TONNA, A. and HASHAD, N. 2023. An application of theoretically informed implementation research in pharmacy practice. Presented at the 51st European Society of Clinical Pharmacy (ESCP) Aberdeen symposium workshops 2023: innovations in clinical pharmacy practice, education and research workshops, 31 October - 02 November 2023, Aberdeen, UK.

An application of theoretically informed implementation research in pharmacy practice.

TONNA, A. and HASHAD, N.

2023

An application of theoretically informed implementation research in pharmacy

Facilitated by

Dr Antonella Tonna

Senior Lecturer in clinical pharmacy, School of Pharmacy and Life Sciences, Robert Gordon University, Aberdeen, Scotland, UK.

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Lecturer, Pharmacy, Higher Colleges Of Technology, Dubai, UAE.

By the end of this workshop, attendees will be able to:

Understand the meaning of and need for implementation research.

Recognise the classification of implementation theories, models and frameworks.

Apply different implementation theories, models and frameworks to varied research studies.

Workshop outline

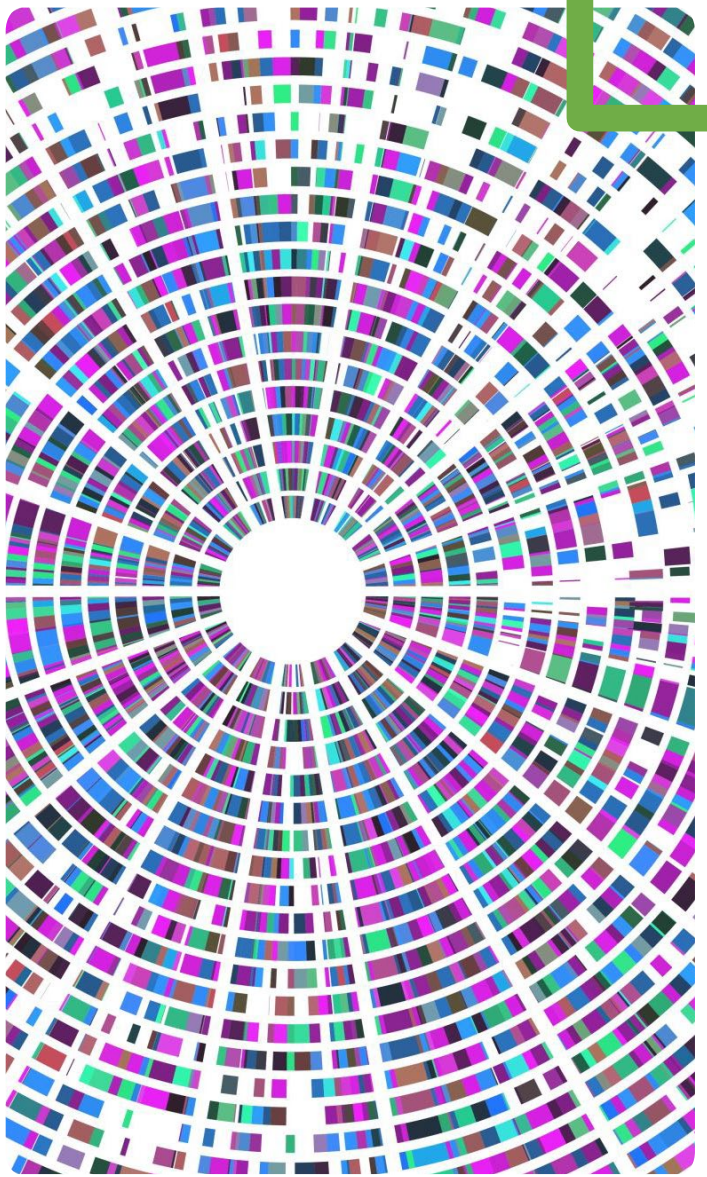
- 40 minutes: Introduction to theoretically informed implementation research

- 60 minutes: Application of knowledge by trying out some case scenarios

- 15 minutes: Putting learning into practice – a worked example
- 5 minutes: Any last minute comments

Introduction

30 minutes



Implementation - historical insights

"I hate to tell you, but you have very little. Ideas are easy. Implementation is hard. Keep thinking."

Guy Kawasaki

Published in a commentary Forbes.com, 2004

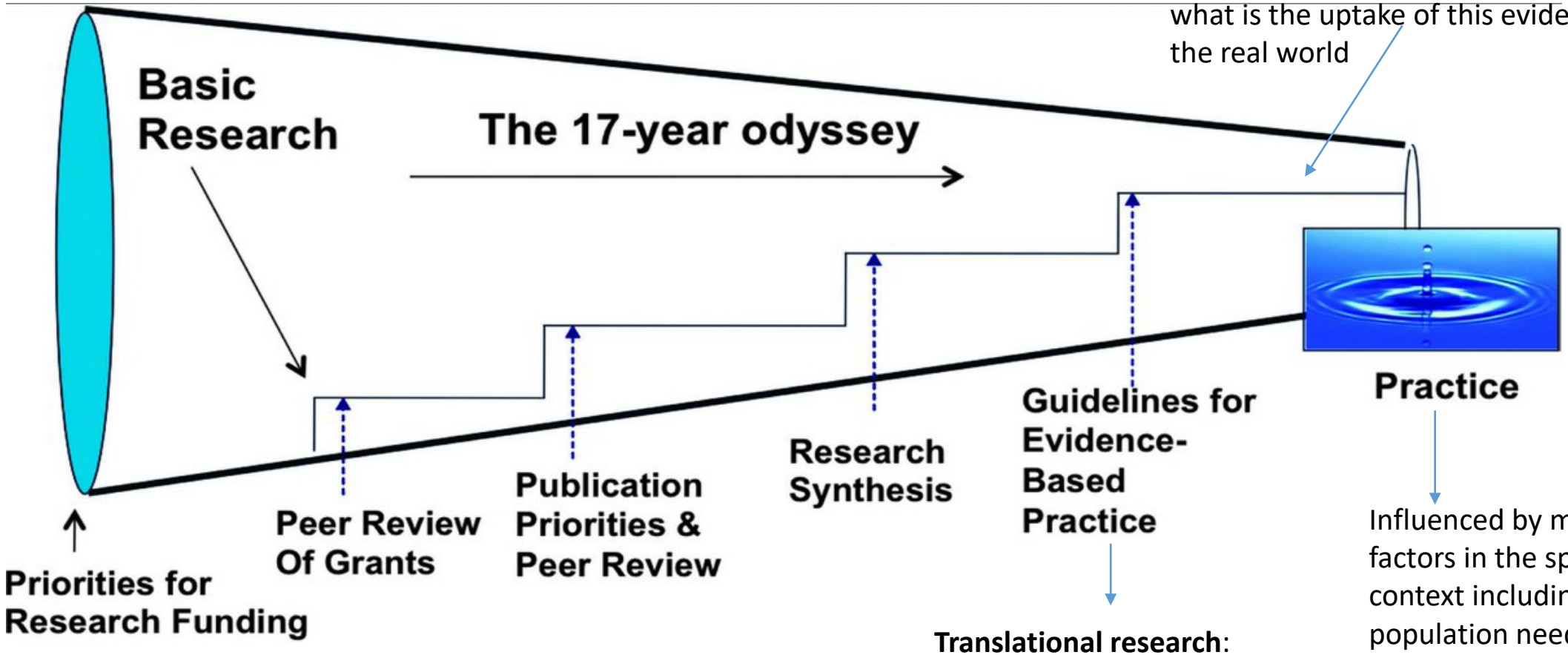
On of the original Apple employees responsible for marketing Macintosh computer line

"Organizations are successful because of good implementation, not good business plans."

- The concept of implementation was developed in the 1970s.
- It was taken to new levels when it was linked to evidence-based practice (EBP).

Bridging the Gap Between Research and Practice: Implementation Science

Implementation research: what is known to be efficacious i.e. EBM vs what is the uptake of this evidence in the real world



Translational research: applying knowledge from clinical trials to tools addressing clinical needs

Influenced by many factors in the specific context including population needs, funding, professional discretion, fit of evidence into the practice

Closing the research – practice gap

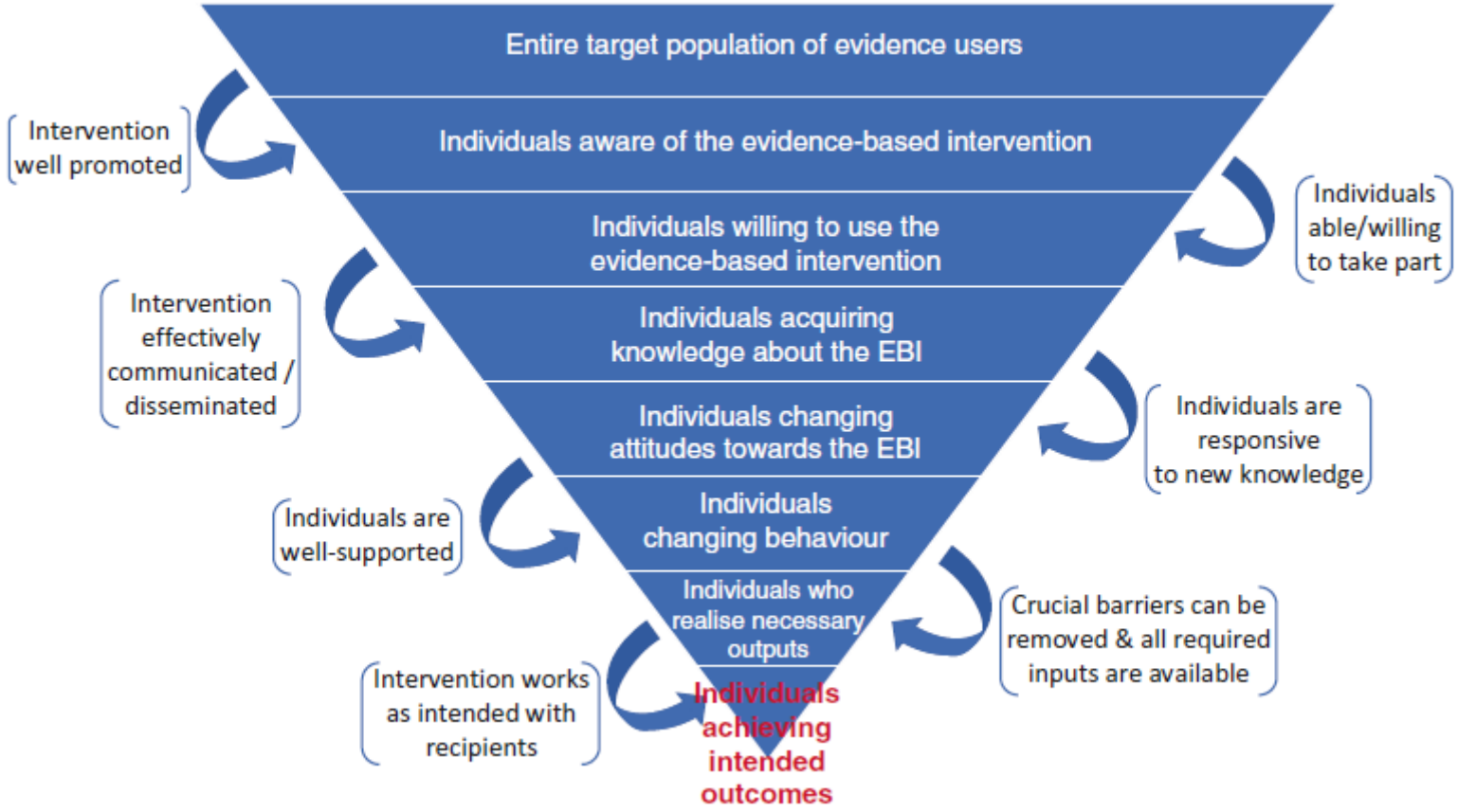
Scholars were increasingly interested in closing research-practice gap through the identification and examination of activities and processes that effectively support the dissemination, uptake, and implementation of evidence in real-world practice and policy settings.

Initially elements of interest were factors (setting or individuals related) influencing implementation and activities supporting implementation.

