Creating Learning Systems: Lessons from Public Health Practice-Based Research Networks

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Failures in health production

Figure 1. There are large differences in life expectancy and health care spending across OECD countries 2008¹

1. Or latest year available.
Source: OECD Health Data 2010.
Failures in health production

U.S. Men and Women Under Age 65 Have Higher Rates of Potentially Preventable Deaths
Slowest Rate of Improvement, 1999–2007

Amenable mortality, men ages 0–64
Amenable mortality, women ages 0–64

Age-standardized death rate/100,000

1999 2007

0 10 20 30 40 50 60 70 80 90 100

FRA GER* UK US

FRA GER* UK US

* Data for Germany are 1999 and 2006.
Failures in health production

Premature Deaths per 100,000 Residents

Commonwealth Fund 2012
Drivers of population health failures

Proportional Contribution to Premature Death

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

Preventable disease burden and national health spending

>75% of US health spending is attributable to conditions that are largely preventable
  – Cardiovascular disease
  – Diabetes
  – Lung diseases
  – Cancer
  – Injuries
  – Vaccine-preventable diseases and sexually transmitted infections

<5% of US health spending is allocated to prevention and public health

CDC 2008 and CMS 2011
Social Investments and Health

Ratio of non-health care social spending to health care social spending:

- 2.0 in the OECD countries
- 0.83 in the United States

Source: Bradley et al., 2011:3 (BMJ)
Bending the medical cost curve

Roehrig et al. Health Affairs 2011
Vicious cycles to learning systems

Translate evidence for policy and administrative decisions & advocacy

Discover causes & consequences of variation in public health delivery
What are Population Health Strategies?

- Designed to achieve **large-scale** health improvement: neighborhood, city/county, region
- Target **fundamental** and often **multiple** determinants of health
- Mobilize the **collective actions** of multiple stakeholders in government & private sector
  - Public health authorities
  - Health care providers
  - Social & community-based organizations
  - Business, finance, economic development
What Makes Population Health Strategies So Hard?

- 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

GOVERNING the COMMONS

Elinor Ostrom

The Evolution of Institutions for Collective Action

Political Economy of Institutions and Decisions

Nobel Prize Winner 2009
Diffusion of Public Health PBRNs

- First cohort (December 2008 start-up)
- Second cohort (January 2010 start-up)
- Affiliate/Emerging PBRNs (2011-14)
The Logic of Public Health PBRNs

- Identify Common questions of interest
- Engaged practice settings
- Research partner
- Data exchange
- Analysis & interpretation
- Translation & application
- Apply Rigorous research methods
What is Practice-Based Research in Public Health?

- Research that tests effectiveness & impact of public health practices in real-world *public health settings*
- Research designed to address uncertainties and information needs of real-world public health *decision-makers*
- Research that evaluates the implementation and impact of *innovations in practice*
- Research that uses *observations generated through public health practice* to produce new knowledge
PBRN Reach

- 1593 local health agencies
- 35 state health agencies
- 52 academic research units
- 58 professional & community organizations
Research Progression

Delivery System Organization and Structure

Practice Variation

Volume, Intensity, and Quality of Delivery

Cost of Delivery

Value of Delivery
Productivity & Dissemination

- 60 competitively awarded research projects
- 81 articles in peer-reviewed journals
- 221 presentations and conferences & meetings
- 51 reports & tools in the grey literature


- >15,000 downloads of *Frontiers in PHSSR* articles
- >8,000 downloads from Research Archive
- >2,000 page views on PublicHealthEconomics blog
National Coordinating Center

- Extramural research programs
  - Quick Strike studies
  - Natural Experiments in Public Health Delivery
  - Predoctoral and Postdoctoral Awards
  - Mentored Research Scientist Awards

- Intramural research activities
  - **Public Health Value**: Cost estimation & economic evaluation
  - **Public Health Reform**: Effects of ACA on public health delivery
Data Development
- Periodic census surveys of local and state agencies
- National Longitudinal Survey of Public Health Systems
- Public Health Activities and Services Tracking (PHAST): compiling existing administrative data across states

Dissemination & Translation
- Weekly Work in Progress Webinars
- Open-access journal: *Frontiers in PHSSR*
- Newsletters, Podcasts, Blogs
- Briefings with policy stakeholders
### Local Health Departments Engaged in Research Implementation & Translation Activities During Past 12 months

<table>
<thead>
<tr>
<th>Activity</th>
<th>PBRN Agencies Percent/Mean</th>
<th>National Sample Percent/Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identifying research topics</td>
<td>94.1%</td>
<td>27.5%</td>
</tr>
<tr>
<td>Planning/designing studies</td>
<td>81.6%</td>
<td>15.8%</td>
</tr>
<tr>
<td>Recruitment, data collection &amp; analysis</td>
<td>79.6%</td>
<td>50.3%</td>
</tr>
<tr>
<td>Disseminating study results</td>
<td>84.5%</td>
<td>36.6%</td>
</tr>
<tr>
<td>Applying findings in own organization</td>
<td>87.4%</td>
<td>32.1%</td>
</tr>
<tr>
<td>Helping others apply findings</td>
<td>76.5%</td>
<td>18.0%</td>
</tr>
<tr>
<td>Research implementation composite</td>
<td>84.04 (27.38)</td>
<td>30.20 (31.38)</td>
</tr>
</tbody>
</table>

