Implementation Science/ Knowledge Translation

A/Prof Luke Wolfenden

Clinical Research Fellow and Program Manager, Population Health HNELHD and Career Development Fellow, School of Medicine and Public Health, UoN

A/Prof Jed Duff

School of Nursing and Midwifery, UoN

Objective

This session will describe

1. Practical and evidence-based approaches for enhancing the implementation of knowledge into clinical policy and routine practice; and

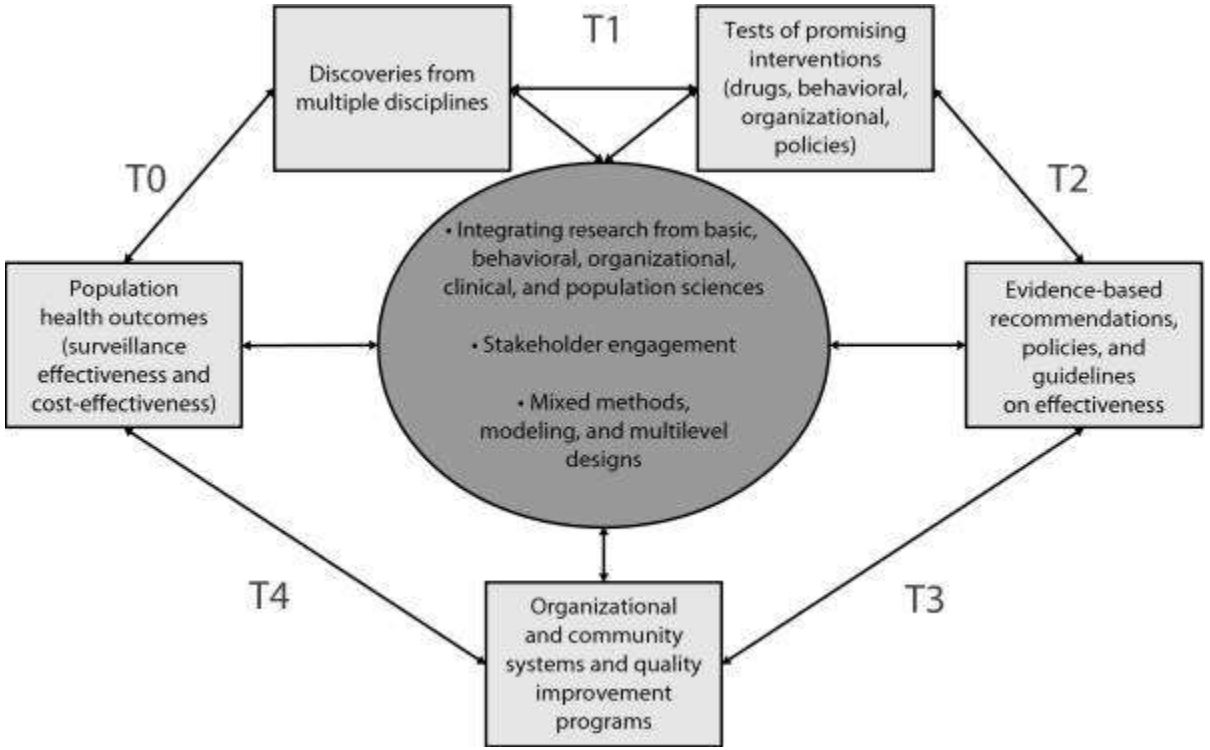
2. Research methods used for studying and improving the implementation of knowledge.

Questions

- What is implementation science?
- Why does implementations science matter?
- What theories/ models/ frameworks inform the science?
- What kind of methods and approaches are used?
- How can we use implementation science to improve implementation of health services/interventions?

What is implementation science?

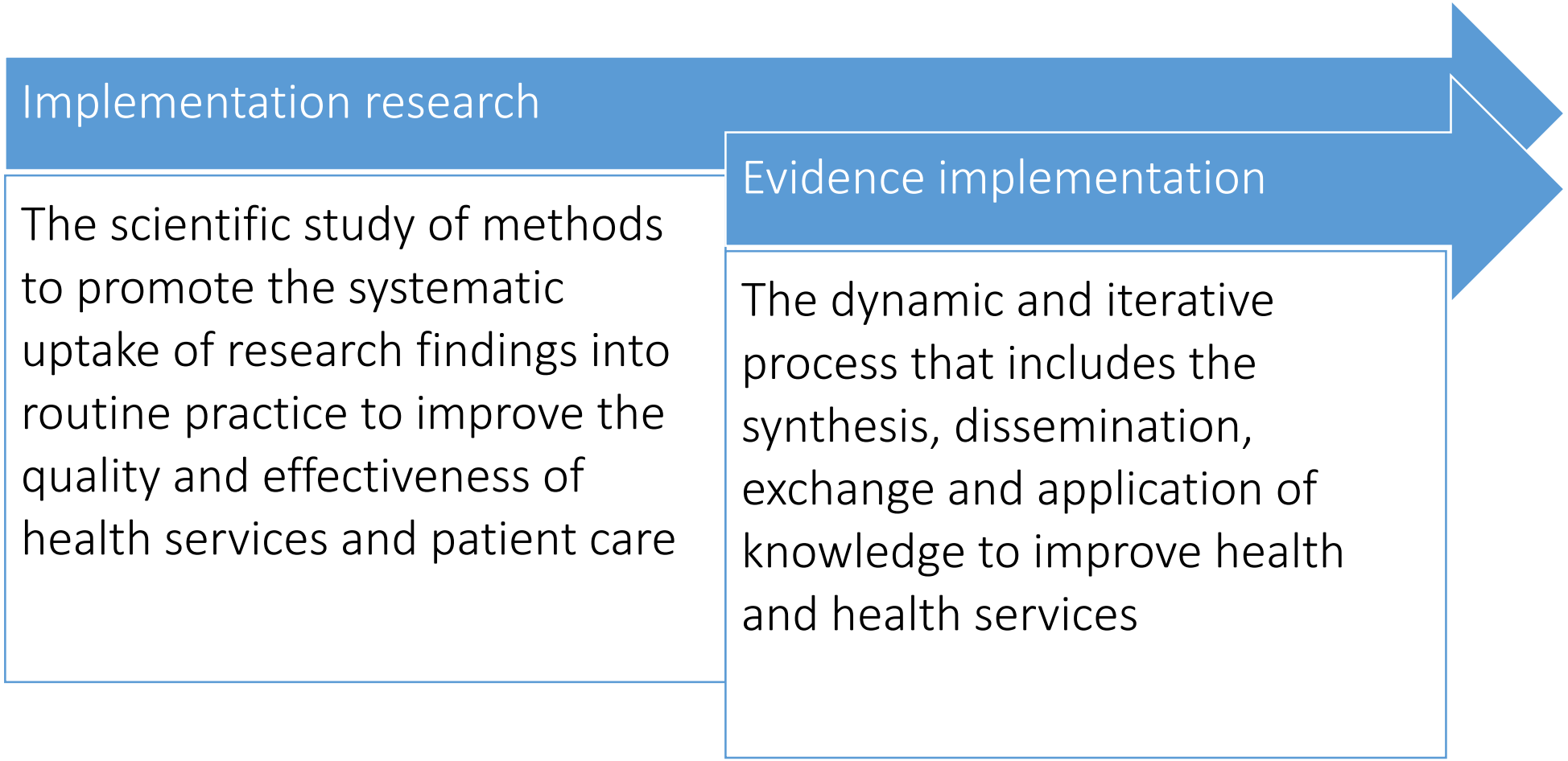
NIH Translation Process Model



Glasgow et al. Am J Public Health 2012 July; 102(7): 1274–1281.

NSW Health Translational Framework

Implementation Science

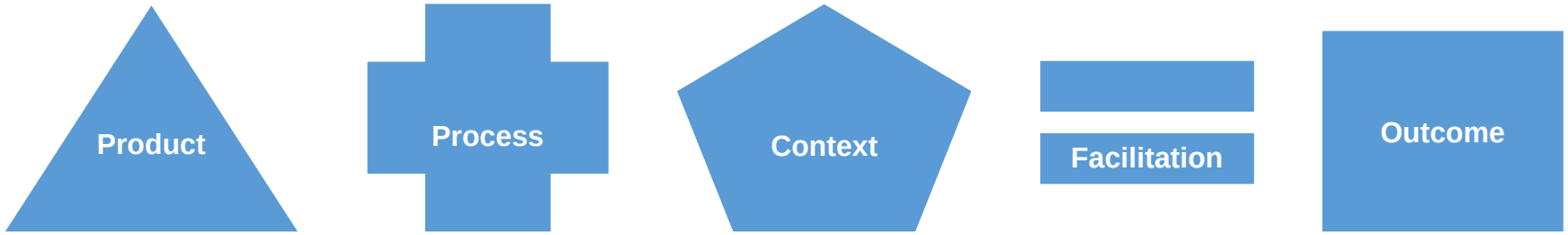


Component	Evidence implementation vs Implementation research	
Aim	Brings about improvement	Studies improvement methods
Intervention	Applies interventions	Studies interventions
Design	Iterative pragmatic design	(more) Classical design
Protocol	Flexible adaptive protocol	(more) Rigid protocol
Results	Context specific	(more) Generalisable

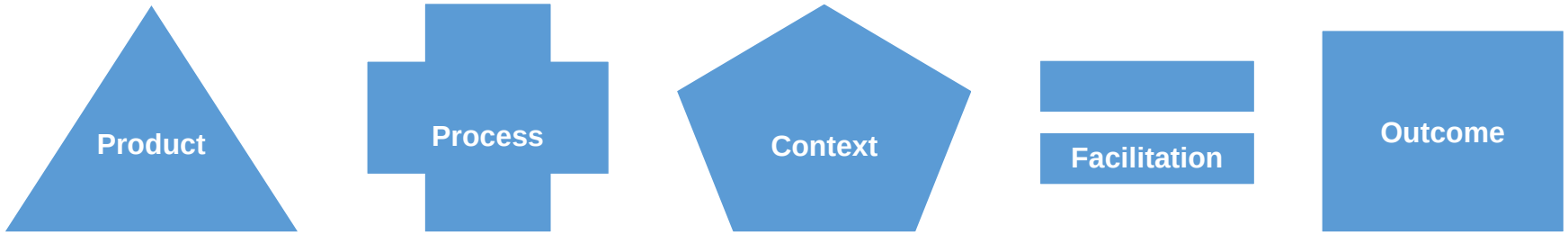
Also known as…

- Implementation research
- Knowledge translation
- Knowledge mobilisation
- Translational research

Key Components of Implementation Science

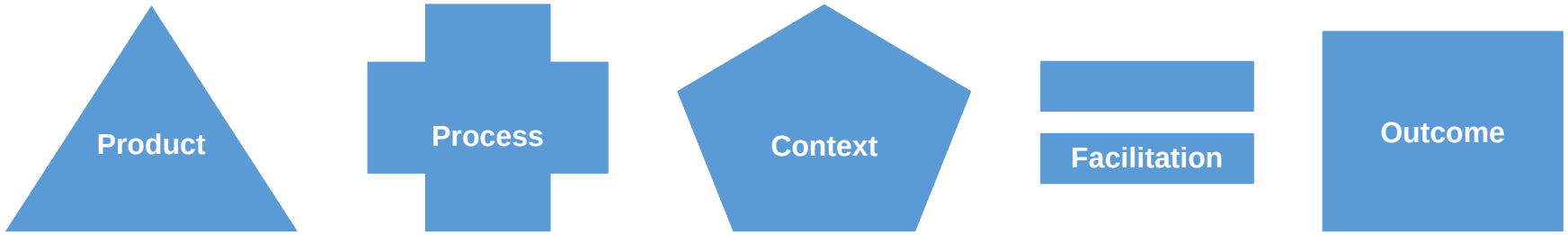


Key Components of Implementation Science



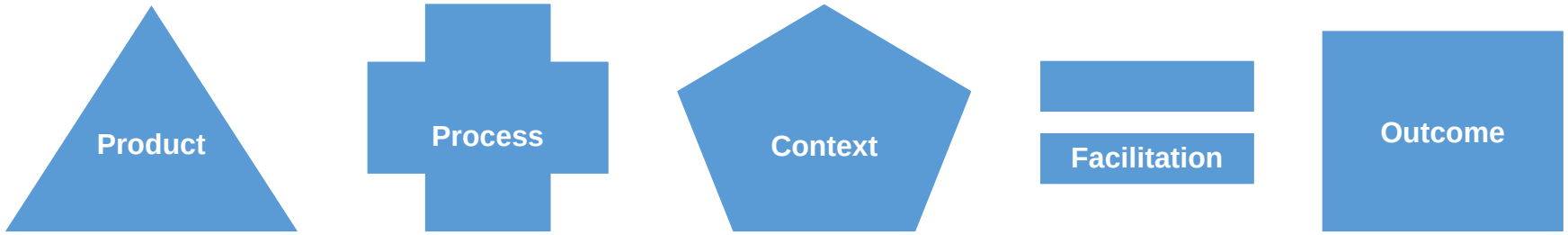
- Research
- Guidelines
- Evidence
- Knowledge
- Knowledge tools
- EB Products