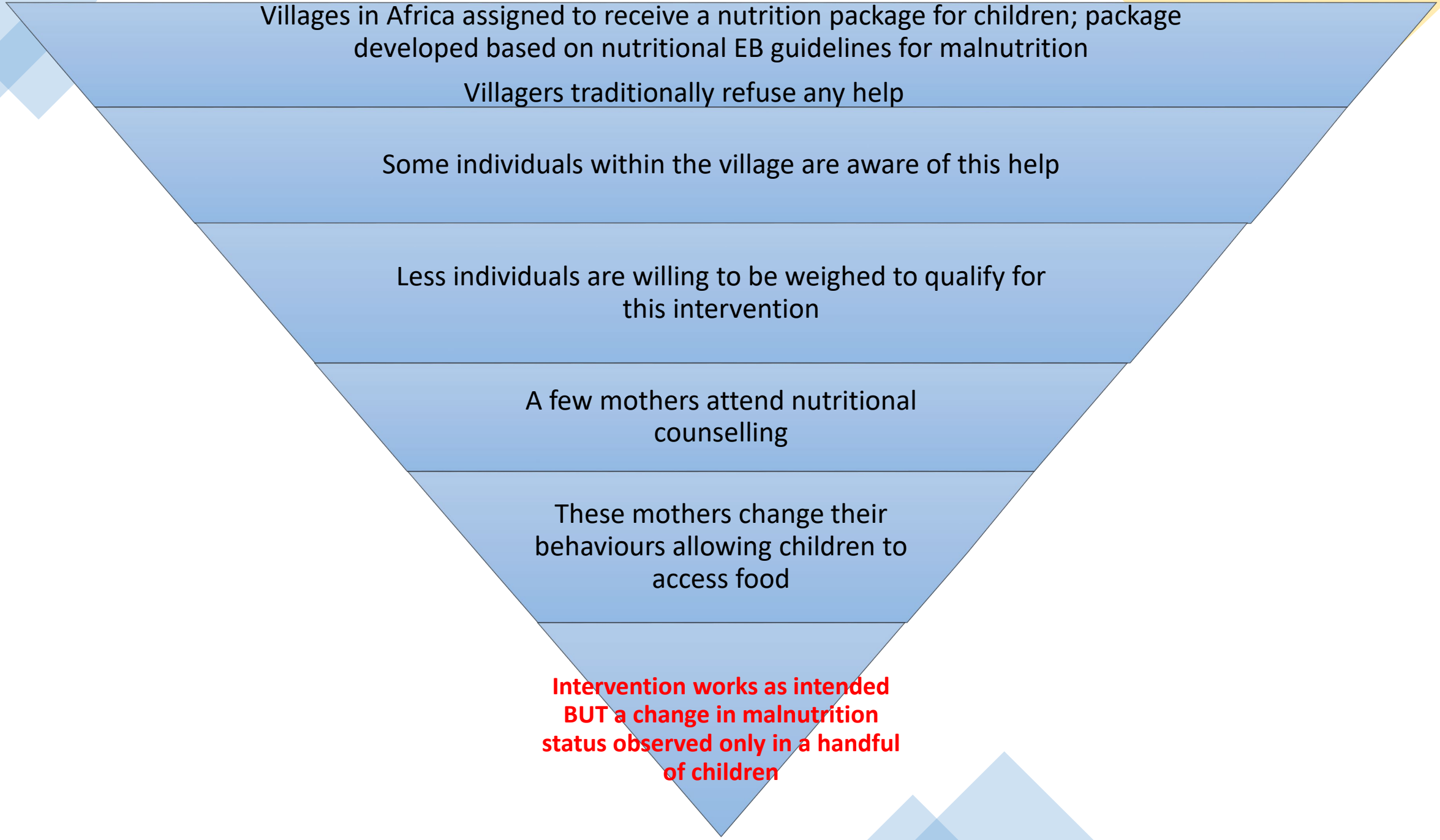
Constructs were grouped into implementation frameworks, aiming to identify overarching determinants of implementation success or failure.

Funnel of attrition

- Multiple steps are required to achieve outcomes in real-world practice using evidence.
- This can potentially lead to a loss of impact – because of presence of a broad range of barriers hampering each stage
- Eventually leading to a small number of individuals benefiting from the effective intervention.



Reference: ALBERS, B., SHLONSKY, A. and MILDON, R., 2020. *Implementation science 3.0.* Cham, Switzerland: Springer


Villages in Africa assigned to receive a nutrition package for children; package developed based on nutritional EB guidelines for malnutrition
Villagers traditionally refuse any help
Some individuals within the village are aware of this help
Less individuals are willing to be weighed to qualify for this intervention
A few mothers attend nutritional counselling
These mothers change their behaviours allowing children to access food
Intervention works as intended BUT a change in malnutrition status observed only in a handful of children

Implementation research, definition

"The scientific study of methods to promote the systematic uptake of research findings and other Evidence-Based Practices (EBP) into routine practice, and hence, to improve the quality and effectiveness of health services and care"

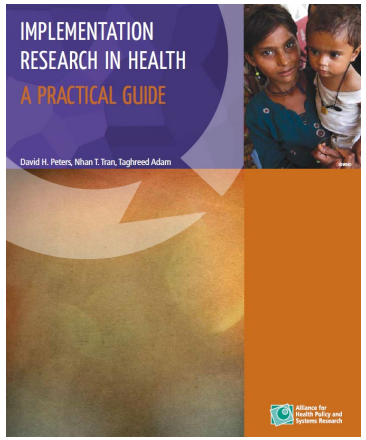
In simple language

..... Implementation research takes what we know and turns it into what we do.

Reference: ALBERS, B., SHLONSKY, A. and MILDON, R., 2020. *Implementation science 3.0.* Cham, Switzerland: Springer

According to World Health Organization practical guide for implementation research:

- There is little understanding of how to deliver interventions effectively in diverse settings and within the wide range of existing health systems.
- Implementation issues often arise as a result of contextual factors that policy-makers and health system managers may not even have considered.



Reference: PETERS, D. et al., 2013. Implementation research in health: a practical guide. Geneva: World Health Organization.

Why do we need implementation research?

University of Washington implementation science research hub

Source: https://impsciuw.org/

Planning an implementation research study

Source: https://impsciuw.org/

1. Frame/Identify your research question
2. Create an implementation logic model
3. **Pick an implementation science theory, model, or framework**
4. Identify implementation strategies
5. Select research method
6. Select study design
7. Choose measures and evaluation approach
8. Secure Funding
9. Conduct Study
10. Disseminate Results

Why should we use implementation frameworks to support implementation research?

They are useful at multiple levels:

- Guide the design and conduct of studies
- Inform the theoretical and empirical thinking of research teams
- Aid interpretation of findings

Reference: Moullin, J.C. et al., 2020. Ten recommendations for using implementation frameworks in research and practice. Implementation science communications, 1, pp. 42

Lack of employing implementation Frameworks in implementation research can lead to:

- Wasted resources, erroneous conclusions, specification errors in implementation methods and data analyses, and attenuated reviews of funding applications.
- Lead stakeholders to misjudge their implementation context or develop inappropriate implementation strategies.
- Poor use of frameworks can slow the translation of research evidence into practice, and thereby limit public health impact.

Reference: Moullin, J.C. et al., 2020. Ten recommendations for using implementation frameworks in research and practice. Implementation science communications, 1, pp. 42

Implementation frameworks can provide a structure for the following:

Describing and/or guiding the process of translating effective interventions and research evidence into practice - **process frameworks**

Analysing what influences implementation outcomes - **determinant frameworks**

Evaluating implementation efforts - **outcome frameworks**

Reference; Nilsen, P. Making sense of implementation theories, models and frameworks. *Implementation Sci* **10**, 53 (2015). https://doi.org/10.1186/s13012-015-0242-0

Selecting a suitable implementation framework

The process for selecting implementation framework(s) for a particular implementation effort should consider the following:

1. **The purpose of the framework** (describing/ guiding the implementation process, analysing what influences outcomes [barriers and facilitators], or evaluating the implementation effort)
2. **The level(s)** included within the framework (e.g., provider, organization, system)
3. The **degree of inclusion and depth of analysis or operationalisation** of implementation concepts (process, determinants [barriers and facilitators], strategies, evaluation)
4. The **framework's orientation**, which includes the setting and type of intervention (i.e., EBP generally, a specific intervention, a guideline, a public health program being implemented) for which the framework was originally designed

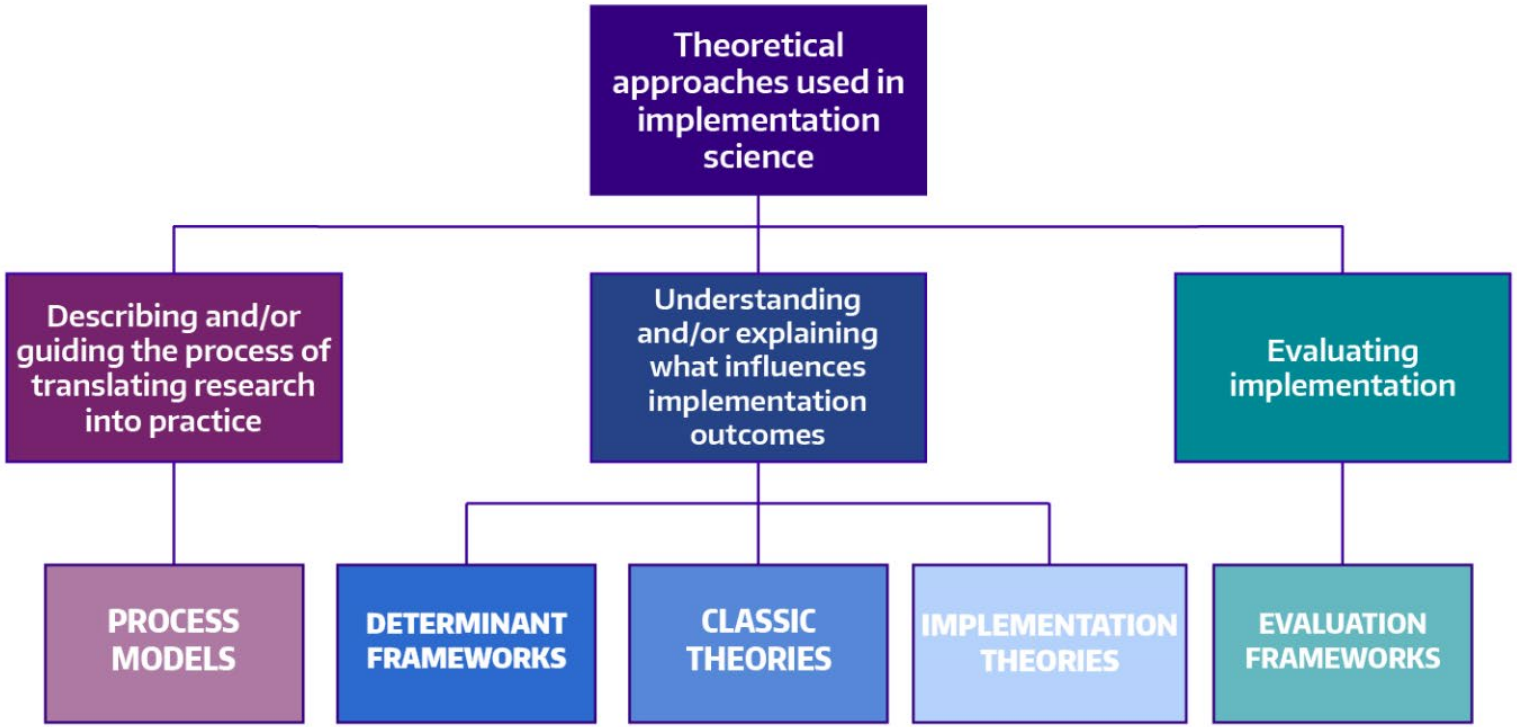
Reference: Moullin, J.C. et al., 2020. Ten recommendations for using implementation frameworks in research and practice. *Implementation science communications,* 1, pp. 42

Per Nilsen's schema sorts implementation science theories, models, and frameworks into five categories:

1. Process models
2. Determinants frameworks
3. Classic theories
4. Implementation theories
5. Evaluation frameworks

Per Nilson's classification

Reference: Nilsen, P., 2015. Making sense of implementation theories, models and frameworks. Implementation science : IS, 10, pp. 53



Source: https://impsciuw.org/implementation-science/research/frameworks/

Adapted from: Nilsen, P. Making sense of implementation theories, models and frameworks. *Implementation Sci* **10**, 53 (2015). https://doi.org/10.1186/s13012-015-0242-0

