Effectiveness-Implementation Hybrid Studies: An Overview and Reflection on 10 Years Since Their Introduction

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Goals for today

- **Present on the hybrid study idea**
  - **From the perspective of their original conception…**
  - **Why and when to consider them**
- **Review 3 types of hybrid studies**
- **Present reflections from a recent working group**
  - **Chambers, Curran, Fernandez, Landes, McBain, Mittman, Pyne, Smith**
  - **Critique, adjustments, new recommendations…**
  - ***Under review***
- **Take your questions**

Who am I?

- Sociologist by training (1996)
- Began doing im… …e US Department
- …RI)
- …nplement
- …rants
- …s in support of adoption of EBPs
- …design in implementation

Think back to 2012…

Published in final edited form as:
Med Care. 2012 March ; 50(3): 217–226. doi:10.1097/MLR.0b013e3182408812.

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**[‡]

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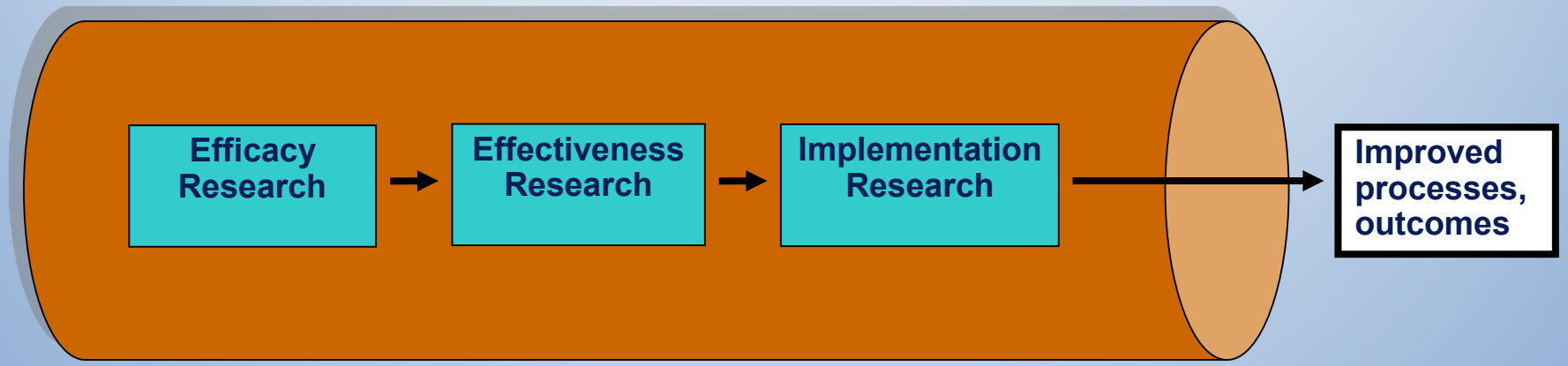
Traditional Research Pipeline

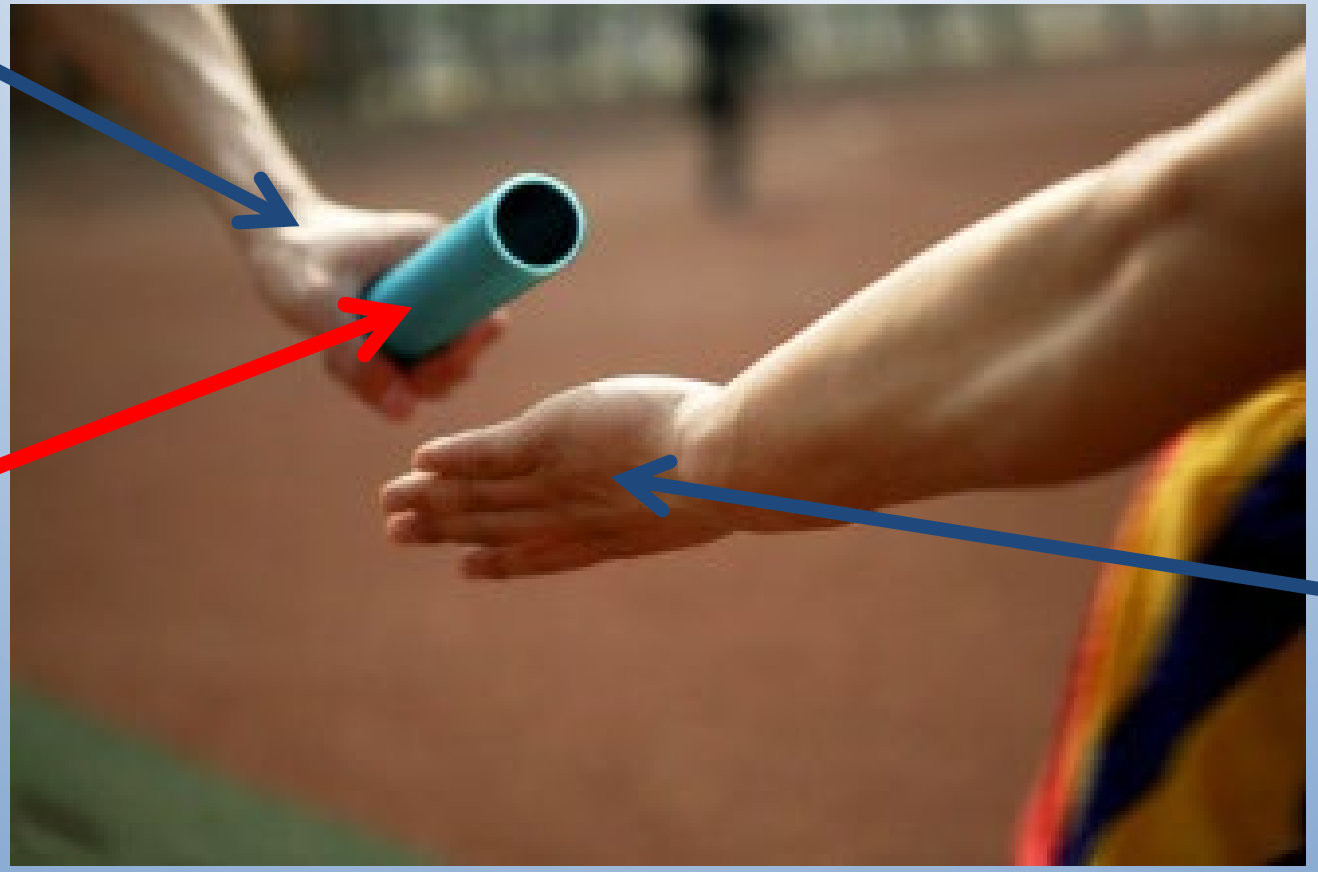
(…when do we do implementation research?)