Key Components of Implementation Science



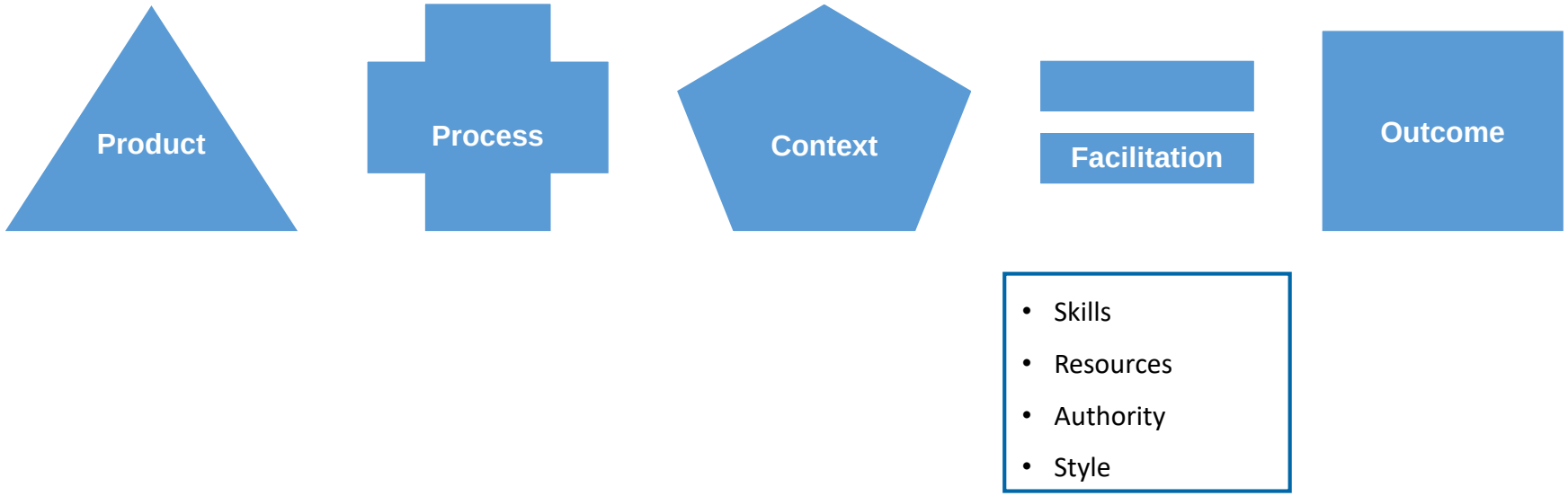
- Implementation interventions
- Change strategy
- Planned action framework
- Protocol

Key Components of Implementation Science



- Inner and outer setting
- Culture
- Resources
- Leadership

Key Components of Implementation Science



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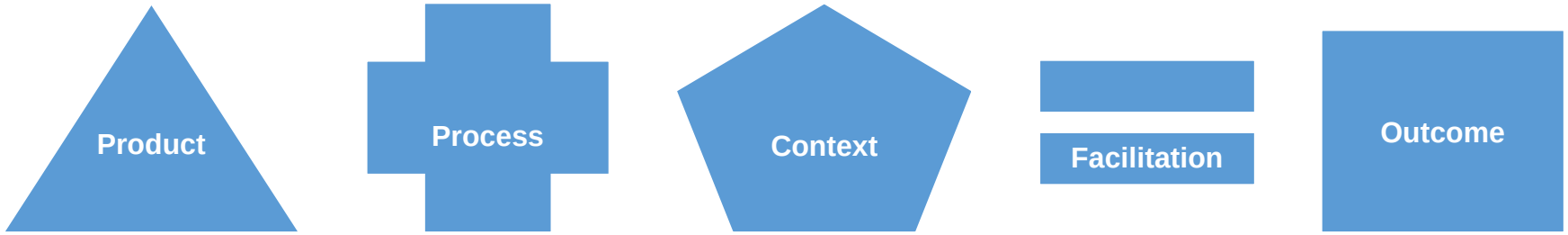
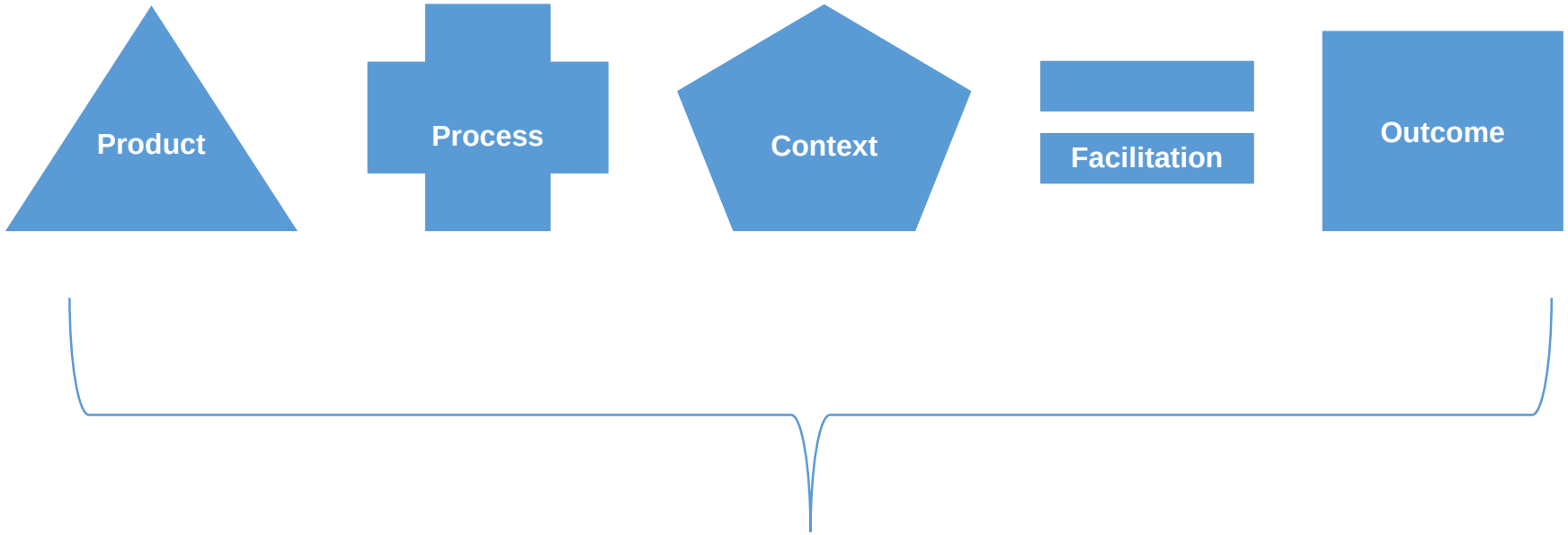


- Fidelity
- Acceptability
- Sustainability
- Cost
- Appropriateness
- Reach
- Impact

Key Components of Implementation Science



Why does implementations science matter?

Research to Practice: Traditional Model

Idea

Research to Practice: Traditional Model

Idea → funding

Research to Practice: Traditional Model

Idea → funding → trial

Research to Practice: Traditional Model

Idea → funding → trial → submit

Research to Practice: Traditional Model

Idea → funding → trial → submit →

publish/guideline

Research to Practice: Traditional Model

Idea → funding → trial → submit →

publish/guideline → end-user aware of research

Research to Practice: Traditional Model

Idea → funding → trial → submit →

publish/guideline → end-user aware of research

→ adoption

Research to Practice: Traditional Model

Idea → funding → trial → submit →

publish/guideline → end-user aware of research

→ adoption

17 years

Research to Practice: Traditional Model

Idea → funding → trial → submit →

publish/guideline → end-user aware of research

→ adoption

100% 17 years

Research to Practice: Traditional Model

Idea → funding → trial → submit →

publish/guideline → end-user aware of research

→ adoption

100% 17 years 14%

Background

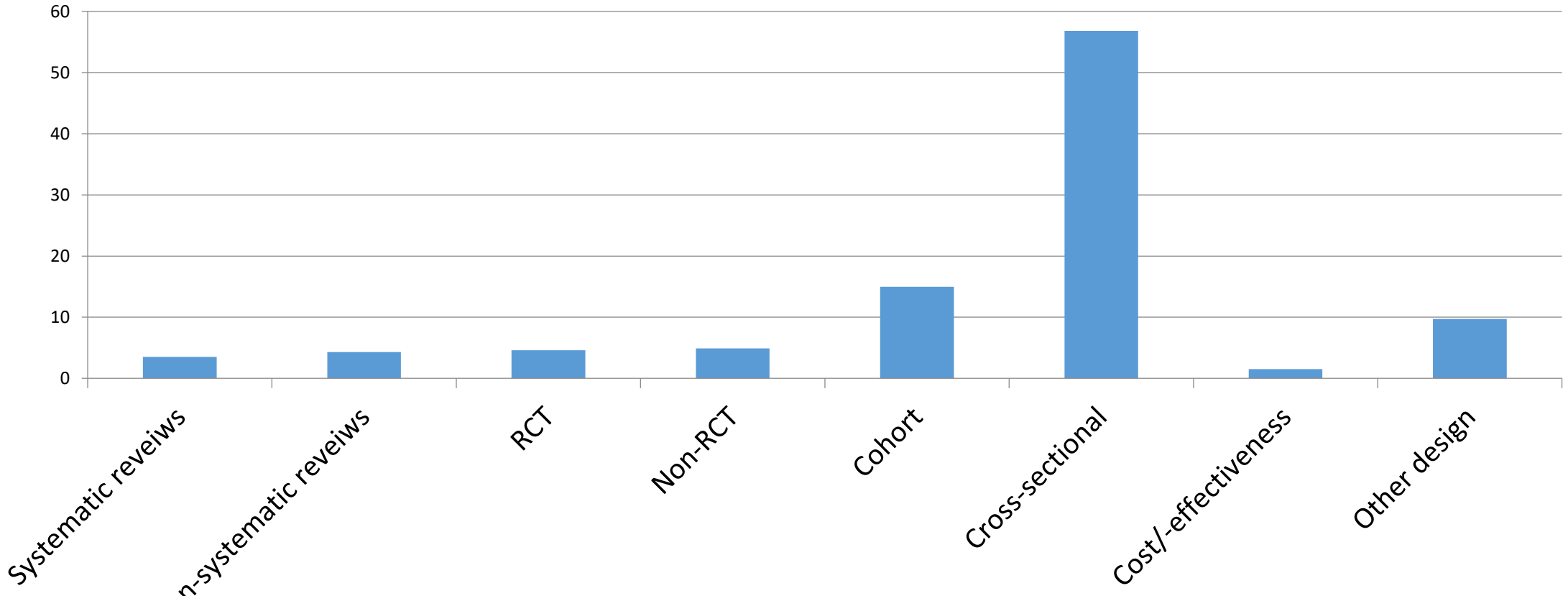
- An enormous gap between ‘evidence’ and ‘practice’
- Adoption of evidence-based nutrition practices in community settings
  - <5% childcare services comply with dietary guidelines [Yoong et al, 2014]
  - 20-30% of schools adhere to mandatory canteen policies [Wolfenden et al 2017]
  - Less than 50% of primary care clinicians provide routine dietary advice [McElwaine 2015]
- Considerable research waste and translation delay
  - 16% of NHMRC health promotion research has impact [Cohen et al, 2014]

Why the Gap?

- Many (push/pull) factors influence translation
- Lack of alignment between research production process and user needs
- What do end-users want to know?

