DISSEMINATION AND IMPLEMENTATION
IMPLEMENTATION RESEARCH

CHALLENGES AND OPPORTUNITIES

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Selected slides from David Chambers, DPhil, Brian Mittman, PhD, Rinad Beidas, PhD, and Enola Procter, PhD, MSW
“A little knowledge that acts is worth infinitely more than much knowledge that is idle.”

-Kahlil Gibran
“Closing the gap between research discovery and program delivery is both a complex challenge and an absolute necessity if we are to ensure that all populations benefit from the Nation’s investments in new scientific discoveries.” (National Institutes of Health)

• The field of Implementation Research seeks to close this gap:

  “supports the movement of evidence-based interventions and approaches from the experimental, controlled environment into the actual delivery contexts where the programs, tools, and guidelines will be utilized, promoted, and integrated into the existing operational culture” (Rubenstein, 2006)
Dissemination and Implementation Research

- **Dissemination is** “the targeted distribution of information and intervention materials to a specific public health or clinical practice audience.”
  - how, when, by whom, and under what circumstances evidence spreads throughout the agencies, organizations, front line workers and consumers of public health and clinical services

- **Implementation is** “the use of strategies to adopt and integrate evidence-based health interventions and change practice patterns within specific settings.”
  - Seeks to understand the behavior of healthcare professionals and support staff, healthcare organizations, healthcare consumers and family members, and policymakers in context as key influences on the adoption, implementation and sustainability of evidence-based interventions and guidelines

*From: NIH PAR 16-238: Dissemination and Implementation Research in Health (R01); Adapted from Lomas (1993)*
Who is responsible?

Researchers/ program developers, implementers, health service providers, funders, politicians?

A barrier to translation of intervention research findings for public health benefit is that developers (often researchers) practitioners, and policy makers believe that the responsibility for dissemination lies elsewhere.
Researchers: I don’t have the training or interest in approaches to enhance dissemination of research products; grant funding does not support such activities.

Practitioners: The responsibility for summarizing and making research products useful lay elsewhere. But if they were easy to find and use we would do it.

Fostering implementation of health services research findings into practice: a consolidated framework for advancing implementation science
Laura J Damschroder*, David C Aron, Rosalind E Keith, Susan R Kirsh, Jeffery A Alexander and Julie C Lowery
Studying Implementation

What?
Evidence-based Interventions

How?
Implementation Strategies

Implementation Outcomes
Feasibility
Sustainability
Uptake
Costs

Service Outcomes
Efficiency
Patient-centeredness
Timeliness

Health Outcomes
Satisfaction
Function
Health status/symptoms

Implementation Research Methods

*IOM Standards of Care

Adapted from Proctor et al 2009 Admin. & Pol. in Mental Health Services
Types of D&I Research Questions

- Questions about factors influencing adoption, implementation, and sustainability of evidence based programs, policies, practices.
- Testing of models or frameworks; relationships between constructs; predictors of implementation outcomes; measurement studies
Questions related to the development and evaluation of strategies (or groups of strategies) to increase adoption, implementation, and sustainability.

- Questions related to scale-up
- Questions related to sustainability
## Distinguishing clinical research from implementation research

<table>
<thead>
<tr>
<th>Study feature</th>
<th>Clinical research</th>
<th>Implementation research</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Aim: evaluate a / an ...</strong></td>
<td>clinical intervention</td>
<td>implementation strategy</td>
</tr>
<tr>
<td><strong>Typical intervention</strong></td>
<td>drug, procedure, therapy</td>
<td>organizational practice change, training</td>
</tr>
<tr>
<td><strong>Typical outcomes</strong></td>
<td>symptoms, health outcomes, patient behavior</td>
<td>adoption, adherence, fidelity, level of implementation</td>
</tr>
<tr>
<td><strong>Typical unit of analysis, randomization</strong></td>
<td>Patient, community member</td>
<td>clinic, team, facility, school</td>
</tr>
</tbody>
</table>
How to Increase Implementation?
Often a Haphazard Process

It Seemed Like A Good Idea At The Time”

ISLAGIATT principle

Martin Eccles via Jeremy Grimshaw’s (2012) Presentation at KT Summer Institute
Implementation Strategies Are…

Methods or techniques used to enhance the adoption, implementation, and/or sustainability of a clinical or public health program or practice

OR

The ‘how to’ component of changing healthcare or public health practice.

