11-12-2014

Optimizing Public Health Systems for Population Health Improvement: Institutions, Economics, and Metrics

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Optimizing Public Health Systems for Population Health Improvement: Institutions, Economics & Metrics

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Public Health Grand Rounds | Columbia University | 12 November 2014
Key Questions

What are the strengths and weaknesses in how U.S. public health activity is currently organized & financed?

How might public health delivery systems adapt and transform to enhance population health impact?

What types of infrastructure, incentives & information could support system transformation?
Failures in population health

Figure 1. There are large differences in life expectancy and health care spending across OECD countries 2008

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

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%

### Costly failures in population health

**EXHIBIT 1**

Estimates of Waste in US Health Care Spending in 2011, by Category

<table>
<thead>
<tr>
<th>Estimate of Waste</th>
<th>Cost to Medicare and Medicaid(^a)</th>
<th>Total cost to US health care(^b)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low</td>
<td>Midpoint</td>
</tr>
<tr>
<td>Failures of care delivery</td>
<td>$26</td>
<td>$36</td>
</tr>
<tr>
<td>Failures of care coordination</td>
<td>21</td>
<td>30</td>
</tr>
<tr>
<td>Overtreatment</td>
<td>67</td>
<td>77</td>
</tr>
<tr>
<td>Administrative complexity</td>
<td>16</td>
<td>36</td>
</tr>
<tr>
<td>Pricing failures</td>
<td>36</td>
<td>56</td>
</tr>
<tr>
<td><strong>Subtotal (excluding fraud and abuse)</strong></td>
<td>166</td>
<td>235</td>
</tr>
<tr>
<td>Percentage of total health care spending</td>
<td>6%</td>
<td>9%</td>
</tr>
</tbody>
</table>

\(^a\)Source: Author's calculations based on U.S. Centers for Medicare and Medicaid Services data.

\(^b\)Source: Author's calculations based on U.S. Centers for Medicare and Medicaid Services data.
Drivers of population health failures

>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 2013
Missed opportunities in public health delivery

Evidence-based public health strategies reach less than half of U.S. populations at risk:

- Smoking cessation
- Influenza vaccination
- Hypertension control
- Nutrition & physical activity programs
- HIV prevention
- Family planning
- Substance abuse prevention
- Interpersonal violence prevention
- Maternal and infant home visiting for high-risk populations
Vicious cycles in public health delivery

Limited public understanding & political support

Incoherence in missions, responsibilities & expectations

Complex, fragmented, variable financing & delivery systems

Large inequities in resources & capabilities

Variable productivity and efficiency

Resources incongruent with preventable disease burden

Gaps in reach & implementation of efficacious strategies

Difficulties demonstrating impact, value & ROI
Failed connections generate population health failures

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

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

Social Supports

Waste & inefficiency
- Inequitable reach & outcomes
- Limited population health impact
Learning how to succeed with 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

http://www.iom.edu/Home/Global/Perspectives/2014/EconomicsOfAdaptation.aspx
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
Can Public Health Infrastructure Help?

Organized programs, policies, and laws to prevent disease and injury and promote health on a population-wide basis

- Epidemiologic surveillance & investigation
- Community health assessment & planning
- Communicable disease control
- Chronic disease and injury prevention
- Health education and communication
- Environmental health monitoring and assessment
- Enforcement of health laws and regulations
- Inspection and licensing
- Inform, advise, and assist school-based, worksite-based, and community-based health programming

…and roles in assuring access to medical care
What do we know about the current structure and performance of U.S. public health delivery systems?
Delivery of recommended public health activities in U.S. communities

![Chart showing the percentage of activities in terms of Assurance, Policy, and Assessment from 1998 to 2012.]

- **1998**: Upward trend of 10%
- **2006**: Upward trend of 5%
- **2012**: Downward trend of 5%

Variation in Scope of Public Health Delivery

Delivery of recommended public health activities, 2012

Variation and Change in Delivery
Delivery of recommended public health activities, 2006-12

Quintiles of communities

-40% -20% 0% 20% 40% 60% 80% 100%

Q1 Q2 Q3 Q4 Q5

∆ 2006-12

% of recommended activities performed

Organizations contributing to local public health production

<table>
<thead>
<tr>
<th>% Change 2006-2012</th>
<th>Scope of Production 2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>-50%</td>
<td>50%</td>
</tr>
<tr>
<td>-30%</td>
<td>30%</td>
</tr>
<tr>
<td>-10%</td>
<td>10%</td>
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<tr>
<td>10%</td>
<td></td>
</tr>
<tr>
<td>30%</td>
<td></td>
</tr>
<tr>
<td>50%</td>
<td></td>
</tr>
</tbody>
</table>

