8th Annual Symposium on General Population Screening for T1D
Barbara Davis Center
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Pragmatic Trials

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ARIADNE LABS

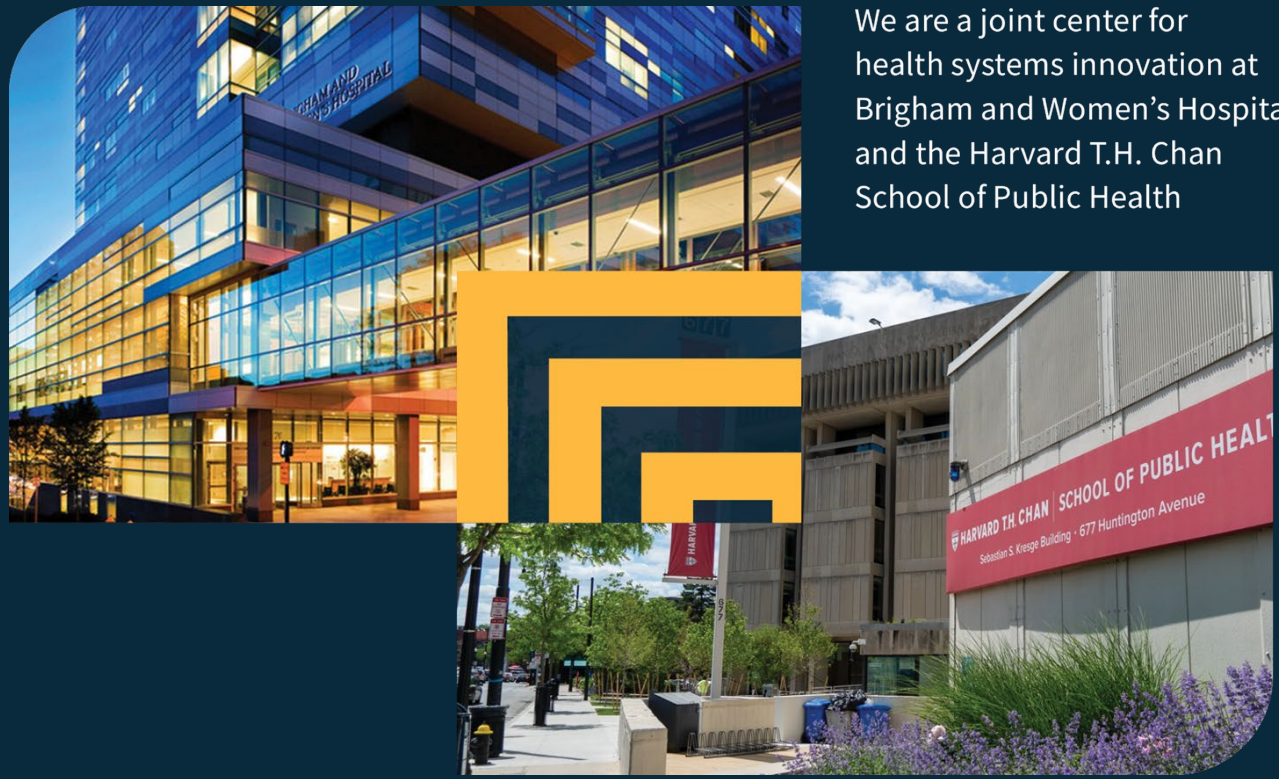
Disclosures

I have nothing to disclose

Objectives

- Describe the use of pragmatic trials and implementation research as applied to T1D Screening and Monitoring
- Share lessons learned from global research experience
- Demonstrate different study design methodologies to create rigorous approaches in implementation research

Who We Are



We are a joint center for health systems innovation at Brigham and Women's Hospital and the Harvard T.H. Chan School of Public Health