Key: How to make the “right thing to do” the “easy thing to do…” Carolyn Clancy, Former Director of AHRQ

Adapted from Proctor, Powell, & McMillen, 2013
Types of Implementation Strategies

Implementation Strategies

- **Discrete** - Single action or process (e.g., institute system of reminders)
- **Multifaceted** - Combination of multiple discrete strategies (e.g., training + reminders)
- **Blended** - Multifaceted strategies that have been protocolized and (often) branded (e.g., ARC)

Powell et al., 2012; Procter 2011
Implementation Strategy Types/Taxonomies

From Powell 2012

- Plan Strategies
- Educate Strategies
- Finance Strategies
- Restructure Strategies
- Quality Management Strategies
- Attend to Policy Context Strategies
A refined compilation of implementation strategies: results from the Expert Recommendations for Implementing Change (ERIC) project

Byron J Powell\textsuperscript{1}, Thomas J Waltz\textsuperscript{2}, Matthew J Chinman\textsuperscript{3,4}, Laura J Damschroder\textsuperscript{5}, Jeffrey L Smith\textsuperscript{6}, Monica M Matthieu\textsuperscript{6,7}, Enola K Proctor\textsuperscript{8} and JoAnn E Kirchner\textsuperscript{6,9}
Types of Implementation Strategies

- Use Evaluative and Iterative Strategies
- Provide Interactive Assistance
- Adapt and Tailor to Context
- Develop Stakeholder Interrelationships
- Train and Educate Stakeholders
- Support Clinicians
- Engage Consumers
- Utilize Financial Strategies
- Change Infrastructure

Evidence-Base for Implementation Strategies

- Several strategies found to be effective under some, but not all circumstances
- Most strategies result in modest improvements
- Passive approaches (e.g., “train and pray”) are generally ineffective
- Mixed-evidence regarding the effectiveness of multi-faceted implementation strategies (Grimshaw et al., 2006; Squires et al., 2014; Wensing et al., 2009)
Where can I find them?

- Reviews & Compilations
- Key Textbooks
- Treatment and Strategy
  - Manuals
- Literature Searches
- Learning from Positive Deviants
- Develop your own....
Stages of Research and Phases of D&I

Preintervention

Efficacy Studies

Effectiveness Studies

D&I Studies

Exploration

Adoption

Implementation

Sustainment

Shortcomings of a sequential model

• Traditional clinical effectiveness research tends to declare victory early and is considered finished when effects are shown in one or more settings
• Traditional Implementation research tends to buy into the fantasy that the innovation is ready for dissemination

This results in:
• Endless RCTs of innumerable tweaks for various specific applications.....each followed by an implementation study
• Long loops and a long time to public health impact

Based on a presentation by: Geoffrey M. Curran, PhD, Brian S. Mittman, PhD, Sara Landes, PhD, Jeffrey M. Pyne, MD, David Chambers, DPhil
Effectiveness-implementation Hybrid Designs

Combining Elements of Clinical Effectiveness and Implementation Research to Enhance Public Health Impact

Geoffrey M. Curran, PhD,* Mark Bauer, MD, † Brian Mittman, PhD, ‡
Jeffrey M. Pyne, MD,* and Cheryl Stetler, PhD, †

Objectives: This study proposes methods for blending design components of clinical effectiveness and implementation research. Such blending can provide benefits over pursuing these lines of research independently, for example, more rapid translational gains, more effective implementation strategies, and more useful information for decision makers. This study proposes a "hybrid effectiveness-implementation" typology, describes a rationale for their use, outlines the design decisions that must be faced, and provides several real-world examples.

