

# Achieving Outcomes from Evidence Based Interventions: An Introduction to Implementation Science

CCTST Grand Rounds

Rohit Ramaswamy

June 17, 2022

# Session Objectives

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- Define Implementation Science and describe why it is important
- Explain key IS principles and concepts
- Discuss Implementation Research designs

# Translating Knowledge to Practice: The Know-Do Gap

## KNOWLEDGE

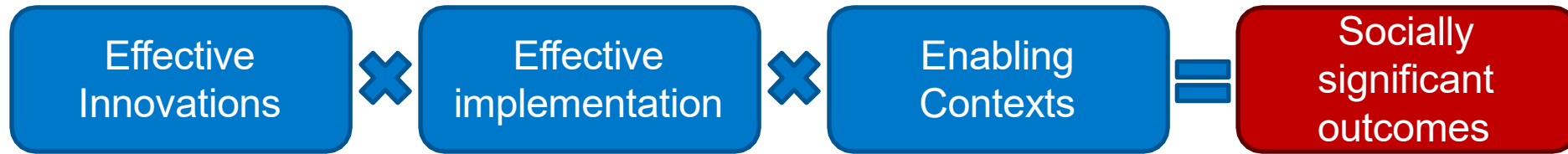
- Efficacious interventions
- Often demonstrated through randomized clinical trials
- High level of internal validity

## IMPLEMENTATION

- Engaged communities and target populations
- Infrastructure
- Equipment and supplies
- Motivated staff
- Policies
- Processes

# Formula for Closing the Know-Do Gap

## Active Implementation Frameworks



<http://nirn.fpg.unc.edu/learn-implementation/implementation-defined>

# Effective Intervention: The Surgical Safety Checklist

The NEW ENGLAND JOURNAL of MEDICINE

SPECIAL ARTICLE



## A Surgical Safety Checklist to Reduce Morbidity and Mortality in a Global Population

Surgical complications are a considerable cause of death and disability around the world.<sup>3</sup> They are devastating to patients, costly to health care systems, and often preventable, though their prevention typically requires a change in systems and individual behavior. In this study, a checklist-based program was associated with a significant decline in the rate of complications and death from surgery in a diverse group of institutions around the world. Applied on a global basis, this checklist program has the potential to prevent large numbers of deaths and disabling complications, although further study is needed to determine the precise mechanism and durability of the effect in specific settings.

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# Surgical Safety Checklist: Ontario Study

## Introduction of Surgical Safety Checklists in Ontario, Canada

David R. Urbach, M.D., Anand Govindarajan, M.D., Refik Saskin, M.Sc.,  
Andrew S. Wilton, M.Sc., and Nancy N. Baxter, M.D., Ph.D.

### RESULTS

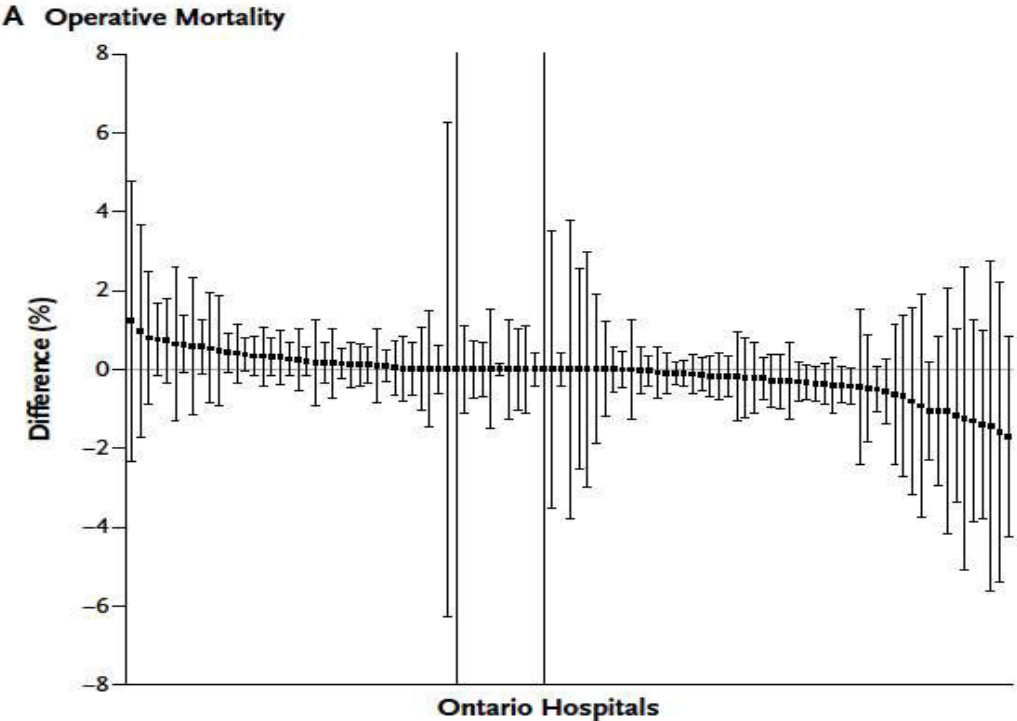
During 3-month periods before and after adoption of a surgical safety checklist, a total of 101 hospitals performed 109,341 and 106,370 procedures, respectively. The adjusted risk of death during a hospital stay or within 30 days after surgery was 0.71% (95% confidence interval [CI], 0.66 to 0.76) before implementation of a surgical checklist and 0.65% (95% CI, 0.60 to 0.70) afterward (odds ratio, 0.91; 95% CI, 0.80 to 1.03;  $P=0.13$ ). The adjusted risk of surgical complications was 3.86% (95% CI, 3.76 to 3.96) before implementation and 3.82% (95% CI, 3.71 to 3.92) afterward (odds ratio, 0.97; 95% CI, 0.90 to 1.03;  $P=0.29$ ).

Source: Urbach DR, Govindarajan A, Saskin R, Wilton AS, Baxter NN. Introduction of surgical safety checklists in Ontario, Canada. *N Engl J Med*. 2014 Mar 13;370(11):1029-38. doi: 10.1056/NEJMSa1308261. PMID: 24620866.

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# Results



Source: Urbach DR, Govindarajan A, Saskin R, Wilton AS, Baxter NN. Introduction of surgical safety checklists in Ontario, Canada. *N Engl J Med.* 2014 Mar 13;370(11):1029-38. doi: 10.1056/NEJMs1308261. PMID: 24620866.

# Reactions

*“We hope that these findings from Ontario will **lead to greater attention not just to the intervention but also to the implementation process**”*

*“The authors neither evaluated the validity of reported claims of checklist use nor collected process measures to assess trends in compliance with known standards of care, **even though the difference between reported compliance and actual adherence can frequently be vastly divergent.**”*

*“The diligence with which the checklist is developed and applied **is critical to its effectiveness.**”*



# Implementation Challenges

## WHO safe surgery checklist: Barriers to universal acceptance

Divya Jain, Ridhima Sharma, Seran Reddy

Department of Anesthesia and Intensive Care, Post Graduate Institute of Medical Education and Research, Chandigarh, India

*“despite substantial evidence advocating the need of the WHO checklist in reducing the infection rate and morbidity, the hesitancy among many health-care providers to implement it in everyday practice is a matter of concern”*

# Implementation Science

Study of methods and strategies that facilitate the uptake of evidence-based interventions into regular use.