Per Nilson's classification

Per Nilson's classification

1. Process models

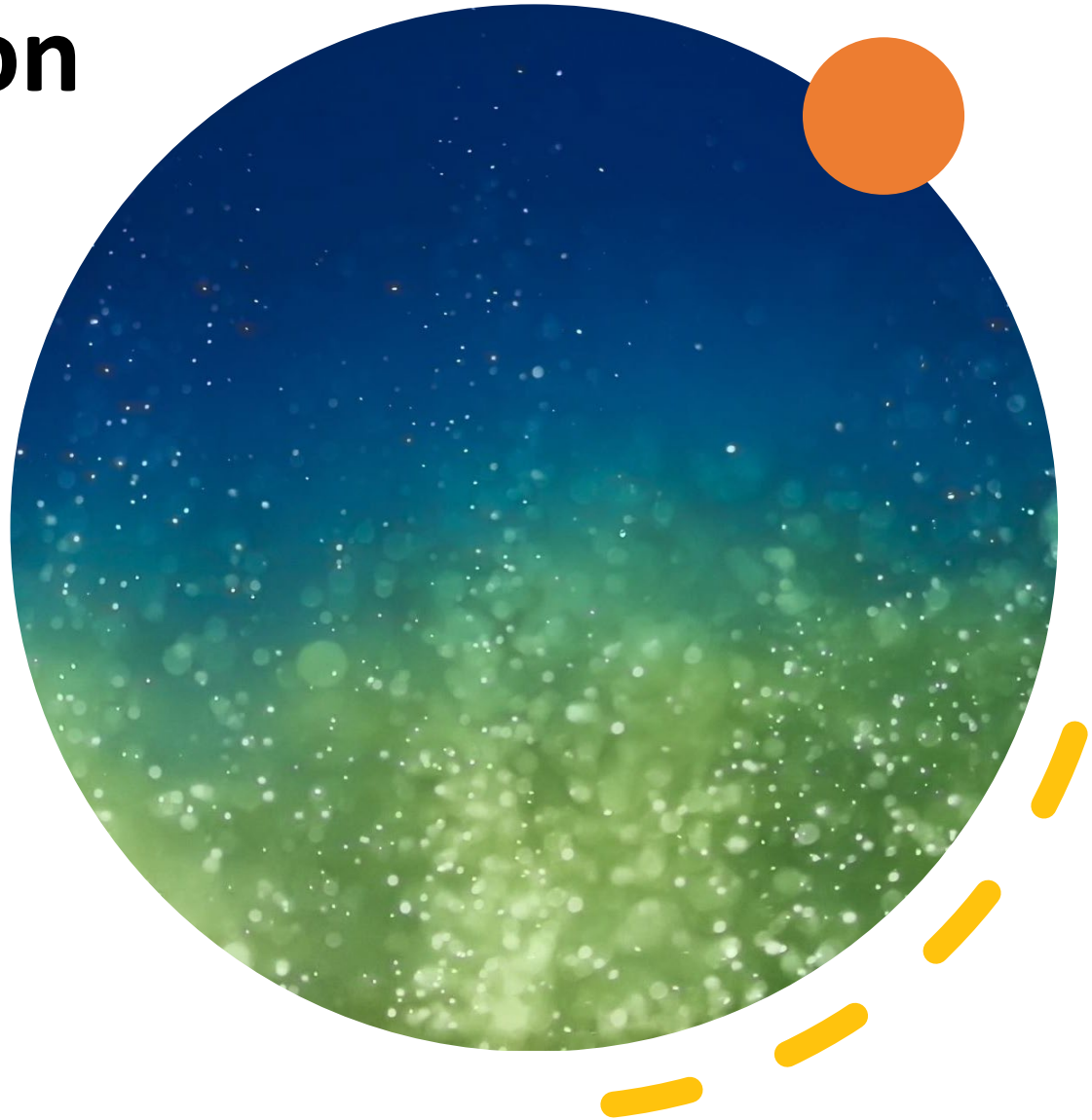
- Describe and/or guide the process of translating research into practice.

2. Determinant frameworks

- Specify types (also known as classes or domains) of determinants and individual determinants, which act as barriers and enablers (independent variables) that influence implementation outcomes (dependent variables).
  - Consolidated Framework for Implementation Research – organization
  - Theoretical domains framework - individual

3.Classic theories

- Theories that originate from fields external to implementation science, e.g. psychology, sociology and organizational theory, which can be applied to provide understanding and/or explanation of aspects of implementation
  - Diffusion of innovation



Reference: NILSEN, P., 2015. Making sense of implementation theories, models and frameworks. Implementation science : IS, 10, pp. 53

Some examples from our practice

J R Coll Physicians Edinb 2017; 47: 40–46 | doi: 10.4997/JRCPE.2017.109

PAPER

A qualitative study of determinants of patient behaviour leading to an infection related hospital admission

AP Tonna[1], AE Weidmann[2], RBS [illegible], [illegible] Tonna, [illegible], V Paudyal[6], D Stewart[7]

Abstract

Objectives To describe and understand the determinants of patients' behaviours surrounding admission to hospital for an acute infective episode

Method Patients admitted to the infection or acute medicine admission units of a major Scottish teaching hospital and commenced on antibiotic therapy after admission were included. Semi-structured face-to-face interviews were conducted using a pre-piloted interview schedule guide that focused on gathering information about patient behaviours and experiences prior to admission to hospital with an acute infection. Interviews were audio-recorded, transcribed verbatim and analysed using the Framework Approach. Emerging themes were matched to the Theoretical Domains Framework of behavioural determinants.

Results Twenty-one patients consented to participate and 18 transcripts were available for analysis. The most common infections were those of the skin, soft tissue and respiratory tract. From the patients' perspectives, behavioural determinants that appeared to impact their admission to hospital were principally their knowledge, beliefs of consequences, the environmental context and resources (mainly out-of-hours services), social influences and their own emotions. Determinants such as knowledge of the signs and symptoms, beliefs of consequences and environmental context were facilitators of health seeking behaviours. The main barriers were a lack of awareness of consequences of infection potentially leading to delayed admission impacting infection severity, stay in secondary care and resource utilisation.

Conclusions This study has shown that any initial patient-centred intervention that is proposed to change patient behaviour needs to be based on behavioural determinants emerging in this research. The intervention may include aspects such as patient education on resources available out-of-hours and ways to access the healthcare system, education on recognising signs of infection leading to prompter treatment and positive reinforcement for patients who present with recurrences of infection.

Keywords behaviour, hospital admission, infection, theoretical domains framework

Declaration of interests No conflicts of interest declared

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Discussion

Key findings of this research are that, from the patients' perspectives, several determinants appeared to impact their admission to hospital, principally their knowledge, beliefs of consequences, the environmental context and resources (largely the GP), social influences and their emotions. Their experience of the admission was likely to impact their future behaviours of self-management and seeking help if the infective presentation recurred.

Domain	Constructs
Knowledge	Knowledge Knowledge about condition/scientific rationale Schemas + mindsets + illness representations Procedural knowledge
Skills	Skills Competence/ability/skill assessment Practice/skills development Interpersonal skills Coping strategies
Social/professional role and identity	Identity Professional identity/boundaries/role Group/social identity Social/group norms Alienation/organisational commitment
Beliefs about capabilities	Self-efficacy Control—of behaviour and material and Social environment Perceived competence Self-confidence/professional confidence Empowerment Self-esteem Perceived behavioural control Optimism/pessimism
Beliefs about consequences	Outcome expectancies Anticipated regret Appraisal/evaluation/review Consequents Attitudes Contingencies Reinforcement/punishment/consequences Incentives/rewards Beliefs

2. Did you seek help/advice from anyone at any time during the infective episode?

If NO: Move on to Question 5.

If YES: Who was this from?

Was this from:

- GP
- Community pharmacist
- Practice nurse
- NHS24
- A and E
- Herbalists
- A practitioner in alternative medicine
- Family/friends

If YES, can you describe the advice/help that was provided?

Ongoing research culture survey being conducted internally at RGU
Online questionnaire with use of multiple frameworks

6. Please rate the following statements. Please do not select more than one option per row. * *Required*

	Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree	Not currently applicable to my job
I am competent to contribute to research	☐	☐	☐	☐	☐	☐
I am confident in my ability to contribute to research	☐	☐	☐	☐	☐	☐
I am able to determine my own research-related training needs	☐	☐	☐	☐	☐	☐

Use of theoretical domains framework to help us understand how the participants approach research – this question exploring Domain – "Belief about capabilities"
Determinants of behaviour on an individual level

Diffusion of innovation theory to help us understand the respondent's approach to change

21. Which of the following best describes your approach to change * *Required*

- ☐ Innovative with new ways of working
- ☐ Serve as a role model for others in relation to new ways of working
- ☐ Think for some time before adopting new ways of working
- ☐ Cautious in relation to new ways of working and only tend to change once peers have done so
- ☐ Resist new ways of working

Domain	Constructs
Knowledge	Knowledge Knowledge about condition/scientific rationale Schemas + mindsets + illness representations Procedural knowledge
Skills	Skills Competence/ability/skill assessment Practice/skills development Interpersonal skills Coping strategies
Social/professional role and identity	Identity Professional identity/boundaries/role Group/social identity Social/group norms Alienation/organisational commitment
Beliefs about capabilities	Self-efficacy Control—of behaviour and material and Social environment Perceived competence Self-confidence/professional confidence Empowerment Self-esteem Perceived behavioural control Optimism/pessimism
Beliefs about consequences	Outcome expectancies Anticipated regret Appraisal/evaluation/review Consequents Attitudes Contingencies Reinforcement/punishment/consequences Incentives/rewards Beliefs

2. Please rank the following statements.

D1 Knowledge

Please don't select more than 1 answer(s) per row.

	Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree	Not currently applicable to my work
I am aware of the support available for research in RGU	☐	☐	☐	☐	☐	☐

D2: SKILLS

Please don't select more than 1 answer(s) per row.

	Strongly Agree	Agree	Neither agree or disagree	Disagree	Strongly Disagree	Not currently applicable to my current j o b
I am currently skilled to contribute to research	☐	☐	☐	☐	☐	☐
I have been provided with training to contribute to research	☐	☐	☐	☐	☐	☐

Per Nilson's classification

4. Implementation theories

- Theories that have been developed by implementation researchers (from scratch or by adapting existing theories and concepts) to provide understanding and/or explanation of aspects of implementation
  - Normalization Process Theory

5. Evaluation frameworks

- Specify aspects of implementation that could be evaluated to determine implementation success

Reference: Nilsen, P., 2015. Making sense of implementation theories, models and frameworks. Implementation science : IS, 10, pp. 53

Using an implementation theory to explore factors influencing implementation within an organization

Contents lists available at ScienceDirect

Research in Social and Administrative Pharmacy

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

Use of Normalization Process Theory to explore key stakeholders' perceptions of the facilitators and barriers to implementing electronic systems for medicines management in hospital settings

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ARTICLE INFO

Keywords:
Normalization process theory
eHealth
Medication
Implementation
Hospital
Healthcare professionals

ABSTRACT

Background: Limited data exist on the facilitators and barriers to implementing electronic systems for medicines management in hospitals. Whilst numerous studies advocate system use in improved patient safety and efficiency within the health service, their rate of adoption in practice has been slow.
Objective: To explore the perceptions of key stakeholders towards the facilitators and barriers to implementing electronic prescribing systems, robotic pharmacy systems, and automated medication storage and retrieval systems in public hospital settings using Normalization Process Theory as a theoretical framework.
Methods: Individual face-to-face semi-structured interviews were conducted in three public hospitals in Ireland with 23 consenting participants: nine nurses; four pharmacists; two pharmacy technicians; six doctors; and two Information Technology managers.
Results: Enhanced patient safety and efficiency in healthcare delivery emerged as key facilitators to system implementation, as well as the need to have clinical champions and a multi-disciplinary implementation team to promote engagement and cognitive participation. Key barriers included inadequate training and organisational support, and the need for ease and confidence in system use to achieve collective action.
Conclusions: Many themes that are potentially transferable to other national settings have been identified and extend the evidence base. This will assist organisations around the world to better plan for implementation of medication-related eHealth systems.

Table 5
Summary of key facilitator and barrier themes related to NPT constructs and components.

