The Promise and Challenge of Dissemination and Implementation Science (DIS)

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HTTPS://GOO.GL/FTUYRM

ACKNOWLEDGMENTS:
ROSS BROWNSON, DAVID CHAMBERS, BRYAN FORD, AMY KILBOURNE, BORSIKA RABIN AND THE GREAT RESEARCHERS CITED THROUGHOUT THIS TALK
Everything I know (about DIS)

Dissemination and Implementation Science (DIS) is about:

• Multi-level, contextual issues, and external validity
• Relevant, pragmatic models, research methods and measures
• Real world implementation and adaptation
• Designing for dissemination, sustainability and equity

(Normal science (T1– T2) is necessary but not sufficient)
Objectives

1. Why do we need DIS? How can DIS inform your work?

2. What might you expect if you engage in DIS? ....better outcomes: better fit to local context, better uptake, etc.

3. Overview some current DIS research areas and future opportunities
Balas & Boren, 2000

Original research

Negative results

Submission

Negative results

Acceptance

Negative results

Publication

Lack of numbers

Bibliographic databases

Inconsistent indexing

Reviews, guidelines, textbook

Implmentation

0.3 year

0.5 year

0.6 year

0.3 year

“PUBLICATION PATHWAY”

18%

46%

35%

Dickersin, 1987

Koren, 1989

Balas, 1995

Kumar, 1992

Kumar, 1992

Poyer, 1982

Koren, 1989

9.3 years

Balas & Boren, 2000
It takes 17 years to transform 14% of original research into the benefit of patient care.
Need for Pragmatic DIS Research

• Traditional biomedical RCTs study the effectiveness of treatments delivered to carefully selected populations under ideal conditions.

• Even when we do implement a tested intervention into everyday clinical practice, we often see a “voltage drop”...a dramatic decrease in effectiveness.

• Most common reason evidence-based programs are not adopted...they are not seen as relevant.

“...If we want more evidence-based practice, we need more practice-based evidence.”

Green LW. Am J Pub Health 2006

A Big Tent of Terms (and ovals)

Population Health (and Community) Services

Health Services Research

Implementation Science

Implementation Research

Dissemination Research

Quality Improvement Science

Health Communication Research

Pragmatic Research

QI

T1-T4 Research

Which type (T) is most common?

- **T1 (Bench)**: Can we invent a solution to a health problem?
- **T2 (Bedside)**: Could the invention work in humans?
- **T3 (Patients)**: Does it benefit patients?
- **T4 (Practice)**: Can it be delivered reliably in practice?
- **T5 (Public Health)**: Does it improve public health?
### Key Differences Between Traditional RCTs and Pragmatic Controlled Trials (PCTs)

<table>
<thead>
<tr>
<th></th>
<th>A traditional RCT tests a hypothesis under ideal conditions</th>
<th>A PCT compares treatments under everyday clinical conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GOALS</strong></td>
<td>To determine causes and effects of treatment</td>
<td>To improve practice and inform clinical and policy decisions</td>
</tr>
<tr>
<td><strong>DESIGN</strong></td>
<td>Tests the intervention against placebo using rigid study protocols and minimal variation</td>
<td><em>Tests two or more real-world using flexible protocols &amp; local customization</em></td>
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<tr>
<td><strong>PARTICIPANTS</strong></td>
<td>Highly defined and carefully selected</td>
<td>More representative because eligibility criteria are less strict</td>
</tr>
<tr>
<td><strong>MEASURES</strong></td>
<td>Require data collection outside routine clinical care</td>
<td>Brief and designed so data can be easily collected in clinical settings</td>
</tr>
<tr>
<td><strong>RESULTS</strong></td>
<td>Rarely relevant to everyday practice</td>
<td>Useful in everyday practice, especially clinical decision-making</td>
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</table>
## Key Characteristics of D&I Science