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

Patterns of interaction in public health delivery systems

Seven types of public health delivery systems

<table>
<thead>
<tr>
<th>Scope</th>
<th>Centralization</th>
<th>Integration</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Mod</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Low</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Mod</td>
<td>High</td>
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<td>Low</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Low</td>
<td>Low</td>
<td>Mod</td>
</tr>
</tbody>
</table>

Source: Mays et al. 2010; 2012
Integrated systems do more with less


Expenditures per capita

Type of delivery system

- Comprehensive
- Conventional
- Limited
- Very limited

% of recommended activities performed

Expenditures per capita

$0 $10 $20 $30 $40 $50 $60 $70 $80

% of recommended activities performed

0% 10% 20% 30% 40% 50% 60% 70% 80% 90%
Integrated systems achieve better health outcomes

Percent Changes in Preventable Mortality Rates Attributable to Delivery System Type

- Infant Deaths/1000 Births
  - Comprehens | Conventional | Limited | Very Limited

- Cancer deaths/100,000 population
  - Comprehens | Conventional | Limited | Very Limited

- Heart Disease Deaths/100,000
  - Comprehens | Conventional | Limited | Very Limited

- Influenza Deaths/100,000
  - Comprehens | Conventional | Limited | Very Limited

- Infectious Disease Deaths/100,000
  - Comprehens | Conventional | Limited | Very Limited

Fixed-effects models control for population size, density, age composition, poverty status, racial composition, and physician supply.
Bridging capital in public health delivery systems
Trends in betweenness centrality

* Change from prior years is statistically significant at $p<0.05$
Governmental Expenditures for Public Health Activity, USDHHS National Health Expenditure Accounts

- State and local
- Federal

U.S. Centers for Medicare and Medicaid Services, Office of the Chief Actuary
Variation in Local Public Health Spending

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

- 62% growth
- 38% decline
Mortality reductions attributable to investments in public health delivery, 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

Public health investments generate larger health & economic gains in low-resource communities

Impact in Low-Income vs. High Income Communities

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

Mays et al. forthcoming 2014
Public health investments produce larger gains in communities with robust infrastructure

Impact in Communities with Low vs. High Public Health Infrastructure

- Mortality
- Medical costs

95% CI

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

Mays et al. forthcoming 2014
More system resources, integration, and infrastructure are good for population health.

How do we get more?
New incentives & infrastructure are in play

Next Generation
Population Health Improvement

- Hospital community benefit regs
- Innovation Center Funding
- Funding constraints
- ACOs and PCMHs
- Employer wellness incentives
- Value-based payment
- Health insurance expansions
- Community Transformation Grants
- Health information exchange
- Public health Accreditation
Stimuli in the Affordable Care Act

- $10 billion Prevention & Public Health Fund
- $10 billion CMMI demonstration programs
  - ACOs
  - Bundled payments
  - Shared savings
- Medicaid Health Home pilots
- CDC community health worker program
- Enhanced IRS requirements for hospital community benefits
- Minimum loss ratio incentives for health insurers
- Employer incentives and support for health promotion
Estimated crowd-out in hospital contributions to public health activities

Note: GLLAMM estimates, holding all other variables constant in the model
A Cautionary Note: dynamics of Medicaid and public health spending.
Some Promising Examples
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
Some Promising Examples
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
Some Promising Examples
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
Toward a deeper understanding of costs & returns

2012 Institute of Medicine Recommendations

- Identify the components and **costs of a minimum package** of public health services
  - Foundational capabilities
  - Basic programs
- Implement a **national chart of accounts** for tracking spending and flow of funds
- Expand **research on costs and effects** of public health delivery

Defining what to cost: the public health package

- Washington State’s Foundational Public Health Services
- Ohio’s Public Health Futures Committee: Minimum Package of Services
- Colorado’s Core Public Health Services
- National Workgroup on Foundational Public Health Capabilities
Defining what to cost:

<table>
<thead>
<tr>
<th>Additional Important Services</th>
<th>Communicable Disease Control</th>
<th>Chronic Disease &amp; Injury Prevention</th>
<th>Environmental Public Health</th>
<th>Maternal/Child/Family Health</th>
<th>Access/Linkage with Clinical Health Care</th>
<th>Vital Records</th>
</tr>
</thead>
</table>

← ACROSS ALL PROGRAMS →

- Assessment (surveillance and epidemiology)
- Emergency preparedness and response (all hazards)
- Communications
- Policy development and support
- Community partnership development
- Business competencies
Pilot Estimates: Current and Projected Costs of Foundational Capabilities

Current

Projected
What’s the role of the scientific enterprise?
Vicious cycles to learning systems

Limited public understanding & political support

Incoherence in missions, Complex, fragmented, variable responsibilities & expectations financing & delivery systems

Large inequities in resources & capabilities Variable productivity and efficiency

Resources incongruent with preventable disease burden

Gaps in reach & implementation of efficacious strategies

Difficulties demonstrating impact, value & ROI

Translate evidence for policy and administrative decisions & advocacy

Discover causes & consequences of variation in public health delivery
How Can Evidence & Community-Engaged Research Help?

- Identify common interests, incentives & problems
- Mitigate asymmetries in power & information
- Use theory, evidence & experience to design strategies with high probability of success
- **Measure progress & provide feedback**
  - Fail fast
  - Continuously improve
- Evaluate health & economic impact
PBRNs as Mechanisms for Community-Engaged Scholarship & Learning

- Identify Common questions of interest
- Research partner
- Engaged practice settings
- Analysis & interpretation
- Data exchange
- Apply Rigorous research methods
- Translation & application
Developing actionable measures of public health implementation: MPROVE

- 3 “high value” domains of activity: chronic, communicable, environmental
- 8 core measure “bundles” (+2 optional)
- 27 total measures (+5 optional)
- 2 levels of measurement: institution-specific vs. community
- 5 dimensions: availability, reach, capacity, volume, quality
- 5 networks/5 states
Proportion of local settings reporting MPROVE measures

- Healthy food (A)
- Physical activity (A)
- Tobacco (A)
- Physical activity (C)
- Oral health prevention (A)
- STI cases (C)
- Immunization (A)
- Healthy food staffing (A)
- Enteric confirmed cases (C)
- Enteric reported cases (C)
- Food inspection volume (A)
- Agency PA funding (A)
- Oral health screening (A)
- Lead rate (C)
- Smoking enforcement (C)
- Enteric completion time (A)
- TB case volume (C)
- Enteric investigations (A)
- STI staffing (A)
- Vaccine preventable diseases (C)
- Immunization (C)
- TB contact treatment (A)
- Food inspection reach (A)
- STI contact tracing (A)
- Food safety staffing (A)
- TB treatment (A)
- Lead investigation (A)
- TB contact screening (A)
MPROVE Patterns of Variation

% of Total Variance

<table>
<thead>
<tr>
<th>Metric</th>
<th>Within state</th>
<th>Between state</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoking policy enforcement</td>
<td>80%</td>
<td>20%</td>
</tr>
<tr>
<td>Physical activity promotion</td>
<td>70%</td>
<td>30%</td>
</tr>
<tr>
<td>Physical activity funding/capita</td>
<td>60%</td>
<td>40%</td>
</tr>
<tr>
<td>Enteric investigation time</td>
<td>50%</td>
<td>50%</td>
</tr>
<tr>
<td>STI staffing/capita</td>
<td>40%</td>
<td>60%</td>
</tr>
<tr>
<td>Food safety staffing/capita</td>
<td>30%</td>
<td>70%</td>
</tr>
</tbody>
</table>
## PBRNs and Research Translation

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>
<tr>
<td>N</td>
<td>209</td>
<td>505</td>
</tr>
</tbody>
</table>

Finding the connections

- Act on aligned incentives
- Exploit the disruptive policy environment
- Innovate, prototype, study – then scale
- Pay careful attention to shared governance, decision-making, and financing structures
- Demonstrate value and accountability to the public
Toward a “rapid-learning system” in population 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.

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

Implement: Apply the plan in pilot and control settings.

Adjust: Use evidence to influence continual improvement.

Disseminate: Share results to improve care for everyone.

Internal and External Scan: Identify problems and potentially innovative solutions.

Internal

External

More Information

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