Key themes	NPT constructs and components	Facilitators	Barriers
Theme 1: Understanding of how electronic systems differ from manual practices and the value of system implementation	**Coherence:** Differentiation Internalisation	Patient safety Efficiency: - Stock control - Traceability - Accountability - Cost reduction - Integration	Time inefficiencies Security issues Logistics of changing system
Theme 2: A need to work together to build a shared sense of purpose for system implementation and have a clear understanding of individual roles and responsibilities	**Coherence:** Communal specification Individual specification	Understand reasons for implementation Participants with experience had a clear understanding of their roles	Limited communication on implementation Participants without experience had a limited understanding of requirements
Theme 3: A need for clinical leadership, champions at ward level, and a multidisciplinary implementation team to promote buy-in	**Cognitive participation:** Enrolment Activation Initiation Legitimation	Clinical champions to promote benefits and engagement via effective communication Early adaptors Multidisciplinary team approach	Older generation may not realise benefits as easily as younger generation Resist work changes: - Lack of prioritisation - Force of change - Limited involvement - Bureaucracy - Lack of recognition of professional roles
Theme 4: A need for adequate training and organisational support	**Collective action:** Skill set workability Contextual integration	Sufficient training Sufficient support and resources Robust governance Operational guidelines	Training not sufficient Inadequate support No additional resources
Theme 5: A need for electronic systems to be easier to use than manual systems	**Collective action:** Interactional workability	Light guided Ease of stock management Sufficient number of systems Mobile units nearer the patient	Manual system easier as more patient-focused and less task oriented Workflow issues e.g. time delays in queuing, limited accessibility, inadequate numbers/sizes of units resulting in delayed medication administration
Theme 6: A need for a sense of confidence in system use	**Collective action:** Relational integration	Safety alerts Double checking Clear record Confident with familiarity	Lack of confidence with identifying drugs Substantial time away from patients
Theme 7: A need to use systems as intended	**Reflexive monitoring:** Reconfiguration	Alter system use for efficiency e.g. recheck chart before administration	Not using system as trained e.g. trolley to carry drugs for multiple patients increasing risk of errors
Theme 8: A need to measure and audit practice	**Reflexive monitoring:** Communal appraisal Individual appraisal Systematization	Auditing of practice e.g. cost, time, end-user satisfaction	Limited formal measures Unable to determine actuality from reality

https://bmcmedicine.biomedcentral.com/articles/10.1186/1741-7015-8-63/tables/1

NPT [19, 20] identifies factors that promote and inhibit the routine incorporation of complex interventions into everyday practice. It also explains how these interventions work, looking not only at early implementation, but beyond this to the point where an intervention becomes so embedded into routine practice that it 'disappears' from view (i.e., it is normalised).

NPT Components	Questions to consider within the NPT framework	Example: NPT evaluation of the ImPACT back pain study
Coherence	Is the intervention easy to describe?	Participating GPs did not differentiate the new intervention from current practice and were unable to perceive the projected benefits to patients, primary care teams and physiotherapists.
	Is it clearly distinct from other interventions?	
(i.e., meaning and sense making by participants)	Does it have a clear purpose for all relevant participants?	
	Do participants have a shared sense of its purpose?	
	What benefits will the intervention bring and to whom?	
	Are these benefits likely to be valued by potential participants?	
	Will it fit with the overall goals and activity of the organisation?	
Cognitive participation	Are target user groups likely to think it is a good idea?	Participating GPs saw it as research (i.e., recruiting patients to the study), and peripheral to their main task of delivering patient care. Projected benefits were not obvious to the GPs so they were insufficiently motivated to invest thought and energy into changing their practice.
(i.e., commitment and engagement by participants)	Will they see the point of the intervention easily?	
	Will they be prepared to invest time, energy and	

Table 4.2: Mapping of concepts in the interview schedules to NPT

NPT constructs	Interview schedule concepts
Coherence	
Sense-making work that people do individually and collectively at the planning stages of implementation	Perceptions of the overall goals of implementation e.g. patient safety, increased efficiency
Cognitive participation	
Relational work that people do to enrol and engage with the planning of implementation	Responsibility for implementation e.g. implementers driving it forward, end-users buy-in to implementation
Collective action	
Operational work that people do to enact the new system	Tasks carried out in delivering the implementation process e.g. training, policies
Reflexive monitoring	
Assess and understand the outcomes of implementation	Monitoring the effectiveness of implementation e.g. individual and collective feedback

References

- Albers, B., Shlonsky, A. and Mildon, R., 2020. Implementation science 3.0. Cham, Switzerland: Springer.
- Moullin, J.C. et al., 2020. Ten recommendations for using implementation frameworks in research and practice. Implementation science communications, 1, pp. 42
- Nilsen, P., 2015. Making sense of implementation theories, models and frameworks. Implementation science : IS, 10, pp. 53
- Peters, D. et al., 2013. Implementation research in health: a practical guide. Geneva: World Health Organization.

Any questions

10 minutes

Application to different case scenarios
Handing over to you

60 minutes

Application of knowledge gained to case scenarios

Now we will be looking into few case scenarios and attempt to identify a suitable implementation theory/model/framework according to Per Nilson classification.

We will need the following:

- Per Nilson classification article (See printed simplified guide)
- University of Washington implementation research Hub:QR code provided (https://impsciuw.org/implementation-science/research/frameworks/)
- Dissemination and implementation models in health (interactive web-based tool)QR code provided (https://dissemination-implementation.org/tool/explore-di-models/)

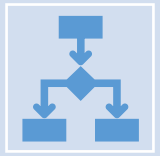
University of Washington implementation research Hub

Dissemination and implementation models in health

(interactive web-based tool)

Application of knowledge gained to case scenarios

First: What is the aim of the implementation research project?



Second: Select one of the theories/models/frameworks most appropriate to underpin the research as per the recommendation of Per Nilson

Third: Use Dissemination and Implementation resource to check the included constructs, examples of publications and figure if available.

Case scenario one

A pharmacist working in an ambulatory health care clinic, is about to start using automated (robotic) dispensers.

These are machines which employ artificial intelligence to prepare prescriptions according to system entry by physicians.

The pharmacist is interested in examining which contextual factors will support the implementation process so that they can consider in their plan.

What would be the most appropriate theoretical tool to underpin this study?

10 minutes

How do we go about selecting a tool?

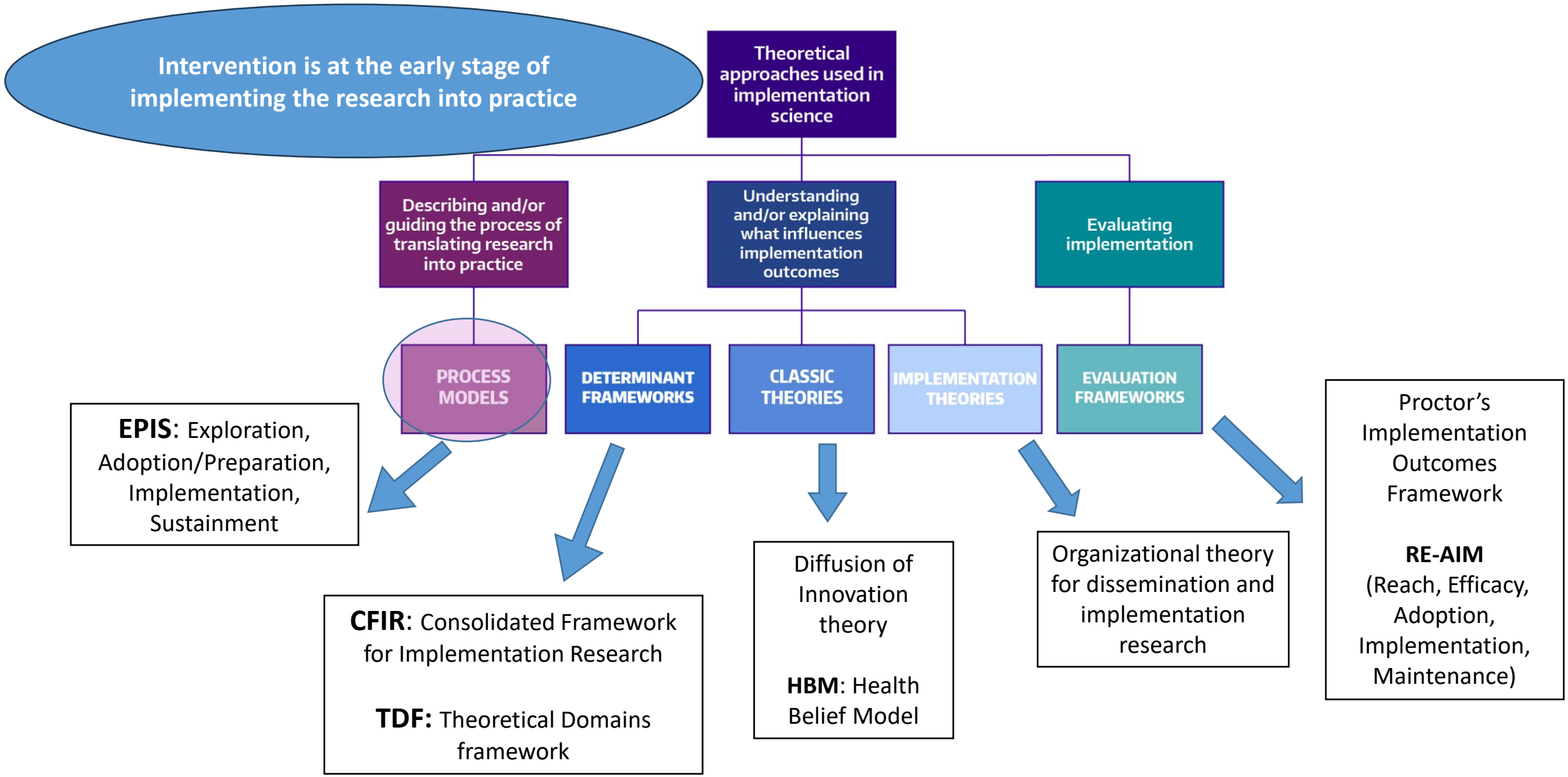
Criteria for selecting implementation science theories and frameworks: results from an international survey

Most commonly used implementation theories and frameworks used based on this study

Table 5 Theories used

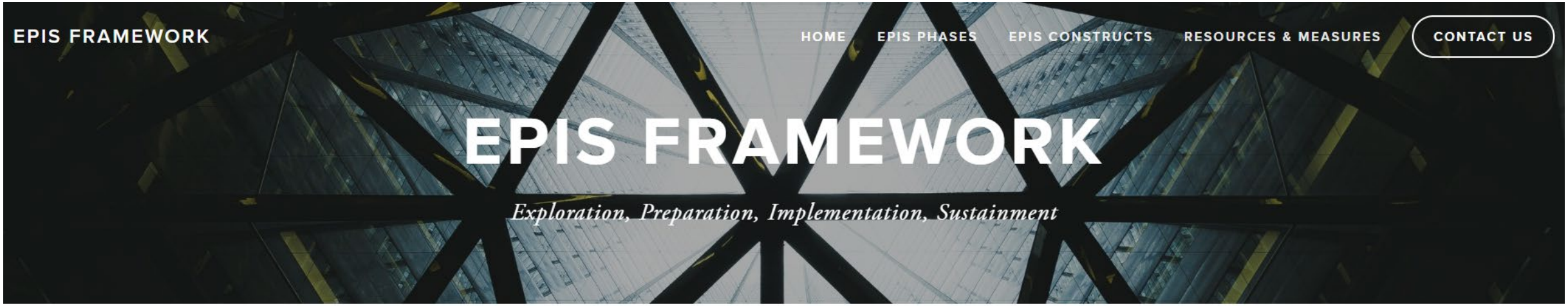
Theory	Percent
Consolidated Framework for Implementation Research	20.63
Reach Effectiveness Adoption Implementation Maintenance	13.90
Diffusion of Innovation	8.97
Theoretical Domains Framework	5.38
Exploration, Preparation, Implementation, Sustainment	4.93
Proctor's Implementation Outcomes	4.93
Organizational Theory of Implementation of Innovations	3.59
Knowledge to Action	3.14
Implementation Drivers Framework	3.14
Active Implementation Framework	2.69
Theory of Planned Behaviour	2.69
Behaviour Change Wheel	2.69
Normalization Process Model	2.69
PARIHS	1.79
Social Cognitive Theory	1.79
Intervention Mapping	1.79
Interactive Systems Framework	1.79
Organizational Readiness Theory	1.79
Replicating Effective Programs	1.35
Social Ecological Framework	1.35
QUERI	1.35
PBIS	1.35
Social Learning Theory	1.35
Other	4.04

Reference: Birken, S.A. et al., 2017. Criteria for selecting implementation science theories and frameworks: results from an international survey. *Implementation science : IS,* 12(1), pp. 124


Intervention is at the early stage of implementing the research into practice
Theoretical approaches used in implementation science
Describing and/or guiding the process of translating research into practice
Understanding and/or explaining what influences implementation outcomes
Evaluating implementation
PROCESS MODELS
DETERMINANT FRAMEWORKS
CLASSIC THEORIES
IMPLEMENTATION THEORIES
EVALUATION FRAMEWORKS
EPIS: Exploration, Adoption/Preparation, Implementation, Sustainment
CFIR: Consolidated Framework for Implementation Research
TDF: Theoretical Domains framework
Diffusion of Innovation theory
HBM: Health Belief Model
Organizational theory for dissemination and implementation research
Proctor's Implementation Outcomes Framework
RE-AIM (Reach, Efficacy, Adoption, Implementation, Maintenance)

