hospital Data
  3. American Hospital Association (AHA) Annual Survey Data

• Datasets were merged using Medicare ID
Database: Challenges

- Multiple matching points to pull Medicare IDs for hospitals in PARTNER
  - Name
  - Location
- Iterative process with lots of data quality checking
- Bounding public health systems
Analysis Lens: Two Perspectives

• Hospital – Public Health **System**: Cross-Sector Interorganizational Partnerships

• Hospital – Public Health **Agencies**: Partnerships with only PH Agencies
Nonprofit Hospitals in Dataset

- 134 unique hospitals
- 200 observations, some repeated within and across years
- Size ranges from 16-2083 best, average = 284 beds
Cross-Sector Partner Perceptions of Hospitals
Analytic Approach

• Multivariate regression
  • Goal: examine the relationship between the level of hospital engagement in the public health network and their investment in the system
  • Dependent variable: Percentage of Revenue spent on Community Benefits
  • Key control variables: Measures of network engagement
  • Control for hospital size (Nurse FTE) and Payment Arrangements (Capitation)
  • Fixed effects for system membership
Analytic Approach

• **Dependent Variable**
  • Measure of Community-Engaged Activities:
    - Sum of 990 Community Benefit categories
    - Total Spending (Percentage of total operating expenses)
    - Community Health Improvement / Benefit Operations
    - Cash and in-kind contributions
    - Community building
Analytic Approach

- **Key Independent Variables**
  - Measures of hospital participation in public health systems
    - **Degree Centrality**: number of connections a network member has with other members of the network
    - **Overall Value**: average of the three dimensions of value as ranked by the other members of the network.
    - **Overall Trust**: average of the three dimensions of trust as ranked by the other members of the network.
    - **Breadth**: proportion of different organizations existing in the network by low, moderate, and high diversity categories
    - **Relative Connectivity**: Benefit to the hospital from the network relative to the most trusted / connected member of network
Results: Descriptive Statistics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>SD</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sum Total</td>
<td>0.95%</td>
<td>1.508</td>
<td>0</td>
<td>10.484</td>
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<tr>
<td>Community Building Total (% of total operating expenses)</td>
<td>0.12%</td>
<td>0.288</td>
<td>0</td>
<td>1.878</td>
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<tr>
<td>Community Health Improvement Services and Community Benefit Operations</td>
<td>0.56%</td>
<td>1.209</td>
<td>0</td>
<td>9.601</td>
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<tr>
<td>Cash and in-kind contributions for community benefit</td>
<td>0.26%</td>
<td>0.821</td>
<td>0</td>
<td>8.205</td>
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<tr>
<td>Degree Centrality</td>
<td>9.67</td>
<td>7.891</td>
<td>0</td>
<td>55</td>
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<tr>
<td>Overall Value</td>
<td>3.02</td>
<td>0.563</td>
<td>1</td>
<td>4</td>
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<tr>
<td>Total Trust</td>
<td>3.16</td>
<td>0.724</td>
<td>0.33</td>
<td>4</td>
</tr>
<tr>
<td>Relative Connectivity</td>
<td>0.41</td>
<td>0.306</td>
<td>-0.07</td>
<td>1</td>
</tr>
<tr>
<td>Breadth</td>
<td>2.54</td>
<td>0.609</td>
<td>1</td>
<td>3</td>
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</tbody>
</table>

- Total Sample size: 184
## Early Results: Regression Models

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Cash and in-kind contributions</th>
<th>Community Building</th>
<th>Community Health Improvement Services and Community Benefit Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Centrality</td>
<td>0.068 *</td>
<td>n/s</td>
<td>0.013†</td>
<td>0.025**</td>
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<tr>
<td>Value</td>
<td>1.019 **</td>
<td>1.158*</td>
<td>n/s</td>
<td>n/s</td>
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<tr>
<td>Trust</td>
<td>n/s</td>
<td>n/s</td>
<td>n/s</td>
<td>n/s</td>
</tr>
<tr>
<td>Relative Connectivity</td>
<td>-3.70**</td>
<td>-3.33**</td>
<td>n/s</td>
<td>n/s</td>
</tr>
<tr>
<td>Breadth Medium</td>
<td>1.99†</td>
<td>n/s</td>
<td>n/s</td>
<td>n/s</td>
</tr>
<tr>
<td>Breadth High</td>
<td>n/s</td>
<td>n/s</td>
<td>n/s</td>
<td>n/s</td>
</tr>
</tbody>
</table>

Controlling for System Membership, Nurse FTE, Capitation

** p<.01  * p<.05  † p<.1
Early Findings

• Association between lower spending and being well-connected to valued partners that report trusted relationships

• It is possible that hospitals that spend less on community benefits (in dollars) spend more on relationship building in the community (in social capital)

• Leads to questions about:
  • What is the (dollar) value of building strategic, strong relationships between hospitals and public health systems? How does that compare with actual per-dollar investments? (What is the value of social capital in these settings?)
  • Should we account for relationship building as a “contribution” to the public health system? Are we weighing that effort sufficiently?
  • Do hospitals that spend less in the community compensate for that by investing greater time/effort in relationship building?
Limitations and Next Steps

- Working with noisy data
- Small sample size
- Need to analyze variables in more detail
- Likely will merge in more data-NACCHO and ARF