ARIADNE LABS

Vision and Mission

OUR VISION

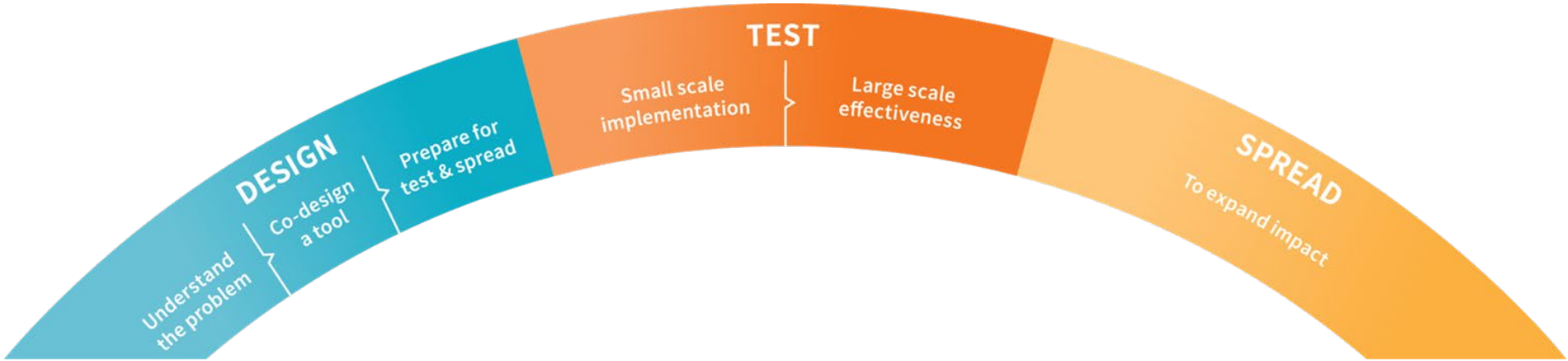
Our vision is that health systems equitably deliver the best possible care for every person, everywhere, every time.

OUR MISSION

Our mission is to save lives and reduce suffering for people everywhere by creating scalable solutions that address system failures to improve health.

Innovation Through Real-World Testing

To ensure that our solutions meet the highest standards of science, we utilize our innovation pathway, the Ariadne Labs Arc.



Our 2024 Global Impact on People and Patients

140 MILLION
Patient lives touched in FY24

55 Tools designed, tested, and spread in 2024

Worked with 259 health systems

Worked directly with **147K** health care providers

56,000
Health care professionals trained

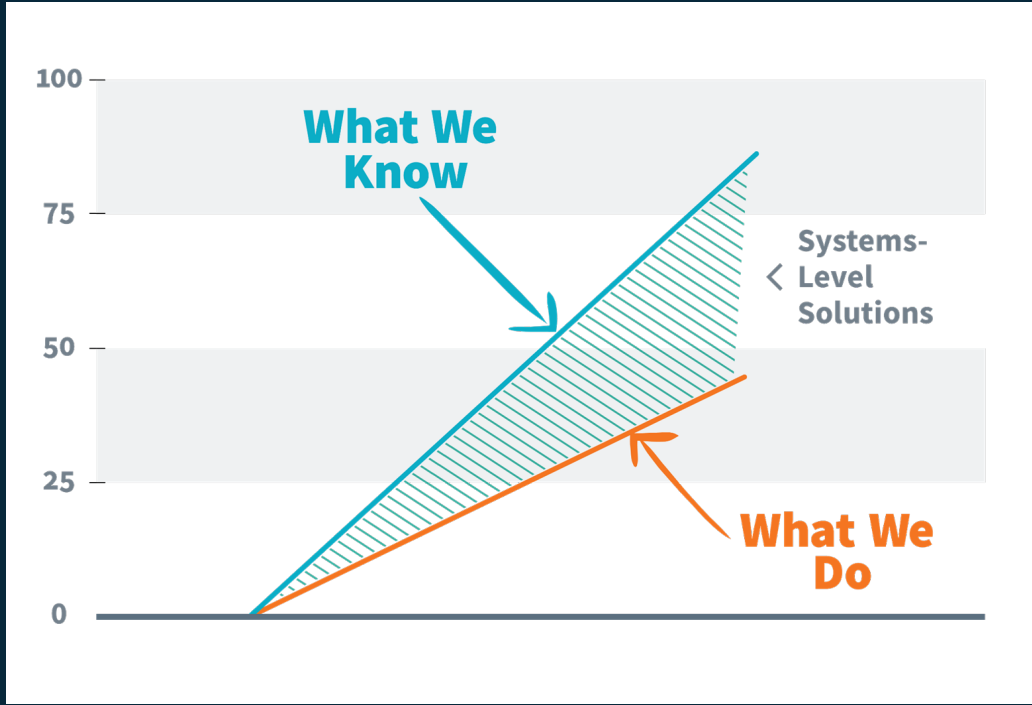
83
Peer reviewed publications

14.9K
downloads of tools and resources

180 Number of countries where health care professionals accessed our work

Closing Know-Do Gaps

Through scalable, systems-level solutions, we aim to close the gaps between what we know should happen in health care and what actually happens.