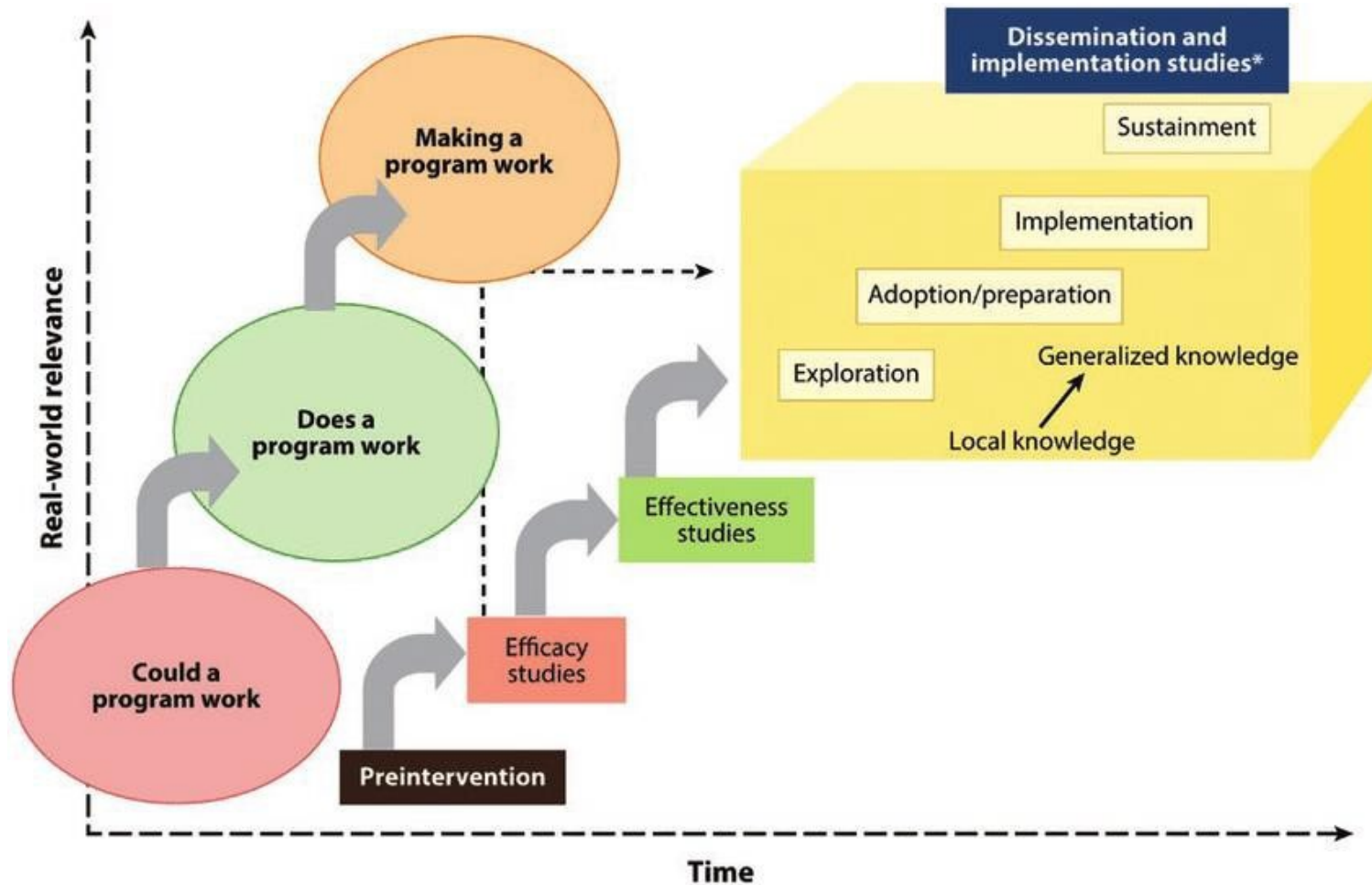


# The Goals of Implementation Science

- Develop, test and refine relevant theories, conceptual frameworks, and measures to understand the process of implementation.
- Produce generalizable knowledge on implementation strategies by understanding the barriers and facilitators of implementation
- Develop effective strategies for implementing evidence-based practices that improve health-related processes & outcomes.

Kirchner, J. E., Smith, J. L., Powell, B. J., Waltz, T. J., & Proctor, E. K. (2019). Getting a clinical innovation into practice: An introduction to implementation strategies. *Psychiatry Research*, 112467. doi: 10.1016/j.psychres.2019.06.042

# The Translational Continuum



\*These dissemination and implementation stages include systematic monitoring, evaluation, and adaptation as required.

# Distinguishing Clinical Research from Implementation Research

Study feature	<b>Study type</b> <u>Clinical research</u>	<u>Implementation research</u>
<b>Aim: evaluate a / an ...</b>	clinical intervention, health promotion intervention, policy	implementation strategy
<b>Typical intervention</b>	drug, procedure, therapy, prevention program	organizational practice change, training
<b>Typical outcomes</b>	symptoms, health outcomes, patient behavior	adoption, adherence, fidelity, level of implementation
<b>Typical unit of analysis, randomization</b>	Patient, community member	clinic, team, facility, school

