Systems Thinking, the Opioid Crisis, and Artificial Intelligence

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Outline

• Part One: Asleep at the switch
• Part Two: Opioids—One Success Story from NC
• Part Three: Collective Impact 101
• Part Four: How to implement
• Part Five: Pitfalls and how to address
Part 1 Asleep at the Switch

How all 50 States Failed to React to Recent Outbreaks of Deaths of Despair
Core Functions of Public Health
Is the Public Health Wheel Spinning in US?

- Rising cause specific mortality in every US state over last 15 years
- Did states respond?
Age Adjusted M

9 - Suicide

Year

Expenditure on Behavioral Health in Millions
Epidemics and State Expenditure

New York

1 - Alcohol

6 - Drugs

9 - Suicide

5 - Diabetes

Age Adjusted Mortality Rate vs. Expenditure in Millions

- Expenditure on Behavioral Health in Millions
- Expenditure on Chronic Diseases in Millions
Epidemics and State Expenditure 2

Maryland

1 - Alcohol

6 - Drugs

9 - Suicide

5 - Diabetes

Age Adjusted Mortality Rate

Expenditure in Millions
Epidemics and State Expenditure 4

Georgia

1 - Alcohol

6 - Drugs

Age Adjusted Mortality Rate

Expenditure on Behavioral Health in Millions

Expenditure in Millions

9 - Suicide

Expenditure on Behavioral Health in Millions

Expenditure on Chronic Diseases in Millions

5 - Diabetes
Epidemics and State Expenditure 5

Wyoming

1 - Alcohol

6 - Drugs

Age Adjusted Mortality Rate

Expenditure in Millions

9 - Suicide

5 - Diabetes

Expenditure on Behavioral Health in Millions

Expenditure on Chronic Diseases in Millions
Lame response to behavioral epidemic

- 50 states had epidemics of suicide, alcohol, drug deaths from 2000 to 2016
- 11 states increased spending on behavioral health during this period
Epidemic Spotting?
Role for Artificial Intelligence
When to tell the Governor— "Epidemic!"

No official definition of "Outbreak" for chronic disease epidemics
Idaho
Suicide

Age Adjusted Mortality Rate per 100,000

Year


bandwidth = .8
Progress using Artificial Intelligence

We developed four robots

Algorithms for when to announce a trend break
Which was best?

Crowd sourced survey showing 10 curves to 200 grad students/faculty

Picked the robot that had the lowest mean squared error compared to the humans
Limits to Artificial Intelligence

Doubtful that the root problem is outbreak detection

What else could be askew in US public health responsiveness?
Part 2 Case study of Political Will and Systems Approach
• In 2007 Wilkes County, NC had the highest overdose mortality rate in the State

• Project Lazarus is a public health NGO that adopted a collective impact approach and became an umbrella for:
  • Hub
    • Coalition convening
    • Public awareness
    • Data consolidation
  • Spokes
    • Chronic pain management
    • Safer prescribing by providers in outpatient and ED
    • Naloxone
    • Pill drops
    • Recovery support groups

• Project Lazarus now scaling to other communities
Hub (i.e. “backbone”)

- Town hall meetings
  - Medical providers, Pharmacists, Law enforcement, Mental Health, Schools, Hospitals, Insurers, Faith communities
- Engage sectoral leaders
  - School superintendents
  - Sheriffs,
  - Substance abuse treatment directors,
  - Hospital CEOs
Data Collation

- **Outcome Data**
  - Gathered state and local epi data
  - Substances involved in overdoses
  - Demographics

- **Process Data**
  - Spoke projects supported in measuring their initiatives
Results
Part 3: Collective Impact, Top Down, Bottom Up
What is Collective Impact?

- Convening a community’s chief stakeholders in an enabling environment with:
  - 1) A common agenda
  - 2) A shared measurement system
  - 3) Mutually reinforcing activities
  - 4) Continuous communication
  - 5) Backbone support

- Achieve coherence and coordination
- Mobilize resources
5 Core Conditions for Collective Impact (5CCCI)

1) Establishing a common agenda
   - Agenda to be developed by community committees

2) Utilizing shared measurement
   - Health indicators developed for ease of use

3) Engaging in mutually reinforcing activities
   - Coherent plan developed with deep engagement of community committee

4) Facilitating continuous communication
   - Community health workers and others keep communication going

5) Providing backbone support
   - Training and facilitation of community committee functionality
Two Valid Approaches to Public Health

Top Down  (Hedgehog with a Big Idea)
- Execute
- Implement
- Accept
- Implement
- Accept
- Implement
- Accept

Bottom Up  (Fox knows many things)
- Execute
- Facilitate
Bottom Up

• Community capabilities
  • To convene community stakeholders
  • To set a common agenda
  • To execute their agenda
  • To measure their progress
  • To mutually reinforce activities across multiple sectors

• Outsiders = Partners
  • To set up/strengthen a forum where community can convene and openly discuss their agendas
  • To facilitate collaboration between residents as well as between residents and NGO staff
  • To (listen) participate in community-wide discussions
  • To empower/mobilize community members through the sharing of knowledge (i.e. health burden and solution)
  • To provide tech support/to facilitate to their execution
Bottom Up Pros and Cons