Basic Effectiveness Designs

- Randomized controlled trials (RCTs) have long been considered the highest form of clinical evidence
- Minimized threats to internal validity
- Most valid methods evaluate the efficacy or effectiveness of interventions

Limitations of RCTs

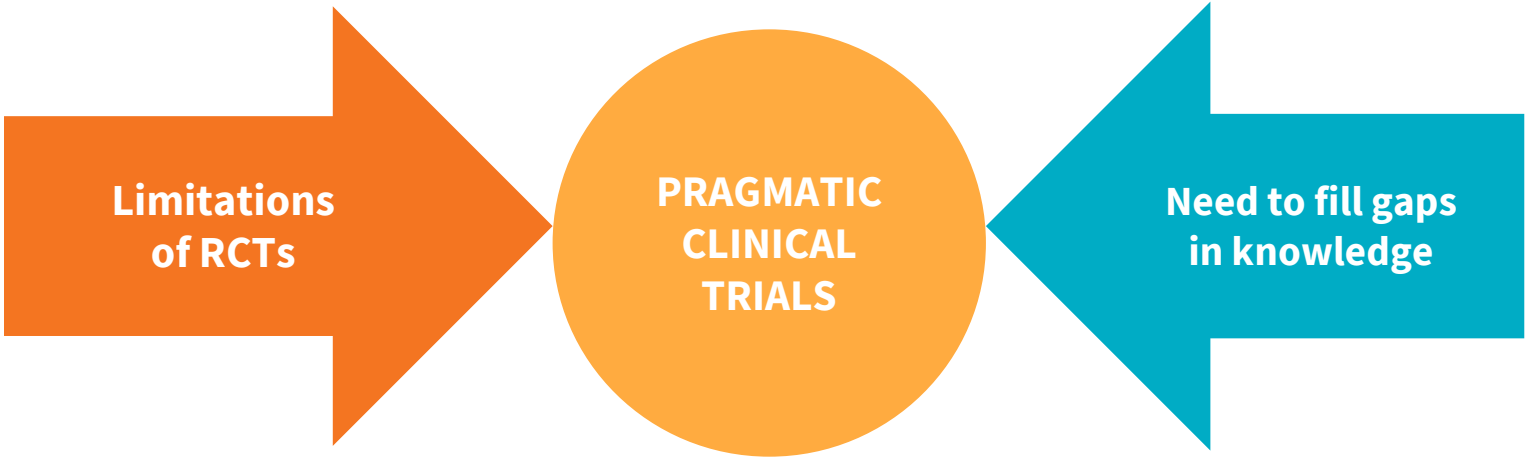
	Typical RCTs	Needs of Decision Makers
Comparator	Placebo	Active
Patient Population	Highly Selective	Representative of Typical Practice
Care Setting	Highly Selective	Representative of Typical Practice
Outcome Measures	Surrogate	Patient Centered
Follow-up Time	Short	Long
Cost	High	Moderate
Speed	Slow	Faster

It has been said….

"Culture eats strategy for breakfast"

Yes and…we can create program implementation and strategies considering culture & community to create opportunities for studying screening & monitoring.

Doing Trials in the “Real World”



What is Implementation Science & Research?

"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."

— NIH Conference on the Science of Dissemination and Implementation. NLM.NIH.gov

Problem We Are Solving For

Current State

- Primary care providers do not have guidance to screen families for T1D.
- Families are often diagnosed at the point of DKA.
- The general population is largely unaware about T1D and screening.

Unaware
Families-at-Risk & General Population

Underequipped
Primary Care and Pediatricians

GAP

Future State

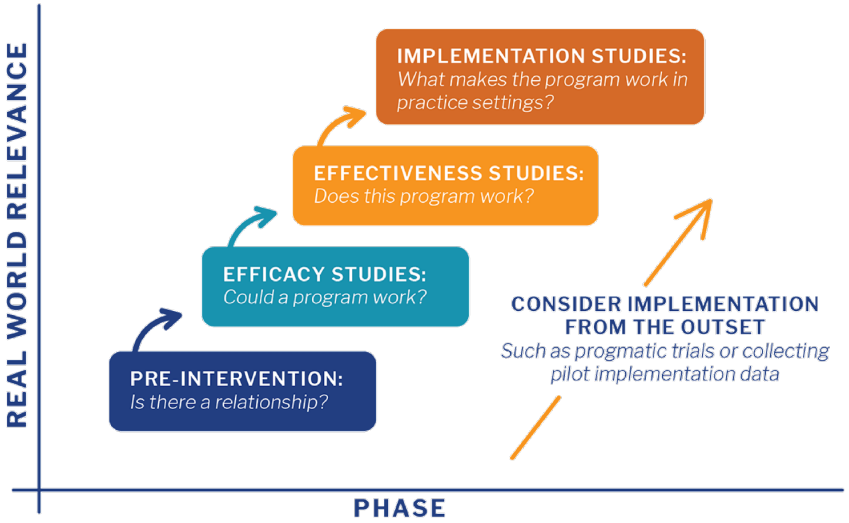
- Primary care providers can screen for early T1D, shifting diagnosis from crisis.
- T1D families have time to plan care, consider research participation, or possibly explore treatment to delay stage 3 onset.
- The general population is familiar with T1D, its signs, risks and screening.