Case scenario one

https://episframework.com/



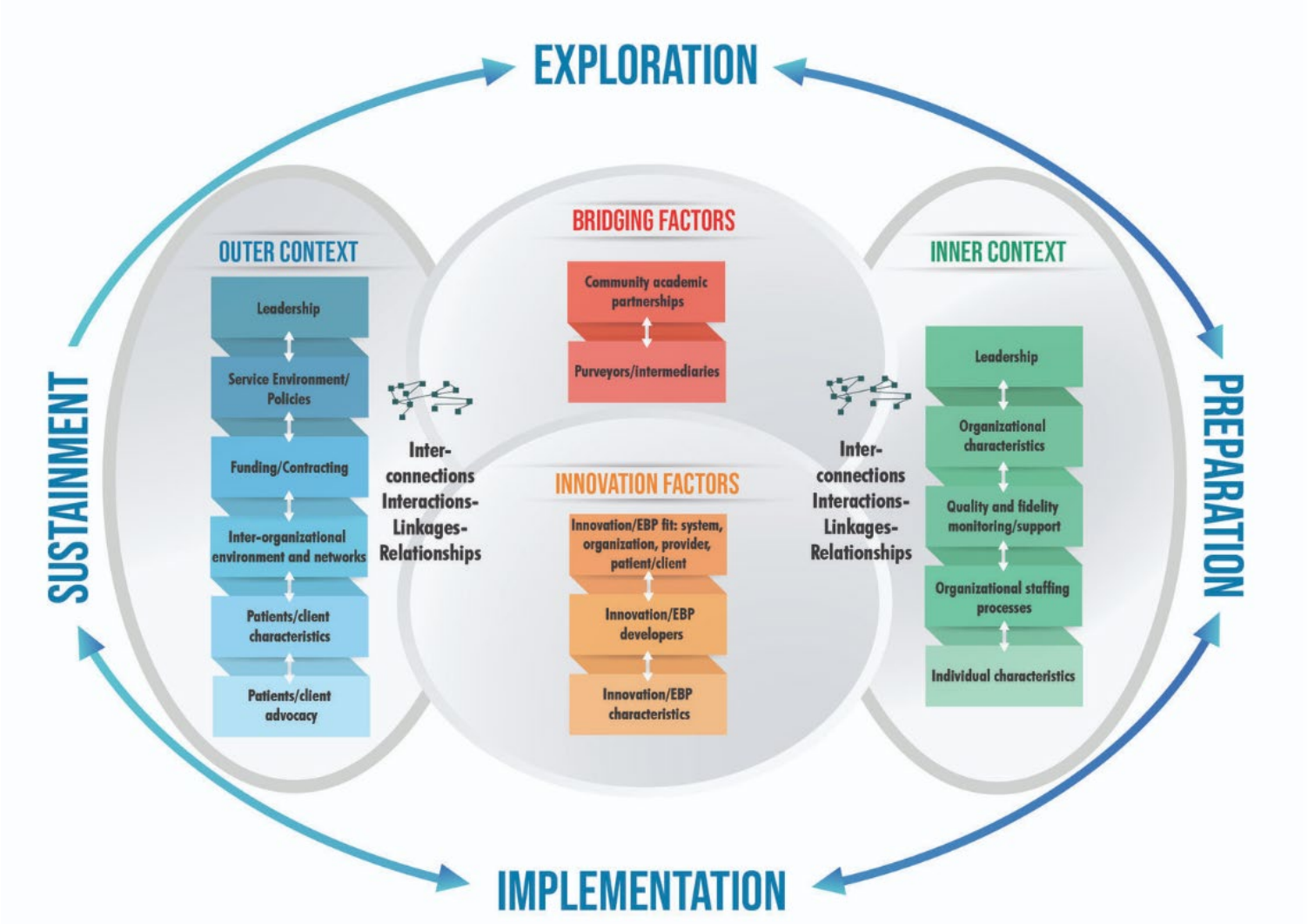
The EPIS Implementation Framework

Welcome to the Exploration, Preparation, Implementation, Sustainment (EPIS) Website! This site was created to explain and support the EPIS Framework and provides resources for using EPIS including measures and tools (e.g., worksheets, guides).

The EPIS Framework highlights key phases that guide and describe the implementation process and enumerates common and unique factors within and across levels of outer context (system) and inner (organizational) context across phases, factors that bridge outer and inner context, and the nature of the innovation or practice being implemented and the role of innovation/practice developers.

Case scenario one

EPIS: Exploration, Adoption/Preparation, Implementation, Sustainment



Include the four phases of **implementation process**:

- Exploration
- Preparation
- Implementation
- Sustainment

Also include:

- Outer system
- Inner organizational context
- Characteristics of innovation
- Bridging factors

https://episframework.com/

Case scenario two – one year on

10 minutes

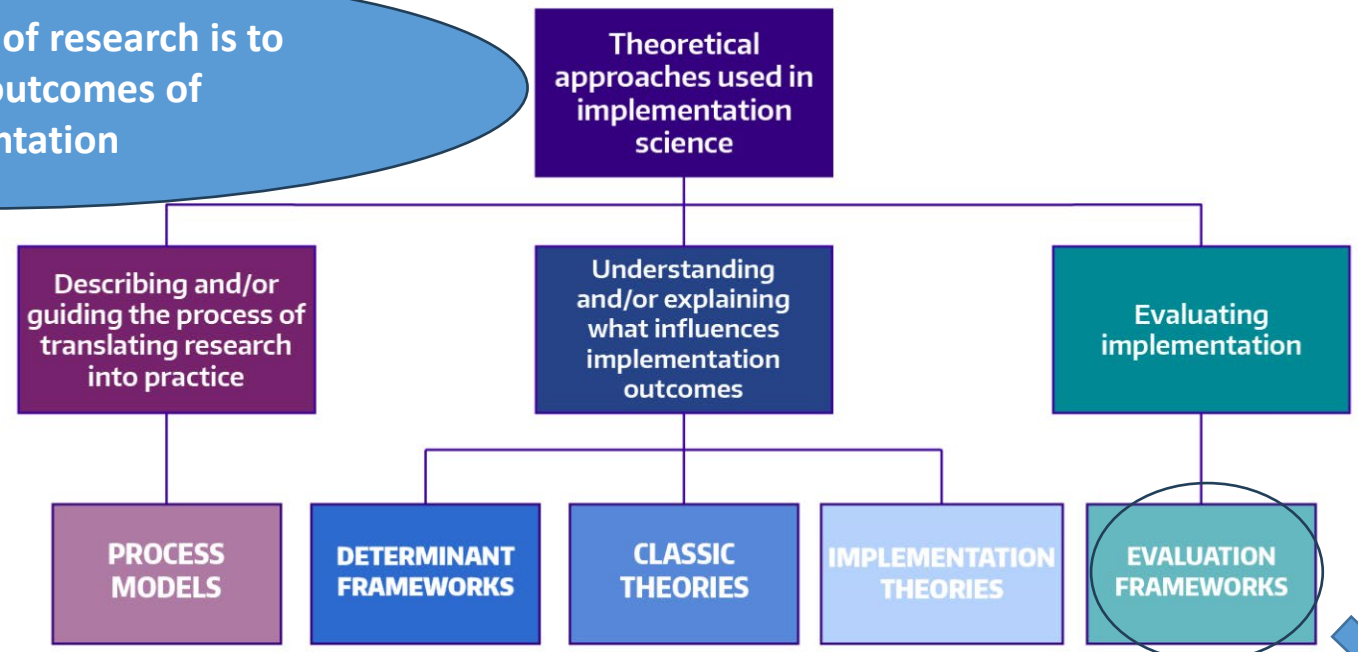
The ambulatory health care clinic has been using automated dispensers (robotics) throughout the past year.

These are machines which employ artificial intelligence to prepare prescriptions according to system entry by physicians.

The pharmacist is interested in evaluating outcomes of implementation over this past year.

What would be the most appropriate theoretical tool to underpin this study?

One year on – aim of research is to evaluate the outcomes of implementation



EPIS: Exploration, Adoption/Preparation, Implementation, Sustainment

CFIR: Consolidated Framework for Implementation Research

TDF: Theoretical Domains framework

Diffusion of Innovation theory

HBM: Health Belief Model

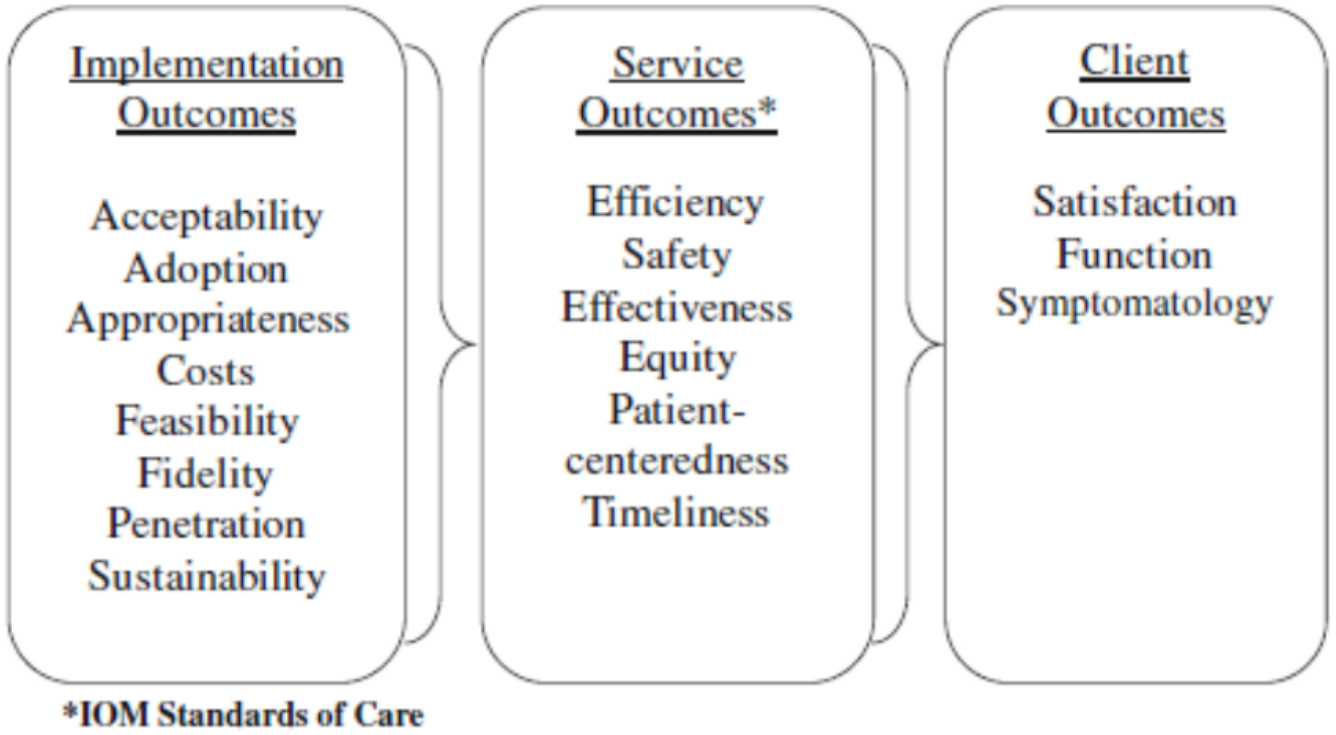
Organizational theory for dissemination and implementation research

Proctor's Implementation Outcomes Framework

RE-AIM (Reach, Efficacy, Adoption, Implementation, Maintenance)

Case scenario two

Proctor's Implementation Outcomes Framework



Proctor, Enola, et al. "Outcomes for implementation research: conceptual distinctions, measurement challenges, and research agenda." *Administration and Policy in Mental Health and Mental Health Services Research* 38.2 (2011): 65-76.

Case scenario three

10 minutes

The medical use of cannabis has been approved and regulated by health authorities.