Results: An effectiveness-implementation hybrid design is one that takes a dual focus a priori in assessing clinical effectiveness and implementation. We propose 3 hybrid types: (1) testing effects of a clinical intervention on relevant outcomes while observing and gathering information on implementation; (2) dual testing of clinical and implementation interventions/strategies and (3) testing of an implementation intervention in the context of an existing clinical trial. An example is provided from the Public Health Intervention Development (PHID) Project, which tested the feasibility of comprehensive clinical effectiveness and implementation interventions for tobacco control in health care settings.

Much has been written about the nature of health care science-to-service gaps both in general and specifically to health promotion and numerous medical specialties. Thus far, the literature indicates that gaps between research and practice can result from multiple factors, including educational/knowledge deficiencies and/or disagreements, time constraints for practitioners, lack of decision support tools and feedback mechanisms, poorly aligned incentives, and a host of other organizational climate and cultural factors.

In addition to these provider-level and systems-level barriers to rapid translation, Glasgow et al. and others argue that the time lag between research discovery and routine uptake is also inflated by the dominant developmental approach; that is, one that encourages delimited, step-wise progressions of research through clinical efficacy research, then through effectiveness research, and finally through implementation research.
Effectiveness-Implementation Hybrid Designs

Why Hybrid Trial Designs?

- The speed of moving research findings into routine adoption can be improved by considering hybrid designs that combine elements of effectiveness and implementation research.
- Don’t wait for “perfect” effectiveness data before moving to implementation research.
- We can “backfill” effectiveness data while we test implementation strategies.

Based on a presentation by: Geoffrey M. Curran, PhD, Brian S. Mittman, PhD, Sara Landes, PhD, Jeffrey M. Pyne, MD, David Chambers, DPhil
Traditional Research Pipeline

Spatially speaking, hybrids “fit” in here…

Based on a presentation by: Geoffrey M. Curran, PhD, Brian S. Mittman, PhD, Sara Landes, PhD, Jeffrey M. Pyne, MD, David Chambers, DPhil
Types of Hybrids

Hybrid Type 1: test clinical/prevention intervention, observe/gather information on implementation

Hybrid Type 2: test clinical/prevention intervention, test/study implementation strategy

Hybrid Type 3: test implementation strategies, observe/gather information on clinical/prevention outcomes

From Curran, G. et al. (2012); Medical Care, 50(3), 217-226
Theories and Frameworks in D&I Science
Theories vs Frameworks

- **Theories**
  - describe a way of understanding events or behaviors
  - provide descriptions of interrelated concepts or constructs that explain or predict events or behaviors by spelling out the relationships between variables
  - not content specific; they are generic, abstract, and broadly applicable.

- **Frameworks**
  - conceptual structures or scaffolds that can provide a systematic way to develop, manage, and evaluate interventions.

- While conceptually different, both theories and frameworks can be used to enhance D&I research
Caveats to use of Models for D&I

- There is no comprehensive model sufficiently appropriate for every study or program
- Not all models are well operationalized
- Models should be considered dynamic

Chambers, 2014 (Chapter Two) in Beidas & Kendall (eds), OUP.
Tabak et al. review

- Identified 109 models

- Exclusions
  - 26 focus on practitioners
  - 12 not applicable to local level dissemination
  - 8 end of grant knowledge translation
  - 2 duplicates

- Included 61 models

- Categories: Construct Flexibility, Socio-ecological Framework, D vs. I

Tabak, Khoong, Chambers, Brownson, *AJPM*, 2012
Conducted a narrative review of selective literature to identify key theories, models and frameworks used in implementation science.

- Process models- describing or guiding the process of translating research to practice
- Evaluation frameworks
- Frameworks for understanding or explaining what influences implementation outcomes
  - Determinants frameworks
  - Classic theories
  - Implementation theories

Examples of Implementation Frameworks

Diffusion of Innovation
RE-AIM
Consolidated Framework for Implementation Research
Diffusion of Innovation Theory

The process of communicating innovation through certain channels over time through members of a social system.