- "Finish" efficacy research
- "Finish" effectiveness research
- *Then* start implementation research…

Traditional Pipeline as a relay race analogy: "Here… *GO! GO! GO!*"

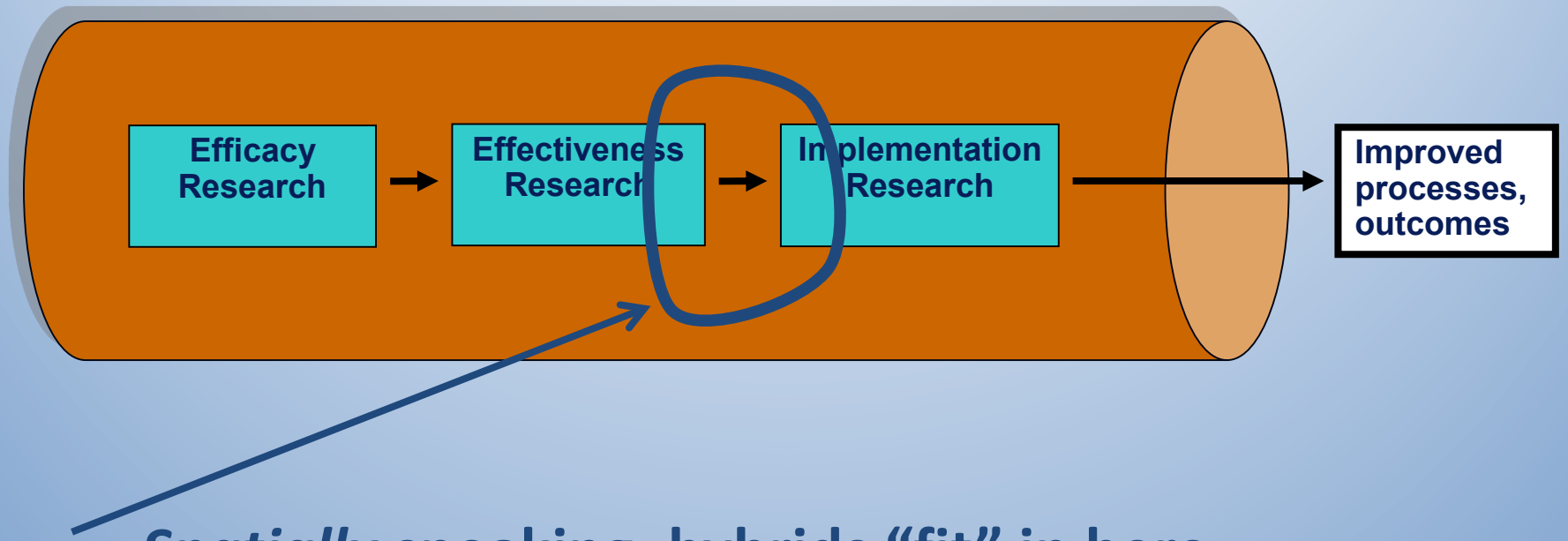
"Clinical" Researcher



Intervention "*ready for*" dissemination and implementation

"Implementation" Researcher

Effectiveness-Implementation hybrid studies



Spatially speaking, hybrids "fit" in here…

Why Hybrid Studies?

- **Can we hurry up please?**
  - **Blend intervention "effectiveness" and "implementation" research questions in the same study and save time**
- **Don't wait for "perfect" effectiveness data before moving to implementation research**
- **We can "backfill" effectiveness data while we test implementation strategies**
- **How do intervention outcomes relate to levels of adoption and fidelity?**
  - **How will we know this without data from "both sides"?**