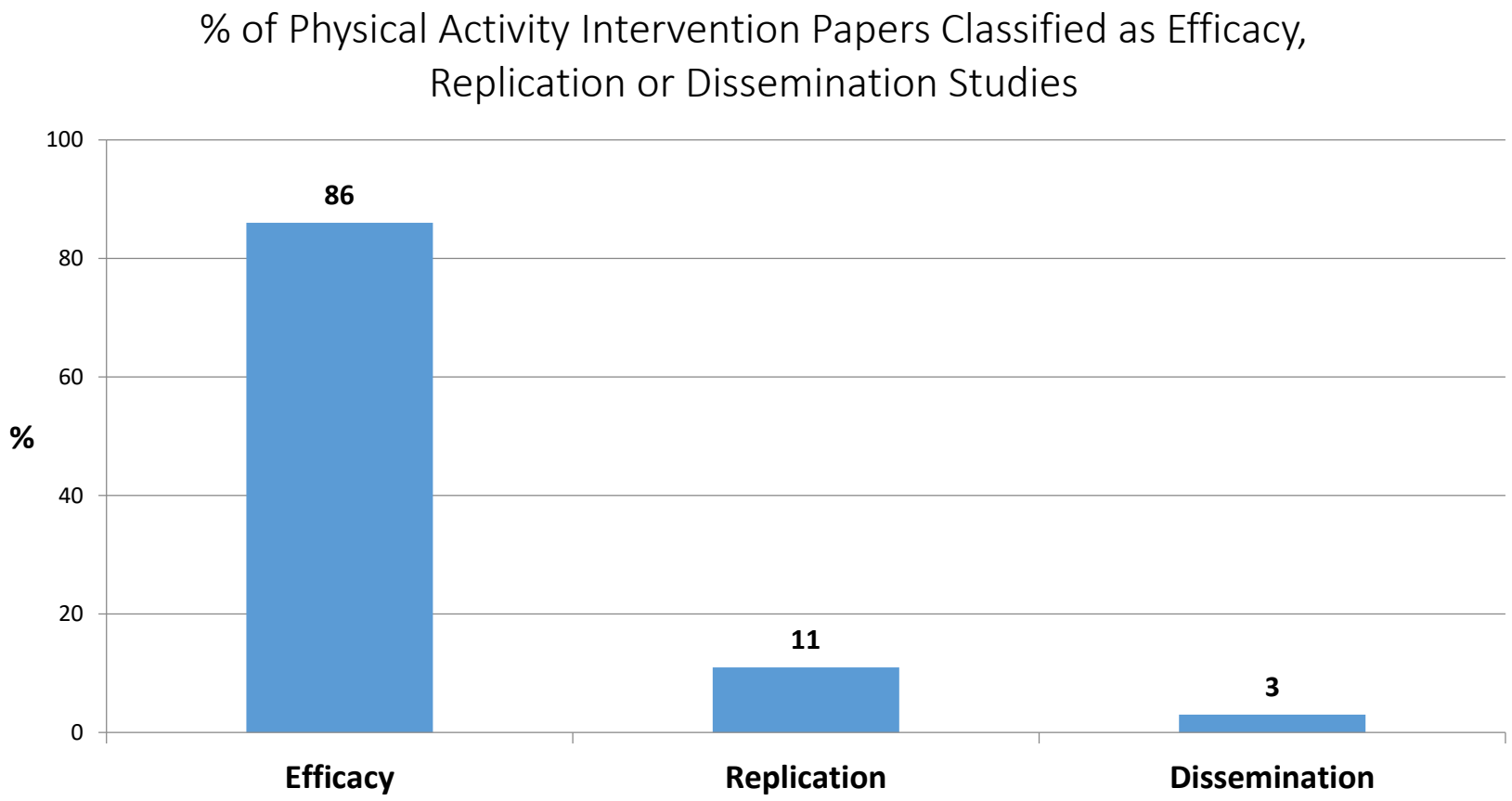
    1. What interventions will be effective when implemented in my context
    2. What is the best way to deliver (implement) the intervention (‘at scale’)
    3. How much will it cost and will there be any adverse effects

% Public Health Output by Research Design



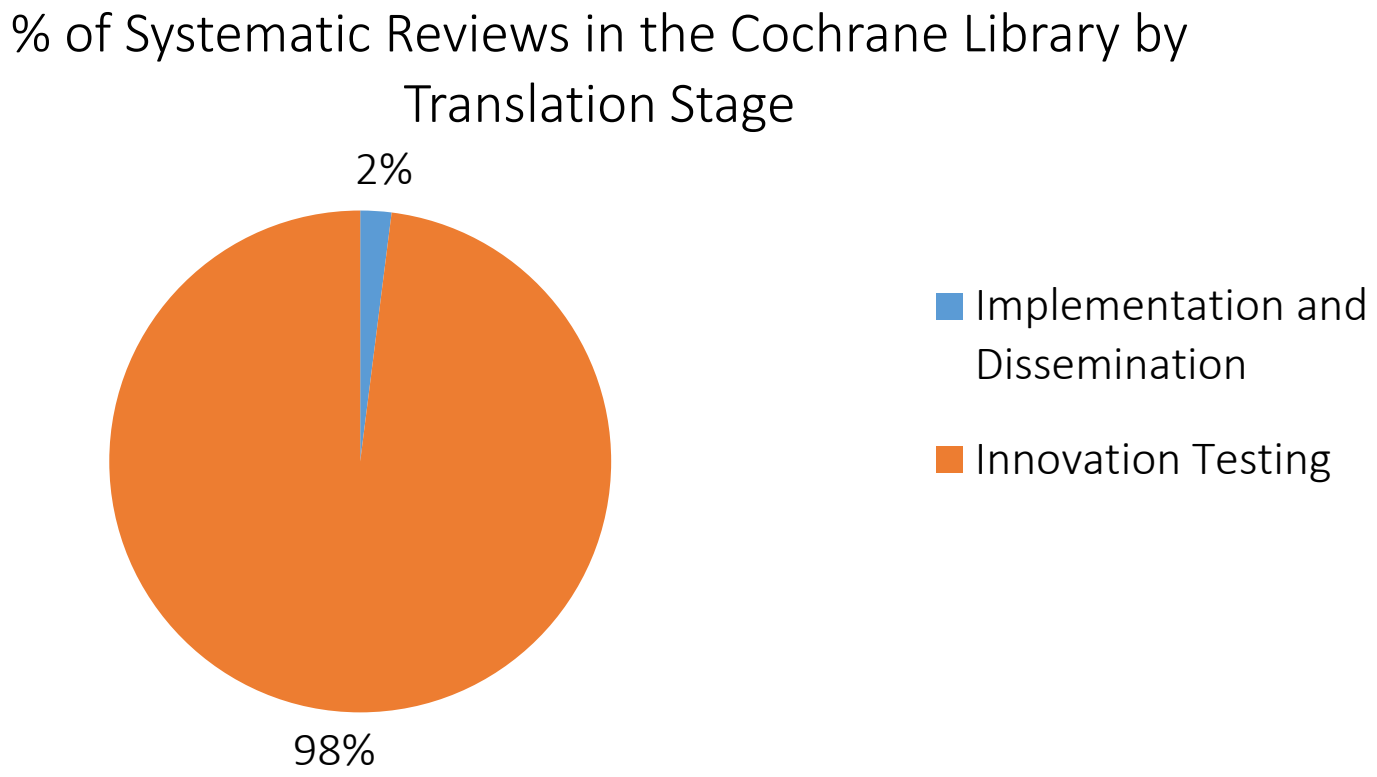
Wolfenden L et al. What is generated and what is used: a description of public health research out-put and citation. Eur J Pub Health 2016

Bibliographic Studies



Milat et al Public health research out-puts from efficacy to dissemination: a bibliometric analysis. BMC Public Health, 2011

Bibliographic Studies



Yoong SL, et al. Systematic reviews examining implementation of research into practice and impact on population health are needed. Journal of Clinical Epidemiology. 2015; 68(7):788-91

Limitations of Current Trials for End-users

- Most test interventions that are difficult to replicate and implement in the real world (non pragmatic)
    - Require external recourses, skills, expertise
- Most use self selected samples
    - Motivated, not typical of the practice setting
    - Difficult to assess potential population reach
    - Inflate effects?
- Limited description of context
    - Difficult to assess local relevance

Are Interventions Effective in The Real World?

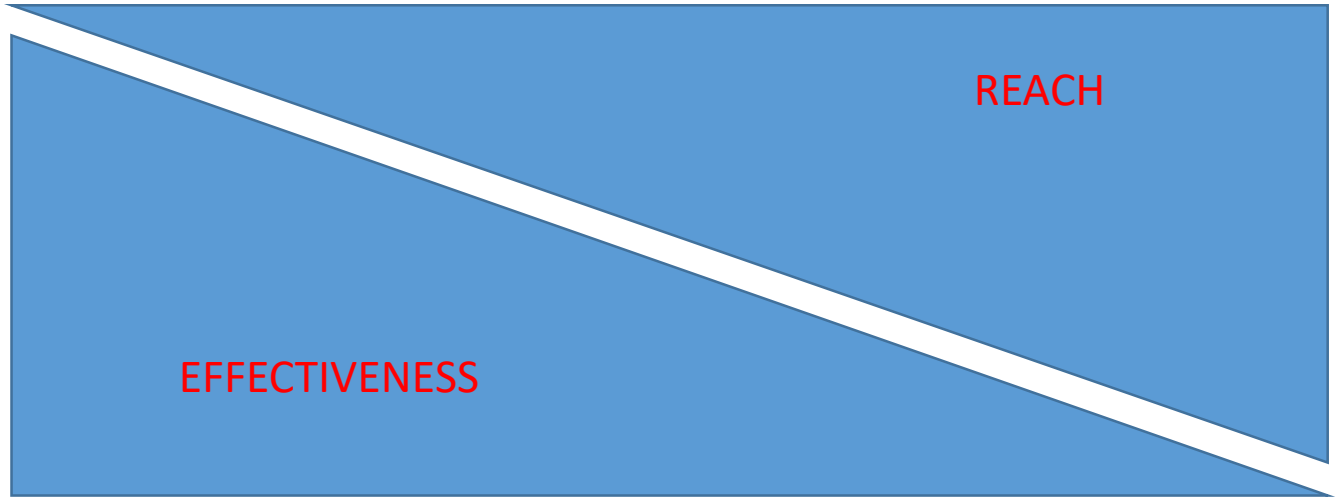
Effects of explanatory (ideal research conditions) and pragmatic (real world) interventions for child obesity prevention

Research type	Effect estimate (zBMI)	95% Confidence Interval
Trials conducted in a more controlled research environment	-0.21*	-0.35, -0.08
Trials conducted in a more 'real word' environment	-0.09	-0.19 , 0.01

Yoong SL et al. Exploring the impact of pragmatic and explanatory study designs on outcomes of systematic reviews of public health interventions: a case study. J Pub Health. 2014;36 170-176.