- How new ideas, products, and behaviors become norms
- All levels: individual, interpersonal, community, and organizational
- Success determined by: nature of innovation, communication channels, adoption time, social system

Figure 1. Elements of the RE-AIM Framework

- **Adoption**
  - How do I incorporate the intervention so it is delivered over the long-term?
  - How do I ensure the intervention is delivered properly?
  - How do I develop organizational support to deliver my intervention?

- **Implementation**
  - How do I know my intervention is effective?

- **Reach**
  - How do I reach the targeted population?

- **Effectiveness**
  - How do I know my intervention is effective?

- **Maintenance**
  - How do I know my intervention is effective?

Glasgow et al, RE-AIM.net, 2011
What is RE-AIM

- RE-AIM is an acronym that consists of five elements, or dimensions, that relate health behavior interventions:
  - **Reach** the target population
  - **Efficacy** or effectiveness
  - **Adoption** by target settings or institutions
  - **Implementation** - consistency of delivery of intervention
  - **Maintenance** of intervention effects in individuals and populations over time
Consolidated Framework for Implementation Research (CFIR)

Damschroder and Damush, 2009


Adapted from: David Chambers, DPhil Associate Director, NIMH D&I Research; American College of Epidemiology D&I Research Workshop 2014
**Consolidated Framework for Implementation Research (CFIR)**

- “An overarching typology to promote implementation theory development”
- Builds on Greenhalgh et al.’s synthesis of 500 sources, plus newer articles
- Combines Greenhalgh’s conceptual model with 18 new models
- “Meta-theoretical” – a synthesis of existing theories, no depiction of inter-relationships, ecologic levels or hypotheses

Consolidated Framework for Implementation Research (CFIR)

- Composed of 5 major domains:
  - Intervention characteristics
  - Outer setting
  - Inner setting
  - Characteristics of the individuals involved
  - Process of implementation

Characteristics of the Intervention

- Intervention source
- Evidence strength & quality
- Relative advantage
- Adaptability
- Trialability
- Complexity
- Design quality and packaging
- Cost
Inner Setting

Constructs

- Structural characteristics
- Networks & communication
- Culture
- Implementation climate
- Readiness for implementation
Outer Setting

 Constructs

- Patient needs and resources
- Cosmopolitanism
- Peer pressure
- External policy & incentives
Characteristics of Individuals

Constructs

- Knowledge & beliefs about the intervention
- Self-efficacy
- Individual stage of change
- Individual identification with the organization
- Other personal attributes
Process of Implementation

Constructs

- Planning
- Engaging
- Executing
- Reflecting & evaluating
Measurement of CFIR constructs

- Researcher opportunities:
  - Assess each construct for salience, and adapt and operationalize definitions for each study
  - Discern levels at which each construct should be evaluated and defined (e.g., individuals, teams, units, clinics)
  - Decide how to measure and assess each
  - Consider best timing for measurement given dynamic process of implementation
ISF

- ISF provides heuristic for understanding key systems, functions, and relationships relevant to dissemination and implementation process
  - Identifies key stakeholders
  - Determines how key stakeholders can interact
- Provides useful way of organizing existing dissemination and implementation theories from different disciplines
- Suggests important areas for new research on dissemination and implementation
- Suggests activities that could improve dissemination and implementation
**A Heuristic**

\[ R = MC^2 \]

Readiness\(_i\) = \( \text{Motivation}\_i \times \text{General Capacity} \times \text{Innovation-Specific Capacity}\_i \)

