Modeling Regional Health Reform Using the ReThink Health Dynamics Model

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Director, ReThink Health

Institute of Medicine
Roundtable on Population Health Improvement
Washington, DC
April 9, 2015
Regional Differences

Variations in Health and Risks
*The County Health Rankings*

Variations in Practice and Spending
*The Dartmouth Atlas of Health Care*

2012 County Health Rankings - Premature Death

2013 Variations in Care for Advanced Cancer
Guiding Question

What are the likely health and economic consequences of local health reform strategies under realistic, regional conditions?

Accounting for local trends related to:
- Insurance expansion
- Demography, aging, and inequity
- Health status, risks, and disease progression
- Quality, utilization, and cost of care
- Demand-supply for health care resources
- Economic recession and recovery
- Provider payment
- Program financing
ReThink Health Dynamics

Watch an overview video at: http://tiny.cc/RTH-Model-Video
Learning with Innovators in Context

- Anytown, USA (300k, 50k)

Regional Projects (2010-2015)
Regional Models (N=9)

Users
- 9
- ~65
- ~2,500
- ~15

Local Configurations
Strategy Labs
Leaders
Universities

Educational Institutions:
- Dartmouth
- MIT
- Columbia University
- Penn State
- University of Alabama
- Medical University of South Carolina
- Vanderbilt University
- Arizona State University
- University of Virginia
System Stewardship

How to Transform the Health System in Your Region?

**Challenge:** Craft an effective strategy to improve performance of the regional health system, *and sustain those gains over time.*
## Initiative Options

<table>
<thead>
<tr>
<th>RISK</th>
<th>Healthier behaviors</th>
<th>Environmental hazards</th>
<th>Crime</th>
<th>Pathways to advantage (family; student)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CARE</td>
<td>Preventive/chronic care</td>
<td>Mental illness care</td>
<td>Self care</td>
<td>Hospital infections</td>
</tr>
<tr>
<td>CAPACITY</td>
<td>PCP efficiency</td>
<td>Recruit PCPs (general; FQHC)</td>
<td>Hospital efficiency</td>
<td></td>
</tr>
<tr>
<td>COST</td>
<td>Pre-visit consult</td>
<td>Coordinate care</td>
<td>Post-discharge care</td>
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<tr>
<td>Medical home</td>
<td>Malpractice</td>
<td></td>
<td>Hospice</td>
<td></td>
</tr>
<tr>
<td>TRENDS</td>
<td>Uninsurance</td>
<td>Primary care slots</td>
<td>Inflation rate</td>
<td></td>
</tr>
<tr>
<td>Local economy</td>
<td>Hospital occupancy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FUNDING</td>
<td>Innovation fund</td>
<td>Reinvest savings</td>
<td>Contingent global payment</td>
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# Illustrative Scenarios

In Anytown, USA (based on national data at 1:1,000 scale)

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Some Insights: **Downstream Investments**

- Can deliver relatively fast, focused impact

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**Urgent episodes per capita**

- Baseline
- High Value Care

**Severe chronic physical illness**

- Baseline
- High Value Care

Care
Some Insights: **Downstream Investments**

- Tend to plateau and have mixed effects on cost and inequity
Some Insights: **Balanced Investments**

- Could unlock much greater potential for health and resilience
- The upstream elements yield broad progress on health, cost, equity, and productivity. The effects can be large, but accumulate gradually.
Some Insights: **Balanced Investments**

- Could unlock much greater potential for health and resilience
- The upstream elements yield broad progress on health, cost, equity, and productivity. The effects can be large, but accumulate gradually.

![Healthcare costs, per cap](chart)

- **Baseline**
- **Care + Protect**
- **High Value Care**

- **Care**
- **Care + Beh/Env**

YEAR: 2005-2040

difference of $0
0.0% change

ReThink Health
Some Insights: **Spending & Yield**

- Balanced initiatives are more expensive to implement
Some Insights: Spending & Yield

- But they may be affordable, especially when coupled with gains from downstream reforms

Cost savings available for reinvestment (cumulative)

- Baseline
- Care + Protect
- High Value Care

- $936M
- $1.82B

Care + Beh/Env

Care
Some Insights: **Spending & Yield**

- Many regions may not be able to afford *not to* make these cost-saving investments
Some Insights: Spending & Yield

- Beyond reducing health care costs, balanced strategies could drive greater economic productivity
Like all models, this tool is an... Inexact representations of the real thing

Special considerations

- Boundary
- Time horizon
- Aggregation
- Uncertainties

Over-reliance

Under-reliance

Tests of Confidence


Modeling Provides a Critical Strand

- Strong Stewardship
- Sustainable Financing
- Sound Strategy
ReThink Health modeling helped people discover surprisingly strong areas of consensus. It helped us sail through a step where we might otherwise have gotten stuck.