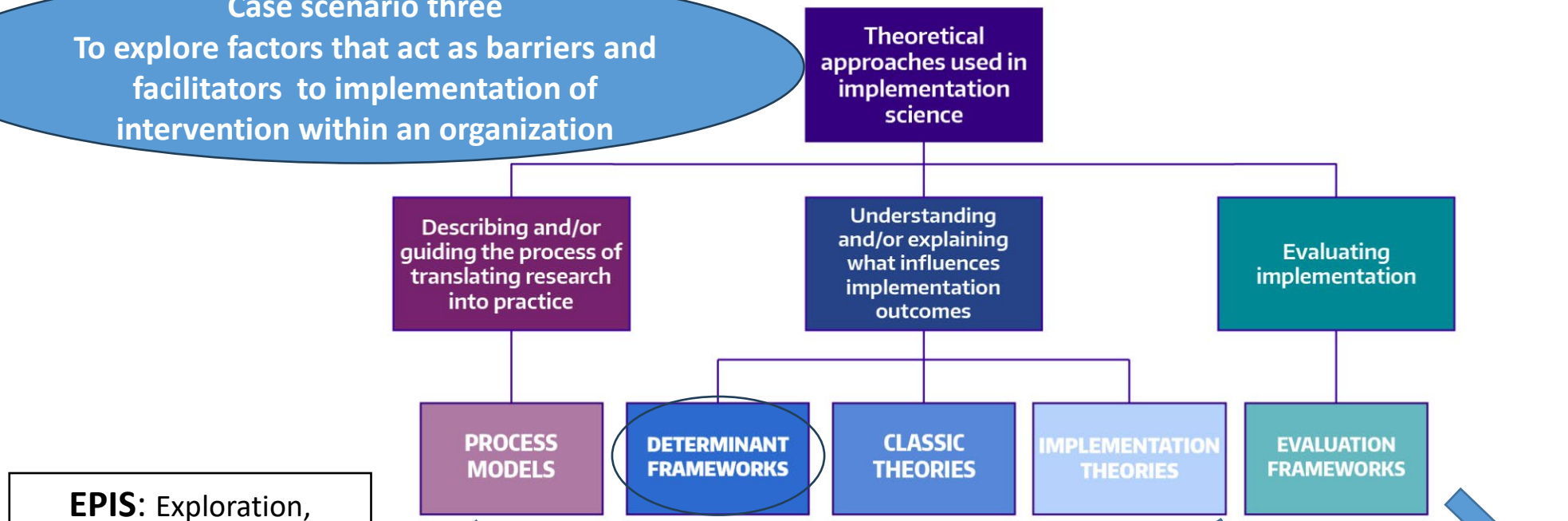
Your hospital has been implementing the service for a few years now.

You would like patients in need to get the maximum possible benefit from this service.

You decided to design a study to explore different factors (determinants) related to the context of your practice that are acting as facilitators or barriers for successful implementation.

What would be the most appropriate theoretical tool to underpin this study?

Case scenario three
To explore factors that act as barriers and facilitators to implementation of intervention within an organization



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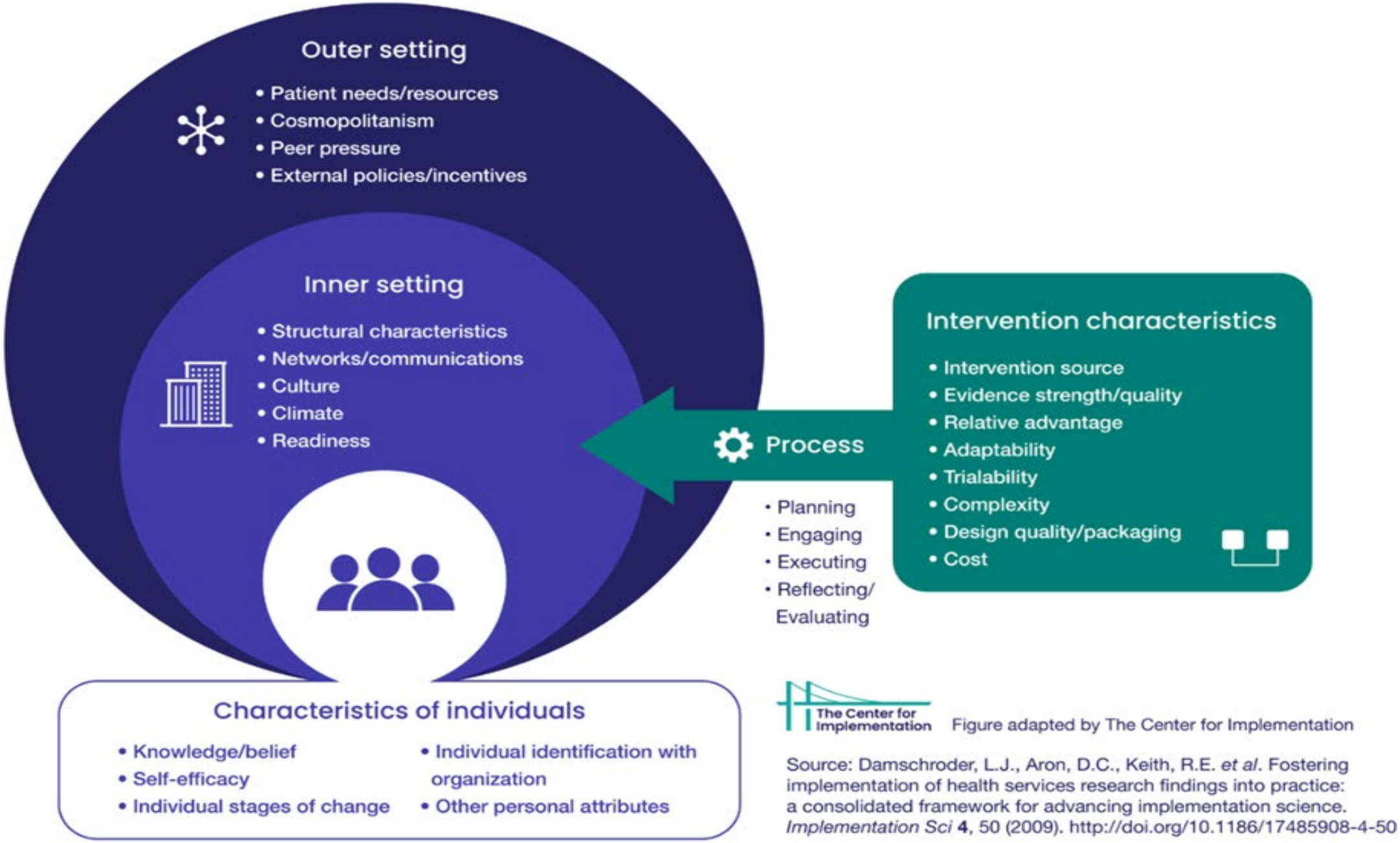
Case scenario three

Consolidated Framework for Implementation Research

Source: https://cfirguide.org/



The Center for Implementation

Figure adapted by The Center for Implementation

Source: Damschroder, L.J., Aron, D.C., Keith, R.E. *et al*. Fostering implementation of health services research findings into practice: a consolidated framework for advancing implementation science. *Implementation Sci* **4**, 50 (2009). http://doi.org/10.1186/17485908-4-50

Case scenario four

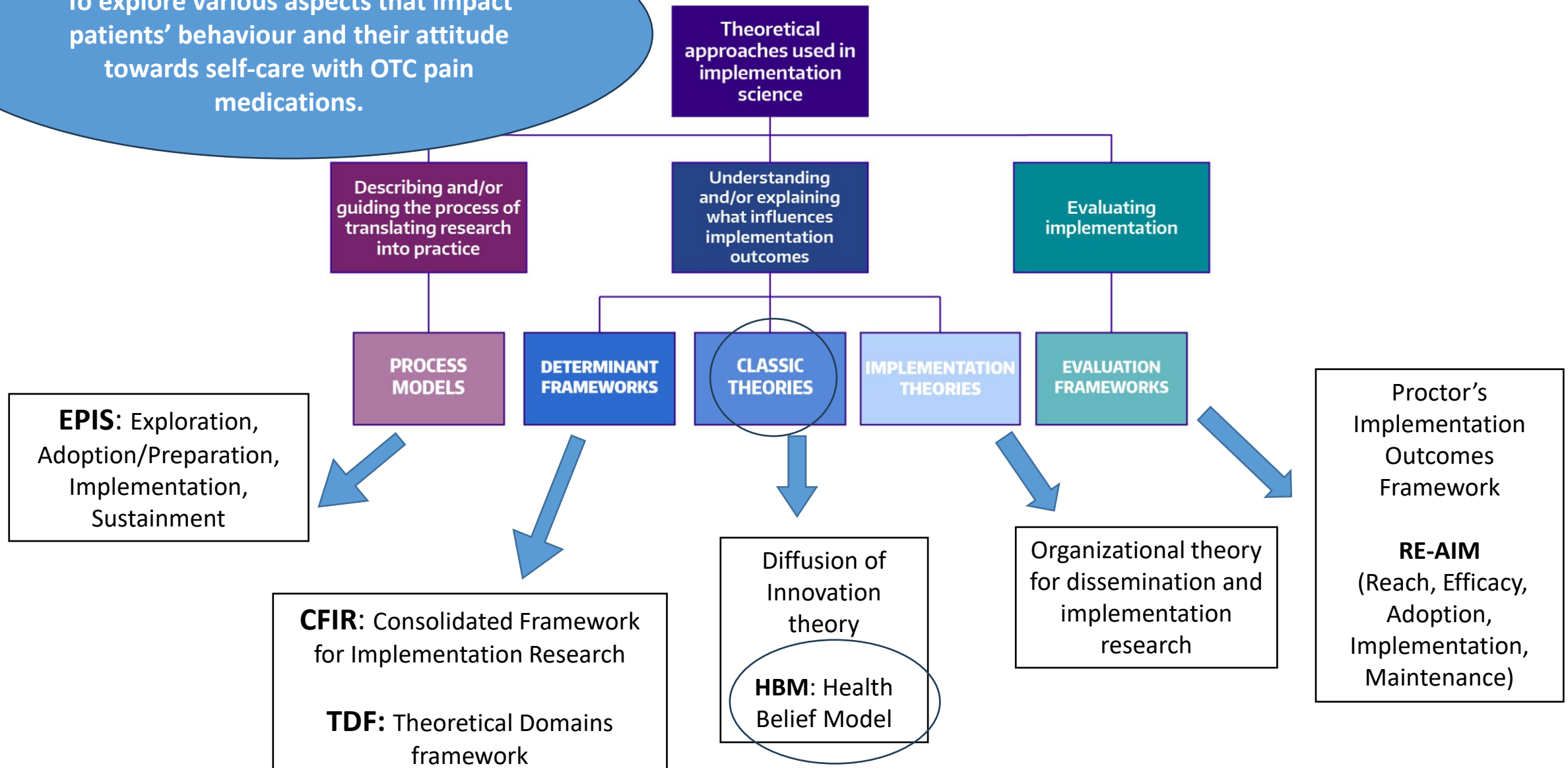
- **You observed that your patients are increasingly asking for different categories of OTC pain medications. You are not sure what exactly are the factors which have led to this surge in OTC demand.**

- **You decide to design a study to explore various aspects that impact patients' behaviour and their attitude towards self-care with OTC pain medications.**

- **What would be the most appropriate theoretical tool to underpin this study?**

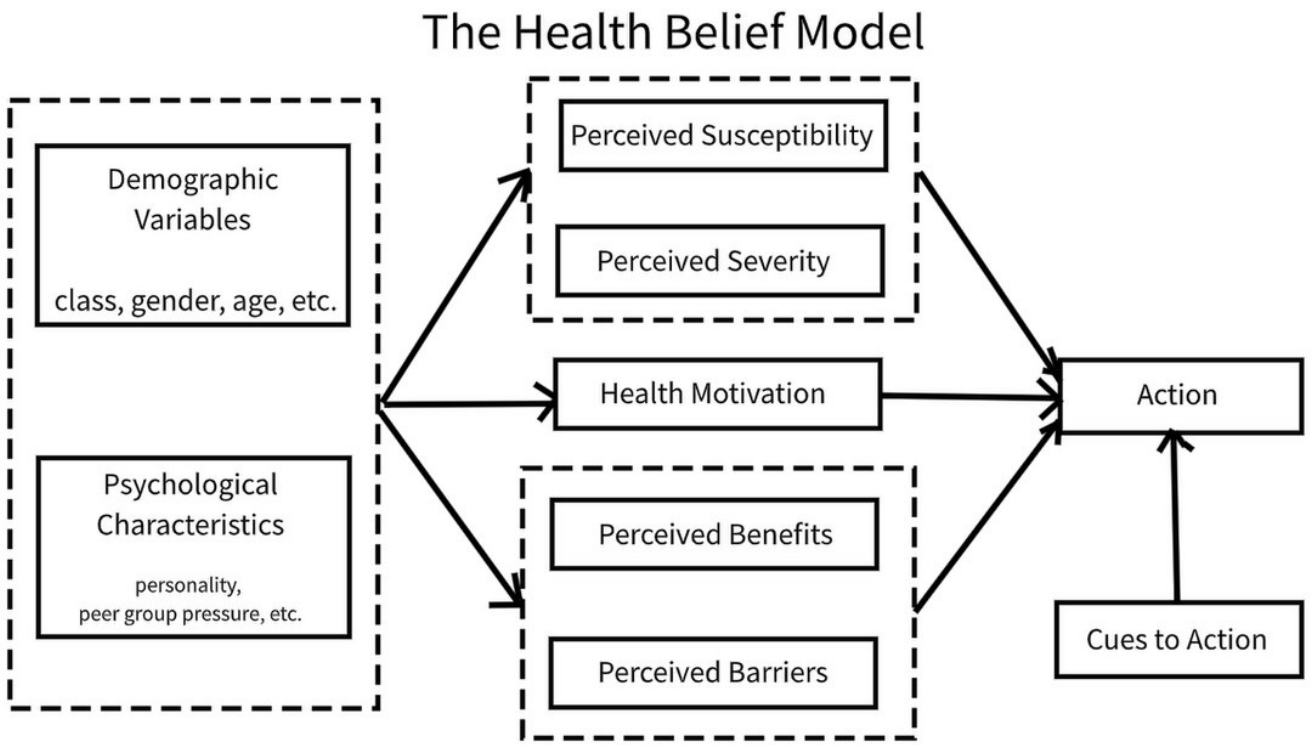
Case scenario four

To explore various aspects that impact patients' behaviour and their attitude towards self-care with OTC pain medications.