The Role of Implementation in Impact

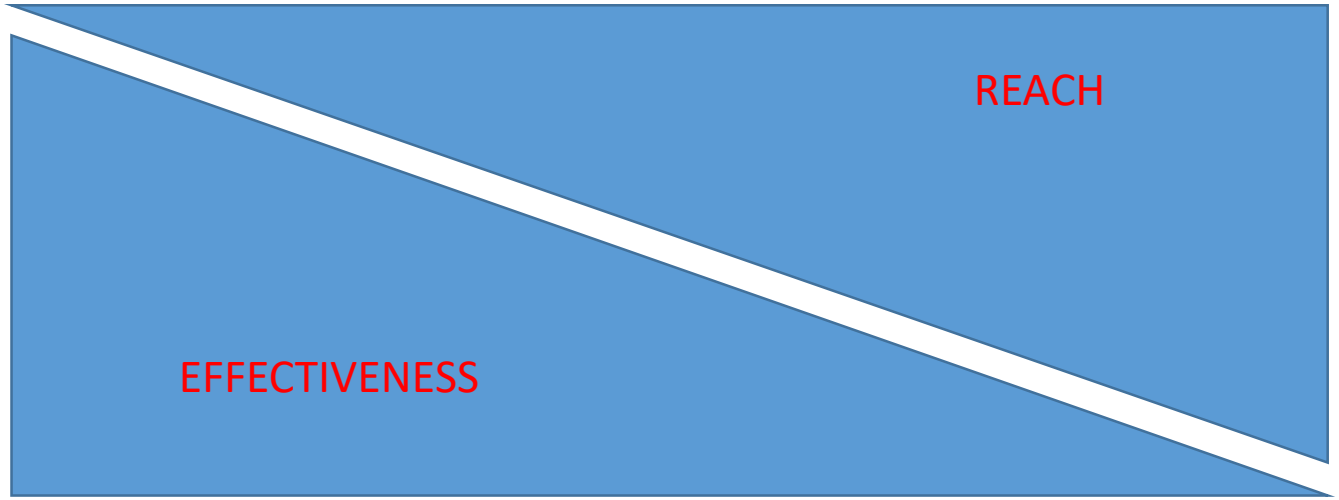
Impact = Reach x Effectiveness



The Role of Implementation in Impact

Implementation

Impact = Reach x Effectiveness



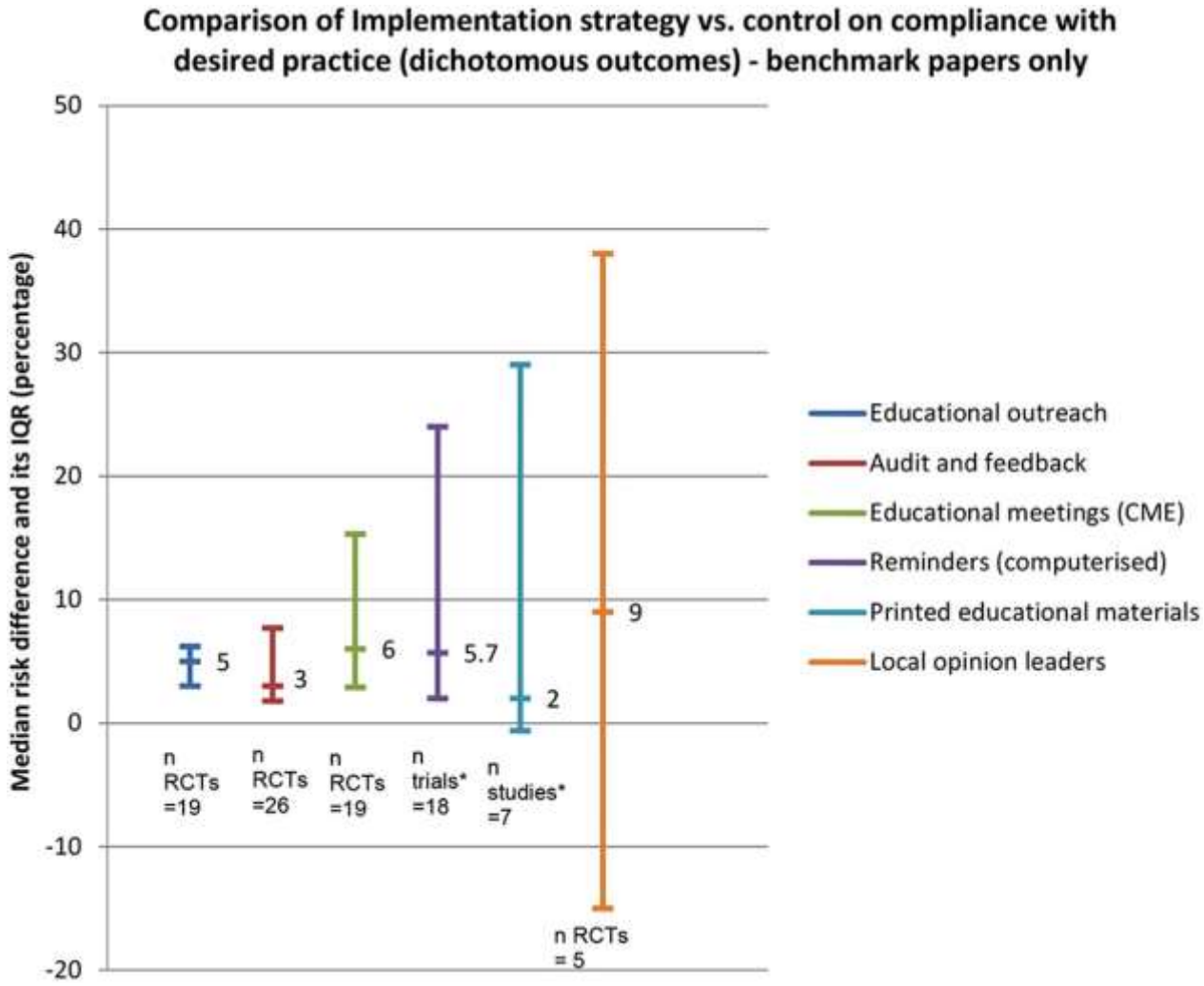
Effectiveness of Implementation Strategies

- AHRQ in 2008 [Raibin 2010]
- Cochrane Reviews published/underway across multiple risks and settings
    - 35 trials – considerable heterogeneity
    - 7 test strategies ‘at scale’
    - 3 examined cost or adverse effects
    - Poor Quality (GRADE = very low)

Cochrane: % improvement in policy or practice implementation

Setting (n)	Median Effect size
Childcare (5)	5%
Schools (7)	19%
Sporting clubs (2)	6%

Graph illustrating median effects of single professional-level strategies alone versus no strategy or usual care in primary care.



Rosa Lau et al. BMJ Open 2015;5:e009993

BMJ Open

What will be the costs / cost effectiveness and will there be any adverse effects?

What are the Costs/Likely Adverse Effects

- Systematic reviews are recommended basis for health decisions [Kite et al, Prev Med 2015]
    - 153 obesity prevention systematic reviews
    - <1/4 discuss cost or cost effectiveness
- Adverse events and cost/cost effectiveness rarely considered [Wolfenden 2010]
    - Requires ‘dark logical models’ of cause an effect

What kind of methods and approaches are used in implementation science?

Objective	Description	Example methods
Describe/ Explore	Describe/ explore an idea or phenomenon to make hypotheses or improve understanding.	Qualitative Methods; Surveys; Network Analysis; Mixed Methods.
Develop	Create a 'knowledge tool' that synthesises best evidence into a usable product.	Design Methods (Design Thinking); Delphi; Co-design Methods; Quality Improvement
Act	Implement best available evidence using local practice knowledge.	Action Research; Knowledge Translation; Quality Improvement .
Test	Test whether an intervention produces an expected outcome.	Experimental (C-RCT, Stepped Wedge); and Quasi Experimental (ITS, Before-and-After).
Explain	Develop a theory to explain the relationship between concepts and/or events.	Qualitative Methods; Realist Evaluation; Experimental (SMART RCT); Hybrid Trials.

Describe/ Explore

- Qualitative methods
- Mixed Methods
- Case study
- Surveys
- Network Analysis

INTERNATIONAL JOURNAL of NURSING PRACTICE

International Journal of Nursing Practice 2015; **21**: 207–213

RESEARCH PAPER

'Rounding' for better patient care: An evaluation of an improvement intervention implementation

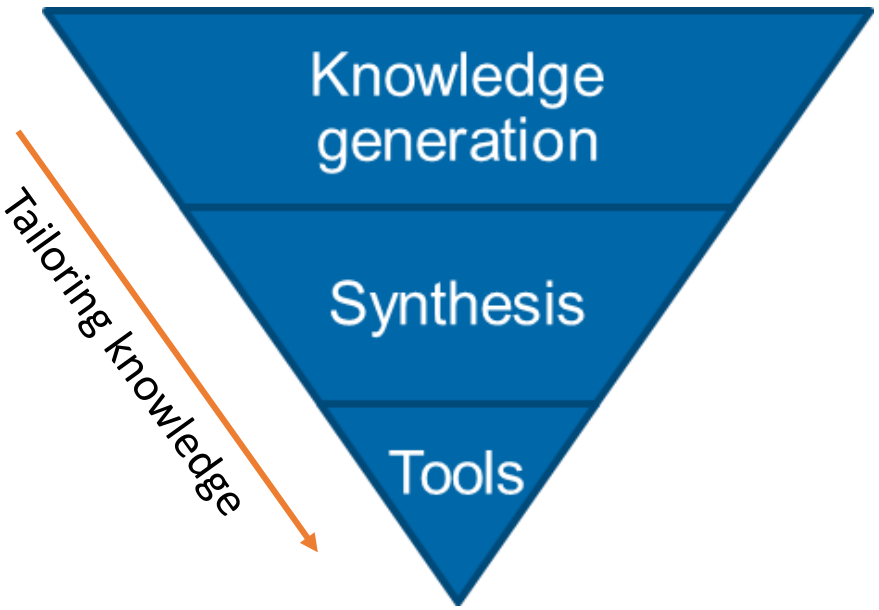
Kim Walker RN PhD
Professor of Healthcare Improvement, St Vincent's Private Hospital, School of Nursing & Midwifery, University of Tasmania, Sydney, New South Wales, Australia

Jed Duff RN PhD
Clinical Research Fellow, St Vincent's Private Hospital, Sydney, New South Wales, Australia

Katherine Fitzgerald RN MPH
Research Assistant, St Vincent's Private Hospital, Sydney, New South Wales, Australia

Accepted for publication June 2013

Develop



Collaborative Development of a Perioperative Thermal Care Bundle Using the Guideline Implementability Appraisal Tool

Jed Duff, RN, PhD, Kim Walker, RN, PhD, Karen-Leigh Edward, RN, PhD

Act

- Action Research
- Quality Improvement
- Knowledge Translation

Accepted: 4 November 2017
DOI: 10.1111/jocn.14171

ORIGINAL ARTICLE

WILEY Journal of Clinical Nursing

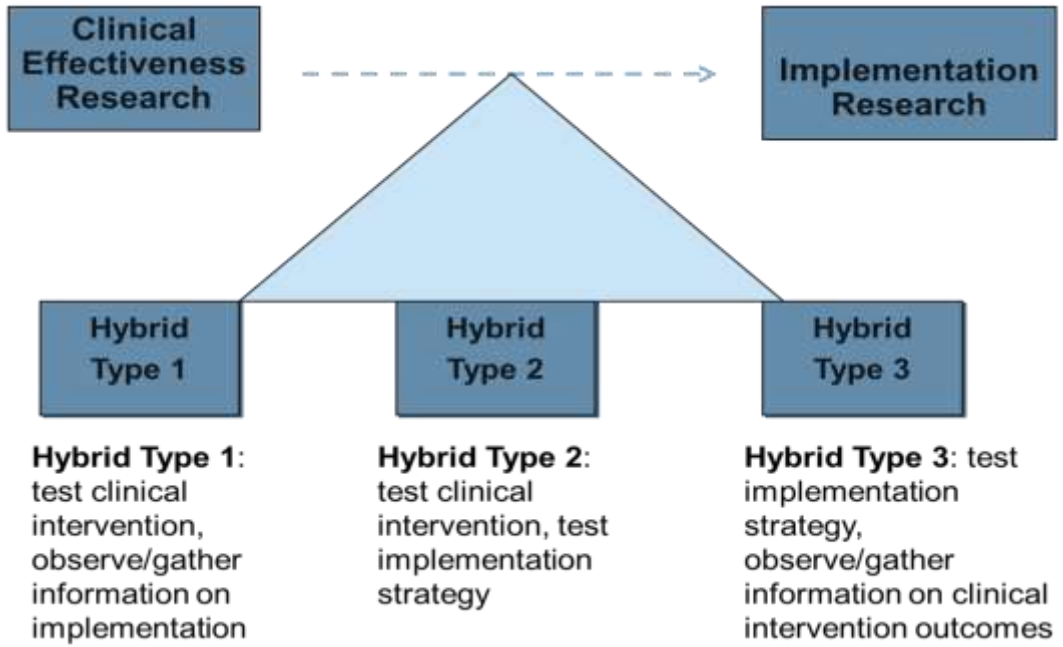
Effect of a thermal care bundle on the prevention, detection and treatment of perioperative inadvertent hypothermia

Jed Duff PhD, RN, FACORN, Associate Professor[1] | Kim Walker PhD, RN, Principal Healthcare Improvement Scientist[2] | Karen-Leigh Edward PhD, RN, Professor of Nursing and Practice-based Research[3] | Nicholas Ralph PhD, RN, MClinPrac, Associate Professor, Principal Research Fellow[4,5] | Jo-Ann Giandinoto RN, BN Hons, BBSc, Research Associate[6] | Kimberley Alexander PhD, RN, BN, Associate Professor[7,8] | Jeff Gow BAgEcon Hons, MEcon, PhD, Professor of Economics[9,10] | John Stephenson BSc Hons, Msc Eng, PhD, Senior Lecturer[11]

