Ending Failures, Showing Results, Improving Population Health: Insights from Research & Reform in the U.S.

Glen P Mays, University of Kentucky
Ending Failures, Showing Results, Improving Population Health:
Insights from Research & Reform in the U.S.

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British Columbia Ministry of Health | Policy Rounds | 10 October 2014
Key Questions

- Why is system alignment needed for population health improvement yet so hard to achieve?
- What types of infrastructure and incentives can help to align systems?
- How can evidence and community-engaged scholarship help?
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
### Cost of failures in population health

#### Exhibit 1

<table>
<thead>
<tr>
<th>Category</th>
<th>Cost to Medicare and Medicaida</th>
<th>Total cost to US health careb</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><strong>Percentage of total health care spending</strong></td>
<td>6%</td>
<td>9%</td>
</tr>
</tbody>
</table>

http://www.healthaffairs.org/healthpolicybriefs/
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%

Factors driving growth in medical spending

Roehrig et al. Health Affairs 2011
Factors driving growth in medical spending

- Unmet social needs have large effects on medical resource use and health outcomes
- Most primary care physicians lack confidence in their capacity to address unmet social needs
- Linking people to needed health and social support services is a core public health function
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 2011
Evidence-based public health strategies reach less than two-thirds 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
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

Inefficient delivery

Inequitable outcomes

Limited population health impact

Social Supports

Public Health

- Fragmentation
- Variability in practice
- Resource constrained
- Limited reach
- Insufficient scale
- Limited public visibility & understanding
- Limited evidence base
- Slow to innovate & adapt
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
  - Usual and unusual suspects
  - Infrastructure requirements

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
### Leading models of integration

#### Summary Of Features And Components For Models Linking Medical Care And Social Support Services

<table>
<thead>
<tr>
<th>INTERVENTION PROCESS</th>
<th>VBH</th>
<th>SCO</th>
<th>COP</th>
<th>Mercy</th>
<th>GRACE</th>
<th>CMP</th>
<th>EDPP</th>
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<tbody>
<tr>
<td>Baseline health assessment</td>
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<td>●</td>
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<tr>
<td>Individualized care plan</td>
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<td>Specialized intervention protocols</td>
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<td>●</td>
<td>●</td>
<td>●</td>
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<tr>
<td>Specialized training for service providers</td>
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<td>●</td>
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<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Ongoing monitoring</td>
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<td>●</td>
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<td>●</td>
</tr>
<tr>
<td>Coaching in self-management</td>
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<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Link to or communication with primary care physician or practice</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
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<tr>
<td>Use of electronic health records</td>
<td>●</td>
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<table>
<thead>
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<th>SERVICE</th>
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<th>CMP</th>
<th>EDPP</th>
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<td>Case management</td>
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<td>●</td>
<td>●</td>
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<td>●</td>
<td>●</td>
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<tr>
<td>Medication management</td>
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<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
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<tr>
<td>Mental health services</td>
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<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
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<tr>
<td>Referral to or arrangement for social or supportive services</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
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<tr>
<td>Referral to or arrangement for medical services</td>
<td>●</td>
<td>●</td>
<td>●</td>
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<td>●</td>
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<td>●</td>
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<td>Caregiver support</td>
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<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>

Gayle Shier, Michael Ginsburg, Julianne Howell, Patricia Volland and Robyn Golden
Strong Social Support Services, Such As Transportation And Help For Caregivers,
Can Lead To Lower Health Care Use And Costs
*Health Affairs, 32, no.3 (2013):544-551*
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
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
- CMS focus on hospital readmission prevention
Complexity in population health strategies

Health & Social Systems
- Scale of operations
- Scope of activity
- Division of responsibility
- Effect of organizations
- Compatibility of missions
- Distribution of effort
- Nature & intensity of relationships
- Breadth of organizations

Public Health Agency
- Scope of services
- Staffing levels & mix
- Intergovernmental relationships
- Legal authority
- Funding levels & mix
- Governing structure
- Leadership

Decision Support
- Accreditation
- Performance measures
- Practice guidelines
- Quality improvement

Strategic Decisions

Population & Environment
- Needs
- Preferences
- Risks
- Threats
- Resources
- Perceptions

Outputs and Outcomes
- Reach
- Effectiveness
- Efficiency
- Timeliness
- Equity
- Adherence to EBPs

Mays et al 2009
What does integration look like?
Patterns of interaction in public health delivery systems
Organizations engaged in local public health delivery

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

Delivery of recommended public health activities in U.S. communities

Variation in Scope of Public Health Delivery

Delivery of recommended public health activities, 2012

Seven types of public health delivery systems

Scope

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

Source: Mays et al. 2010; 2012

% of communities

Comprehensive

Conventional

Limited

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


Expenditures per capita

% of recommended activities performed

Type of delivery system

Comprehensive
Conventional
Limited
Very limited

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

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
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
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 in Low-Income vs. High Income Communities

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

Mays et al. forthcoming 2014
Community-specific estimates of public health spending on heart disease mortality

Impact in Communities with Low vs. High Public Health Infrastructure

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

Mays et al. forthcoming 2014
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
- Public health Accreditation
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](http://www.visionproject.org)
Leading models of integration

By Holly C. Felix, Glen P. Mays, M. Kathryn Stewart, Naomi Cottoms, and Mary Olson

**THE CARE SPAN**

Medicaid Savings Resulted When Community Health Workers Matched Those With Needs To Home And Community Care

![Graph showing Medicaid spending per recipient over time for comparison group and CCP participants.](image-url)
A cautionary note: Crowd out in Medicaid and Public Health Spending
### Effects of 10% Growth in Medicaid Spending Share on Public Health Spending Share