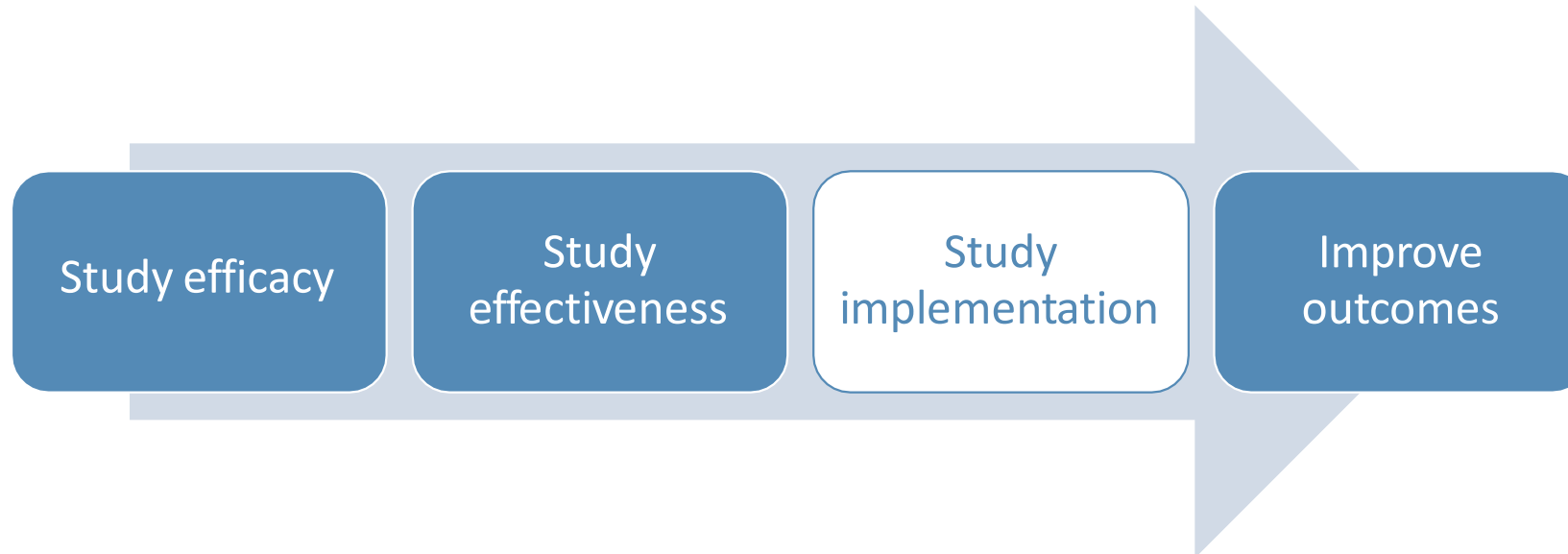
Source: Maria Fernandez, UTH

# Terminology in Simple Terms

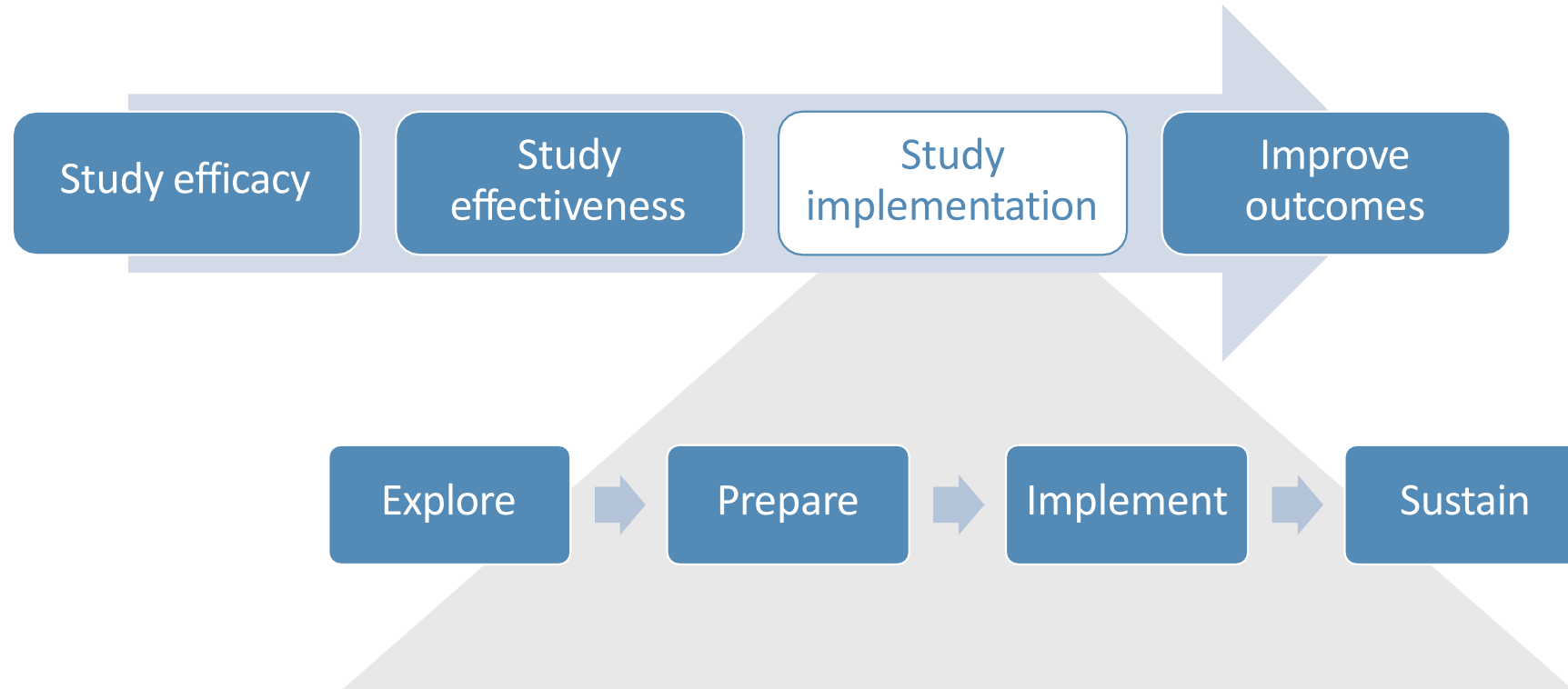
- The intervention/practice innovation is **THE THING**
- Effectiveness research looks at whether **THE THING** works
- Implementation research looks at how best to help people **DO THE THING**
- Implementation outcomes are **HOW WELL** they **DO THE THING**
- Implementation strategies are the **stuff we do** to help people/organizations **DO THE THING**

Curran, G.M. Implementation science made too simple: a teaching tool. *Implement Sci Commun* 1, 27 (2020). <https://doi.org/10.1186/s43058-020-00001-z>

# Implementation pipeline



# Phases of implementation







# Models Theories and Frameworks

## Over 100 unique conceptual frameworks for implementation science

Nilsen *Implementation Science* (2015) 10:53  
DOI 10.1186/s13012-015-0242-0



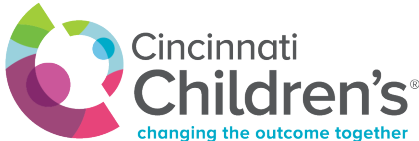
**DEBATE** **Open Access**

### Making sense of implementation theories, models and frameworks

Per Nilsen

Nilsen, P. (2015). Making sense of implementation theories, models and frameworks. *Implementation science*, 10(1), 53.

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# Uses of TMFs in Implementation Science

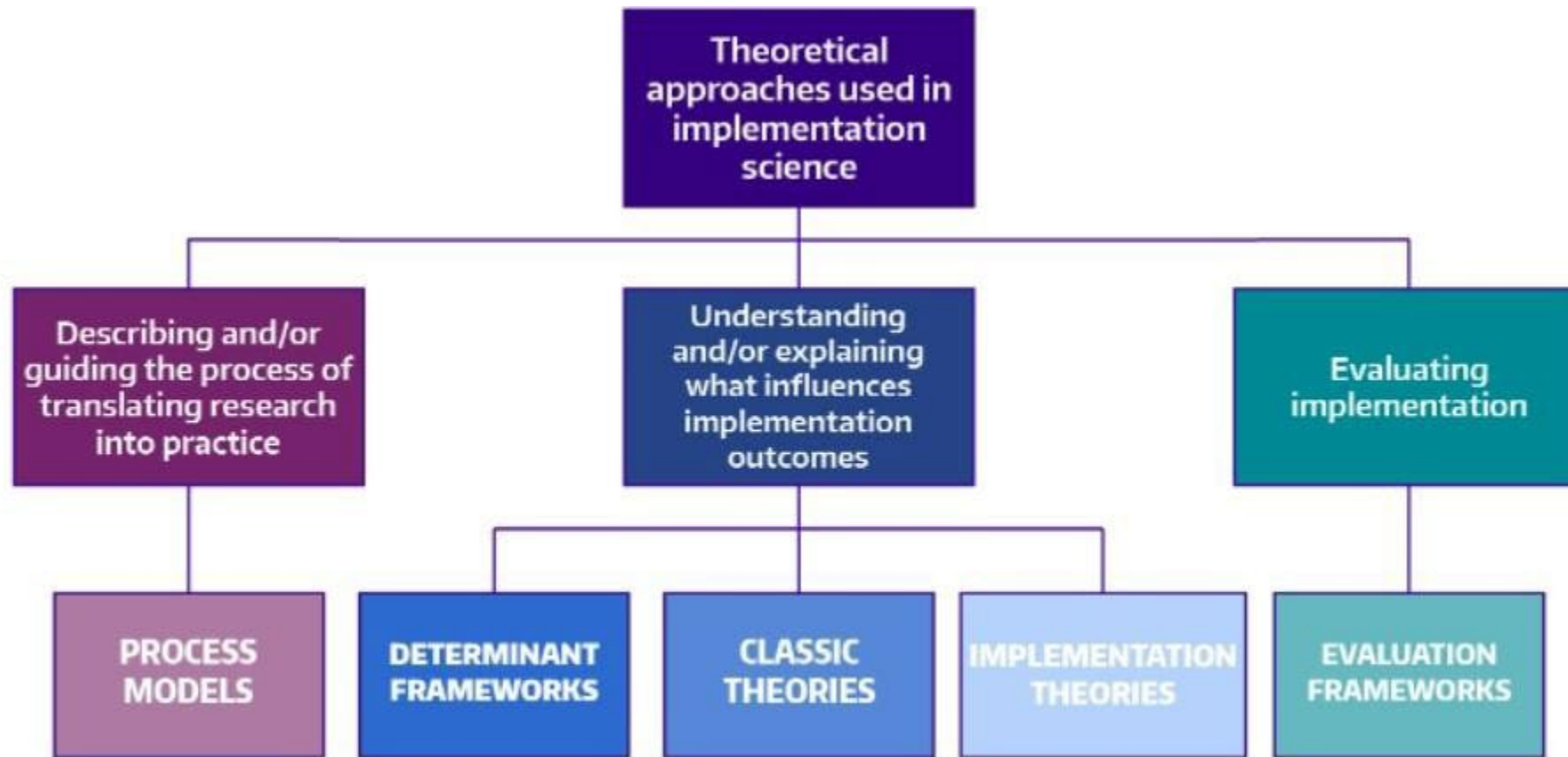
- Understanding and explaining factors that affect the quality of implementation
- Providing a “roadmap” to support the implementation process
- Evaluating implementation
- Guide the formulation of specific aims in implementation research proposals

Nilsen, P. (2015). Making sense of implementation theories, models and frameworks. *Implementation science*, 10(1), 53.