Case scenario four

Health Belief Model



An in-depth example of the process to design, conduct and publish and implementation research studies

Putting learning into practice

15 minutes

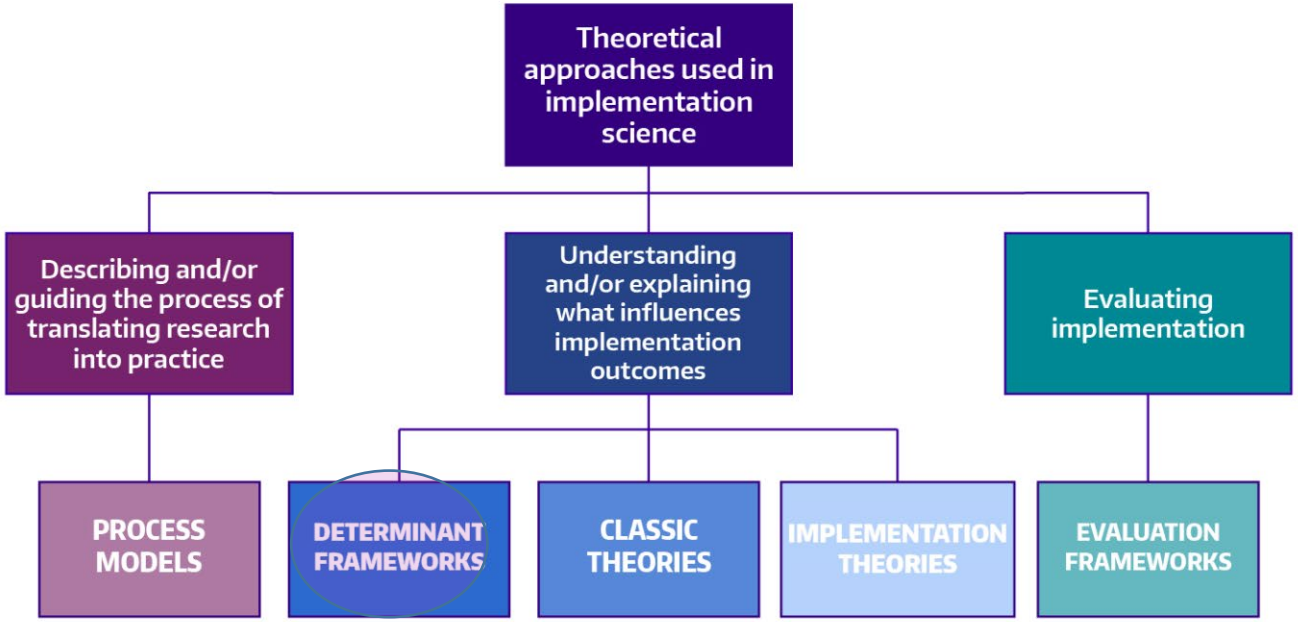
A theoretical exploration of the implementation of Antimicrobial Stewardship Programmes

Perspectives of key stakeholders underpinned by the Consolidated Framework for Implementation Research

Consolidated Framework for Implementation Research (CFIR)

- The study aim was to explore key stakeholders' perspectives of ASP implementation in United Arab Emirates (UAE) hospitals, with a focus on facilitators and barriers.

- Therefore, a determinant comprehensive framework was deemed most suitable.

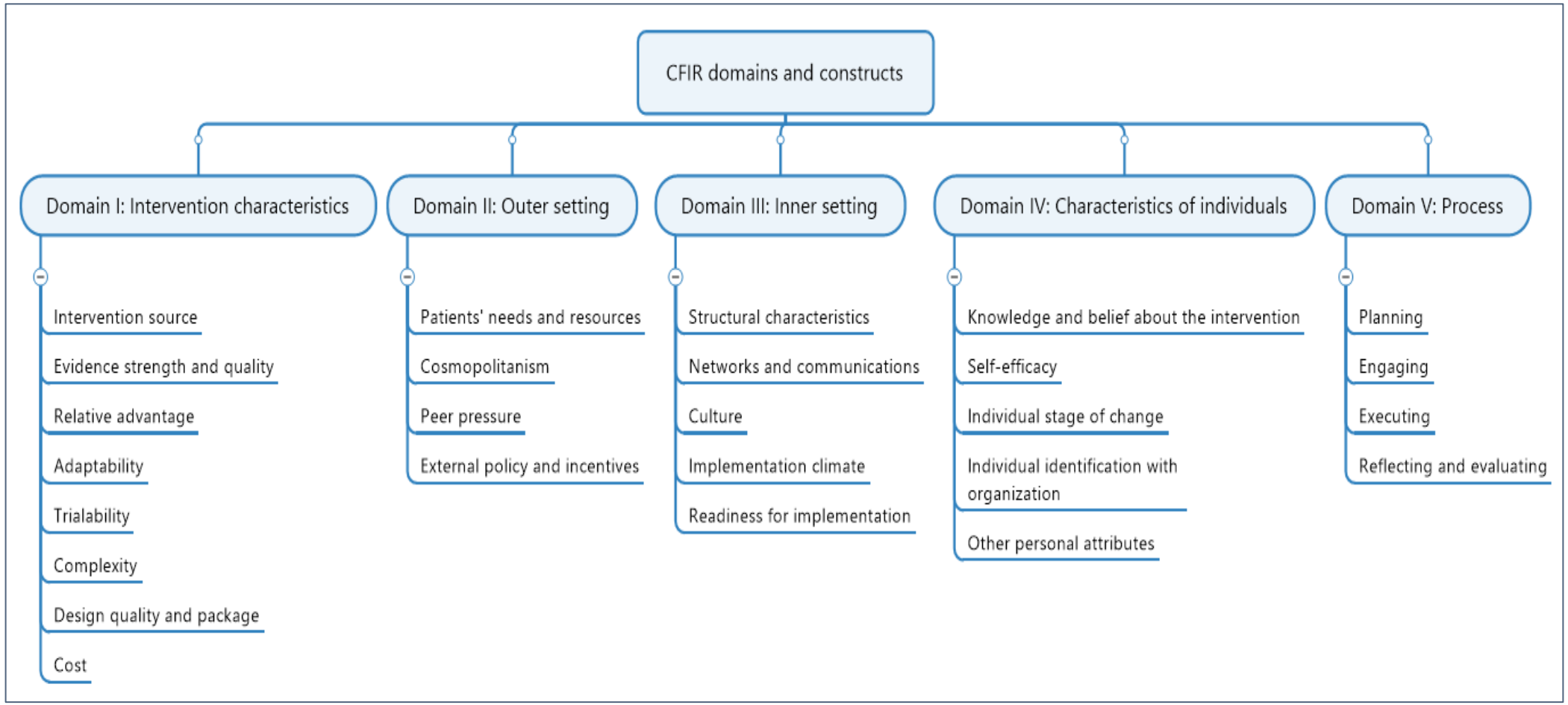


Specify types of determinants which act as barriers and enablers that influence implementation outcomes

Source: https://impsciuw.org/implementation-science/research/frameworks/

Adapted from: Nilsen, P. Making sense of implementation theories, models and frameworks. *Implementation Sci* **10**, 53 (2015). https://doi.org/10.1186/s13012-015-0242-0

Consolidated Framework for Implementation Research

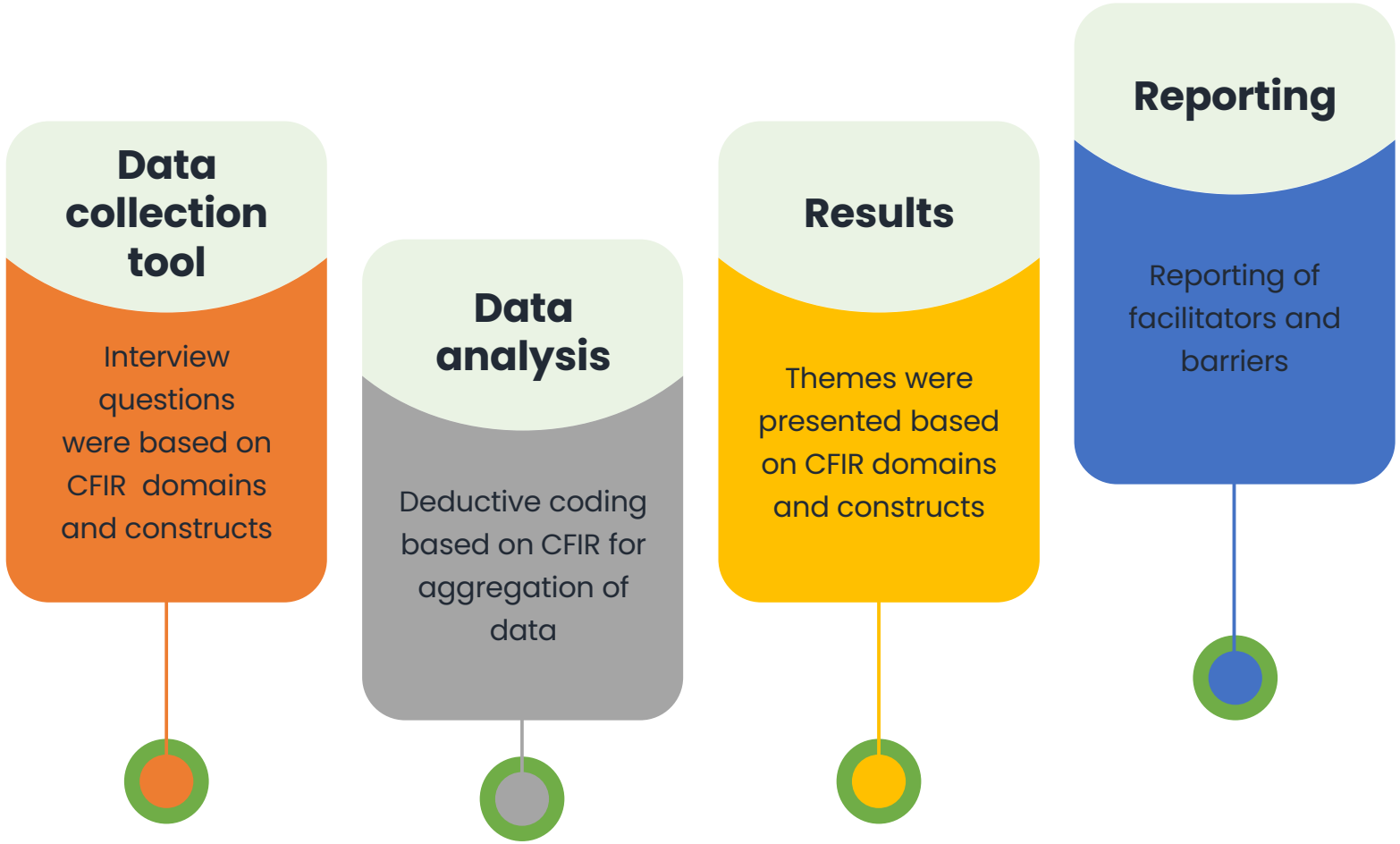


Map produced by Mind Manager from Coral Corporate

Consolidated Framework for Implementation Research (CFIR)