<table>
<thead>
<tr>
<th>Point #</th>
<th>Characteristic</th>
<th>Implication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systems Perspective</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Context is critical</td>
<td>Research should focus on and describe context</td>
</tr>
<tr>
<td>2</td>
<td><strong>Multilevel complexity</strong></td>
<td>Most problems, and interventions are multilevel and complex</td>
</tr>
<tr>
<td>3</td>
<td>Focus on systems characteristics</td>
<td>More emphasis needed on interrelationships among system elements and systems rules</td>
</tr>
<tr>
<td>Robust, Practical Goals</td>
<td></td>
<td></td>
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<tr>
<td>4</td>
<td>Representatives and reach</td>
<td>Focus on reaching broader segments of population and those most in need</td>
</tr>
<tr>
<td>5</td>
<td>Generalizability</td>
<td>Study generalization (or lack of such) across settings, subgroups, staff, and conditions</td>
</tr>
<tr>
<td>6</td>
<td>Pragmatic and practical</td>
<td>Producing answers to specific questions relevant to stakeholders</td>
</tr>
<tr>
<td>7</td>
<td><strong>Scalability and sustainability</strong></td>
<td>From outset, greater focus on scale-up potential and likelihood of sustainability</td>
</tr>
<tr>
<td>Research Methods to Enhance Relevance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Rigorous</td>
<td>Identify and address plausible threats to validity in context of question. Greater focus on replication</td>
</tr>
<tr>
<td>9</td>
<td>Rapid</td>
<td>Approaches that produce faster answers</td>
</tr>
<tr>
<td>10</td>
<td><strong>Adaptive</strong></td>
<td>Best solutions usually evolve over time, as a result of informed hypotheses and mini-tests with feedback</td>
</tr>
<tr>
<td>11</td>
<td>Integration of methods; triangulation</td>
<td>For greater understanding, integrated Quantitative and Qualitative methods are often required</td>
</tr>
<tr>
<td>12</td>
<td>Relevance</td>
<td>Relevance to stakeholders should be top priority</td>
</tr>
<tr>
<td>Flexibility</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Multiplicity</td>
<td>Encourage and support diverse approaches with the above characteristics (all models are wrong)</td>
</tr>
<tr>
<td>14</td>
<td><strong>Respect for diverse approaches; humility</strong></td>
<td>Different perspectives, goals, methods and approaches are needed. Continuing the same existing approaches will produce the same unsatisfactory results</td>
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Too often, we have assumed, “If you build it...”
An Evidence-Based Cancer Prevention... or Weight Loss... or Mental Health.....or (fill in blank) Story

Even if 100% effective...is only so good as how and whether:

• it is adopted
• practitioners are trained to deliver it
• trained practitioners choose to deliver it
• eligible populations receive it
• it can be sustained

If we assume 50% threshold for each step…

(even with perfect access/adherence/dosage/maintenance)

**Impact:** \[0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 = 3\% \text{ benefit}\]

[www.Re-aim.org](http://www.Re-aim.org)

# Pragmatic DIS Use of RE-AIM

<table>
<thead>
<tr>
<th>RE-AIM Dimension</th>
<th>Key Pragmatic Priorities and Key DIS Questions to Consider and Answer</th>
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<tbody>
<tr>
<td><strong>Reach</strong></td>
<td><strong>WHO</strong> is/was intended to benefit, and who actually participates or is exposed to the intervention?</td>
</tr>
<tr>
<td><strong>Effectiveness</strong></td>
<td><strong>WHAT</strong> is/was the most important benefits you are trying to achieve and what is/was the likelihood of negative outcomes?</td>
</tr>
<tr>
<td><strong>Adoption</strong></td>
<td><strong>WHERE</strong> is/was the program or policy applied and <strong>WHO</strong> applied it?</td>
</tr>
<tr>
<td><strong>Implementation</strong></td>
<td><strong>HOW</strong> consistently is/was the program or policy delivered, <strong>HOW</strong> will it be adapted, <strong>HOW</strong> much will/did it cost, and <strong>WHY</strong> will/did the results come about?</td>
</tr>
<tr>
<td><strong>Maintenance</strong></td>
<td><strong>WHEN</strong> will/was the initiative become operational; how long will/was it be sustained (setting level); and how long are the results sustained (individual level)?</td>
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The 5 Rs to Enhance Pragmatism, DIS and Likelihood of Translation

Research that is:

• Relevant
• Rapid and Recursive
• Redefines Rigor
• Reports Resources Required
• Replicable


Types of Outcomes in DIS Research (Proctor, et al., 2010)

<table>
<thead>
<tr>
<th>Implementation Outcomes</th>
<th>Service Outcomes</th>
<th>Client Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acceptability</td>
<td>Efficiency</td>
<td>Satisfaction</td>
</tr>
<tr>
<td>Adoption</td>
<td>Effectiveness</td>
<td>Function and QoL</td>
</tr>
<tr>
<td>Appropriateness</td>
<td>Equity</td>
<td>Symptoms</td>
</tr>
<tr>
<td>Costs</td>
<td>Patient-centeredness</td>
<td></td>
</tr>
<tr>
<td>Feasibility</td>
<td>Timeliness</td>
<td></td>
</tr>
<tr>
<td>Penetration</td>
<td>Safety</td>
<td></td>
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<td>Sustainability</td>
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Future Opportunities