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# A classification theme for frameworks



Adapted from: Nilsen P. Making sense of implementation theories, models and frameworks. *Implement Sci.* 2015;10(1):1-13.

Nilsen, P. (2015). Making sense of implementation theories, models and frameworks. *Implementation Science*, 10(1), 55.

# Some common frameworks

- RE-AIM Evaluation Framework
- Consolidated Framework for Implementation Research (CFIR)
- Exploration, Preparation, Implementation, Sustainment (EPIS) Framework
- Active Implementation Frameworks

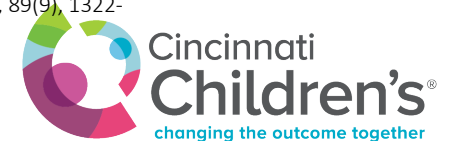


# RE-AIM Evaluation Framework

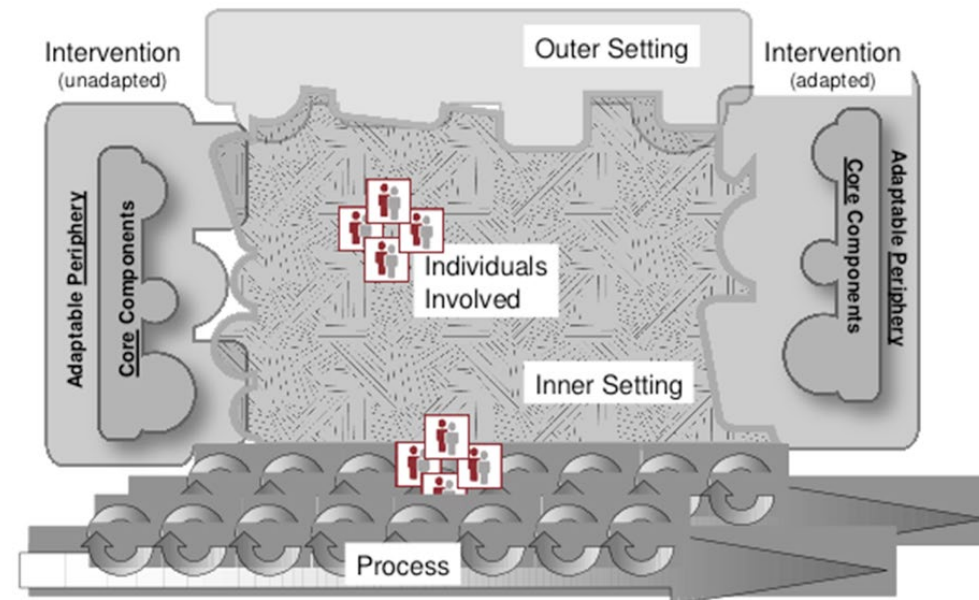


Glasgow, R. E., Vogt, T. M., & Boles, S. M. (1999). Evaluating the public health impact of health promotion interventions: the RE-AIM framework. *American Journal of Public Health*, 89(9), 1322-1327

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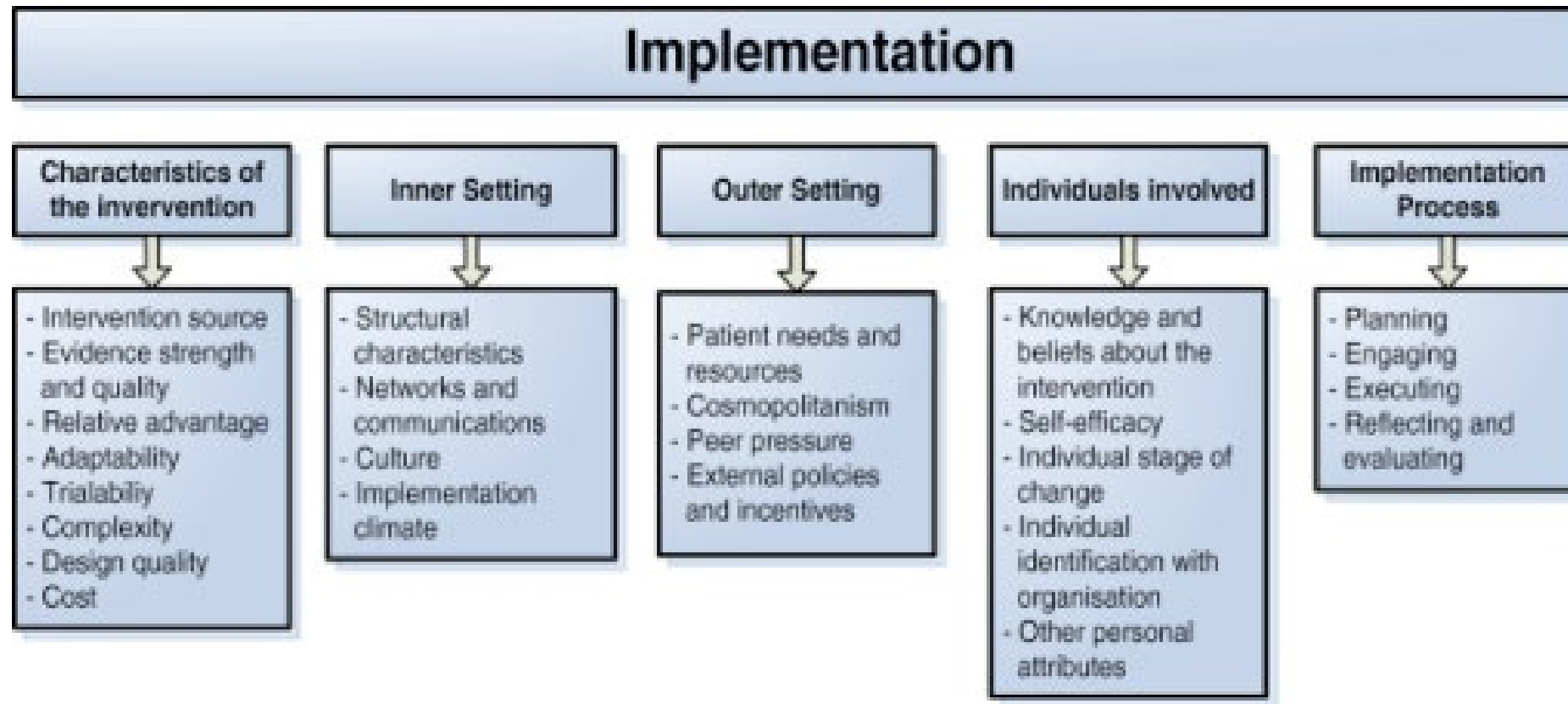
# Consolidated Framework for Implementation Research (CFIR)



Damschroder, L. J., Aron, D. C., Keith, R. E., Kirsh, S. R., Alexander, J. A., & Lowery, J. C. (2009). Fostering implementation of health services research findings into practice: a consolidated framework for advancing implementation science. *Implementation science*, 4(1), 50.

