Implementation science and learning health systems: Pieces of a puzzle

ANNE SALES PHD RN
SALESANN@UMICH.EDU
Overview

- Brief cartoon versions
  - Learning health systems
  - Implementation science
  - Points of similarity and convergence
  - Points of divergence
- Some of my recent (relevant) work
- Fitting the puzzle together—sort of
IOM defines a learning health system as

“... one in which progress in science, informatics, and care culture align to generate new knowledge as an ongoing, natural byproduct of the care experience, and seamlessly refine and deliver best practices for continuous improvement in health and health care”
IOM Learning Health System Series 2007 - 2012

VISION
CARE COMPLEXITY
EFFECTIVENESS RESEARCH
THE DATA UTILITY
EVIDENCE
DIGITAL PLATFORM
SYSTEMS ENGINEERING
PATIENTS & THE PUBLIC
COST & OUTCOMES
VALUE
LEADERSHIP
DATA QUALITY
From Chuck’s slides: Schema of a Learning Health System
And more from Chuck: the Virtuous Learning Cycle
Not unlike the PDSA cycle from continuous improvement
And...not unlike the Knowledge to Action cycle

A staple of Knowledge Translation (Canada)

Processes
- Identify gaps
- Adapt to local context
- Assess barriers to knowledge use
- Select, tailor and implement interventions
- Monitor knowledge use
- Evaluate outcomes
- Sustained knowledge use

http://ktclearinghouse.ca/knowledgebase/knowledgetoaction
Defining implementation science (IS)

- As defined by the Annual NIH Conference on Implementation and Dissemination, implementation is the use of strategies to adopt and integrate evidence-based health interventions and change practice patterns within specific settings. Research on implementation addresses the level to which health interventions can fit within real-world public health and clinical service systems.

- Implementation science is the study of methods to promote the integration of research findings and evidence into healthcare policy and practice. It seeks to understand the behavior of healthcare professionals and other stakeholders as a key variable in the sustainable uptake, adoption, and implementation of evidence-based interventions.

- [http://www.fic.nih.gov/News/Events/implementation-science/Pages/faqs.aspx](http://www.fic.nih.gov/News/Events/implementation-science/Pages/faqs.aspx)
Implementation Science—the journal

www.implementationscience.com
Current state of the science

- Most recent systematic review identified 61 different models or frameworks for dissemination and implementation

- Previous review (2006) found 41

  - Several efforts to consolidate frameworks
Exponential growth curve
The importance of theory: Behavior Change Wheel

Michie et al. *Implementation Science* 2011
http://www.implementationscience.com/content/6/1/42
And more theory

http://www.ucl.ac.uk/health-psychology/research/theories-techniques

<table>
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<th>Page</th>
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<td>1. Goals and planning</td>
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<td>6. Comparison of behaviour</td>
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<td>12. Antecedents</td>
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<td>1.1. Goal setting (behavior)</td>
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<td>2. Feedback and monitoring</td>
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<td>7. Associations</td>
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<td>2.1. Monitoring of behavior by others without feedback</td>
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<td>7.1. Prompts/cues</td>
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<td>7.8. Associative learning</td>
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And more theory

Consolidated Framework for Implementation Research
Damschroder et al. *Implementation Science* 2009
http://www.implementationscience.com/content/4/1/50
And more

http://cfirguide.org/constructs.html
And finally

Carl May: Towards a general theory of implementation
http://www.implementationscience.com/content/8/1/18
No magic bullets: a systematic review of 102 trials of interventions to improve professional practice

Andrew D. Oxman, MD, MSc; Mary Ann Thomson, BHSc(PT); David A. Davis, MD; R. Brian Haynes, MD, PhD

Still No Magic Bullets: Pursuing More Rigorous Research in Quality Improvement

Kaveh G. Shojania, MD, Jeremy M. Grimshaw, MBChB, PhD
Data for improvement and clinical excellence: report of an interrupted time series trial of feedback in long-term care

Anne E Sales¹², Corinne Schalm³, Melba Andrea B Baylon⁴ and Kimberly D Fraser⁴

The impact of implementation and change transfer in long-term care facilities: Protocol for a study

Anne E Sales*, Carole A Estabrooks¹ and Thomas W Valente²
Data for Improvement and Clinical Excellence (DICE)