Test: Experimental and Quasi-experimental

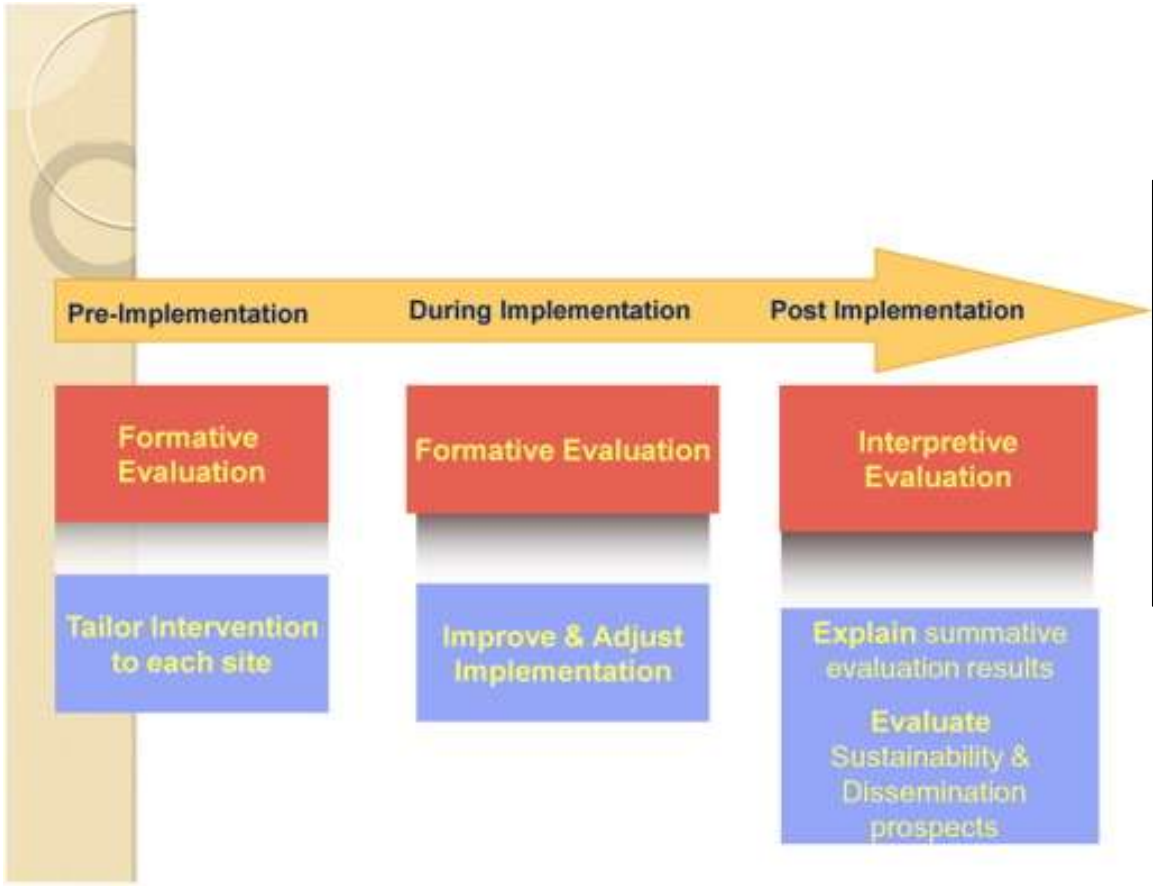
- Cluster-RCT
- Cluster-RCT with baseline
- Randomised Stepped Wedge
- Time Series
- Controlled Before-and-After
- Controlled Before-and-After
- Inset example

Test: Hybrid Designs



- Type 1: Physical activity interventions in childcare
- Type 2 and 3: Trials of interventions to improve implementation of a nutrition policy in school

Test + Explain: Trials with Qualitative Methods



Dixon-Woods et al. Implementation Science 2013, 8:70
http://www.implementationscience.com/content/8/1/70

IMPLEMENTATION SCIENCE

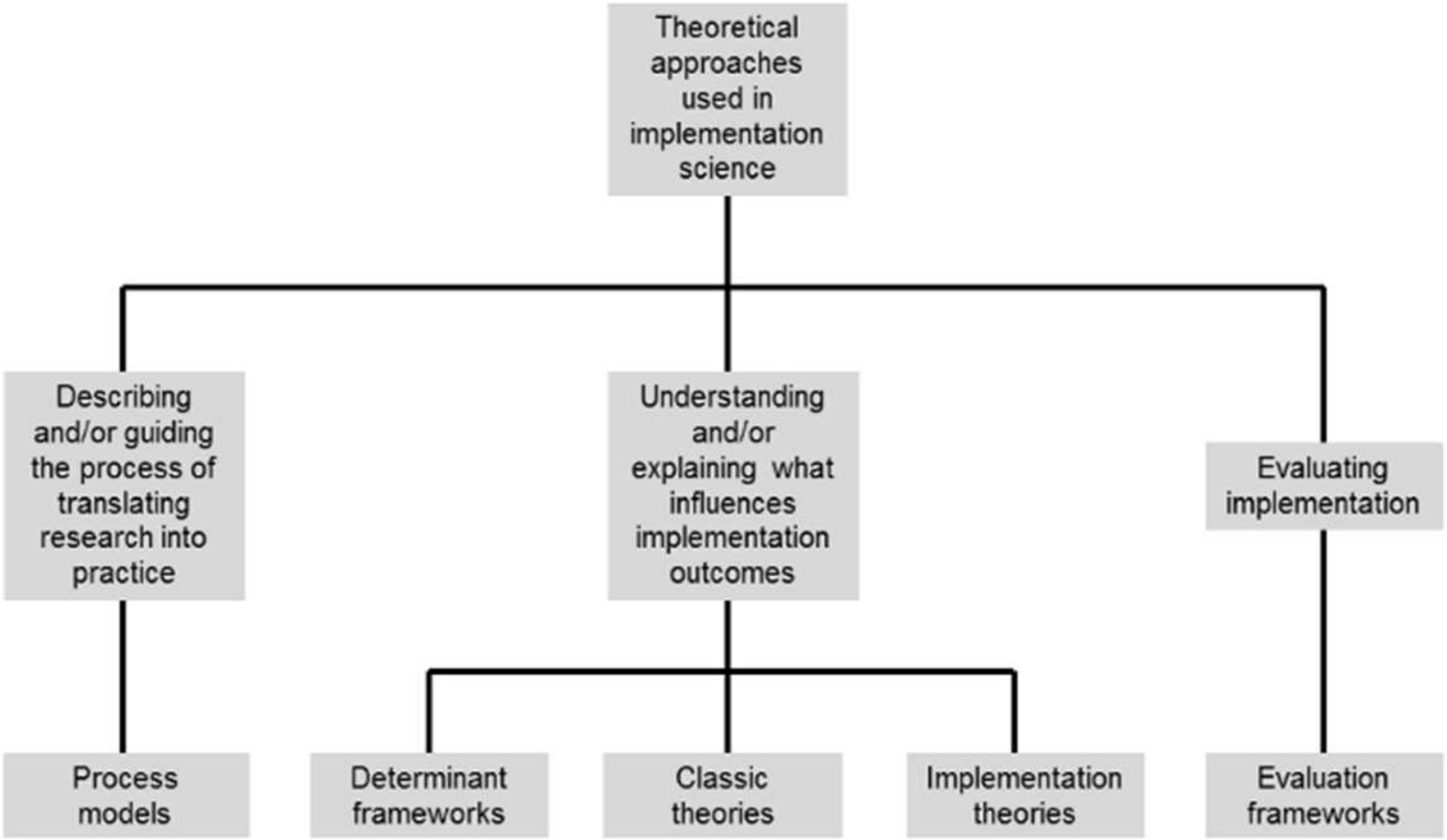
RESEARCH Open Access

Explaining *Matching Michigan*: an ethnographic study of a patient safety program

Mary Dixon-Woods[1*], Myles Leslie[2], Carolyn Tarrant[1] and Julian Bion[3]

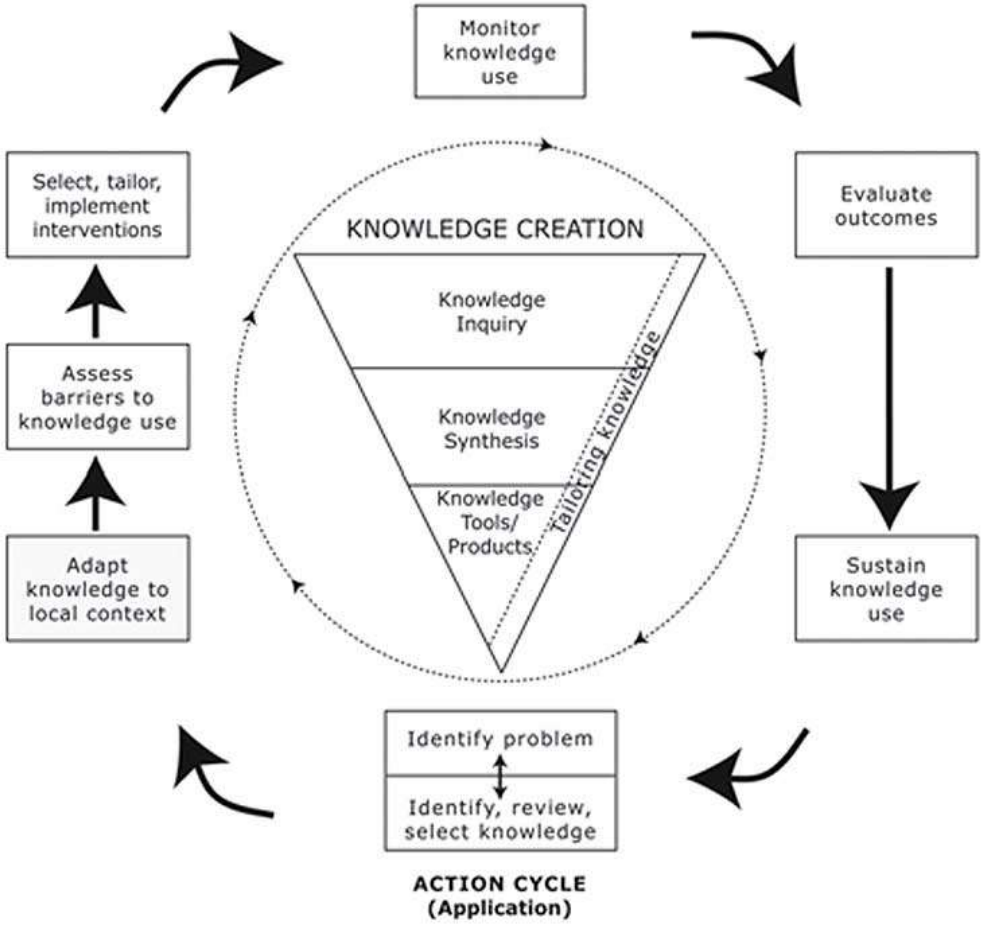
What theories/ models/ frameworks inform the science?

Theories, Models and Frameworks



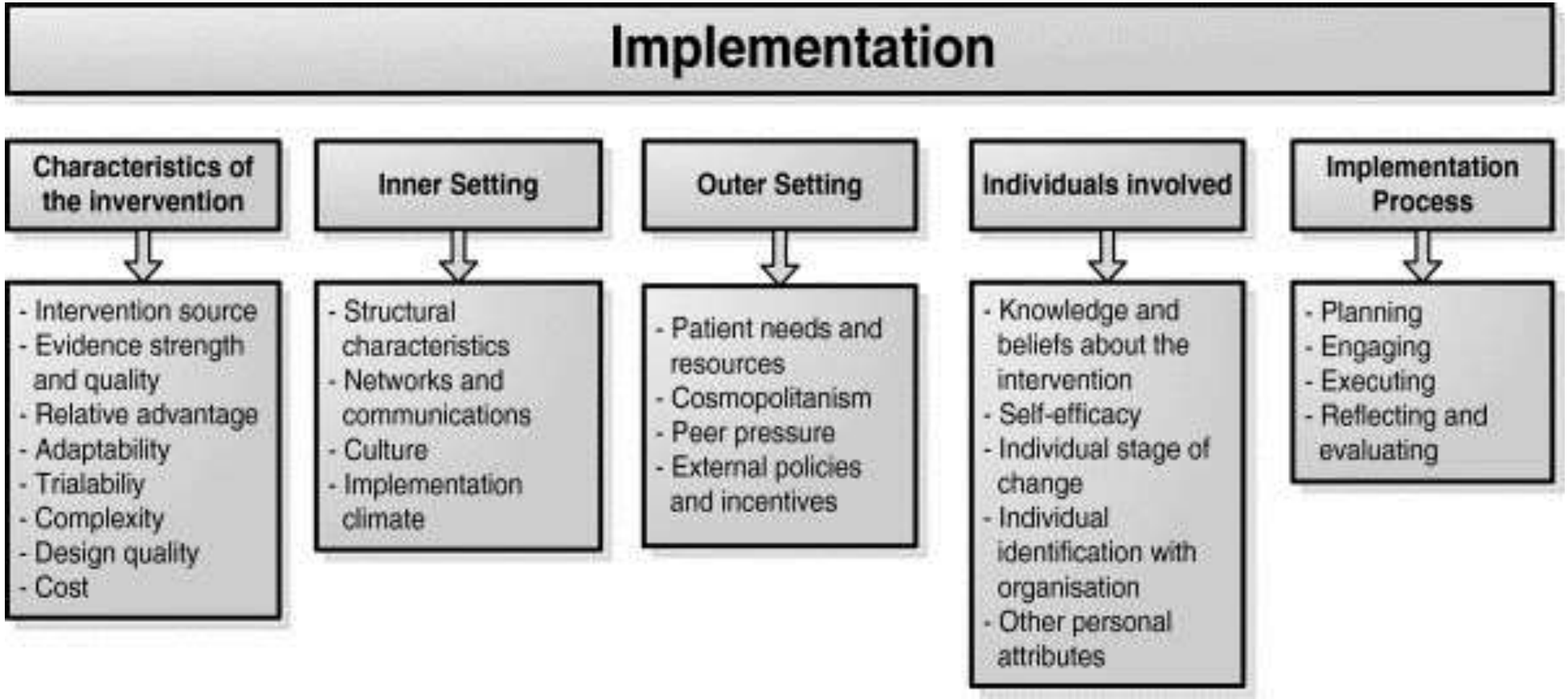
Nilsen, P. (2015). Making sense of implementation theories, models and frameworks. *Implementation Science*, *10*(1), 53.