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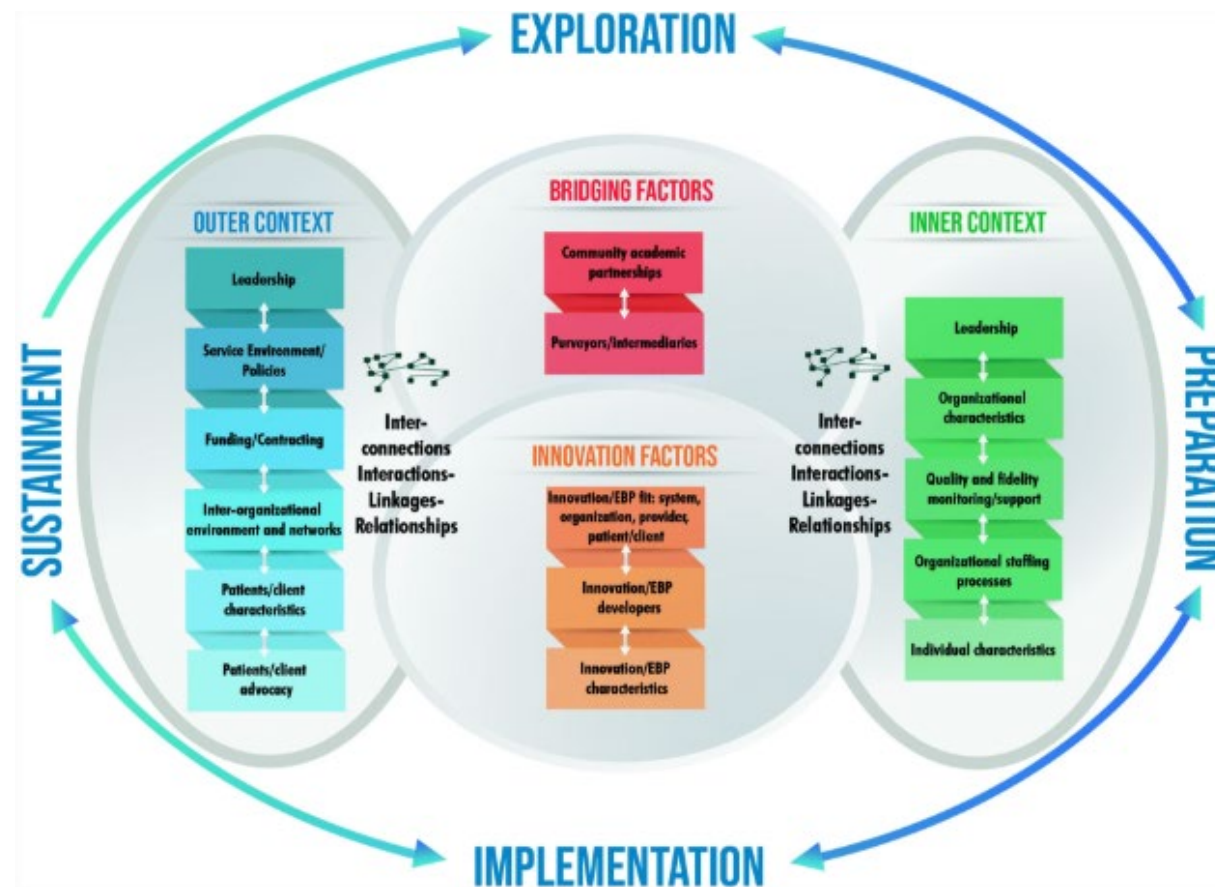
# CFIR domains and constructs



Damschroder, L. J., Aron, D. C., Keith, R. E., Kirsh, S. R., Alexander, J. A., & Lowery, J. C. (2009). Fostering implementation of health services research findings into practice: a consolidated framework for advancing implementation science. *Implementation science*, 4(1), 50.

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# Exploration, Preparation, Implementation, Sustainment (EPIS)



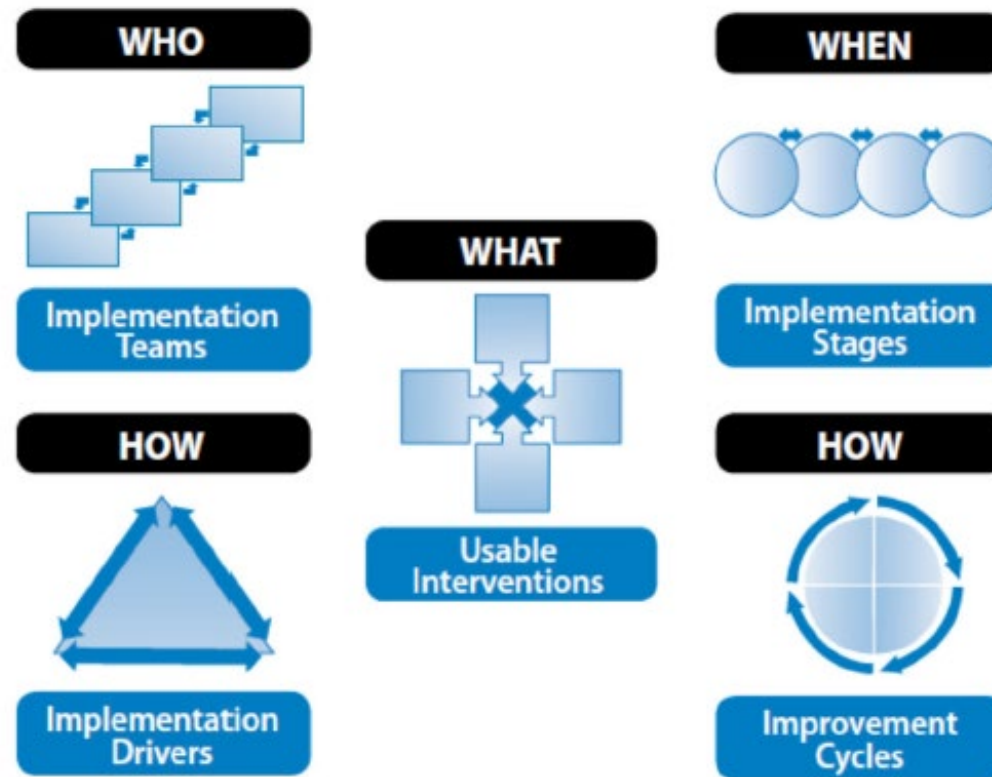
Aarons et al. (2011).

Moullin, J. C., Dickson, K. S., Stadnick, N. A., Rabin, B., & Aarons, G. A. (2019). Systematic review of the exploration, preparation, implementation, sustainment (EPIS) framework. *Implementation Science*, 14(1), 1.

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# Active Implementation Frameworks



*Fixsen et al. (2005); National Implementation Research Network (2013)*

Duda, M.A. & Wilson, B.A. (2015). Using Implementation Science to Close the Policy to Practice Gap. A Literate Nation White Paper, Science Panel. Vol. Spring (2015). San Francisco, CA.

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# Wading through the jungle

- A large number of implementation frameworks exist
- Many of them are based on an integration of multiple theories
- The selection of frameworks should depend on the objective of the study and whether the focus is on research or on practice
- “All frameworks are incomplete, but some are useful”

# Implementation strategies

“...methods or techniques used to enhance the adoption, implementation, and sustainability of an [intervention]”

Proctor, E. K., Powell, B. J., & McMillen, J. C. (2013). Implementation strategies: recommendations for specifying and reporting. *Implementation Science*, 8(1), 139.

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# Categorizing Implementation Strategies

## Review

### A Compilation of Strategies for Implementing Clinical Innovations in Health and Mental Health

69(2) 123-157  
Medical Care Research and Review  
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sagepub.com/journalsPermissions.nav  
DOI: 10.1177/1077558714268660  
<http://mcr.sagepub.com>  
SAGE

Byron J. Powell<sup>1</sup>, J. Curtis McMillen<sup>2</sup>, Enola K. Proctor<sup>1</sup>, Christopher R. Carpenter<sup>3</sup>, Richard T. Griffey<sup>3</sup>, Alicia C. Bunger<sup>4</sup>, Joseph E. Glass<sup>1</sup>, and Jennifer L. York<sup>3</sup>

#### Abstract

Efforts to identify, develop, refine, and test strategies to disseminate and implement evidence-based treatments have been prioritized in order to improve the quality of health and mental health care delivery. However, this task is complicated by an implementation science literature characterized by inconsistent language use and inadequate descriptions of implementation strategies. This article brings more depth and clarity to implementation research and practice by presenting a consolidated compilation of discrete implementation strategies, based on a review of 205 sources published between 1995 and 2011. The resulting compilation includes 68 implementation strategies and definitions, which are grouped according to six key implementation processes: planning, educating, financing, restructuring, managing quality, and attending to the policy context. This consolidated compilation can serve as a reference to stakeholders who wish to implement clinical innovations in health and mental health care and can facilitate the development of multifaceted, multilevel implementation plans that are tailored to local contexts.