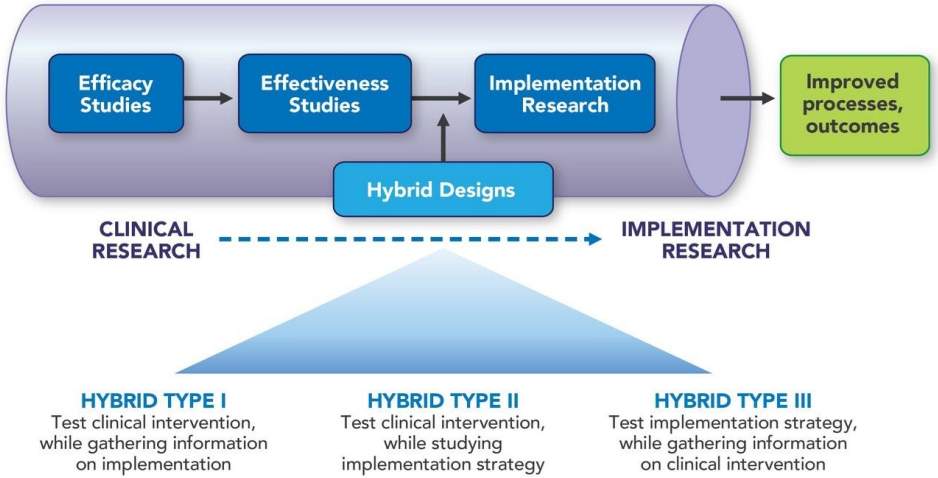
Informed & Supported
Families-at-Risk & General Population

Informed & Supported
Primary Care and Pediatricians

How to design a trial to make it “pragmatic”

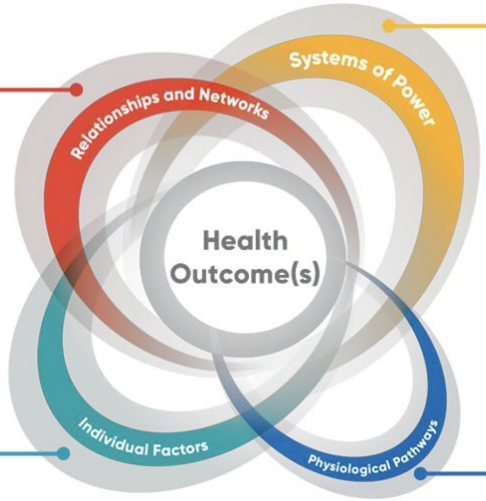
Implementation Research: Rigor & Reality





Health Equity: Frameworks & Implementation

- Beyond the individual, who has influence over this outcome?
- How do or could families, friends, partners or other support systems support better outcomes?
- How do relationships with others enable harmful behaviors or create barriers to better outcomes?



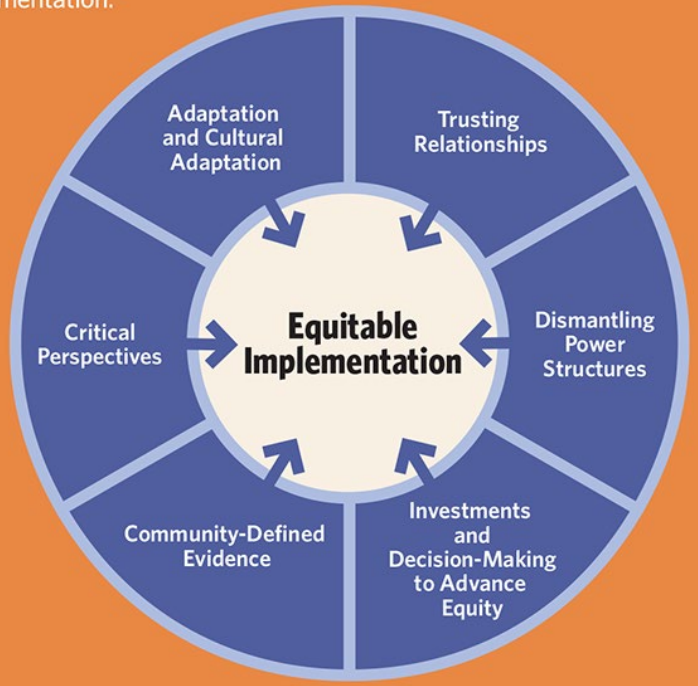
- What systems, institutions or policies impact this outcome?
- How do or could these systems, institutions or policies support better outcomes?
- How do these systems, institutions or policies create barriers to better outcomes?