# General Capacities

<table>
<thead>
<tr>
<th>Types of General Capacities (non-exhaustive)</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Culture</strong></td>
<td>Drzensky et al., 2012; Glisson, 2007; Glisson &amp; Schoenwald, 2005; Hemmelgarn et al., 2006</td>
</tr>
<tr>
<td><strong>Climate</strong></td>
<td>Aarons et al., 2011; Beidas et al., 2013; Damschroder et al., 2009; Glisson, 2007; Greenhalgh et al., 2004, Hall &amp; Hord, 2010; Lehman et al., 2002</td>
</tr>
<tr>
<td><strong>Organizational Innovativeness</strong></td>
<td>Damschroder et al., 2009; Fetterman &amp; Wandersman, 2005; Greenhalgh et al., 2004; Klein &amp; Knight, 2005; Rafferty et al., 2013; Rogers, 2003</td>
</tr>
<tr>
<td><strong>Resource Utilization</strong></td>
<td>Armstrong et al., 2006; Greenhalgh et al., 2004; Klein et al., 2001; Rogers, 2003; Simpson, 2002</td>
</tr>
<tr>
<td><strong>Leadership</strong></td>
<td>Aarons &amp; Sommerfield, 2012; Becan, Knight, &amp; Flynn, 2012; Beidas et al., 2013; Fixsen et al., 2005; Grant, 2013; Rafferty et al., 2013; Simpson et al., 2002</td>
</tr>
<tr>
<td><strong>Structure</strong></td>
<td>Damschroder et al., 2009; Flaspohler et al., 2008; Greenhalgh et al., 2004, Lehman et al., 2002; Rafferty et al., 2013; Rogers, 2003</td>
</tr>
<tr>
<td><strong>Staff Capacity</strong></td>
<td>Flaspohler et al., 2008; McShane &amp; Van Glinow, 2009; Simpson et al., 2002</td>
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</table>
# Innovation-Specific Capacities

<table>
<thead>
<tr>
<th>Types of Innovation-Specific Capacities; (non-exhaustive)</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Innovation-Specific knowledge, skills, and abilities</strong></td>
<td>Wandersman, Chien, &amp; Katz, 2012; Fixsen et al., 2005; Greenhalgh et al., 2004; Simpson, 2002</td>
</tr>
<tr>
<td><strong>Program Champion</strong></td>
<td>Atkins et al., 2008; Damshroder et al., 2009; Greenhalgh et al., 2004; Gladwell, 2002; Grant, 2013; Rafferty et al., 2013; Rogers, 2003</td>
</tr>
<tr>
<td><strong>Specific Implementation Supports</strong></td>
<td>Aarons et al., 2011; Beidas et al., 2013; Damshroder et al., 2009; Fetterman &amp; Wandersman, 2005; Greenhalgh et al., 2004; Hall &amp; Hord, 2010; Rogers, 2003; Schoenwald &amp; Hoagwood, 2001; Weiner et al., 2008.</td>
</tr>
<tr>
<td><strong>Interorganizational Relationships</strong></td>
<td>Aarons et al., 2011; Flaspohler et al., 2004; Powell et al., 2012</td>
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</tbody>
</table>
## Motivation for Innovation

### Types of Motivations (non-exhaustive)

<table>
<thead>
<tr>
<th>Types of Motivations</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relative Advantage</td>
<td>Armenakis et al., 1993; Damschroder et al., 2009; Hall &amp; Hord, 2010; Rafferty et al., 2013; Rogers, 2003; Weiner, 2009</td>
</tr>
<tr>
<td>Compatibility</td>
<td>Chinman et al., 2004; Durlak &amp; Dupre, 2008; Fetterman &amp; Wandersman, 2005; Greenhalgh et al., 2004; Rogers, 2003; Simpson, 2002</td>
</tr>
<tr>
<td>Complexity</td>
<td>Damschroder &amp; Hagedorn, 2011; Fixsen et al., 2005; Greenhalgh et al., 2004; Meyers, Durlak &amp; Wandersman, 2012; Wandersman et al., 2008.</td>
</tr>
<tr>
<td>Trialability</td>
<td>Armenakis et al., 1993; Greenhalgh et al., 2004; Rapkin et al., 2012; Rogers, 2003</td>
</tr>
<tr>
<td>Observability</td>
<td>Beutler, 2001; Chinman et al., 2004; Damschroder et al., 2009; Ford et al., 2008; Rossi, Lipsey, &amp; Freeman, 2004</td>
</tr>
<tr>
<td>Priority</td>
<td>Armenakis &amp; Harris, 2009; Greenhalgh et al., 2004; Flaspohler et al., 2008</td>
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Developing strategies to increase adoption, implementation, and maintenance
Three ways to use IM for D&I