- Designed as a 12 month project to deliver feedback reports to all direct care providers in four nursing homes (9 units) in Edmonton, Alberta, Canada
- Provide feedback reports to all staff
  - Previous studies only provided reports to professional staff
- Measure resident outcomes
- Understand how feedback interventions work in LTC settings
  - Measuring social networks and their interaction with the intervention
  - Measuring context using the Alberta Context Tools (not presented)
- Time series design with control (non-intervention) retrospective comparison
  - Interrupted time series using segmented regression analysis
  - Assessment of social networks embedded within study
# Study timeline

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<th>September-December 2007</th>
<th>November-December 2008</th>
<th>Jan-09</th>
<th>Feb-09</th>
<th>Mar-09</th>
<th>Apr-09</th>
<th>May-09</th>
<th>Jun-09</th>
<th>Jul-09</th>
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<th>Sep-09</th>
<th>Oct-09</th>
<th>Nov-09</th>
<th>Dec-09</th>
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<td>Month 2</td>
<td>Month 3</td>
<td>Month 4</td>
<td>Month 5</td>
<td>Month 6</td>
<td>Month 7</td>
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Monthly feedback reports

- 13 month feedback intervention
  - Delivered brief feedback report monthly based on resident outcomes/process measures to all direct care staff on 9 long term care units
  - Measured staff response to feedback reports one week after reports were delivered in most months

- Used Minimum Data Set-Resident Assessment Instrument (MDS-RAI) version 2.0 data about residents
  - Pain assessment
  - Depression screening
  - Falls and fall risk
Example of feedback graph

Figure 1. Residents with moderate to severe pain

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<tr>
<th>Month</th>
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<td>27.1</td>
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<td>Aug-08</td>
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<td>Mar-09</td>
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<td>Apr-09</td>
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Post-feedback survey

- Anonymous
  - Short demographic section
- Section on perception of feedback report
  - Read
  - Understand
  - Discuss
  - Find useful
  - Take action
- Theory of Planned Behavior section
Falls didn’t change
Pain did
But depression went the wrong way
Response rates varied by time and place
Observed behavior changed over time
Participants received, read and understood the reports.

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<tr>
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<th>Cycle 1</th>
<th>Cycle 2</th>
<th>Cycle 3</th>
<th>Cycle 4</th>
<th>Cycle 5</th>
<th>Cycle 6</th>
<th>Cycle 7/8</th>
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<td>94%</td>
<td>93%</td>
<td>53%</td>
<td>44%</td>
<td>34%</td>
<td>32%</td>
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<td>Read</td>
<td>82%</td>
<td>96%</td>
<td>65%</td>
<td>53%</td>
<td>56%</td>
<td>45%</td>
<td>56%</td>
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<td>Receive</td>
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<td>90%</td>
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<td>92%</td>
<td>99%</td>
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Participants intended to change behavior
Social network methods

- Paper survey, hand distributed
- Obtained lists of all staff working on the six nursing units as well as staff working on multiple units
  - Unit based staff are mostly nursing staff (registered nurses, licensed practical nurses, health care aides)
  - Multiple unit staff are mostly allied health professionals (occupational therapy, physical therapy, pharmacy, social work)
- Asked questions about five types of networks
  - Relevant to this discussion: “Who did you discuss the feedback report with?”
Networks discussing feedback report varied widely by unit
Why did we think this matters? TPB
Revisiting the virtuous cycle

- Gather Data
- Assemble Data
- Analyze Data
- Interpret Findings
- Feedback As Advice
- Change Practice

LHS CYCLE
Important problem

What we know about it

How are we doing? Gap assessment

Plausible reasons for the gap: differential list of barriers from people who have a gap

Plausible approaches to modifying those reasons

Reasons my colleagues and I came up with for the gap

Do something I think will work or is cool

Design interventions that address reasons/barriers

Do we still have a problem? What did we learn?

Design interventions that address reasons/barriers

Plausible reasons for the gap: differential list of barriers from people who have a gap

What we know about it

Reasons my colleagues and I came up with for the gap

Do something I think will work or is cool

Do we still have a problem? What did we learn?

Important problem

My pretty messy real world cycle
Revisiting the virtuous cycle
Fitting into the broader picture

- Beacon Community
- Integrated Delivery System
- Health Center Network
- Health Information Organization
- Pharma
- State Public Health
- Patient-centered Groups
- Federal Agencies

Governance
Patient Engagement
Trust
Analysis
Dissemination
Doing this work is like being in a thunderstorm for a long time...