Karen Minyard
Co-Chair
Atlanta Regional Collaborative for Health Improvement
Evidence of Impact

- **Individuals** ~100% think differently, shift priorities, build competencies, and refocus their roles
- **Groups** ~90% move toward consensus-building and seek different or missing perspectives
- **Strategies** ~30% (within 6 months) change organizational structures, policies, investments
- **Methods** ~85% use system science to set strategies and shape investments

**Health and Resilience**
health, care, cost, equity, productivity
History of the ReThink Health Dynamics Model

- **2008-2011: HealthBound**
  - US health reform strategy
  - Sponsor: CDC
  - Publications: HA 2011; AJPH 2010

- **2003-present: Diabetes; Obesity; PRISM**
  - Multiple chronic diseases, US & 60+ sites
  - Sponsors: CDC and NIH

- **2005-2006: US Health Economy**
  - Growth of US health sector, 1960-2010
  - Sponsor: CDC
  - Publications: SDR 2006

- **1995-1997: Health Care Microworld**
  - Local health, health care, social policy
  - Sponsors: NEHA and Innovation Associates, Dartmouth-Hitchcock
  - Publications: SDR 1999

- **1993: Transition to Capitation**
  - Local healthcare financing
  - Sponsor: Healthcare Forum
  - Publication: Health Forum J 1994

**Selected Awards**
- 2013 Society for Health Education, Article of the Year
- 2012 AcademyHealth, Public Health Systems Research Article of the Year
- 2011 System Dynamics Society Best Application of SD Modeling
- 2009; CDC Honor Awards for 2005 Excellence in Innovation
- 2008 ASysT Institute, Applied Systems Thinking Prize

Refs: http://tinyurl.com/RTH-Related-Models
**Information Sources: Anytown, USA**

Anytown USA represents a perfect microcosm of the nation overall, at a scale of 1:1,000. Some of the main data sources are...

- U.S. Census and American Community Survey
- Vital Statistics
- Health, United States
- National Health and Nutrition Examination Survey (NHANES)
- Behavioral Risk Factor Surveillance Survey (BRFSS)
- National Survey of Children’s Health (NSCH)
- National Ambulatory Medical Care Survey (NAMCS)
- National Hospital Ambulatory Medical Care Survey (NHAMCS)
- National Hospital Discharge Survey (NHDS)
- National Nursing Home Survey (NNHS)
- National Home Health Care Survey (NHHS)
- Medical Expenditure Panel Survey (MEPS)
- Healthcare Cost and Utilization Project National Inpatient Sample (HCUP-NIS)
- National Health Expenditures (NHE)
ReThink Health modeling opened our eyes. It offered perspectives on big impact changes that might not pay off right away.

Christine-Nevin Woods  
Executive Director 
Pueblo City-County Health Department, CO
We saw how savings could yield a revenue stream down the road that would sustain the work. It showed that we can achieve the change we want by transition, we don’t need to tear down everything and start over.

Emile Runge
Health Policy Advisor
Fulton County Commission
Selected Examples of Impact

• **Atlanta** priorities, playbook, engagement, investment
• **Pueblo** priorities, backbone org, core capital
• **New England** regional integration, endowment fund for health
• **RWJF** multi-phase effort on investment and stewardship
• **IOM** tools for accelerating innovation
• **PCAST** report to the President
• **Universities** curricula, competencies, engagements, initiatives
Simulating Local Health System Dynamics

- Realistic yet simplified representation of a local health system (N=9 to date)
- Place-based, wide-angle view; diverse scenario options; scores of metrics to trace changes over decades
- Anchored to evidence from dozens of datasets, rendered in a common—testable—framework
- Tool for open, experiential learning with diverse stakeholders
- Not a prediction, but a way to see and feel how the health system could change under different conditions

ReThink Health Model – Overview

Selected Geographic Focus

Productivity & Equity

Risk → Health → Care → Cost

Capacity

Initiatives

Payment Scheme

Innovation Funds

Reinvested Savings

Aging

Other Trends

- Insurance eligibility
- Economic conditions
- Health care inflation
- Primary care slots
- Hospital occupancy

Population tracked separately in 10 segments by age, insurance, and income
Seeing a Wider System

Many pathways
181 graduate students from 93 schools

Their job was to apply skills learned in the classroom to develop a real-world solution that took into account intervention tactics, stakeholder needs and financial models.