- What knowledge, attitude or values do individuals need to gain better health outcomes?
- What behaviors lead to better or worse outcomes?

- How does a person's development or physical and cognitive ability impact this outcome?
- What role does trauma play in achieving better outcomes?

Elements of Equitable Implementation

Six factors have proven essential in successful equitable implementation.

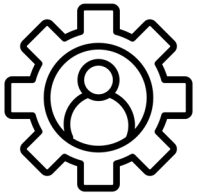


Lesson #1: Know Your Audience

What Matters to them Most

Parents / Family Members

Payors



Health System Administrators / Implementers

Policymakers

Pediatric Primary Care Clinicians

Pediatric Endocrinologists

Researchers

Awareness, Education, & Policy Organizations

Effectiveness-Implementation Hybrid Designs

Blending design components of clinical effectiveness and implementation research.

Hybrid Type I

- Testing effects of a clinical intervention on relevant outcomes while observing and gathering information on implementation.

Hybrid Type II

- Dual testing of clinical and implementation interventions/strategies.

Hybrid Type III

- Testing of an implementation strategy while observing and gathering information on the clinical intervention's impact on relevant outcomes.

Curran et al. 2012

Lesson #2: Implementation Must Be Widely Defined

Readiness to implement goes beyond human and material resources & can impact outcomes

Effectiveness Measures: Does THE THING work?

Effectiveness Core Outcome Datasets

COMET Initiative

ICHOM Datasets (International Consortium for Health Outcomes Measurement): Diabetes Core Set

World Health Organization (Global measures)

Proctor et al. 2011

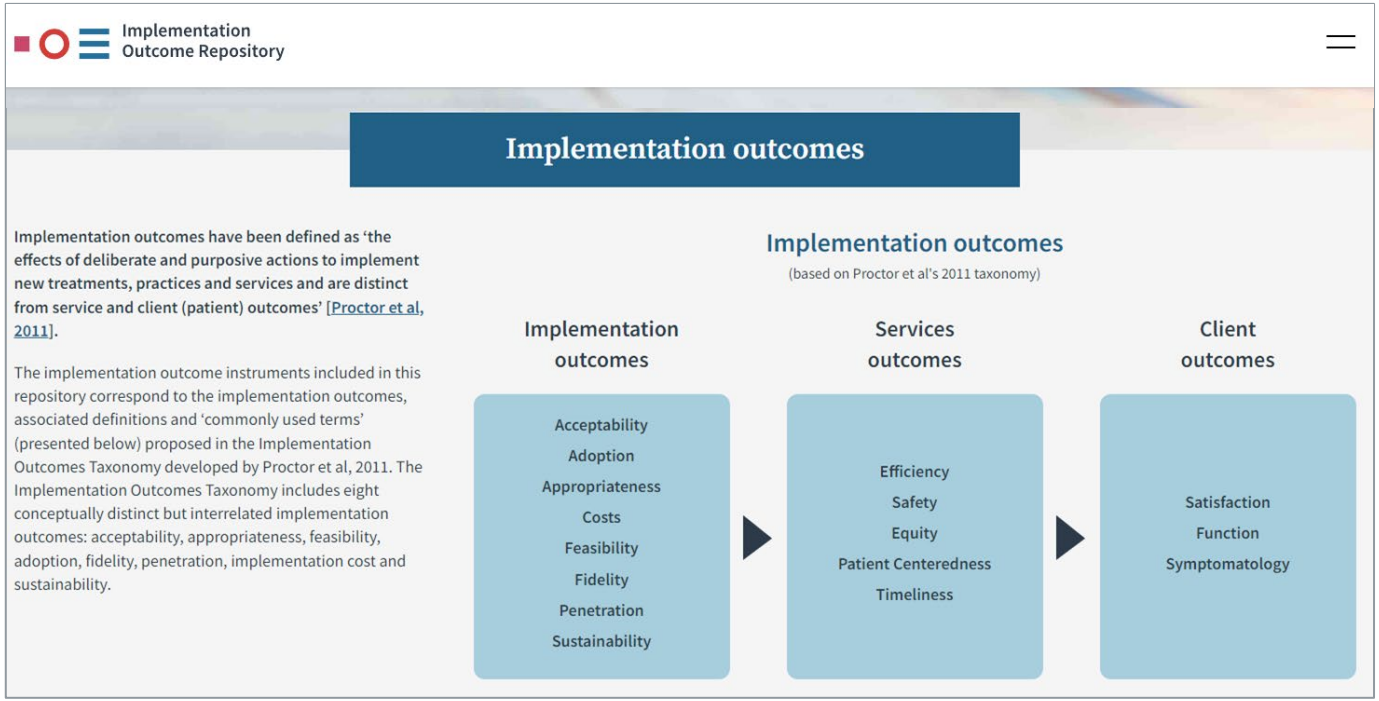
Implementation Outcomes: How does THE THING work?