N  
209  
505

Research examples: organization and structure

- Who contributes to public health delivery?
- How are roles and responsibilities divided?
- How and why do delivery systems vary and change over time?
- How do system structures affect public health delivery and outcomes?
Delivery of recommended public health activities

Variation in Scope of Public Health Delivery
Delivery of recommended public health activities, 2012

Organizations contributing to local public health production

% Change 2006-2012

Scope of Production 2012

Local health agency
Other local government
State health agency
Other state government
Hospitals
Physician practices
Community health centers
Health insurers
Employers/business
Schools
CBOs

Inter-organizational relationships in public health delivery systems

A typology of public health delivery systems

Source: Mays et al. 2010; 2012
Changes in health associated with delivery system

Percent Changes in Preventable Mortality Rates by System Typology (cluster)

Fixed-effects models control for population size, density, age composition, poverty status, racial composition, and physician supply
Do other organizations complement or substitute for local public health agency effort?

Results from Multivariate GLLAMM Models

Note: GLLAMM estimates, holding all other variables constant in the model
Estimated crowd-out in hospital contributions to public health activities

Hospital charity care expenditures ($1000/capita)

Note: GLLAMM estimates, holding all other variables constant in the model
Research examples: financing, costs and economics

- How do *public health* investments vary across communities and change over time?
- What are the health effects attributable to changes in public health spending?
- What are the medical cost effects attributable to changes in public health spending?
- What are the opportunities for improving efficiency in public health delivery?
Variation in Local Public Health Spending

Gini = 0.485
Changes in Local Public Health Spending
1993-2010

38% decline
62% growth
Determinants of Local Public Health Spending Levels

- Delivery system size & structure
- Service mix
- Population needs and risks
- Efficiency & uncertainty

Mays et al. 2009
Mortality reductions attributable to local public health spending, 1993-2008

Hierarchical regression estimates with instrumental variables to correct for selection and unmeasured confounding

Mays et al. 2011
Medical cost offsets attributable to investments in public health delivery, 1993-2008

For every $10 of public health spending, ≈$9 are recovered in lower medical care spending over 15 years.

Community-specific estimates of public health spending on heart disease mortality

Impact of 10% Increase in Public Health Spending/Capita Based on Income Per Capita in Communities

Log IV regression estimates controlling for community-level and state-level characteristics

Mays et al. forthcoming
Economies of scale and scope in public health delivery systems

Source: 2010 NACCHO National Profile of Local Health Departments Survey
Economies of scale and scope in public health delivery

Mays et al. 2013
Gains from regionalizing public health delivery

Mays et al. 2013
New frontiers through PBRN research

- **MPROVE**: Measuring geographic variation in the implementation of a core set of population health strategies
- **DACS**: Effects of public health delivery system characteristics on costs of delivering evidence-based programs and policies
  - Chronic disease prevention
  - Communicable disease control
  - Environmental health protection
Studying innovations in alignment

Hennepin Health ACO

- Partnership of county health department, community hospital, and FQHC
- Accepts full risk payment for all medical care, public health, and social service needs for Medicaid enrollees
- Fully integrated electronic health information exchange
- Heavy investment in care coordinators and community health workers
- Savings from avoided medical care reinvested in public health initiatives
  - Nutrition/food environment
  - Physical activity
Studying innovations in alignment

Massachusetts Prevention & Wellness Trust Fund

- $60 million invested from nonprofit insurers and hospital systems
- Funds community coalitions of health systems, municipalities, businesses and schools
- Invests in community-wide, evidence-based prevention strategies with a focus on reducing health disparities
- Savings from avoided medical care are expected to be reinvested in the Trust Fund activities
Studying innovations in alignment

Arkansas Community Connector Program

- Use community health workers & public health infrastructure to identify people with unmet social support needs
- Connect people to home and community-based services & supports
- Link to hospitals and nursing homes for transition planning
- Use Medicaid and SIM financing, savings reinvestment
- ROI $2.92

Source: Felix, Mays et al. *Health Affairs* 2011

www.visionproject.org
Conclusions: getting inside the box

- Engagement of practice and research partners
- Sensitive and specific measures
- Research designs in real-world settings
- What works best in which settings and why
- Informed public health decisions
- Smarter investments and greater value
Toward a “rapid-learning system” in public health

In a learning health care system, research influences practice and practice influences research.

Evaluate
Collect data and analyze results to show what does and does not work.

Adjust
Use evidence to influence continual improvement.

Implement
Apply the plan in pilot and control settings.

Design
Design care and evaluation based on evidence generated here and elsewhere.

Disseminate
Share results to improve care for everyone.

Internal and External Scan
Identify problems and potentially innovative solutions.

For More Information

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