- **Advantages**
  - Sustainability from community
  - Adapts to needs
  - Adapts to strengths
  - Builds accountability from below
  - Resilient
  - Coherent with long tradition
  - This is development

- **Disadvantages**
  - Non standard treatment
  - Who gets the credit?
  - What is the package?
  - What if community is fragmented or inept?
Top Down

• The outside executor implements a standard package in every community using outside resources and planning.
Top Down Pros and Cons

• Advantages
  • Standardized product
    • One size fits all
  • Prefabricated components
  • Can attribute outcomes to the skill and wisdom of executive

• Disadvantages
  • Community is passive acceptor
  • Sustainability depends on continued outside initiative
  • Lack buy-in from the community
Part 4: Implementation
Basic steps in top down and bottom up

- Top Down
  - Design packages
  - Pilot test them
  - Deliver them to communities
  - Assure fidelity to design
    - Same package to everyone everywhere
  - Outside motivation
  - Outside resources

- Bottom Up
  - Improve community convening
  - Converse with communities
    - Listen to perception of need
    - Listen to current capacity to act
    - Inform with data on health burden
    - Inform with data on solutions
    - Work out local action plan
  - Facilitate community access to resources for action plan
  - Have a resource catalog that they can draw from
  - Assure continued cycles of support
Part Four: How to Do Bottom Up
Structure and Function

• Assemble
  • A set of community committees based on the above choice
  • Supported by Public Health Workers
  • Public Health workers as community organizers

• Set goals and monitor progress
  • Community committees consciously improve their performance
  • Public health workers consciously improve their performance
Dual Cycles of Continuous Quality Improvement

Public Health Workers

Assess → Analyze → Adapt

Community Committees

Assess → Analyze → Adapt
Professional Growth for Public Health Workers

- Orientation towards enhancing community committee function
- Public Health worker staff must be mentored and coached in:
  - Engaging the community committee in self-assessment of its own function
  - Coaching community leaders in improving committee function
  - Identifying quick wins and SMART objectives with the committee
Performance Expectations for Workers

- Standard competencies from collective impact and community organizing
- Relationship ethics (e.g. power, gender, class, social position)
- Competencies gleaned from current public health workers.
- What do they say they need to know?
Committee Functional Improvement

• Committee is asked to nominate indicators for committee functionality that it believes it should be held accountable for as a committee.
  • Mandatory indicators are, inclusiveness, use of data and ability to execute
  • Other indicators are per the committee’s own priorities

• Committee commits to a round of quarterly self-assessment of key indicators.

• Committee uses self-assessment to make process improvement plan for the committee’s own governance
  • Support capacity improvement services for committee leaders and secretariat. These are offered on site by subscription.
    • Coaching on leadership, budgeting, inclusiveness, task management
Committees in Action

- Community access to data about
  - Leading health burden
  - Risk factors
  - Schooling
  - Livelihoods

- Each community charged with prioritizing issues and identifying their inventory of relevant resources that could address

- Each community charged and coached to root cause analysis of priority problems

- Based on their own analysis, each community starts a plan for combining local resources in multiple sectors with support they requisition from state or philanthropy
Ongoing Evaluation

• Community committees need real time feedback about what is working/not working in the process

• Research team can design a combination of qualitative and quantitative ongoing continuous real time performance assessment of the process to help optimize it.

• Research team can report best practices and lessons learned throughout the district and to external policy makers
Part 5 Pitfalls
Resistance to cultural change

- Power problems—power will change hands from the government agency to the community
- Citizens accustomed to a “suppliant” role
- Elites accustomed to holding power
- Academics accustomed to being passive silent observers
# Aligning old expectations with new approach

<table>
<thead>
<tr>
<th>Who</th>
<th>Old version of success</th>
<th>New version of success</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community committee</td>
<td>Resources supplicated</td>
<td>Capability to make and execute plans</td>
</tr>
<tr>
<td>Elite</td>
<td>More power</td>
<td>Stewardship of population well being</td>
</tr>
<tr>
<td>NGO</td>
<td>Attributable change in counts of benefit</td>
<td>Strengthening capability</td>
</tr>
<tr>
<td>Academic</td>
<td>Effect size of a package</td>
<td>Find and share success factors with community</td>
</tr>
</tbody>
</table>
Complexity

• No central control of what each community will do and when
• Mismatched availability of packages relative to demand
• More openings for subversion of the process at the periphery
How to manage pitfalls

• **Communicate**
  • High level leadership must endorse the cultural change
  • Build in time for discussion of fears and concerns
  • Anticipate resistance
  • Build in flexibility to accommodate concerns
  • Tolerate some failures
The power of “Why”

- People and their organizations are motivated by the “Why” of things
- “Why” do we have our organizations?
- Why do these things day after day?
  - Hunger for a better life for our families and the future
  - Knowing solutions are out there and wanting them to come to pass
- A new structure that opens a pathway for everyone’s passion and skills
- Knowing “Why” will drive all of us to address the pitfalls
Conclusion: Why this works

• Appealing to a community’s shared concerns is “why” communities exist
• Crowd-sourced solutions unlock creativity and resources
• Foundation endures for continued progress
• Information sharing was always necessary
  • Now more accessible than ever because of data technology
  • New approach facilitates communication and information flow