Couple of intro thoughts about hybrids

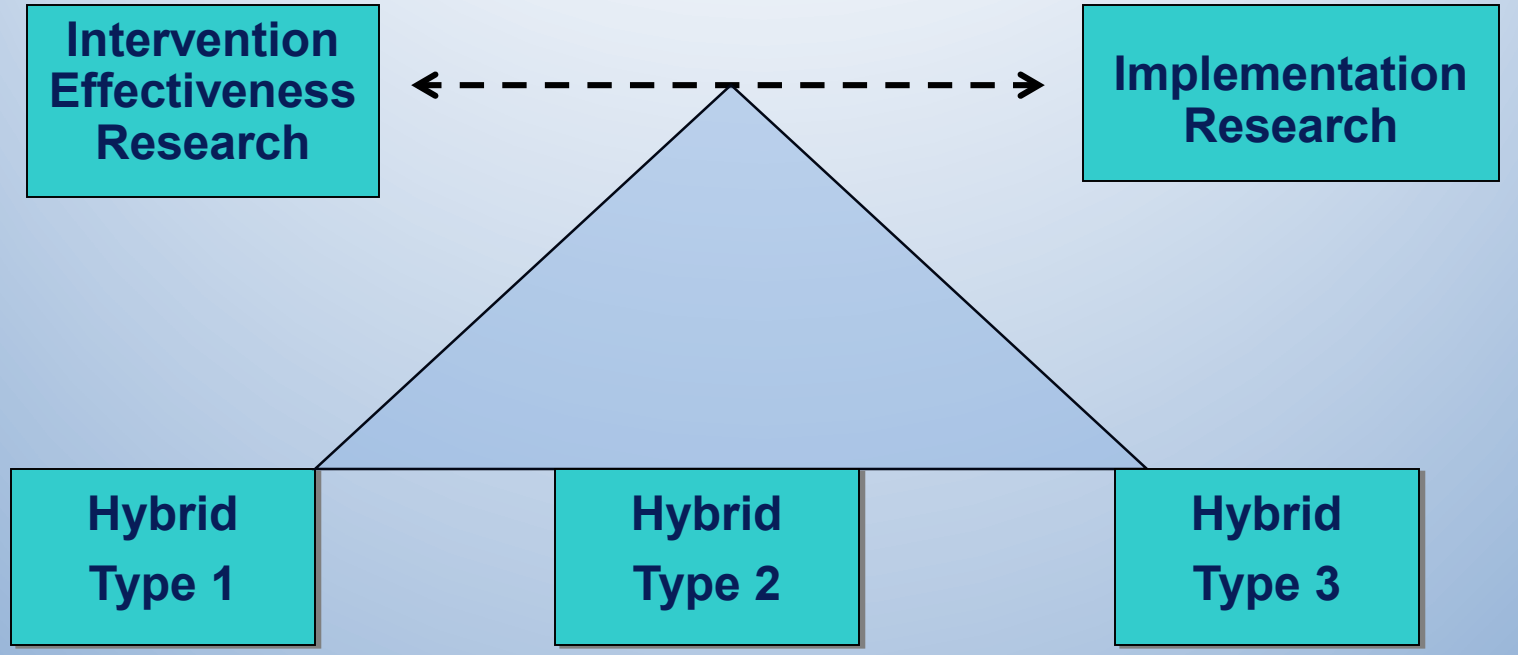
- Researchers were doing “hybrid designs” well before my colleagues and I began speaking and writing about them as such
- 2012 paper tried to bring some clarity, direction, examples, and recommendations
- Original paper focused on ***trials*** but these hybrid concepts can and are being used in many other designs
  - *To me at the moment it’s more about combining research questions*
  - *More on this later…*

When teaching this stuff, some very non-scientific language can also be helpful…

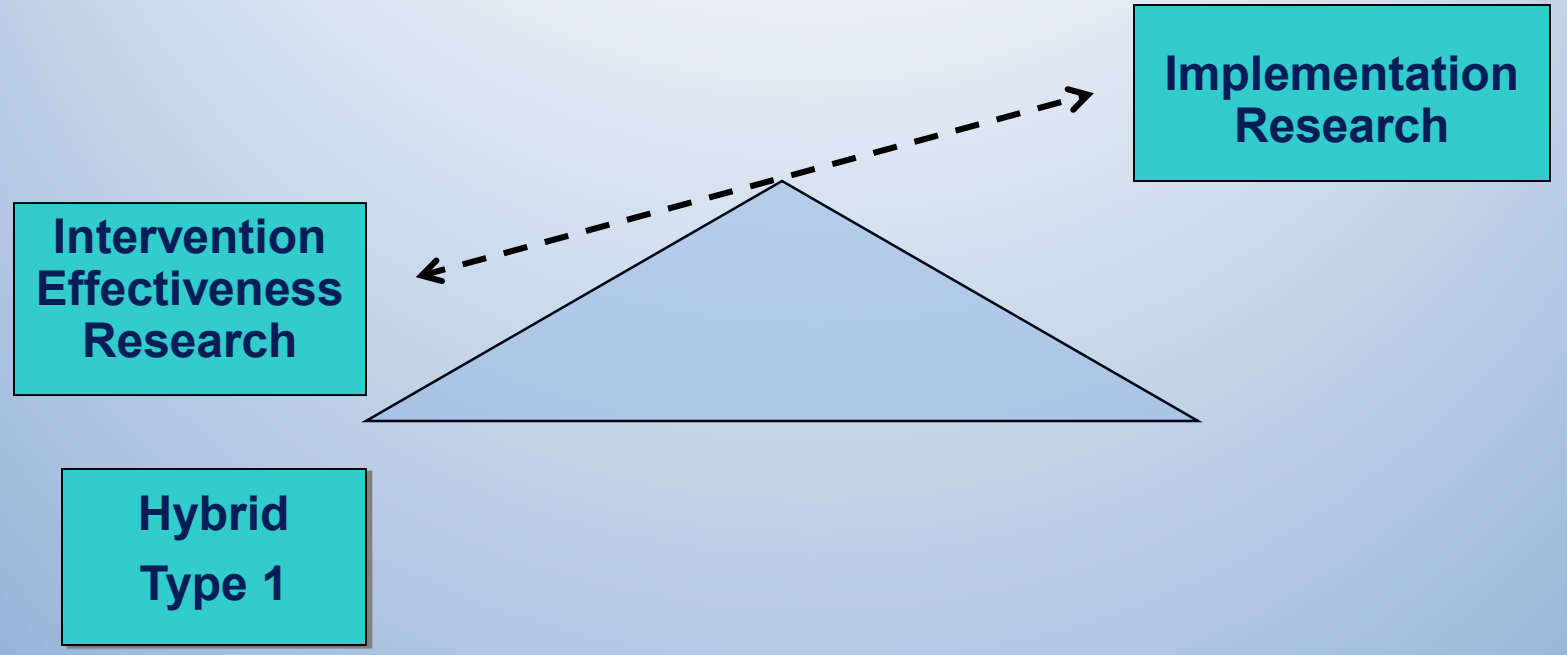
- The intervention/practice/innovation is **THE THING**
- Effectiveness research looks at whether THE THING works
- Implementation research looks at how best to help people/places **DO THE THING**
- *Implementation strategies* are the stuff we do to try to help people/places DO THE THING
- Main implementation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