Examples of how DIS Research can help address current and future prevention, healthcare, health equity and population health
Example One: Learning Healthcare Systems (and Communities)

- Big Data, e-Health/m-Health, geo-coding
- Consumer-driven Healthcare policy reform
  - Exchanges/ACOs
  - Medicaid expansion
- Learning Healthcare Systems
  - Aligning science with clinical priority goals
  - Emphasis on costs and value
  - Conducting more rapid and efficient studies
  - Leveraging existing data to deploy and evaluate innovations and best practices
The Long Road to Learning Healthcare Systems and Communities
(and why we need DIS and pragmatic application)

- New research takes too long for adoption (if at all)
- Research is often not aligned to address critical health and health care problems or feasible
- Research is often not designed with stakeholders
- Providers lack practical tools/technical assistance and strategies to implement EB treatments (data are not enough)
- Large programs are often rolled out without adequate planning to maximize effectiveness, learning and sustainability
- Variation and patient-centered care
  - Treatments work differently for different people and different settings
Example Two: Precision Medicine (Health)

• How does clinical practice incorporate PMI findings?
• How do you implement evidence that will evolve?
• How do you train and support the workforce?
• How do you ensure that PM findings improve, not exacerbate, health inequities?
Convergence of Precision Health, DIS & Learning Health Care Systems and Communities
RE-AIM Precision Medicine (PM- or Precision Health) Questions

Determine

• What percent and types of patients are Reached (equity);
• For whom among them is the PM intervention Effective, in improving what outcomes, with what unanticipated consequences (is health equity improved or decreased)?
• In what percent and types of settings is this approach Adopted;
• How consistently are different PM Implemented at what cost to different parties;
• And how well are the intervention components and their effects Maintained at both setting and individual levels?

Current DIS Funding Opportunities

**NIH:** PAR-18-017; 18-007; (18 ICs & Offices)

Purpose: To support innovative approaches to identifying strategies for the adoption, adaptation, integration, scale-up and sustainability of evidence-based interventions, tools, policies, and guidelines.

Also benefit in studying how to “de-implement” or reduce the use of strategies and interventions that are not evidence-based, yield sub-optimal benefits for patients, and are harmful or wasteful.

**PCORI:** Dissemination and Communication and Large Pragmatic Trials

**NHLBI:** Center on Translational Research and Implementation Science (training and research)
Key Science Questions- New and Old

• **Traditional science** and evidence question: *(necessary but not sufficient): “What intervention produces the largest effect in tightly controlled trials on the major (clinical) outcome?"

• **Pragmatic DIS** question: *(contextual)*
  “What program/policy components are most effective for producing what outcomes for which populations/recipients when implemented by what type of persons under what conditions, with how many resources and how/why do these results occur?”
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*Now ask Borsika the hard questions*
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• re-aim.org

• https://rtips.cancer.gov/rtips/index.do

• www.ucdenver.edu/accords/implementation

• www.Dissemination-Implementation.org
Rethinking Clinical Trials: A Living Textbook of Pragmatic Clinical Trials

Welcome to the Living Textbook of pragmatic clinical trials, a collection of knowledge from the NIH Health Care Systems Research Collaboratory. Pragmatic clinical trials are performed in real-world clinical settings with highly generalizable populations to generate actionable clinical evidence at a fraction of the typical cost and time needed to conduct a traditional clinical trial. They present an opportunity to efficiently address critical knowledge gaps and generate high-quality evidence to

http://www.rethinkingclinicaltrials.org/
Some Remedies and Key Terms

Implementation science is the study of methods to promote the integration of research findings and evidence into healthcare policy and practice.

Dissemination research is the scientific study of targeted distribution of information and intervention materials to a specific public health or clinical practice audience. The intent is to understand how best to spread and sustain knowledge and the associated evidence-based interventions.

Implementation research is the scientific study of the use of strategies to adopt and integrate evidence-based health interventions into clinical and community settings to improve patient outcomes and benefit population health.

Pragmatic research is the use of real-world tests in real-world populations and situations.
Goal: Translating Science into High Quality Care

T0 - Preclinical and Foundational Research
- Informs research with humans

T1 - Translation to Humans
- Clinical interventions and their initial testing

T2 - Translation to Clinical Settings
- Inform evidence-based guidelines

T3 - Translation to Practice
- Implementation in real-world settings

T4 - Translation to Populations
- Population-based outcomes studies