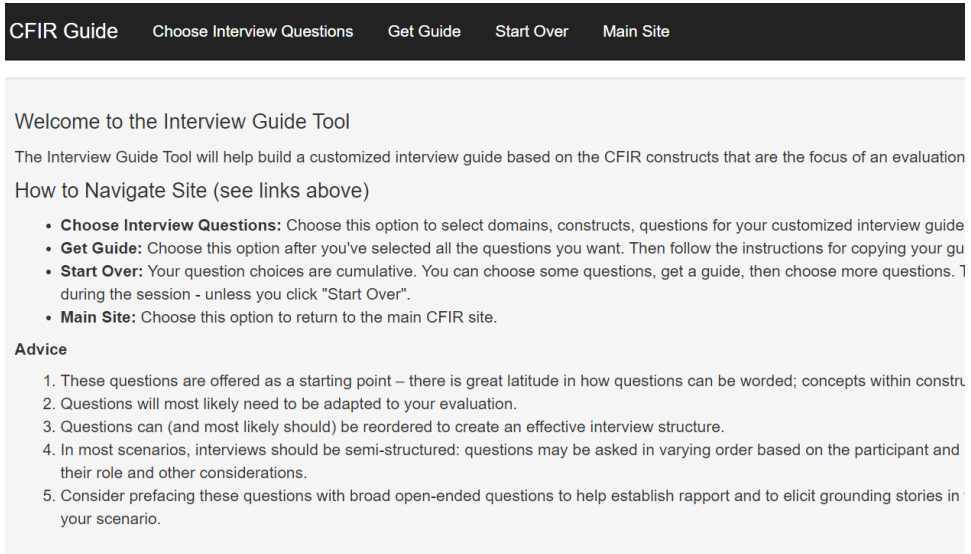
1	**Formation**	A panel of 39 constructs arranged across five domains.
2	**Application**	Increasingly used in healthcare-related implementation research.
3	**Purpose**	Help to gather data about contextual factors that can impact implementation of a service as facilitator or barrier for implementation.
4	**Development**	Developed based on a constellation of 19 implementation theories, models or frameworks that are published in peer-reviewed journals.
5	**Use in this research**	CFIR was used to guide data collection tool development, coding and analysis as well as final reporting of results.

How CFIR was integrated throughout the research process



How CFIR was integrated throughout the research process

CFIR construct	Interview questions and probes
Domain One; Intervention characteristics	
Intervention source	**How did your hospital start ASP implementation?** • Was it developed based on ASP guidelines from other countries or other hospitals? • Who was involved in developing your ASP? • What went well and did not go so well; what helped and did not help? ○ Can you tell me more about that?
Adaptability	**Did you have to adapt or refine to suit your hospital?** • Can you describe these changes required? • Who was involved? **Or Any special plan for adapting or refining ASP to integrate it within the current** practice? • Who will be involved?
Complexity	**What are your thoughts on how complex the ASP was for your hospital?** • Was there a need for stepwise implementation? • Was there any specific training program for staff around implementation? • Do you feel there will be a need for step wise implementation? How?
Cost	**To what extent was (is) cost a consideration for implementing ASP?** • Think about costs incurred and potential to save costs
Domain Two; Outer setting	
Peer pressures	**How did ASP practices from other hospitals influenced your implementation?** • Positive and negative influences?
External policies and incentives	**What kind of national policies or directions influenced the decision to implement ASP?** • Any support has been received from authorities to encourage implementation? • Special training, seminars, educational material, bonuses, or incentives?
Domain Three; Inner setting	
Structural characteristics	**To what extent does (did) your hospital need to update its infrastructure for ASP implementation? (like policies, information technology, practices and guidelines)** • Such as hospital size, staff turnover, use of technology and central decision-making.
Networks and communication:	**Can you comment on the effect of formal and informal communication among teams inside your hospital on ASP implementation?**



First step was operationalising CFIR interview guide tool to suit ASP implementation

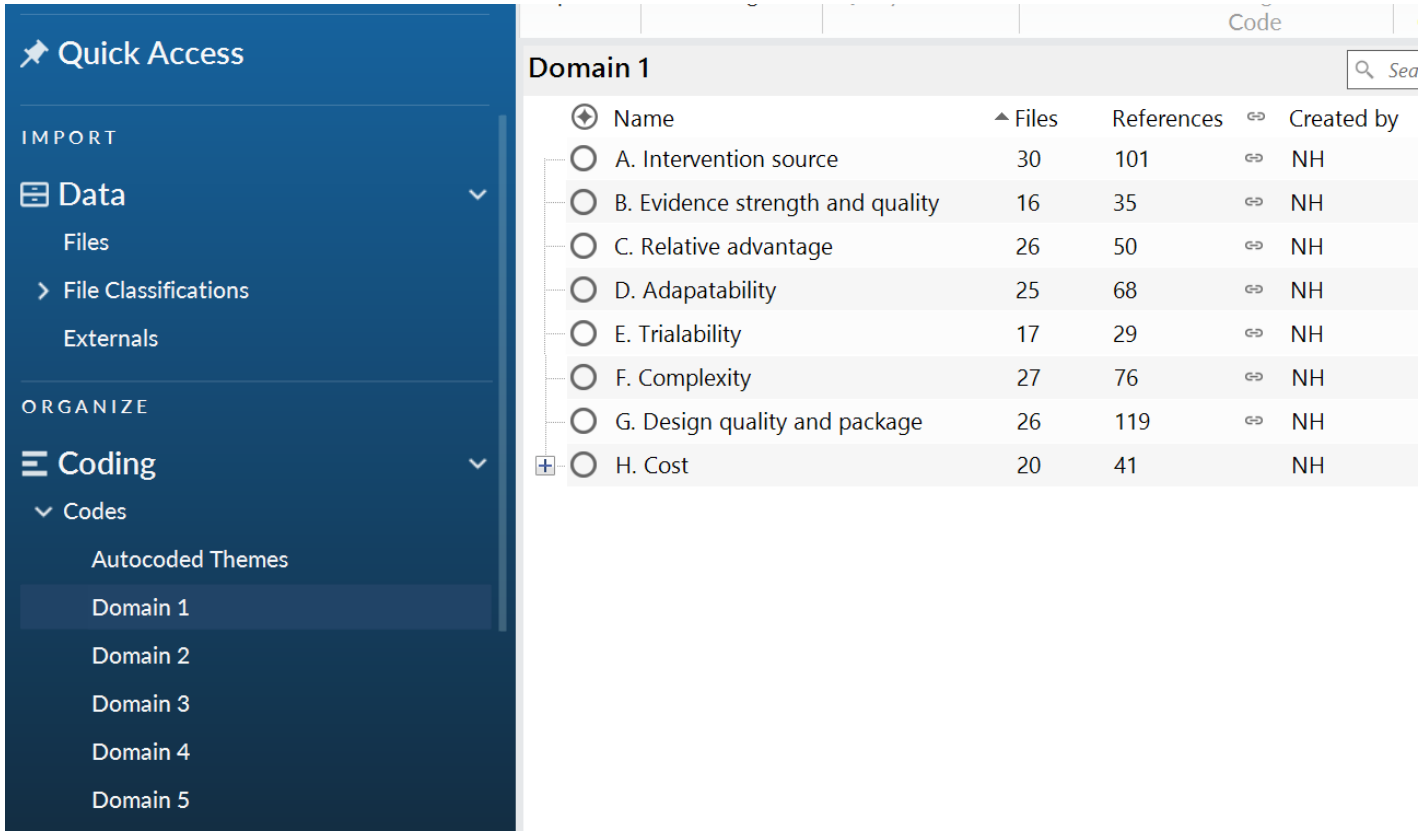
How CFIR was integrated throughout the research process

CFIR Codebook

Note: This template provides inclusion and exclusion criteria for most constructs. Please post additional inclusion and exclusion criteria, guidance, or questions to the CFIR Wiki discussion tab in order to help improve the CFIR.

This template only includes CFIR definitions and coding criteria; codebooks may include other information, such as examples of coded text, rating guidelines, and related interview questions.

I. Innovation Characteristics	
A. Innovation Source	Definition: Perception of key stakeholders about whether the innovation is externally or internally developed. Inclusion Criteria: Include statements about the source of the innovation and the extent to which interviewees view the change as internal to the organization, e.g., an internally developed program, or external to the organization, e.g., a program coming from the outside. Note: May code and rate as "I" for internal or "E" for external. Exclusion Criteria: Exclude or double code statements related to who participated in the decision process to implement the innovation to Engaging, as an indication of early (or late) engagement. Participation in decision-making is an effective engagement strategy to help people feel ownership of the innovation.
B. Evidence Strength & Quality	Definition: Stakeholders' perceptions of the quality and validity of evidence supporting the belief that the innovation will have desired outcomes. Inclusion Criteria: Include statements regarding awareness of evidence and the strength and quality of evidence, as well as the absence of evidence or a desire for different types of evidence, such as pilot results instead of evidence from the literature. Exclusion Criteria: Exclude or double code statements regarding the receipt of evidence as an engagement strategy to Engaging: Key Stakeholders. Exclude or double code descriptions of use of results from local or regional pilots to Trialability.



Then used the CFIR code book as a guide for inductively coding data during analysis

C. Overall summary of CFIR constructs identified as perceived facilitators or barriers for ASP implementation with supporting quotes (Table 1)

CFIR domain	CFIR construct	Identified themes	Supporting quotes	Perceived facilitator/barrier
Domain I	Complexity	Perceived complexity of ASP implementation.	"You say start simple but [ASP] gradually becomes complex because the more and more areas you involve to bring under your stewardship programme, the more difficult it becomes and the more challenging it becomes, because of the data gathering and number of people involved." [Microbiologist 1]	Perceived barrier
Domain II	External policy and incentives	ASP mandates by UAE health authorities and international accreditation bodies.	"We started in the summer of 2017. That was after the Department of Health in Abu Dhabi issued … a circular requiring that all the hospitals operating in the Emirate of Abu Dhabi have such a programme." [Clinical pharmacist 4]	Perceived facilitator
Domain III	Implementation climate (Tension for change)	Inconsistent prescribing practices creating a tension for change and a need to implement ASP.	"People are not using a standard protocol, each one is using his own protocol. Because we have the physicians which are trained in different countries. So, when we see the antibiotic usage, there are many things which were not consistent and standardised, so we wanted to standardise for our hospital also." [Surgeon 1]	Perceived facilitator
	Culture	Influence of blame culture on initial resistance to change antimicrobial prescribing behaviour.	"Most of the physicians, especially the surgeons, are afraid to be blamed of postoperative infection, complications of surgery… [due to]…inadequate coverage of antibiotic or inadequate duration of antibiotic." [Nephrologist 1]	Perceived barrier
		Collaborative culture to enhance acceptance of changing antimicrobial prescribing habits.	"Really, they're [prescribing physicians] accepting the changes. This [collaborative] culture helped to ease implementation of the programme, otherwise we cannot implement any programme if there is so much resistance and nobody is taking initiatives." [Nurse 3]	Perceived facilitator
	Available resources	A Lack of sufficient human resources.	"Our hospital didn't recruit an ID [Infectious diseases] consultant, but it consulted with the ID [consultant] at hospital X as needed." [Clinical pharmacist 4]	Perceived barrier
	Leadership engagement	Importance of engaging leadership using cost savings data.	"They [leadership] actually hired an infectious disease physician to be responsible for ASP." [Clinical pharmacist 5]	Perceived facilitator
	Network and communication	Establishment of effective formal and informal communication routes among ASP team members and healthcare providers.	"You don't come up as a policeman to police on them [physicians]. If you convey this message that … we are not challenging … your clinical decisions… and you do in a timely way the … face to face communication, that is much better than sending an email." [Clinical pharmacist 3]	Perceived facilitator
Domain V	Planning	Effective future planning for ASP implementation through selection of suitable interventions tailored to the specific organisation.	"We collected baseline data for one year to help us to decide where to start. Based on our baseline data, we decided that critical care area is the highest priority… to improve the prescribing practice of antibiotics … to decrease the incidence of the development of multi-drug resistant organism" [Clinical pharmacist 6]	Perceived facilitator

Results were presented based on the most dominant CFIR domains and constructs

How CFIR was integrated throughout the research process

A final message

- The use of theories, models or frameworks can provide researchers with a better understanding of how and why implementation is successful.
- Each tool has a distinct purpose.
- **After identifying the correct tool:**
  - Explore constructs covered by the tool
  - Explore published research that has used the tool
  - Optimize the tool through defining terminologies to suit your research topic


Thank You