<table>
<thead>
<tr>
<th>Model</th>
<th>Coeff.</th>
<th>S.E.</th>
<th>Per Capita Δ</th>
</tr>
</thead>
<tbody>
<tr>
<td>State PH spending</td>
<td>-0.82</td>
<td>0.31***</td>
<td>-13.1%</td>
</tr>
<tr>
<td>Local PH spending</td>
<td>-0.77</td>
<td>0.38***</td>
<td>-14.8%</td>
</tr>
</tbody>
</table>

***p<0.01
Projected Health Effects of Crowd Out

At median levels of crowd-out:

- 12.3% increase in infant mortality rate
- 5.5% increase in cardiovascular mortality rate
- 2.7% increase in diabetes mortality rate
- 1.9% increase in cancer mortality rate

Reduce or fully offset the direct mortality gains from increases in health insurance coverage (e.g. Sommers et al 2014)

Using 10-year mortality effect estimates from Mays and Smith, *Health Affairs* 2011
Understanding costs, resource requirements and value in public health delivery

- Align spending with preventable disease burden
- Identify and address inequities in resources
- Improve productivity and efficiency
- Demonstrate value: linking spending to outcomes
- Strengthen fiscal policy: financing mechanisms
Why a stronger focus on costs?

“Poor costing systems have disastrous consequences. It is a well-known management axiom that what is not measured cannot be managed or improved. Since providers misunderstand their costs, they are unable to link cost to process improvements or outcomes, preventing them from making good decisions….Poor cost measurement [leads] to huge cross-subsidies across services…Finally, poor measurement of costs and outcomes also means that effective and efficient providers go unrewarded.”

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:

<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>

**Foundational Programs**

**Foundational Capabilities**

- Assessment (surveillance and epidemiology)
- Emergency preparedness and response (all hazards)
- Communications
- Policy development and support
- Community partnership development
- Business competencies
## Washington’s Cost Estimates (preliminary)

### Estimated Cost of Providing Foundational Public Health Services Statewide

<table>
<thead>
<tr>
<th>Services Ranked By Cost</th>
<th>Total Estimated Cost of FPHS</th>
<th>State Dept. of Health</th>
<th>Local Health Jurisdictions</th>
<th>State DOH</th>
<th>LHJs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foundational Capabilities</td>
<td>75,700,000</td>
<td>27,750,000</td>
<td>47,945,000</td>
<td>37%</td>
<td>63%</td>
</tr>
<tr>
<td>A. Assessment</td>
<td>11,350,000</td>
<td>5,410,000</td>
<td>5,935,000</td>
<td>48%</td>
<td>52%</td>
</tr>
<tr>
<td>B. Emergency Preparedness and Response</td>
<td>10,825,000</td>
<td>3,620,000</td>
<td>7,205,000</td>
<td>33%</td>
<td>67%</td>
</tr>
<tr>
<td>C. Communication</td>
<td>3,960,000</td>
<td>750,000</td>
<td>3,210,000</td>
<td>19%</td>
<td>81%</td>
</tr>
<tr>
<td>D. Policy Development and Support</td>
<td>4,415,000</td>
<td>1,115,000</td>
<td>3,300,000</td>
<td>25%</td>
<td>75%</td>
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<tr>
<td>E. Community Partnership Development</td>
<td>4,885,000</td>
<td>860,000</td>
<td>4,025,000</td>
<td>18%</td>
<td>82%</td>
</tr>
<tr>
<td>F. Business Competencies</td>
<td>40,265,000</td>
<td>15,995,000</td>
<td>24,270,000</td>
<td>40%</td>
<td>60%</td>
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<tr>
<td>Foundational Programs</td>
<td>252,290,000</td>
<td>134,890,000</td>
<td>117,405,000</td>
<td>53%</td>
<td>47%</td>
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<tr>
<td>A. Communicable Disease Control</td>
<td>33,760,000</td>
<td>9,010,000</td>
<td>24,750,000</td>
<td>27%</td>
<td>73%</td>
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<tr>
<td>B. Chronic Disease and Injury Prevention</td>
<td>24,855,000</td>
<td>12,590,000</td>
<td>12,265,000</td>
<td>51%</td>
<td>49%</td>
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<tr>
<td>C. Environmental Public Health</td>
<td>95,800,000</td>
<td>33,760,000</td>
<td>62,045,000</td>
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<td>65%</td>
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<td>D. Maternal/Child/Family Health</td>
<td>25,175,000</td>
<td>13,765,000</td>
<td>11,410,000</td>
<td>55%</td>
<td>45%</td>
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<td>E. Access/Linkage with Clinical Health Care</td>
<td>65,585,000</td>
<td>62,145,000</td>
<td>3,440,000</td>
<td>95%</td>
<td>5%</td>
</tr>
<tr>
<td>F. Vital Records</td>
<td>7,115,000</td>
<td>3,620,000</td>
<td>3,495,000</td>
<td>51%</td>
<td>49%</td>
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<tr>
<td><strong>Total Cost</strong></td>
<td><strong>327,990,000</strong></td>
<td><strong>162,640,000</strong></td>
<td><strong>165,350,000</strong></td>
<td><strong>50%</strong></td>
<td><strong>50%</strong></td>
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</tbody>
</table>

Source: DOH, 2013; Participating LHJs, 2013; and BERK, 2013.

Local per capita: $24.0  State per capita: $23.6

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

Engaged practice settings

Translation & application

Analysis & interpretation

Research partner

Data exchange

Apply Rigorous research methods
## 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>
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<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.

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.

Internal
External

Supported by The Robert Wood Johnson Foundation

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Journal: www.FrontiersinPHSSR.org
Archive: works.bepress.com/glen_mays
Blog: publichealtheconomics.org

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