Dentzer S. It takes more than a village to improve community health. The Health Care Blog. October 14, 2014. Available at http://thehealthcareblog.com/blog/2014/10/14/it-takes-more-than-a-village-to-improve-community-health/
Some Insights: Spending & Savings

• Balanced investments are expensive, but may still be affordable.
  – Many regions, may not be able to afford full-scale upstream initiatives \textit{unless} coupled with gains from downstream reforms
  – May not be able to afford \textit{not to} make these cost-saving investments

![Change vs baseline in value of productivity less healthcare costs and program spending (per capita)](image-url)

- Care + BehEnv: $3,110
- Care + BehEnv + FamPath: $2,530
- Care: $1,620
Some Insights: Spending & Savings

- Balanced investments are expensive, but may still be affordable.
  - Many regions, may not be able to afford full-scale upstream initiatives *unless* coupled with gains from downstream reforms.
  - May not be able to afford *not to* make these cost-saving investments.

![Per capita change vs baseline in healthcare and program costs](image-url)

- **Care**: 
  - 2005: $102
  - 2015: $102
  - 2020: $46
  - 2025: $1,105
  - 2030: $1,498
  - 2035: $976
  - 2040: $1,105

- **Care + BehEnv + FamPath**: 
  - 2005: $102
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  - 2020: $46
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- **Baseline**: 
  - 2005: $102
  - 2015: $102
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  - 2025: $102
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  - 2035: $102
  - 2040: $102

ReThink Health
“We can’t pursue a different future if we can’t see it.”
Conversations Around the Model

- What’s in the model does not define what’s in the room
- Simulations intentionally raise questions to spark broader thinking and judgment
- Boundary judgments follow from the intended purpose and users

REAL-WORLD
ACTION

Local intervention
opportunities and costs

SYSTEM
DYNAMICS MODEL

Community themes and strengths

Stakeholder relationships

Spatial differences

Available information

Other priorities and effects

Political power

Research agenda

Jan 1 of Year

8,000
7,000
6,000
5,000
4,000
2000
2010
2020
2030
2040

Poverty
Risky Behaviors
Environmental Hazards
Adequacy of Primary Care Capacity
Insurance Coverage
Medical Home Coordinate Care
Post-Discharge Care (to reduce readmission)
Redesign Practices for Efficiency
Recruit Private PCPs
Recruit Safety Net PCPs
Improve Provider Compliance with Routine Care Guidelines
Support Adherence
Control Mental Illness
Reduce Environmental Hazards
Healthier Behaviors
Pathways to Advantage
Insurance expansion due to federal mandate
More Use of Hospice
Funds Available for Initiatives
Capture Cost Savings (as negotiated with payers)
Innovation Fund for Early Investments
Crime
Reduce Crime
Use of ER for minor episodes
Use of Specialists for Routine Care
## Scenario 1: Downstream Care

### High-Value Preventive & Chronic Care

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<td>✓ Improve preventive and chronic care</td>
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<td>✓ Support self-care</td>
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<tr>
<td>✓ Redesign primary care for efficiency</td>
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Scenario 2: **Downstream Care + Upstream Protection**

High-Value Preventive/Chronic Care

+ Healthier Behaviors and Environments

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* Definitions and assumptions about effect size, cost, and time delay are available at: [http://www.rippelfoundation.org/docs/Interventions.pdf](http://www.rippelfoundation.org/docs/Interventions.pdf)
Scenario 3: **Care + Protect + Pathways**

**High-Value Preventive/Chronic Care**  
+ Healthier Behaviors and Environments + Family Pathways

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<td>✓ Reduce environmental hazards</td>
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</tr>
<tr>
<td>✓ <strong>Expand pathways to advantage for families</strong></td>
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Some Insights: **Workforce Productivity**

- XYZ
Some Insights: Inequity

- XYZ