Curran, Implementation Science Communications, 2020

Types of Hybrids *by thing/do the thing*

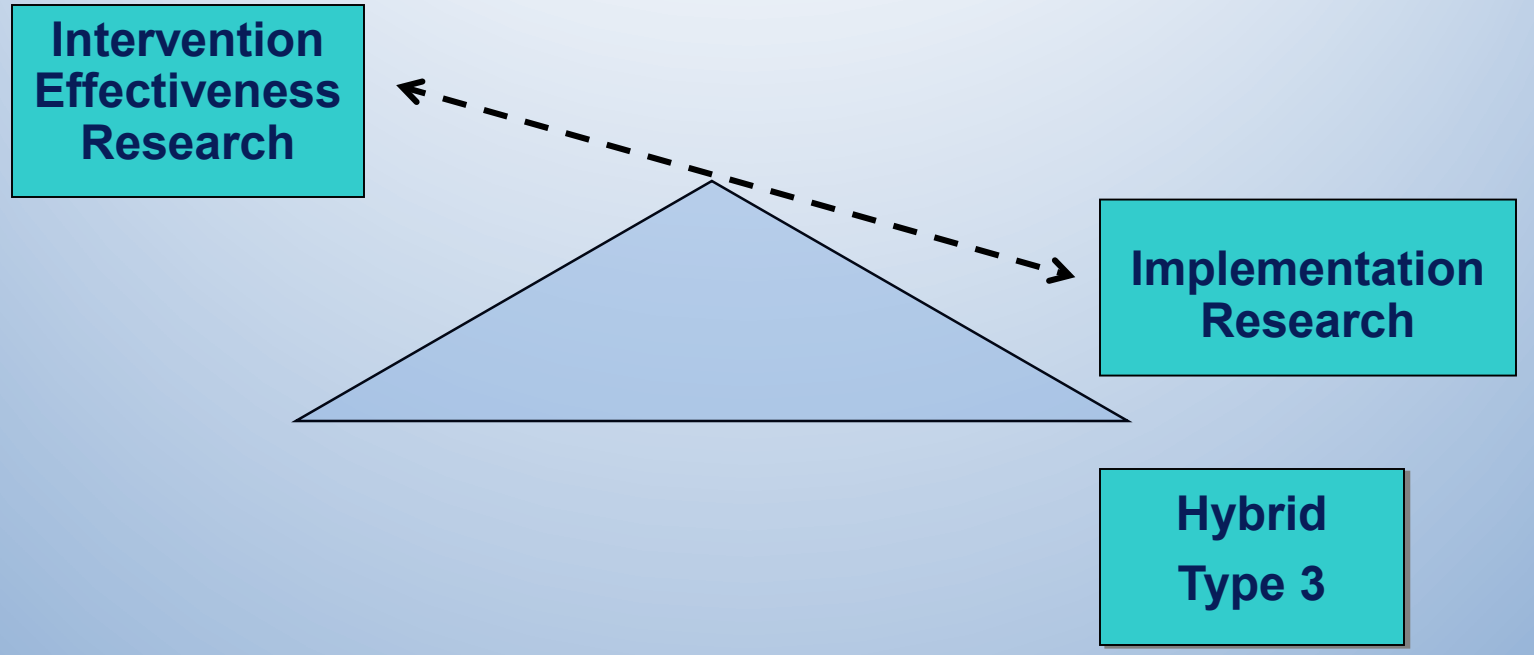


Types of Hybrids *by thing/do the thing*



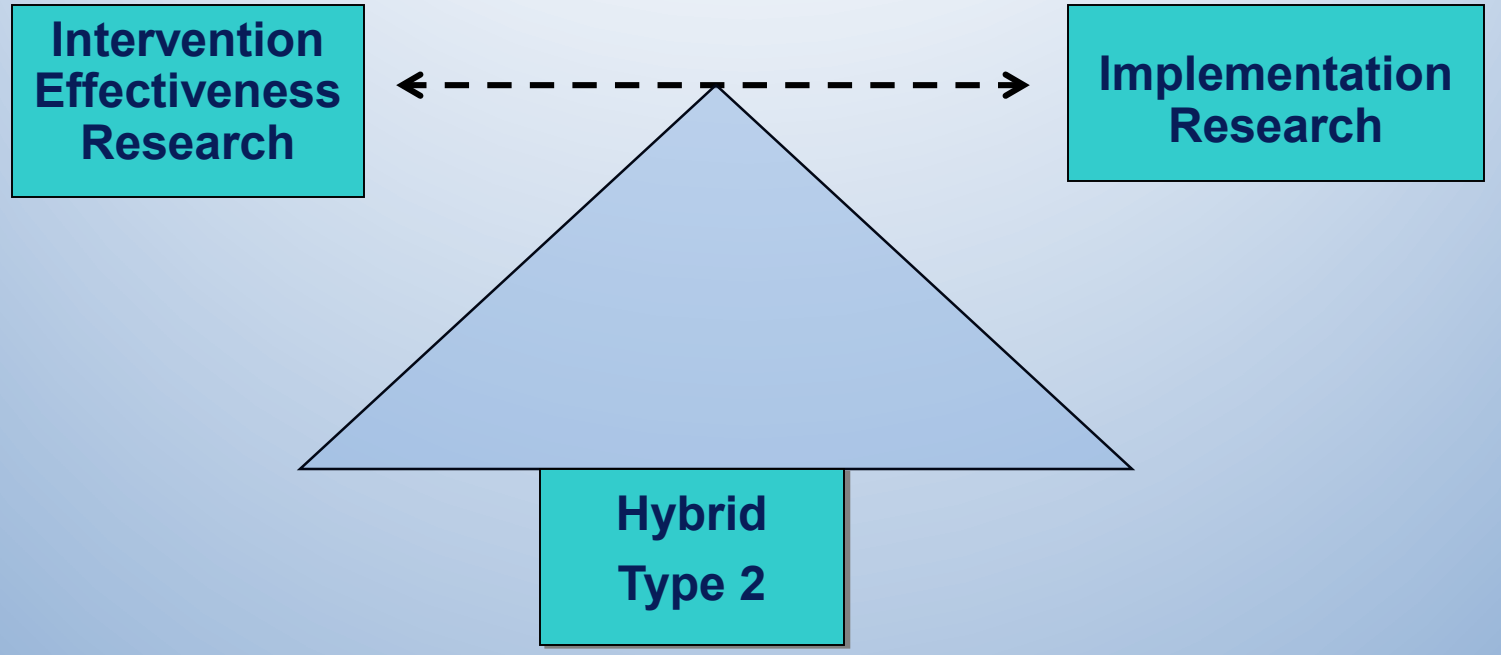
Hybrid Type 1: test the thing, gather information on doing the thing