Implementation Outcomes	Service Outcomes *	Client Outcomes
▪ Acceptability ▪ Adoption ▪ Appropriateness ▪ Costs ▪ Feasibility ▪ Fidelity ▪ Penetration ▪ Sustainability	▪ Efficiency ▪ Safety ▪ Effectiveness ▪ Equity ▪ Patient-centeredness ▪ Timeliness	▪ Satisfaction ▪ Function ▪ Symptomatology

* IOM Standards of Care

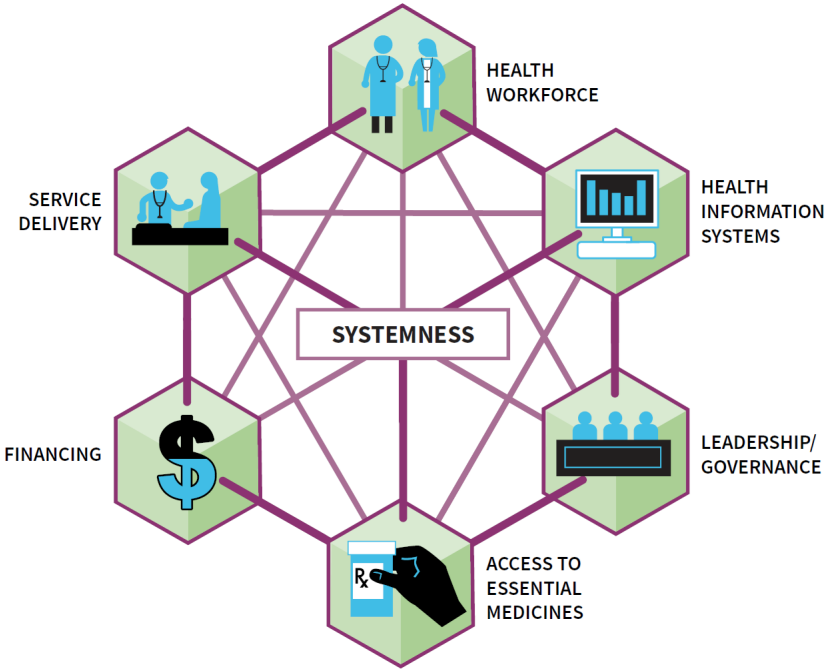
Proctor et al. 2011, Figure 1

Implementation Outcome Measures: Indicator selection



https://implementationoutcomerepository.org/implementation-outcomes

Lesson #3: Health "Systemness" Must Be Leveraged



What systems exist to leverage data and inputs so we do not set up parallel systems?