Process Models: Knowledge to Action Framework



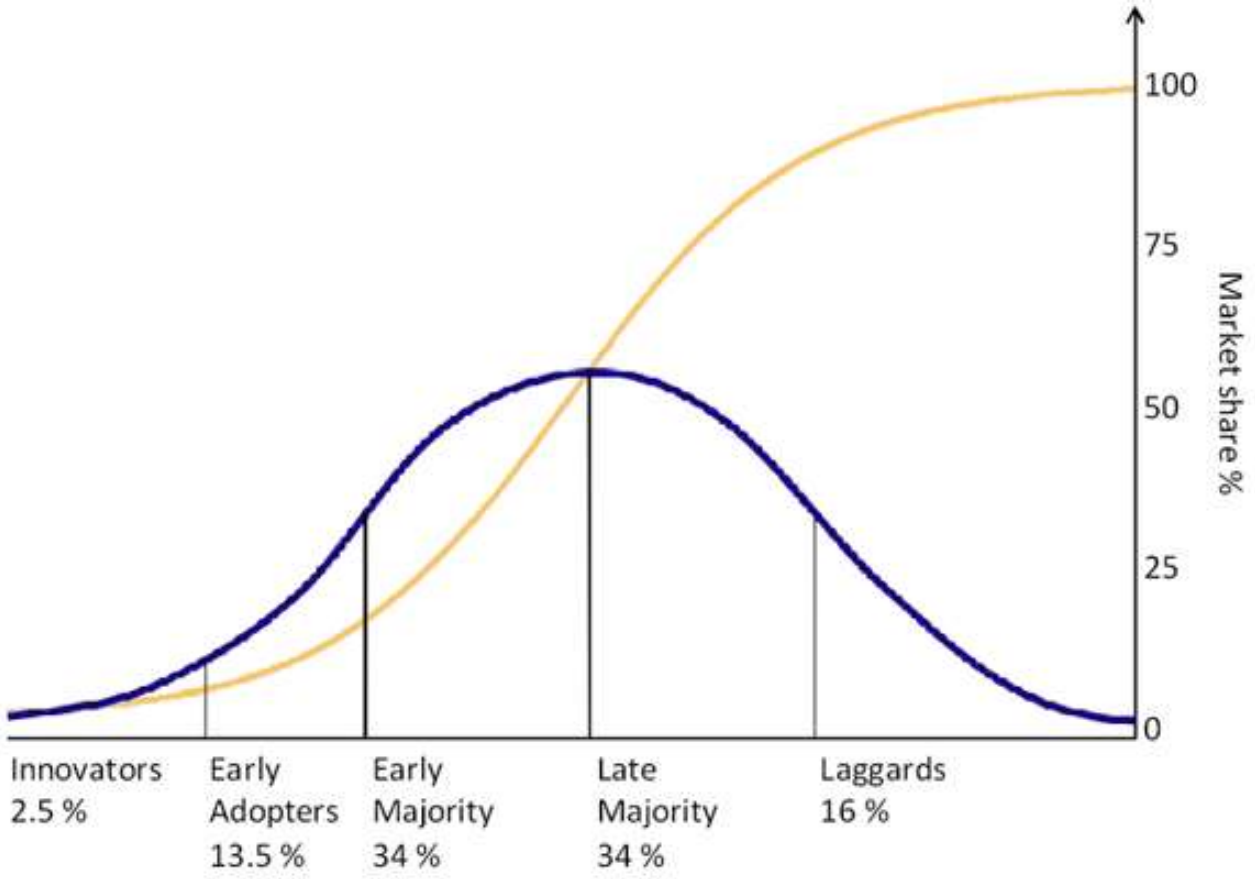
Graham, I. D., Logan, J., Harrison, M. B., Straus, S. E., Tetroe, J., Caswell, W., & Robinson, N. (2006). Lost in knowledge translation: time for a map?. *Journal of continuing education in the health professions*, *26*(1), 13-24.

Determinant Frameworks: Consolidated Framework for Implementation Research



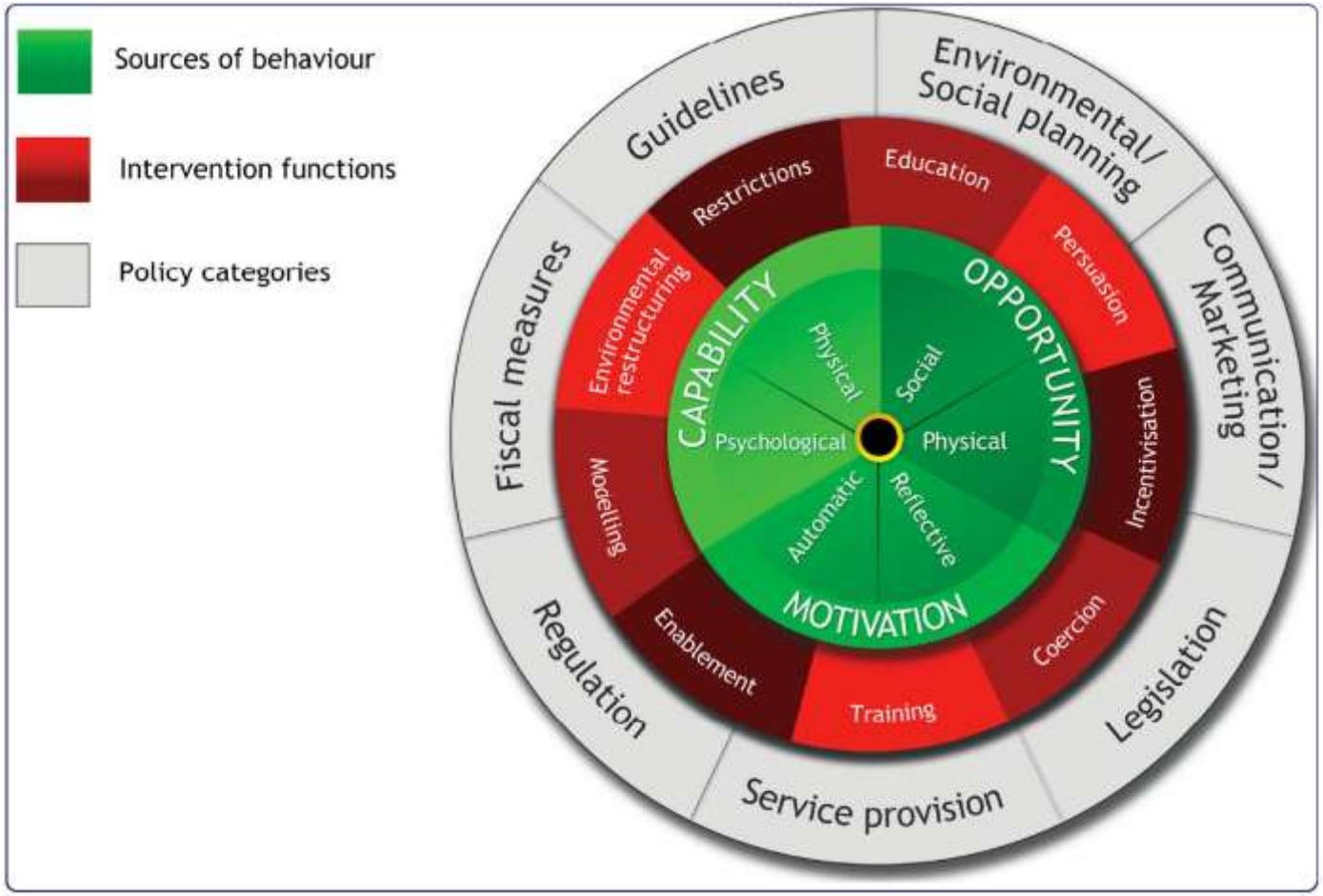
Damschroder, L. J., & Lowery, J. C. (2013). Evaluation of a large-scale weight management program using the consolidated framework for implementation research (CFIR). *Implementation Science*, *8*(1), 51.

Classic Theories: Theory of Diffusion



Rogers, E. M. (2010). *Diffusion of innovations*. Simon and Schuster.

Implementation Theories: Behaviour Change Wheel



Michie, S., Van Stralen, M. M., & West, R. (2011). The behaviour change wheel: a new method for characterising and designing behaviour change interventions. *Implementation science*, *6*(1), 42.

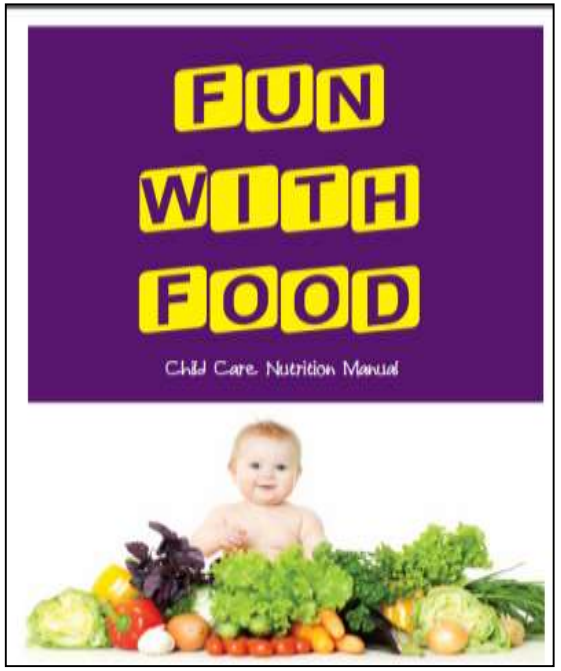
Evaluation Frameworks: RE-AIM

Dimension	Question
Reach	How many and what proportion of the target population is participating in the intervention?
Effectiveness	What are the effect of the intervention on eligible patients?
Adoption	What is the percentage of providers participating in the program?
Implementation	Was the intervention implemented as intended?
Maintenance	Is the intervention maintained after the study period?

Bakken, S., & Ruland, C. M. (2009). Translating clinical informatics interventions into routine clinical care: how can the RE-AIM framework help?. *Journal of the American Medical Informatics Association*, *16*(6), 889-897.

How can we use implementation science to improve implementation of health services/interventions?

Getting children eating well for life means starting early. Whether you run a nursery, work in a children's centre, look after children as a childminder or if you oversee early years education in a local authority, we're here to help you deliver great food for under-fives.



NSW recommendations

Nutrition Checklist for Menu Planning

Use this checklist to plan each two-week cycle of your service menu. The number of serves recommended is the minimum required to meet the nutritional needs of children when one main meal and two midmeals are provided.