1. Designing programs in ways that enhance its potential for being adopted, implemented, and sustained

2. Designing dissemination interventions (strategies) to influence adoption, implementation and continuation

3. Using IM processes to adapt existing evidence-based interventions

Intervention Mapping guides the D&I planner/researcher to answer the following questions:

- Who will decide to adopt and use the program? Which stakeholders will decision makers need to consult?
- Who will make resources available to implement the program?
- Who will implement the program? Will the program require different people to implement different components?
- Who will ensure that the program continues as long as it is needed?
- What do they need to do?
- Why would they do it (determinants)?
- How (what methods and strategies) do we influence these adoption, implementation, and maintenance behaviors and conditions?
### EBI and Implementation Intervention Targets and Outcomes

<table>
<thead>
<tr>
<th>Program</th>
<th>Implementation</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Theory - &amp; Evidence-Based Program, Policy, Practice (EBP)</strong></td>
<td><strong>Implementation</strong>&lt;br&gt;Delivers Methods designed to create change in determinants of Implementation behaviors and implementation environment</td>
<td><strong>Outcomes</strong>&lt;br&gt;Multi-level Implementation Context&lt;br&gt;Setting characteristics, policy climate, culture, readiness, resources</td>
</tr>
<tr>
<td><strong>Context and setting</strong></td>
<td><strong>Determinants of Program Use</strong>&lt;br&gt;Determinants of Adoption: knowledge; perception of EBA&lt;br&gt;Implementation: skills; outcome expectations; collective-efficacy&lt;br&gt;Determinants of Maintenance: beliefs, skills</td>
<td><strong>Program Use Tasks (Performance Objectives)</strong>&lt;br&gt;<strong>Adoption POs</strong>: e.g. Clinic leaders review &amp; discuss EBA&lt;br&gt;<strong>Implementation POs</strong>: e.g. Nurses deliver education to patients&lt;br&gt;<strong>Maintenance POs</strong>: Coordinator adjusts workflow to accommodate patient education prior to provider visit</td>
</tr>
<tr>
<td><strong>Program components for target population and environmental agents</strong></td>
<td><strong>Program Use Outcomes</strong>&lt;br&gt;Adoption&lt;br&gt;Implementation&lt;br&gt;Maintenance</td>
<td><strong>Impact on Health and Quality of Life Outcomes</strong></td>
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Funding Opportunities
Current Funding Announcements

NIH: PAR # 16-236; 237, 238 (R03, R01, R21)

- NCI leads (16 ICs total, including FIC, NIMH, NHLBI, NHGRI, as well as OBSSR)
- Organizes the D&I research agenda across NIH
- 147 grants funded through NIH since 2006 (46 NCI grants over 9 years)
  - 25 NCI R01s; 5 R03s; 16 R21s
- 2010 CSR standing review committee
D&I Areas of Research Ripe for Exploration

- Sustainability of EBPs in a Changing Context
- Adaptability/Evolution of EBPs over time
- Impact of dissemination strategies on practice change
- Scaling up practices across health plans, systems, and networks
- De-Implementation/Exnovation
- Adaptive designs (implementation as a step-wise approach)
- Real-time feedback/monitoring on EBPs
- Use of big data

David Chambers, 2014
Growing Resources

- Training Programs (e.g. TIDIRH, IRI, MT-DIRC, KT Canada, Universities)
- Research Infrastructure (CIPRS, CPCRN, HMORN, Other Centers, CTSA Cores)
- Measurement Tools (GEM-IS, SIRC, SIC, RE-AIM)
- The Next Generation (100s of trainees)
- Implementation Science
- Brownson, Colditz, Proctor (Eds.) *Dissemination and Implementation Research in Health*, 2012
- Annual D&I Meeting December 4-6, 2017 Marriott Crystal gateway, Arlington VA
D&I RESOURCES

- http://dissemination-implementation.org
- http://gem-beta.org
- http://www.societyforimplementationresearchcollaboration.org
- http://cancercontrolplanet.cancer.gov
- https://researchtoreality.cancer.gov
- https://impsci.tracs.unc.edu/