Types of Hybrids *by thing/do the thing*



Hybrid Type 3: test do the thing, gather information on the thing

Types of Hybrids *by thing/do the thing*



Hybrid Type 2: test thing and do the thing

Hybrid Type 1 (original spec)

Definition:

- **Test the thing and explore implementation-related factors *(80%/20%?)***

Description:

- **Intervention effectiveness study "plus":**
  - **Describe implementation experience (worked/didn't; barriers/facilitators)**
  - **How might the thing need to be adapted going forward?**
  - **What is needed to support people/places to do the thing in the real world?**

Indications:

- **Intervention effectiveness evidence remains limited, so intensive focus on implementation might be premature…BUT**
- **Effectiveness study conditions offer ideal opportunity to explore implementation issues, plan implementation strategies for next stage**

Remember…

- All effectiveness studies use “implementation strategies” to support the delivery of the intervention; we just usually don’t call them that…
- In clinical type studies, we “know” that some/many the strategies used are not feasible for supporting wide-spread adoption
  - Paying clinics, paying interventionists, paying for care, intensive training, frequent fidelity checks…
- BUT, we can learn from the use of those strategies during the study!

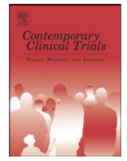
Type 1 examples

Contemporary Clinical Trials 43 (2015) 260–278

Contents lists available at ScienceDirect

Contemporary Clinical Trials

journal homepage: www.elsevier.com/locate/conclintrial



Research aimed at improving both mood and weight (RAINBOW) in primary care: A type 1 hybrid design randomized controlled trial☆

Jun Ma [a,b,*], Veronica Yank [b], Nan Lv [a], Jeremy D. Goldhaber-Fiebert [c], Megan A. Lewis [d], M. Kaye Kramer [e], Mark B. Snowden [f], Lisa G. Rosas [a,b], Lan Xiao [a], Andrea C. Blonstein [a]

Hagedorn *et al. Addiction Science & Clinical Practice* 2014, **9**:12
http://www.ascpjournal.org/content/9/1/12

ADDICTION SCIENCE & CLINICAL PRACTICE

RESEARCH Open Access

An implementation-focused process evaluation of an incentive intervention effectiveness trial in substance use disorders clinics at two Veterans Health Administration medical centers

Hildi J Hagedorn[1,2,3*], Cheryl B Stetler[4], Ann Bangerter[2], Siamak Noorbaloochi[2,3], Maxine L Stitzer[5] and Daniel Kivlahan[6,7]

Lane-Fall *et al. BMC Surgery* 2014, **14**:96
http://www.biomedcentral.com/1471-2482/14/96

BMC Surgery

STUDY PROTOCOL Open Access

Handoffs and transitions in critical care (HATRICC): protocol for a mixed methods study of operating room to intensive care unit handoffs

Meghan B Lane-Fall[1,2,3*], Rinad S Beidas[3,4], Jose L Pascual[5,6], Meredith L Collard[1], Hannah G Peifer[7], Tyler J Chavez[8], Mark E Barry[2], Jacob T Gutsche[1], Scott D Halpern[3,9,10], Lee A Fleisher[1,3,10] and Frances K Barg[11,12]

Bramoweth *et al. Trials* (2018) 19:73
DOI 10.1186/s13063-017-2437-y

Trials

STUDY PROTOCOL Open Access

A hybrid type I trial to increase Veterans' access to insomnia care: study protocol for a randomized controlled trial

Adam D. Bramoweth[1,2*], Anne Germain[3], Ada O. Youk[1,4], Keri L. Rodriguez[1,5] and Matthew J. Chinman[1,2,6]

Hybrid Type 2 ("original spec")

Definition:

- **Test thing and do the thing** ***(50/50? 60/40? 72/28?)***

Description:

- **Dual-focus study:**
  - **Intervention effectiveness study combined with:**
    - **Implementation study of 2+ strategies (randomized?)**
    - **Study of single implementation strategy (not randomized; "pilot")** 

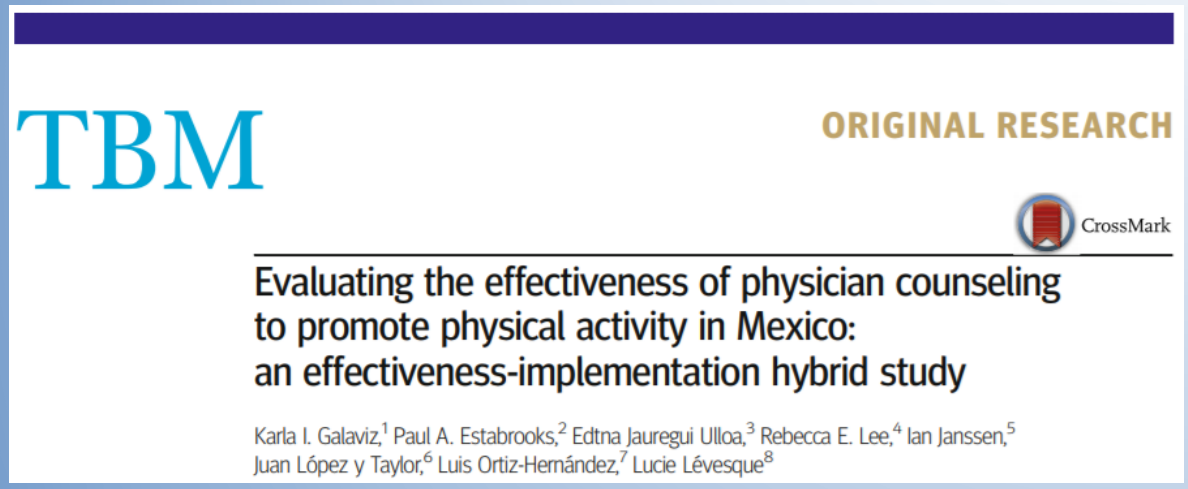
Indications:

- **Intervention effectiveness data available, though perhaps not for context/population of interest for this study**
- **Data on barriers and facilitators to implementation available**

Study Considerations: Type 2

- **Important to have an explicitly described implementation strategy that is thought to be plausible in the real world**
  - **Clear distinction from type 1**
- **Explicit measurement of adoption, fidelity…**
  - **Always happens in type 2**
- **Try to be clear about intervention components versus implementation strategy components**
  - **This isn't always easy to decide or describe**
  - **E.g., *delivery format…***
    - ***Is delivering the intervention over the telephone an intervention component or an implementation strategy?***

Type 2 examples


TBM

ORIGINAL RESEARCH

CrossMark

Evaluating the effectiveness of physician counseling to promote physical activity in Mexico: an effectiveness-implementation hybrid study

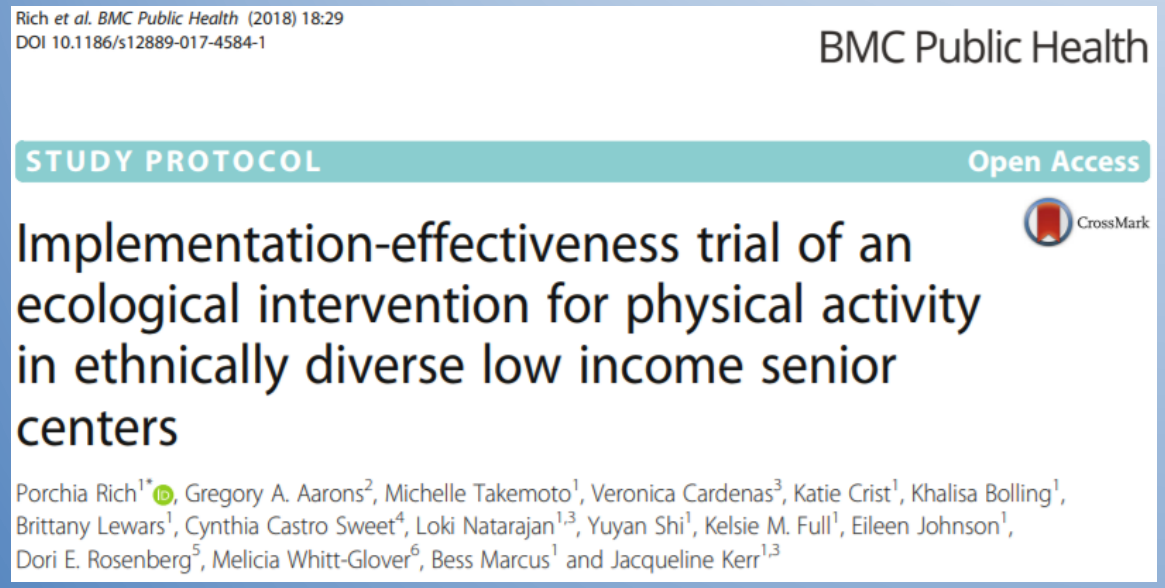
Karla I. Galaviz,[1] Paul A. Estabrooks,[2] Edtna Jauregui Ulloa,[3] Rebecca E. Lee,[4] Ian Janssen,[5] Juan López y Taylor,[6] Luis Ortiz-Hernández,[7] Lucie Lévesque[8]


Open Access Protocol

BMJ Open

Effectiveness of implementing a best practice primary healthcare model for low back pain (BetterBack) compared with current routine care in the Swedish context: an internal pilot study informed protocol for an effectiveness-implementation hybrid type 2 trial

Allan Abbott,[1] Karin Schröder,[1] Paul Enthoven,[1] Per Nilsen,[2] Birgitta Öberg[1]


Rich *et al. BMC Public Health* (2018) 18:29
DOI 10.1186/s12889-017-4584-1

BMC Public Health

STUDY PROTOCOL Open Access

CrossMark

Implementation-effectiveness trial of an ecological intervention for physical activity in ethnically diverse low income senior centers

Porchia Rich[1*], Gregory A. Aarons[2], Michelle Takemoto[1], Veronica Cardenas[3], Katie Crist[1], Khalisa Bolling[1], Brittany Lewars[1], Cynthia Castro Sweet[4], Loki Natarajan[1,3], Yuyan Shi[1], Kelsie M. Full[1], Eileen Johnson[1], Dori E. Rosenberg[5], Melicia Whitt-Glover[6], Bess Marcus[1] and Jacqueline Kerr[1,3]


Rogers *et al. Addiction Science & Clinical Practice* 2013, **8**:7
http://www.ascpjournal.org/content/8/1/7

ADDICTION SCIENCE & CLINICAL PRACTICE

STUDY PROTOCOL Open Access

Telephone care coordination for smokers in VA mental health clinics: protocol for a hybrid type-2 effectiveness-implementation trial