Main Meals

Beef/Lamb/Kangaroo

- Lean red meat is included on the menu at least **6** times per fortnight ❒

Chicken/ Fish/ Pork/ Veal/ Non-Meat Meals

- A variety of lean white meat/non -meat meals are included on the menu up to **4** times per fortnight ❒
- Non-meat meals are based on eggs, cheese, tofu or legumes ❒
- Raw vegetables or fruit high in vitamin C are served with the non-meat meal ❒

Raw vegetables and fruit high in vitamin C include

citrus fruit, tomato, cauliflower, broccoli, kiwi fruit, capsicum, rockmelon

Iron Containing Foods

- On each day that a red meat meal is served, at least **1** other iron containing food is included on the menu ❒
- On each day that a white meat or non-meat meal is served, at least **2** other iron containing foods are included on the menu ❒

Other iron containing foods:

wholemeal bread, breakfast cereal, dried fruit, Milo™

Vegetables and Fruit

- The menu includes at least **2** serves of vegetables daily ❒
- The menu includes at least **1** serve of fruit daily ❒

**A variety of vegetables and fruit throughout the menu is important.*

Dairy Foods

- The menu includes a total of **1** serve of dairy foods daily ❒

Serving milk at morning and afternoon tea may be an easy and reliable way to meet this requirement.

milk, yoghurt, cheese, custard

**Cream, sour cream and butter are not substitutes for milk, yoghurt and cheese*

Breads, Cereals, Rice and Pasta

- The menu includes at least **2** serves of bread, cereal, rice or pasta foods daily ❒
- High fibre varieties e.g. multigrain, wholemeal, high fibre white are included daily ❒

Other breads include: *Pita, lavash, Turkish, Lebanese, fruit bread, scones, etc.*

Morning and Afternoon Tea (Midmeals)

- Midmeals are planned on the menu as part of the total day's intake ❒
- Milk, cheese, yoghurt or custard is included if necessary to meet the recommended daily serve ❒
- Bread/cereal based foods are included if necessary to meet the recommended daily number of serves ❒
- Vegetables and fruit are included if necessary to meet the recommended daily number of serves ❒

50% of recommended dietary intake

- 2 serves vegetables and legumes/beans
- 1 serve fruit
- 2 serves grain(cereal) foods
- ¾ serve lean meats food group
- 1 serve milk, yoghurt, cheese or alternatives

Evidence of poor guideline implementation (evidence-practice gap)

Internationally:

- United States,92 childcare services, 14% complied with guidelines(2006)
- England, 118 childcare services, 0% complied with guidelines (2010)

In Hunter New England:

- 2015, 70 childcare menus, 0% complied with full guidelines
    - Nil compliant with vegetable recommendations
    - Nil compliant with meat recommendations

Application of the Theoretical Domains Framework

Step 1
- Identify who needs to do what, differently

Step 2
- Apply the TDF when identifying the barriers and enablers to the target practice behaviours

Step 3
- Identify intervention strategies that address modifiable barriers and enhance the enablers

Step 4
- Determine how behaviour change will be measured and understood

Menu planning/ review process

Cook identify foods that belong to each food group

(Vegetables; Fruit; Grains; Lean meats, Dairy)

Determine the amount of food that constitutes a serve for each identified food group (eg. 1 serve of vegetables = 150g)

Choose or modify recipes to provide serves for each food group

Calculate quantity of ingredients needed to provide adequate serves for the number of children that attend

Plan menu providing required serves for each food group per child each day = Supervisor sign off

Seven steps for planning healthy meals, snacks and drinks

It is important that the food and drink provided for children is balanced across each day, and that children eat regularly, with breakfast, lunch, tea, and two or three snacks provided daily (either within an early years setting or at home). Using these food and drink guidelines to plan meals and snacks for children will help to make sure that all children eat a healthy, balanced diet, whether they attend full-day care in one setting, or attend several settings throughout the week.

Step 1. Plan menus for all the meals and snacks you provide for children.
This will help you to check that food and drink provision across the day is balanced and includes variety, and also helps planning for shopping and food preparation.

Step 2. Plan menus lasting at least one week.
In practice, a menu that covers between one and four weeks will give children lots of variety. Try to make sure that children who attend your setting on the same day each week are not always provided with the same meal.

Step 3. Plan each meal and snack menu to meet the food and drink guidelines in this guide.
This means that children attending your setting for sessional care or who move between different settings will still meet their nutritional requirements overall.

Step 4. Plan menus to include a variety of foods, tastes, textures and colours.
This will give children opportunity to try a wide range of foods, and make meals and snacks colourful and tasty.

Step 5. Make sure you cater for the cultural and dietary needs of all the children in your care.
You can also plan your menus to enable children to experience food from different cultures. You will find more information about this on page 49.

Step 6. Introduce new menu cycles at least twice a year.
This will incorporate seasonality and give children the chance to try different foods.

Step 7. Share menus for meals and snacks with parents
This can help parents to balance meals and snacks with the food they provide at home. For example, if children are having a light meal at teatime and you expect them to eat again at home, make sure that parents are aware of this.

How do the standards translate into specific nutrients for groups of children of different ages?

Nutrient-based standards for food prepared for 1-4 YEAR OLDS in child care

This table provides figures for the recommended nutrient content of an average day's food and drink over a period of one week or more.

Nutrient			FULL-DAY CARE *	Morning session: SNACK and LUNCH	Afternoon session: SNACK and TEA	SNACK only	LUNCH only	TEA only
Energy		kcals	903	516	387	129	387	258
Fat		g	35.0	20.0	15.0	5.0	15.0	10.0
Total carbohydrate		g	120.4	68.8	51.6	17.2	51.6	34.4
Non-milk extrinsic sugars	MAX	g	26.6	15.2	11.4	3.8	11.4	7.6
Protein	MIN	g	11.0	6.3	4.7	1.6	4.7	3.1
Iron	MIN	mg	5.5	3.1	2.4	0.7	2.4	1.7
Zinc	MIN	mg	4.3	2.4	1.9	0.5	1.9	1.4
Calcium	MIN	mg	260	150	110	40	110	70
Vitamin A	MIN	µg	300	170	130	40	130	90
Vitamin C	MIN	mg	21	12	9	3	9	6

Application of the Theoretical Domains Framework

Step 1
- Identify who needs to do what, differently

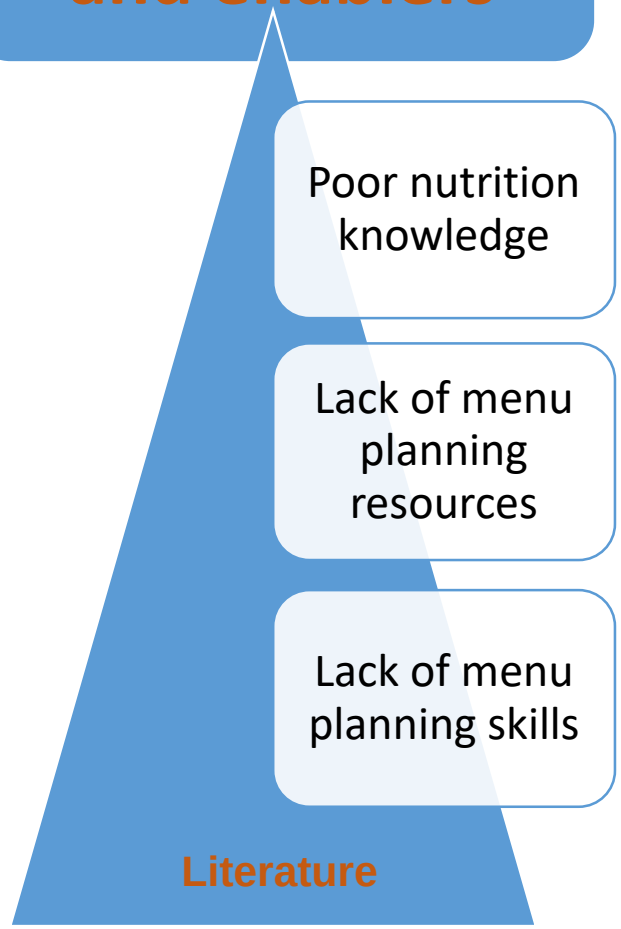
Step 2
- Apply the TDF when identifying the barriers and enablers to the target practice behaviours

Step 3
- Identify intervention components that address modifiable barriers and enhance the enablers

Step 4
- Determine how behaviour change will be measured and understood

Step 2

Identify barriers and enablers

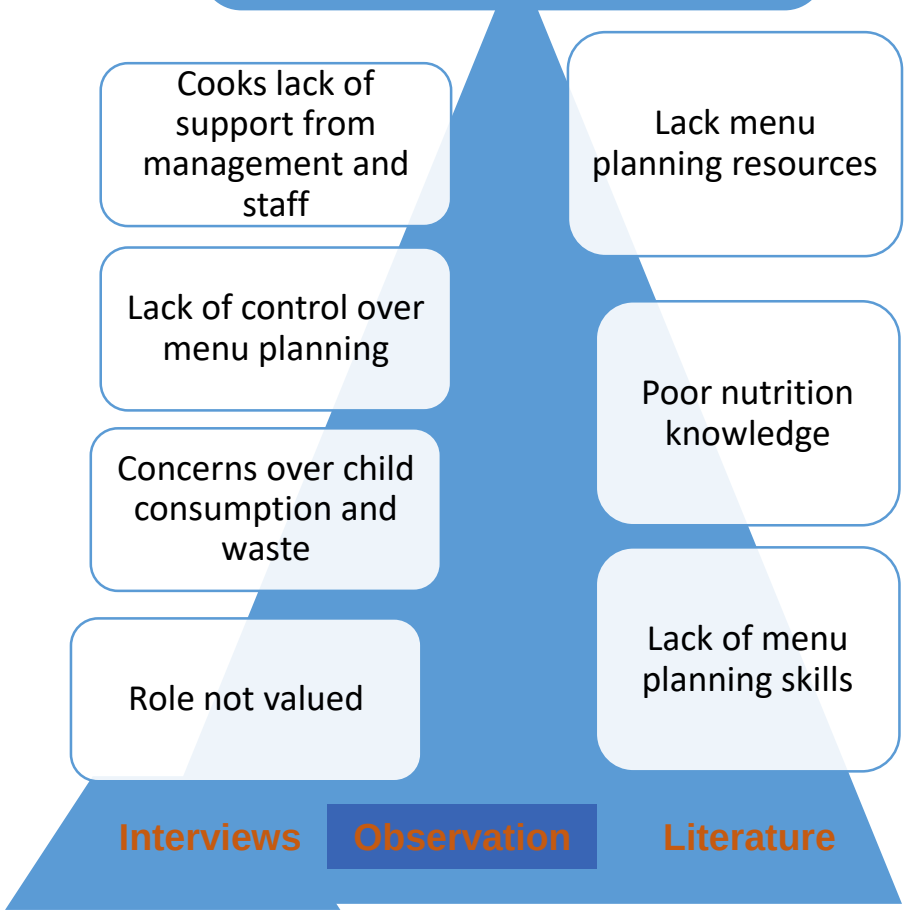


TDF domains identified

- Knowledge
- Skills
- Environmental context and resources

Step 2

Identify barriers and enablers



TDF domains identified

- Knowledge
- Skills
- Environmental context and resources
- Beliefs about consequences
- Social/professional role
- Social influences
- Reinforcement
- Action planning

Application of the Theoretical Domains Framework

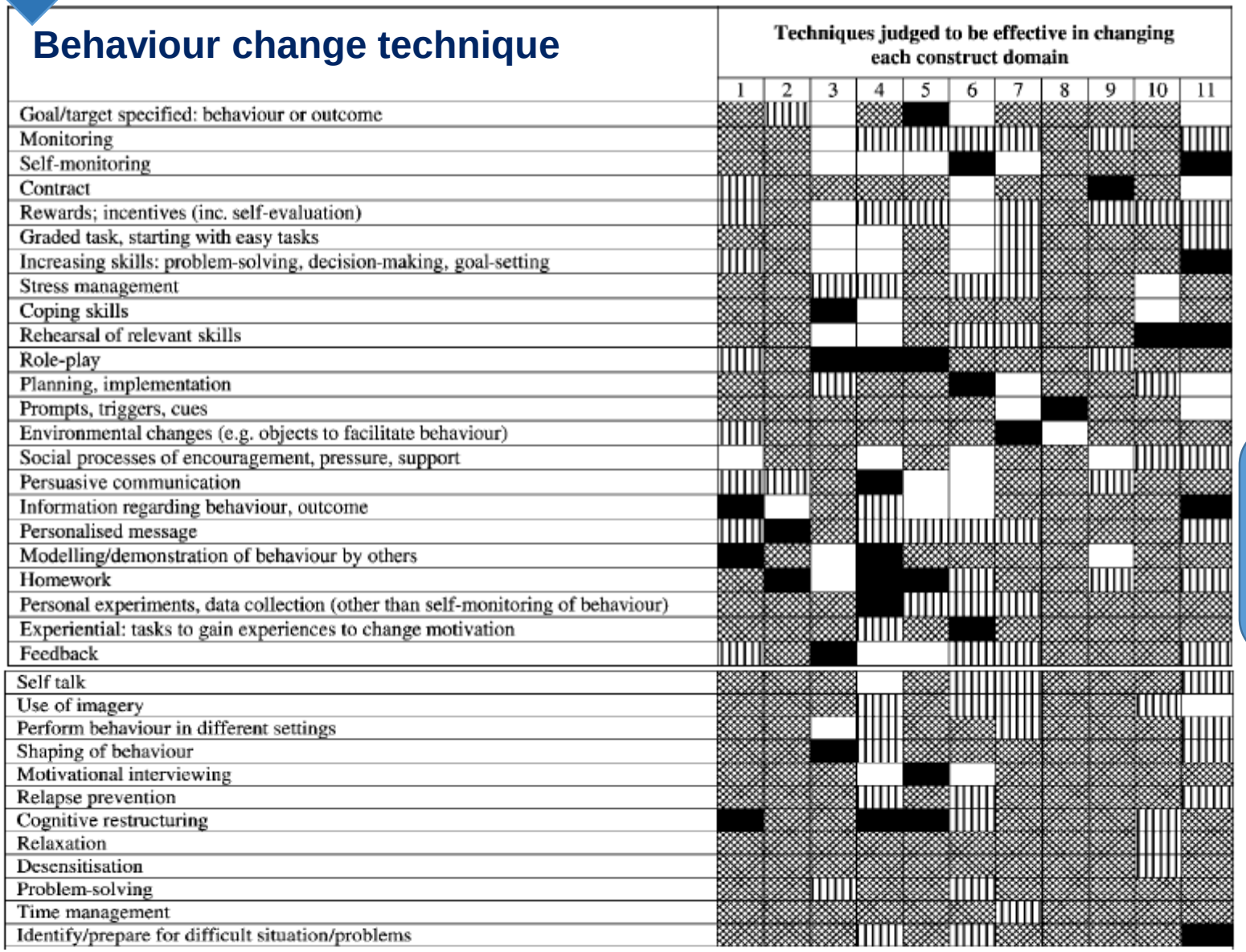
Step 1
- Identify who needs to do what, differently