Implementation Frameworks: CFIR

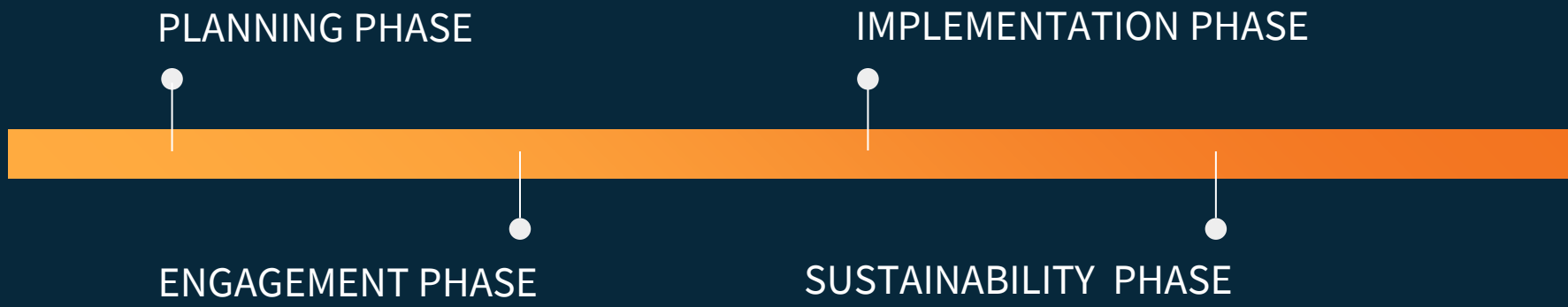
CONSOLIDATED FRAMEWORK FOR IMPLEMENTATION RESEARCH

Intervention	Outer Setting	Inner Setting	Individual	Process
External funding	Government support	Cadre tension/ dynamics	Motivation and perceived burden	Clarity of audit and evaluation process
Ongoing funding	Patient care preferences	Leadership support	Knowledge and skill gaps	Use in emergency situations
Mentorship	Referral system	Staff turnover	Resistance to change	Routine workflow integration
Team-wide use	Motivational incentives	Infrastructure		Identifying practices adopted as habits
Medical record integration	Tension over data collection	Prioritization of quality of care		
Perception of tool				
Printing costs				
Government mandates				

Learning from Research & Implementation Trials: Secondary Analysis

- Leverage the implementations to date and broader healthcare system data
- Opportunities for meta-analysis utilizing newer statistical methods, such as propensity score matching or target trial approaches
- Apply new consensus guidelines to implementation programs & research datasets
- Address key questions around equitable implementation of screening and monitoring, e.g. Who is being screened? Who is missing out? At what age is the highest rates of uptake? At what frequency are children monitored in practice?

Lesson #4: Utilize Pragmatic Trials for Rigorous Evaluation



Experimental Design: Cluster RCT

	CLUSTER RCT		
Cluster	1	■	
	2		■
	3		■
	4	■	
	5		■
	6	■	
	7	■	
	8		■
	9	■	
	10		■

LEVEL OF RANDOMIZATION: Cluster (Facility, Ward, or even Hospital)

OUTCOME MEASURED: Individually assessed, but averaged at cluster level

PRO:

- Most rigorous
- Unaffected by secular trends
- Efficacy & Effectiveness
- Intervention at cluster level

CON:

- Spillover
- Larger sample size required

Appropriate when seeking rigorous evaluation and resources (time, money) available.

What is the optimum timing of T1D screening invitation?

CLUSTER RCT			
Cluster	1		
	2		
	3		
	4		
	5		
	6		
	7		
	8		
	9		
	10		

LEVEL OF RANDOMIZATION: Clinic/Practice Level

INTERVENTION:

- Text message invitation sent 20 days in advance to family (range 13-20 days)
- Text message invitation sent 10 days in advance to family (range 3-10 days)

METHODS: Cluster RCT + Qualitative interviews

OUTCOMES MEASURED: Uptake of T1D screening at clinic visit; Family satisfaction with timing

Who should offer T1D screening invitation?

CLUSTER RCT					
Cluster	1				
	2				
	3				
	4				
	5				
	6				
	7				
	8				
	9				
	10				

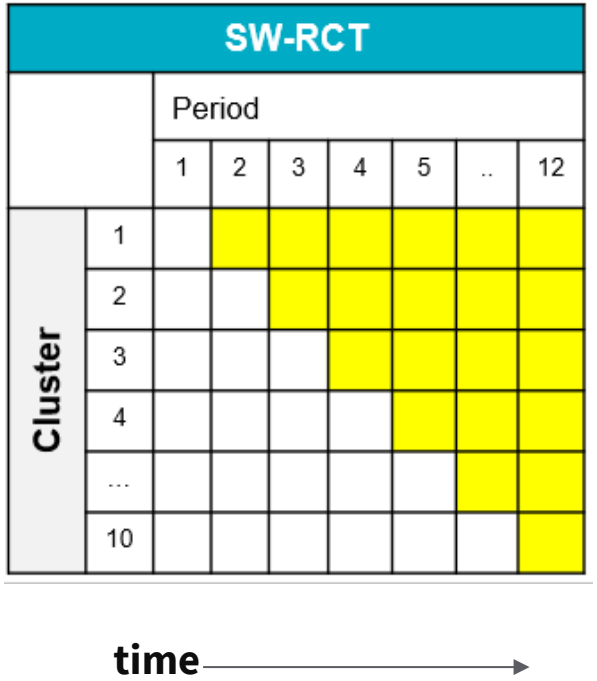
LEVEL OF RANDOMIZATION: Clinic/Practice Level