Erin Rogers[1,2*], Senaida Fernandez[8], Colleen Gillespie[2], David Smelson[4,5], Hildi J Hagedorn[6,7], Brian Elbel[3], David Kalman[4,5], Alfredo Axtmayer[1], Karishma Kurowski[1,2] and Scott E Sherman[1,2]

Hybrid Type 3 (original spec)

Definition: **Test do the thing, gather info on the thing (80%-20%...?)**

Description:

- **Largely focused on evaluating implementation strategies**
- **Unit of analysis = provider, clinic, or system**
- **Clinical outcomes are "secondary"**

Indications:

- **We sometimes proceed with implementation studies without completing a "full portfolio" of effectiveness studies**
  - **Strong momentum in a system, e.g., "We are rolling this out!"**
- **Interested in exploring how clinical effectiveness might vary by level/quality of implementation?**

Study Considerations: Type 3

- How many places you got/need?
  - 6? 20? 40? 100?
- Which study design might work best for all involved?
  - cRCT? Stepped Wedge? Implementation Roll-Out Design?
  - See Brown, Curran, et al., 2017
  - Wolfenden et al., 2020 (trial designs)
- What's your evidence for implementation strategies selected?
- Clinical outcomes data collection
  - Measures available in existing data?
  - Primary data collection? *(Mental Health outcomes not routinely available…)*
    - Sub-sample?

More Type 3 examples

Spoelstra *et al. Implementation Science* (2019) 14:60
https://doi.org/10.1186/s13012-019-0907-1

Implementation Science

STUDY PROTOCOL Open Access

Testing an implementation strategy bundle on adoption and sustainability of evidence to optimize physical function in community-dwelling disabled and older adults in a Medicaid waiver: a multi-site pragmatic hybrid type III protocol

Sandra L. Spoelstra[1*], Monica Schueller[1] and Alla Sikorskii[2]

Kilbourne *et al. Implementation Science* 2014, **9**:132
http://www.implementationscience.com/content/9/1/132

IMPLEMENTATION SCIENCE

STUDY PROTOCOL Open Access

Protocol: Adaptive Implementation of Effective Programs Trial (ADEPT): cluster randomized SMART trial comparing a standard versus enhanced implementation strategy to improve outcomes of a mood disorders program

Amy M Kilbourne[1,2*], Daniel Almirall[3], Daniel Eisenberg[4], Jeanette Waxmonsky[5,6], David E Goodrich[1,2], John C Fortney[7], JoAnn E Kirchner[8,9], Leif I Solberg[10], Deborah Main[11], Mark S Bauer[12], Julia Kyle[1,2], Susan A Murphy[3,3], Kristina M Nord[1,2] and Marshall R Thomas[5,6]

Swindle *et al. Implementation Science* (2017) 12:90
DOI 10.1186/s13012-017-0624-6

Implementation Science

STUDY PROTOCOL Open Access

A mixed methods protocol for developing and testing implementation strategies for evidence-based obesity prevention in childcare: a cluster randomized hybrid type III trial

Taren Swindle[1*], Susan L. Johnson[2], Leanne Whiteside-Mansell[3] and Geoffrey M. Curran[3]

Bauer *et al. Implementation Science* (2016) 11:22
DOI 10.1186/s13012-016-0385-7

Implementation Science

STUDY PROTOCOL Open Access

Partnering with health system operations leadership to develop a controlled implementation trial

Mark S. Bauer[1*], Christopher Miller[1], Bo Kim[1], Robert Lew[2], Kendra Weaver[3], Craig Coldwell[4], Kathy Henderson[5], Sally Holmes[6], Marjorie Nealon Seibert[6], Kelly Stolzmann[6], A. Rani Elwy[6] and JoAnn Kirchner[5]

2019 “intro to…” paper

Contents lists available at ScienceDirect

Psychiatry Research

journal homepage: www.elsevier.com/locate/psychres

An introduction to effectiveness-implementation hybrid designs

Sara J. Landes[a,b,c,*], Sacha A. McBain[b,c], Geoffrey M. Curran[b,c,d]

[a] The Department of Veterans Affairs Quality Enhancement Research Initiative (QUERI) for Team-Based Behavioral Health, 2200 Fort Roots Drive, North Little Rock, AR 72114, USA

[b] South Central Mental Illness Research Education and Clinical Center (MIRECC), Central Arkansas Veterans Healthcare System, 2200 Fort Roots Drive, North Little Rock, AR 72114, USA

[c] University of Arkansas for Medical Sciences, Department of Psychiatry, 4301 W. Markham St, Little Rock, AR 72205, USA

[d] University of Arkansas for Medical Sciences, Department of Pharmacy Practice, 4301 W. Markham St, Little Rock, AR 72205, USA

Thoughts from 2019 paper

- **Hybrid type 1 less of a "special case" but more routine?**
  - **If effectiveness research is the "last step" before trying to get people to do the thing… why not more of a focus on implementation questions?**
  - **Some folks doing hybrid 1 type work in *efficacy* research**
  - **Type 1 pilot studies**
- **Type 2 need to be fully justified and include "failsafe"**
  - **Build in time and data collection to iterate strategies if needed**
- **Hybrid type 3 less of a "special case" also?**
  - **When *wouldn't* we want patient-level outcomes data?**
  - **Shouldn't we PROVE how much fidelity is important and under what circumstances?**

Thoughts from Oct 19, 2022…

Us and others reflecting…

- **Special Issue on Hybrids in Frontiers in Health Services**

- **“Reflections on 10 Years of Effectiveness-Implementation Hybrid Studies”**
  - **In submission**
  - **Curran, Landes, McBain, Pyne, Smith, Fernandez, Chambers, Mittman**
  - **5 questions**

Q1: Are they really “designs”?

- *Depends on your definition…*
- **BUT: Initial paper’s focus on trial designs was too limiting**
  - **Original paper talked about “where to randomize…”**
  - **“Do they have to be trials?” No.**
  - **Lots of folks took the basic idea and applied it to lots of study, program evaluation, QI, designs**
- **Let’s go with “hybrid study” instead**

Q2: Which hybrid type should I use?