Step 2
- Apply the TDF when identifying the barriers and enablers to the target practice behaviours

Step 3
- Identify strategies that address modifiable barriers (and enhance the enablers)

Step 4
- Determine how behaviour change will be measured and understood

Step 3



TDF domains

1 Social/Professional role and identity
2 Knowledge
3 Skills
4 Beliefs about capabilities
5 Beliefs about consequences
6 Motivation and goals
7 Memory, attention, decision processes
8 Environmental context and resources
9 Social influences
10 Emotion
11 Action planning

Recommendation for each technique mapped to TDF domains

KEY[a]:

	Agreed use
	Uncertain
	Disagreement
	Agreed non-use

Domains, techniques and intervention strategies

TDF Domain (practice determinant)	Behaviour change technique	Intervention strategy
Environmental context and resources	Environmental changes (eg. Objects to facilitate change)	• Display the nutrition guidelines and serve size posters in highly visible areas in the kitchen
Professional Identity	Social processes of encouragement Pressure Support	• Facilitated discussions with managers and cooks to determine clear roles and responsibilities • Update the cook position description to reflect their defined roles
Beliefs about consequences	Self monitoring Feedback	• Service manager to provide feedback to the cook throughout the intervention, as detailed in the signed MOU.

Application of the Theoretical Domains Framework

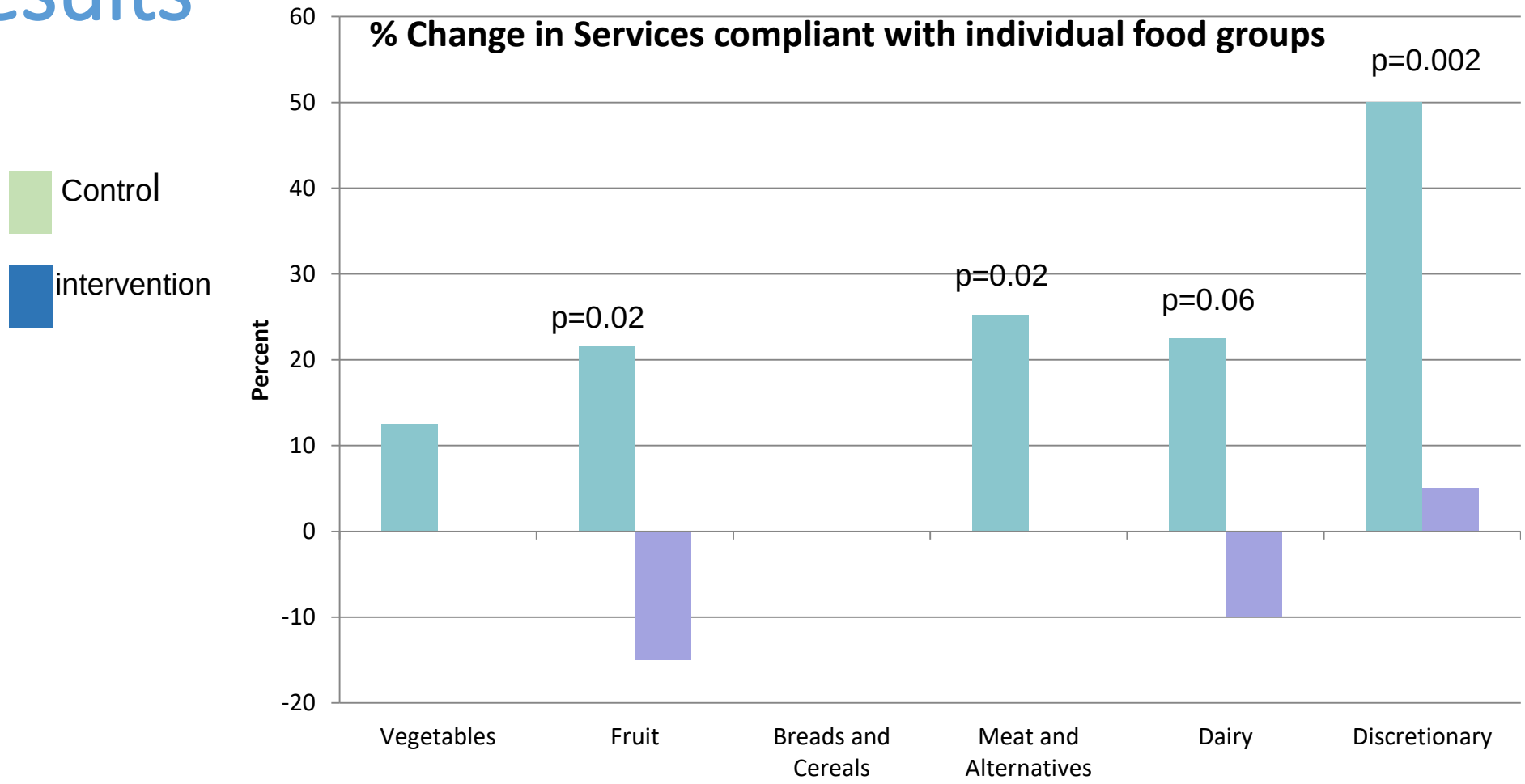
Step 1
- Identify who needs to do what, differently

Step 2
- Apply the TDF when identifying the barriers and enablers to the target practice behaviours

Step 3
- Identify intervention strategies that address modifiable barriers and enhance the enablers

Step 4
- Determine how behaviour change will be measured and understood

Results

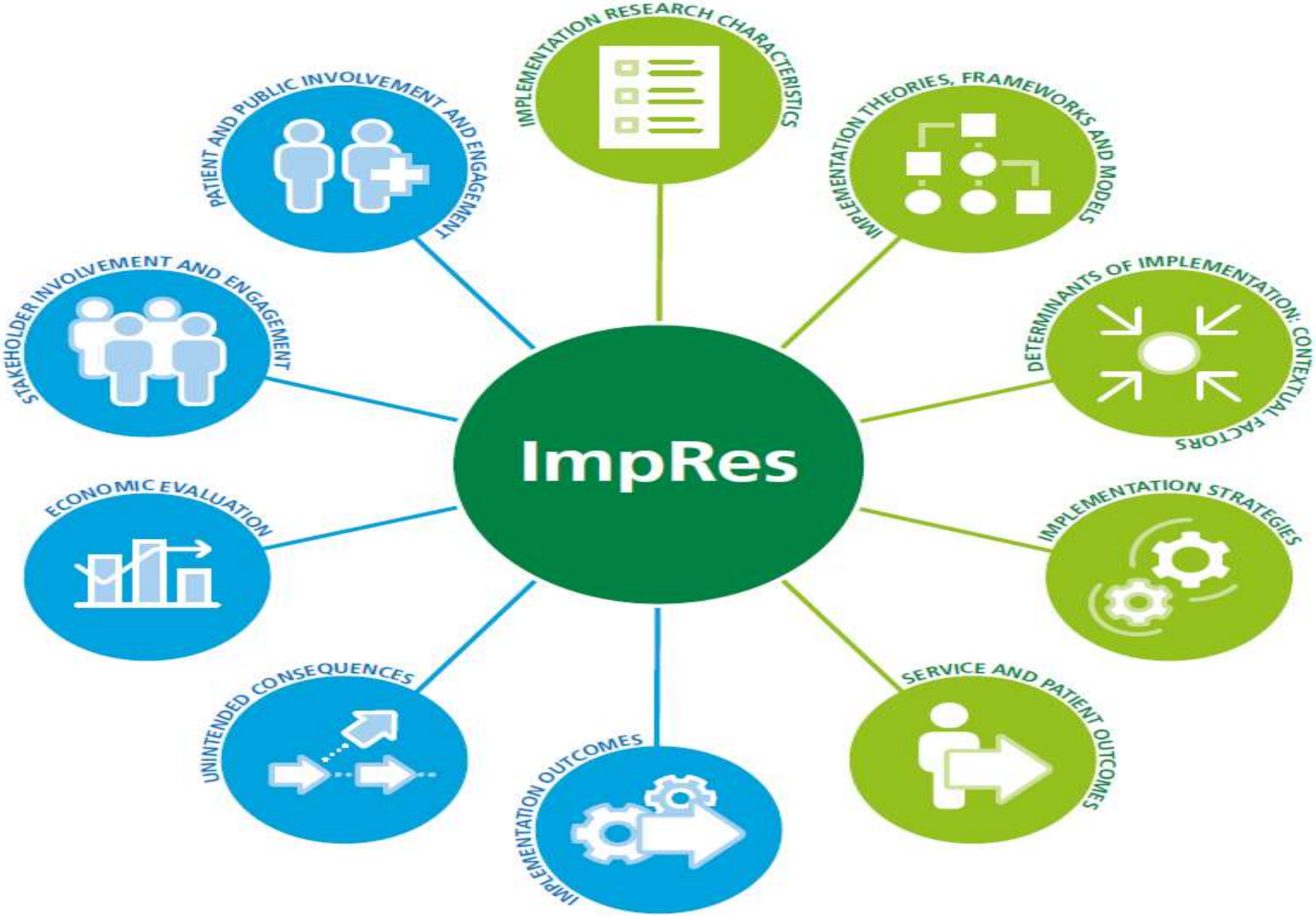

Control
intervention
% Change in Services compliant with individual food groups
Percent
60
50
40
30
20
10
0
-10
-20
p=0.02
p=0.02
p=0.06
p=0.002
Vegetables
Fruit
Breads and Cereals
Meat and Alternatives
Dairy
Discretionary

Resources

- ImPres (http://www.kingsimprovementscience.org/files/ImpRes_Guide_May2018_2.pdf)
- Consolidated Framework for Implementation Research (http://www.cfirguide.org/)
- NSW Health Translational Research Framework (http://www.health.nsw.gov.au/ohmr/Pages/trgs.aspx)
- A guide to using the Theoretical Domains Framework of behaviour change to investigate implementation problems (https://implementationscience.biomedcentral.com/articles/10.1186/s13012-017-0605-9)
- Knowledge Translation (https://ktcanada.org)

Resources


DISSEMINATION AND IMPLEMENTATION RESEARCH IN HEALTH
Translating Science to Practice
KNOWLEDGE TRANSLATION IN HEALTH CARE
Moving from Evidence to Practice
WILEY Blackwell
BMJ Books
Improving Patient Care
THE IMPLEMENTATION OF CHANGE IN HEALTH CARE
WILEY-BLACKWELL
2ND EDITION
the IMPROVEMENT GUIDE
A PRACTICAL APPROACH to ENHANCING ORGANIZATIONAL PERFORMANCE
how to
implement evidence-based healthcare
TRISHA GREENHALGH
WILEY Blackwell


ImpRes
PATIENT AND PUBLIC INVOLVEMENT AND ENGAGEMENT
IMPLEMENTATION RESEARCH CHARACTERISTICS
IMPLEMENTATION THEORIES, FRAMEWORKS AND MODELS
STAKEHOLDER INVOLVEMENT AND ENGAGEMENT
DETERMINANTS OF IMPLEMENTATION: CONTEXTUAL FACTORS
ECONOMIC EVALUATION
IMPLEMENTATION STRATEGIES
UNINTENDED CONSEQUENCES
IMPLEMENTATION OUTCOMES
SERVICE AND PATIENT OUTCOMES

Questions?

Want to Join an Implementation Science Community of Practice?

Jed.Duff@Newcastle.edu.au

Luke.Wolfenden@hnehealth.nsw.gov.au