This article, submitted to *Medical Care Research and Review* on July 11, 2011, was revised and accepted for publication on October 20, 2011.

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Downloaded from [mcr.sagepub.com](http://mcr.sagepub.com) at WASHINGTON UNIV LIBRARY on April 15, 2012

Powell et al. *Implementation Science* (2015) 10:21  
DOI 10.1186/s13012-015-0209-1



## RESEARCH

## Open Access

### A refined compilation of implementation strategies: results from the Expert Recommendations for Implementing Change (ERIC) project

Byron J. Powell<sup>1\*</sup>, Thomas J. Waltz<sup>2</sup>, Matthew J. Chinman<sup>3,4</sup>, Laura J. Damschroder<sup>5</sup>, Jeffrey L. Smith<sup>6</sup>, Monica M. Matthieu<sup>6,7</sup>, Enola K. Proctor<sup>8</sup> and JoAnn E. Kirchner<sup>9,10</sup>

#### Abstract

**Background:** Identifying, developing, and testing implementation strategies are important goals of implementation science. However, these efforts have been complicated by the use of inconsistent language and inadequate descriptions of implementation strategies in the literature. The Expert Recommendations for Implementing Change (ERIC) study aimed to refine a published compilation of implementation strategy terms and definitions by systematically gathering input from a wide range of stakeholders with expertise in implementation science and clinical practice.

**Methods:** Purposive sampling was used to recruit a panel of experts in implementation and clinical practice who engaged in three rounds of a modified Delphi process to generate consensus on implementation strategies and definitions. The first and second rounds involved Web-based surveys soliciting comments on implementation strategy terms and definitions. After each round, iterative refinements were made based upon participant feedback. The third round involved a live polling and consensus process via a Web-based platform and conference call.

**Results:** Participants identified substantial concerns with 31% of the terms and/or definitions and suggested five additional strategies. Seventy-five percent of definitions from the originally published compilation of strategies were retained after voting. Ultimately, the expert panel reached consensus on a final compilation of 73 implementation strategies.

**Conclusions:** This research advances the field by improving the conceptual clarity, relevance, and comprehensiveness of implementation strategies that can be used in isolation or combination in implementation research and practice.

**Future phases of ERIC** will focus on developing conceptually distinct categories of strategies as well as ratings for each strategy's importance and feasibility. Next, the expert panel will recommend multifaceted strategies for hypothetical yet real-world scenarios that vary by sites' endorsement of evidence-based programs and practices and the strength of contextual supports that surround the effort.

**Keywords:** Implementation research, Implementation strategies, Knowledge translation strategies, Mental health, US Department of Veterans Affairs

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Full list of author information is available at the end of the article



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Waltz et al. *Implementation Science* (2015) 10:109  
DOI 10.1186/s13012-015-0295-0



## SHORT REPORT

## Open Access

### Use of concept mapping to characterize relationships among implementation strategies and assess their feasibility and importance: results from the Expert Recommendations for Implementing Change (ERIC) study

Thomas J. Waltz<sup>1,2\*</sup>, Byron J. Powell<sup>3</sup>, Monica M. Matthieu<sup>4,5,10</sup>, Laura J. Damschroder<sup>6</sup>, Matthew J. Chinman<sup>6,7</sup>, Jeffrey L. Smith<sup>8,9,10</sup>, Enola K. Proctor<sup>8</sup> and JoAnn E. Kirchner<sup>9,10</sup>

#### Abstract

**Background:** Poor terminological consistency for core concepts in implementation science has been widely noted as an obstacle to effective meta-analyses. This inconsistency is also a barrier for those seeking guidance from the research literature when developing and planning implementation initiatives. The Expert Recommendations for Implementing Change (ERIC) study aims to address one area of terminological inconsistency: discrete

implementation strategies involving one process or action used to support a practice change. The present report is on the second stage of the ERIC project that focuses on providing initial validation of the compilation of 73 implementation strategies that were identified in the first phase. Findings: Purposive sampling was used to recruit a panel of experts in implementation science and clinical practice (N = 35). These key stakeholders used concept mapping sorting and rating activities to place the 73 implementation strategies into similar groups and to rate each strategy's relative importance and feasibility. Multidimensional scaling analysis provided a quantitative representation of the relationships among the strategies, all but one of which were found to be conceptually distinct from the others. Hierarchical cluster analysis supported organizing the 73 strategies into 9 categories. The ratings data reflect those strategies identified as the most important and feasible.

**Conclusions:** This study provides initial validation of the implementation strategies within the ERIC compilation as being conceptually distinct. The categorization and strategy ratings of importance and feasibility may facilitate the search for, and selection of, strategies that are best suited for implementation efforts in a particular setting.

**Keywords:** Concept mapping, Implementation research, Implementation strategies, Mental health, US Department of Veterans Affairs



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# Taxonomy of Strategies

- *Evaluative and iterative strategies*: assess readiness, conduct a needs assessment, obtain feedback
- *Interactive assistance*: facilitation, technical assistance, clinical supervision
- *Adapt and tailor to context*: tailor strategies, promote adaptability
- *Develop stakeholder interrelationships*: identify and prepare champions, build a coalition
- *Train and educate stakeholders*: conduct ongoing training, develop educational materials
- *Support clinicians*: relay data to providers, remind clinicians, create new clinical teams
- *Engage consumers*: involve patients, prepare patients to be active participants, increase demand
- *Finance strategies*: fund clinical innovation, alter incentives, alter fees
- *Change infrastructure*: mandate change, change record systems, change physical structure

Powell, B. J., Waltz, T.J., Chinman, M. J., Damschroder, L. J., Smith, J. L., Matthieu, M. M., ... & Kirchner, J. E. (2015). A refined compilation of implementation strategies: results from the Expert Recommendations for Implementing Change (ERIC) project. *Implementation Science*, 10(1), 21.

# Types of strategies

## DISCRETE

Single action or process (e.g., reminders, audit and feedback, supervision)

## MULTIFACETED

Combination of multiple discrete strategies (e.g., training + consultation), some of which have been protocolized and branded

Powell, B. J., Waltz, T.J., Chinman, M. J., Damschroder, L. J., Smith, J. L., Matthieu, M. M., ... & Kirchner, J. E. (2015). A refined compilation of implementation strategies: results from the Expert Recommendations for Implementing Change (ERIC) project. *Implementation Science*, 10(1), 21.