INTERVENTION:

- MD
- RN
- NP/PA [APP]
- CHW

OUTCOME MEASURED: Uptake of T1D screening at clinic visit; Duration (minutes) of invitation visit; Family knowledge of screening

Quasi-Experimental Designs (Stepped-Wedge)



LEVEL OF RANDOMIZATION: possible to randomize at cluster level or not

LEVEL OF OUTCOME MEASUREMENT: Assessed at individual or cluster level

PRO

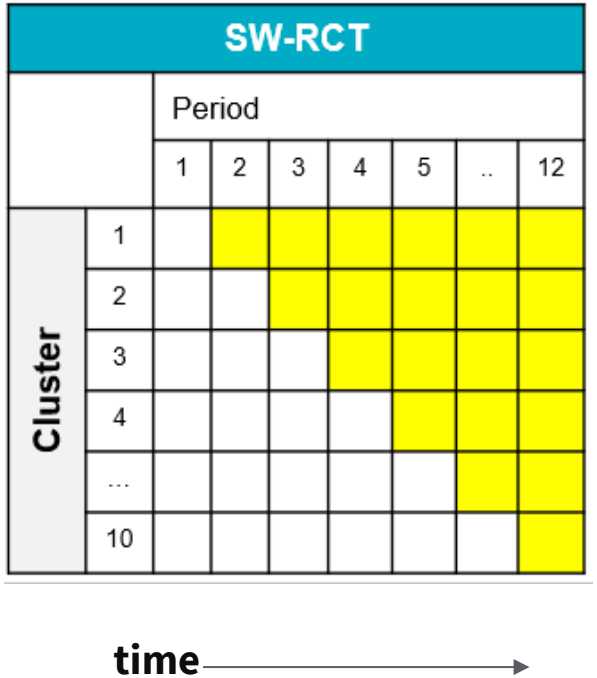
- Intervention at cluster level
- Relatively easy
- Everyone eventually gets the intervention
- Clear control

CON

- Need locations up front
- Some clusters have to wait a long time for intervention to start
- Larger sample size

Appropriate particularly for large scale implementation evaluation as it aligns with project roll-out

Does combining Celiac testing with T1D increase uptake of screening?



LEVEL OF RANDOMIZATION: Facility-level

CONTROL:

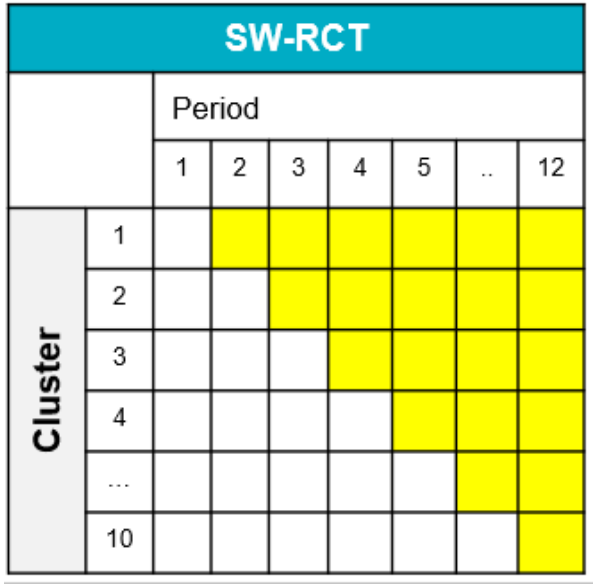
- T1D Screening is being offered to all patients

INTERVENTION:

- Adding Celiac Disease Screening with T1D Screening

OUTCOMES MEASURED: Uptake of screening for T1D; Uptake of Screening for Celiac Disease; Acceptability and feasibility by clinicians and family feedback on screening process

Does school-based screening increase uptake of T1D screening?



LEVEL OF RANDOMIZATION: Schools or School Districts

INTERVENTION:

- School-based screening program implementation with a specified age range

METHODS: Stepped wedge aligning with program roll-out

OUTCOMES MEASURED: Uptake of T1D screening; % cases diagnosed at Stage 3 DKA; Teacher acceptance

Conclusions

- A variety of study designs and methods are available to address intervention effectiveness and implementation
- Each study design has pros/cons
- Determine level of rigor needed & practical realities of evaluation (money, time, scope)
- Hybrid designs are great combinations of effectiveness and implementation studies
- New methods of pragmatic and and adaptive trials are becoming more common

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Thank You

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