3. How much do you already know about implementation determinants for the intervention in your context of interest?
    - Not much? If you also need to focus on effectiveness data, consider type 1.
    - If the effectiveness data are strong, and you know enough already to develop/select a strategy or package of strategies to evaluate? Consider type 2 or 3.
4. How ready are you to evaluate a "real world" implementation strategy or package of strategies?
    - Not ready? A type 1 is indicated, where you collect information on implementation determinants to help you prepare for developing strategies later.
    - Ready, and you need to focus as well on effectiveness of the intervention (Question 1)? Consider a type 2.
    - Ready, and your effectiveness data are strong (Question 1) and you don't need to adapt a lot (Question 2)? Consider a type 3.

And remember…

- You don’t need to do a hybrid study
- “Too early” for a hybrid?
  - Intervention not yet established as safe
- Don’t need to look at intervention effectiveness?
  - Evaluating implementation of vaccines
  - Doing a focused study on implementation determinants
- Explicitly justify why you are doing a hybrid

Q3: Which research design should I use?

- Largely depends on the research questions…
- Research (…, BUT:
  - Type 1 s… …o a lot of these studies (…
  - Type 3 s… …, so a lot of these studies (…
  - Type 2 s… …drive the design c…
- See also o… …nd designs often use… …ed time series…)
  - Observational Types 2-3 in healthcare/public health systems evaluating roll outs
  - Pre-post formative work revising/optimizing strategies

***And remember*: your research design is only as good as your partners are comfortable with…**

Q4: What are challenges with the typology?

- Typology was set with clinical research mindset
  - Doesn't work so well for health promotion/public health type interventions
    - Little "efficacy"; Always start with "real world" implementation and strategies
  - Not sure types fit for policy research…
- "Shorthand" for relative focus on intervention/ implementation outcomes
  - Doesn't capture nuance
- Not everyone agrees on what "the thing" is
  - Medication adherence interventions
  - Contingency management interventions
- Still recommending use of typology…
  - But with language like "*consistent with type X*" when nuance is at play

Q5: How is cost analyzed in hybrids?

- Increasing attention paid to the cost of implementation strategies
- Not always easy to do: lotta time-based activity stuff
- Cost effectiveness analysis can be done in all hybrid types
  - Include implementation costs in conventional CEA
  - Focus of CE of implementation strategies on increments of adoption/fidelity
- Team sport for sure; seek professional help
- More and more examples published

Wrap it up

- **We hope these thoughts and reflections are helpful to folks considering if/when/how to use hybrid studies**
- **Thanks for your attention!**
- **I am happy to take your questions/comments**

Example of Type 1: CALM study

- Curran et al., 2012, *Implementation Science*
- Large effectiveness trial of anxiety intervention in primary care
  - 4 cities, 17 clinics, 1004 patients
  - Care managers using software tool with patients to navigate Tx manual
  - Care managers were local nurses/social workers already working in the clinics
- Qualitative process evaluation alongside trial
  - 47 interviews with providers, nurses, front office, and anxiety care managers
  - Most interviews done on the phone
  - Interview guide informed by an implementation framework (PARIHS)
    - (these days, that link needs to be very explicit…)

What did we learn?

- **Lots of stuff…**
- **But, I'll share one important piece of data that illustrates the value of this kind of evaluation**
  - **Many of the providers in the participating clinics DID NOT refer a lot of patients for the trial. Some referred NOBODY.**
  - **Those who referred a lot were *already* interested in MH**
  - **Those who didn't were not persuaded during the site trainings that this was a good enough idea to be actively involved**
  - **So, "uptake" and "reach" were not great in the trial, even though the researchers tried to get all providers to refer**
  - **So, key barrier to future implementation was provider buy-in and engagement. "Standard" strategies to entice them didn't work.**
  - **We would have learned this about this barrier about 2+ years later if we had done this sequentially.**

Type 2, Example 1: Cully et al., 2012, 2014+

- **Clinical trial of brief cognitive behavioral therapy in treating depression and anxiety; 1 "pilot" implementation strategy**
  - Patient randomization only; Pilot study of implementation strategy (online training, audit and feedback, facilitation) in 2 large VAMCs
  - Intent-to-treat analysis of clinical outcomes (N=320)
  - Feasibility, acceptability, and "preliminary effectiveness" data collected on implementation strategy
    - Measured knowledge acquisition, fidelity to model
    - Qualitative data on implementability, time spent, etc.
  - Preparatory to implementation trial of strategy

Type 2, Example 2: Garner et al., 2017

- **Aim 1: effectiveness of a motivational interviewing-based brief intervention (MIBI) for substance use as an adjunct to usual care (*referral*) within AIDS service organizations (ASOs)**
- **Aim 2: effectiveness of implementation and sustainment facilitation (ISF) as an adjunct to the Addiction Technology Transfer Center (ATTC) model for training staff in MI**
  - **Patients randomized within ASOs (N=1872)**
    - **Substance use outcomes**
  - **ASOs randomized to ACCT or ACCT+ISF (N=39)**
    - **Proctor et al (2011) implementation outcome measures**

Type 3 Example, Smelson et al., 2015

- Mission-Vet is an evidence-based treatment for co-occurring SUD and MH disorders among homeless Veterans
- Compare "implementation as usual" of Mission-Vet to IAU plus Getting To Outcomes (GTO)
  - IAU = Standard training plus access to Mission-Vet manual
  - GTO = planning, implementation (supervision, monitoring…), self evaluation (audit and feedback)
- 3 large VAMCs
  - Case managers (69) randomized to IAU or IAU+GTO
  - 1500-2000 Veterans
- RE-AIM measures
  - Adoption = meeting 50% of eligible Veterans involved in intervention
  - Effectiveness = SUD, MH symptoms, functioning, housing