# What's known about strategies

- Several strategies found to be effective under some, but not all circumstances
- Most strategies result in modest improvements (i.e., no “magic bullet”)
- Passive approaches (e.g., training) are generally less effective
- Mixed-evidence regarding the effectiveness of multifaceted implementation strategies (Grimshaw et al., 2006; Squires et al., 2014; Wensing et al., 2009)
- Consensus seems to exist that effective implementation will involve multifaceted, multilevel implementation strategies to address implementation determinants (Aarons et al., 2011, Mittman, 2012; Weiner, 2012)

# Common approaches to strategy selection

- "Train and pray" (Grimshaw et al 2004)
- "ISLAGIATT" (Eccles)
- "Kitchen sink approach" (Henggeler et al 2002)



# A better approach to selecting strategies

1. Identify implementation determinants
2. Link strategies to identified determinants
3. Use theory and evidence to narrow list of strategies
4. Engage stakeholders to select and operationalize strategies

# Selecting strategies based on determinants

Identified Determinants	Implementation Strategies
Staff knowledge	Interactive education sessions
Staff perceptions/reality mismatch	Audit and feedback
Staff motivation	Incentives/sanctions
Staff beliefs/attitudes	Peer influence/opinion leaders
Organizational systems	Process redesign

Onil Bhattacharyya (2012); Palda (2007)

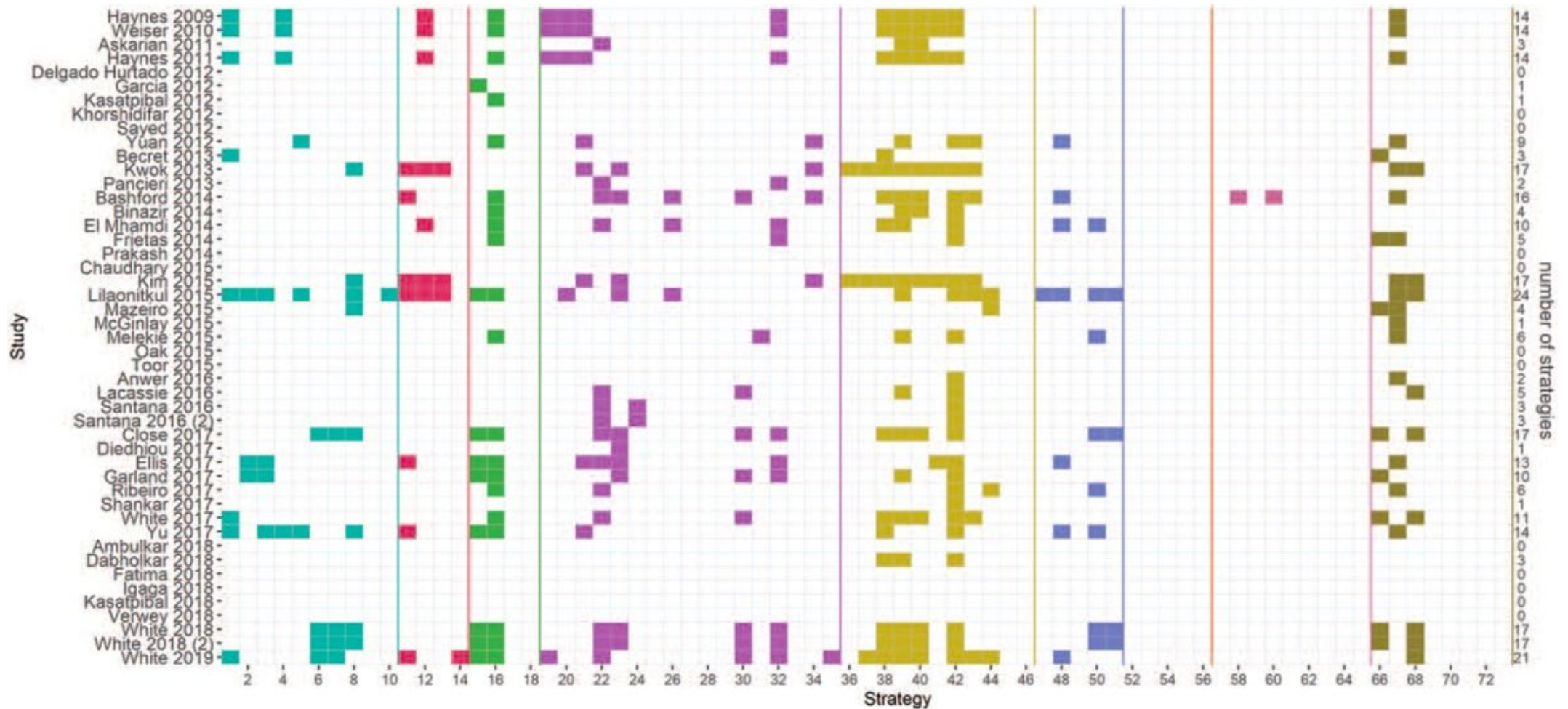
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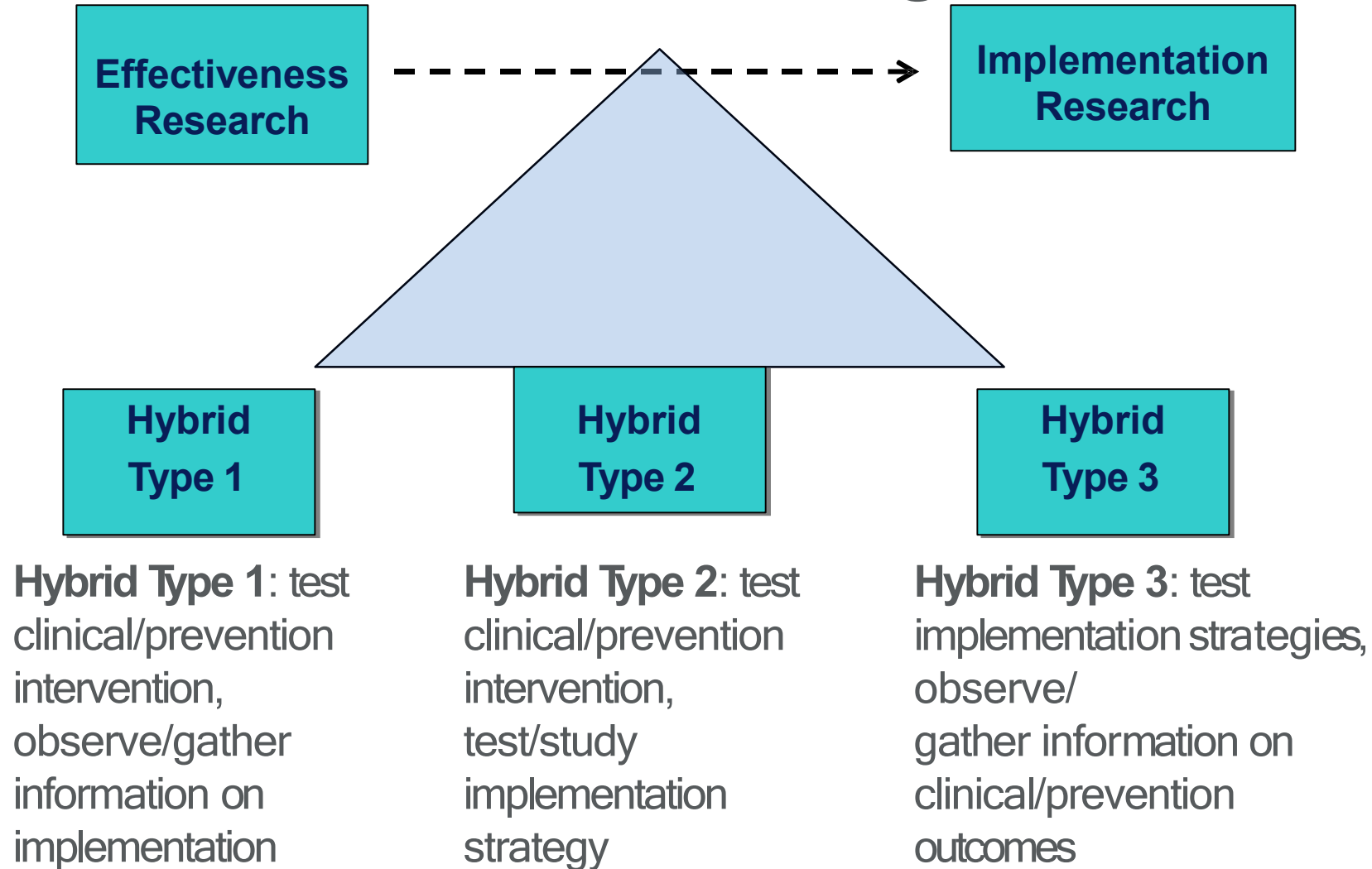
# Implications for strategy selection

- It is not enough to ask whether a strategy works
- Need to know where, when, and for whom it works
- Need to know how to combine and tailor strategies for different situations and context
- Need to focus on tailoring and adaptation of implementation strategies
- Need to understand mechanisms through which strategies produce results

# Implementation Strategies for the Surgical Safety Checklist



# Implementation research designs



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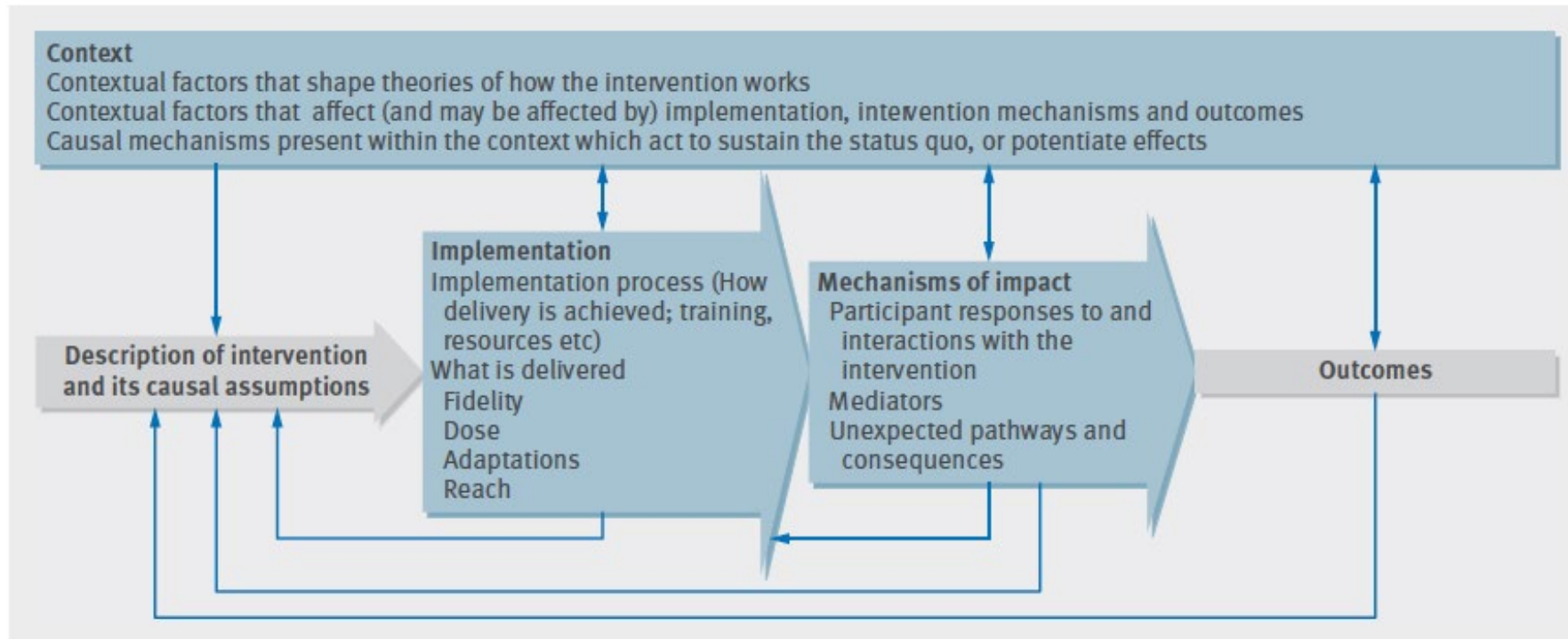
From Curran, G. et al. (2012); Medical Care, 50(3), 217-226

# Implementation research – guiding principles

- Implementation research may need several phases, although they may not follow a linear sequence
- Experimental designs are preferred to observational designs in most circumstances, but are not always practicable
- Understanding processes is important
- Reports of studies should include a detailed documentation of the intervention and of the implementation strategy to enable replication, evidence synthesis, and wider implementation

# Conducting Process Evaluation

## Process evaluation of complex interventions: Medical Research Council guidance



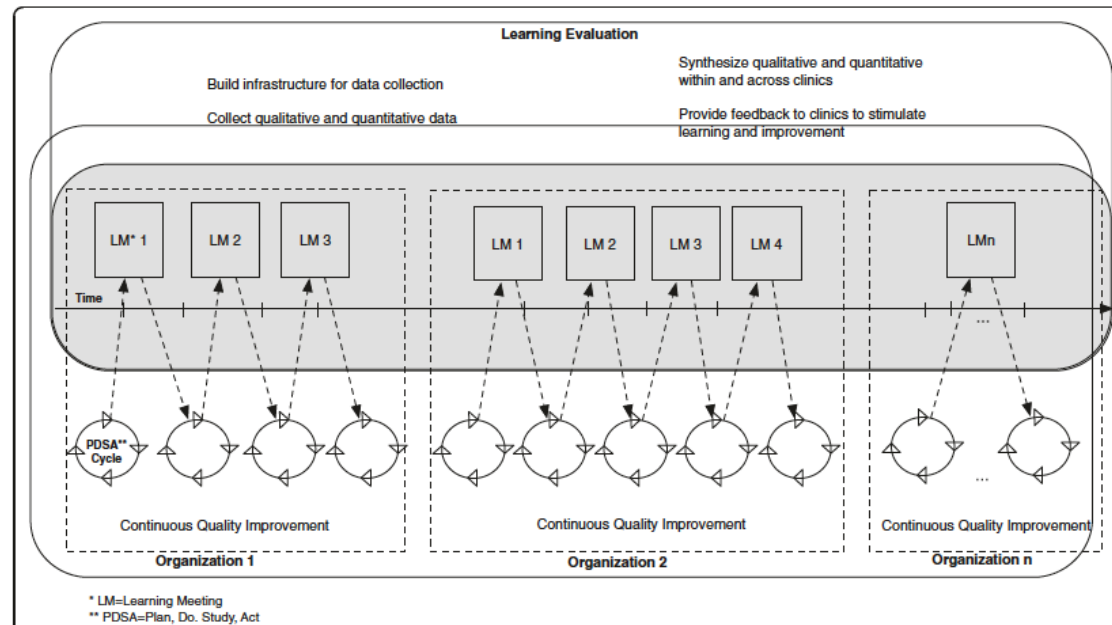
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Moore, G. F., Audrey, S., Barker, M., Bond, L., Bonell, C., Hardeman, W., Moore, L., O'Cathain, A., Tinati, T., Wight, D., & Baird, J. (2015). Process evaluation of complex interventions: Medical Research Council guidance. *BMJ*, 350(mar19 6)

# Learning Evaluation

## Learning Evaluation: blending quality improvement and implementation research methods to study healthcare innovations

Bijal A Balasubramanian<sup>1,2\*</sup>, Deborah J Cohen<sup>3</sup>, Melinda M Davis<sup>3</sup>, Rose Gunn<sup>3</sup>, L Miriam Dickinson<sup>4</sup>, William L Miller<sup>5</sup>, Benjamin F Crabtree<sup>6</sup> and Kurt C Stange<sup>7</sup>



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# Learning Evaluation Principles

- (1) establishing a detailed understanding of the baseline implementation plan
- (2) identifying target populations and tracking relevant process measures;
- (3) collecting and analyzing real-time quantitative and qualitative data on important contextual factors;
- (4) synthesizing data and emerging findings and sharing with stakeholders on an ongoing basis; and
- (5) harmonizing and fostering learning from process and outcome data.

# D&I research opportunity areas

- Adaptation of EBIs
- Sustainability
- Dissemination and Scale up
- De-Implementation
- Policy Implementation
- Methodological advances: use of big data, adaptive designs
- Implementation of multi-level and complex interventions
- Implementation research to increase health equity

April Oh, Cynthia A Vinson, David A Chambers, Future directions for implementation science at the National Cancer Institute: Implementation Science Centers in Cancer Control, *Translational Behavioral Medicine*

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# From knowing to doing

*“When it comes to implementation, what is worth doing is worth doing well.”*

*Joseph Durlak*



# Any Questions ?



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