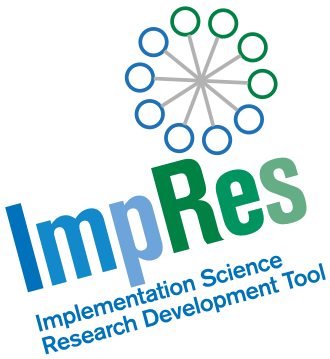

Implementation science research development (ImpRes) tool

A practical guide to using the ImpRes tool

Version 1.1
December 2018

About this guide

This guide provides a systematic step-by-step approach to designing implementation research and is intended to be used in conjunction with the ImpRes tool.

This guide aims to:

- Facilitate the use of the Implementation Science Research Development (ImpRes) tool (described further in the next section) to support research teams in the process of designing implementation research that aims to implement evidence-based interventions into practice, including implementation project grant proposals and applications.
- Highlight the importance of implementation science in optimising the successful implementation of evidence-based interventions into clinical practice.
- Define terminology commonly used in the implementation science literature.
- Direct researchers to relevant literature and online resources, which can be used to help guide the design of implementation research.

Who is this guide for?

- All researchers involved in designing and conducting implementation research.
- Researchers with varying levels of expertise in implementation science.
- Researchers from varying disciplines working to study or evaluate the implementation of evidence-based treatments, guidelines, and practices.

Note: This guide assumes that you have identified a problem or deficiency in the provision of healthcare that an evidence-based intervention aims to tackle (i.e. an implementation gap) and have conducted a review of the evidence-base of the intervention(s) you have selected to address the identified problem.

For more information about the ImpRes tool and guide, contact Dr Louise Hull | Senior Researcher, King's Improvement Science and Deputy Director, Centre for Implementation Science | King's College London.
Email: louise.hull@kcl.ac.uk

The development of the ImpRes tool and guide was funded by the Maudlsey Charity and Guy's and St Thomas' charity, and supported by the National Institute for Health Research (NIHR) Collaboration for Leadership in Applied Health Research and Care (CLAHRC) South London at King's College Hospital NHS Foundation Trust.

Implementation Science is a relatively new but rapidly advancing discipline. As such, this guide will be reviewed and updated biannually to include the state-of-the-art guidance for planning and designing implementation research. This guide is due for review in October 2018.

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About the implementation science research development (ImpRes) tool

We developed ImpRes to help researchers successfully apply implementation science concepts, principles and methods within implementation research.

> Expert-derived guidelines exist for reporting implementation studies (e.g. Standards for reporting implementation studies of complex interventions (STaRi) [Pinnock et al, 2015].[1] However, there are a lack of guidelines and recommendations that describe how to design implementation research. ImpRes was developed to address this gap.

> Whilst guidelines and recommendations exist that can be used by researchers to guide the design of specific aspects of implementation research (e.g. guidelines for selecting and tailoring implementation strategies [Powell et al, 2017])[2] a tool bringing together such guidelines and recommendations does not currently exist. As a result, researchers striving to implement evidence-based practices are tasked with identifying and synthesising a rather disparate literature in order to ensure that the key principles of implementation science are considered when designing an implementation project. ImpRes was developed with the aim of addressing this challenge by providing researchers with a practical yet comprehensive resource.

1 Pinnock et al. Developing standards for reporting implementation studies of complex interventions (StaRI): a systematic review and e-Delphi. Implement Sci. 2015;10:42. www.ncbi.nlm.nih.gov/pubmed/25888928.

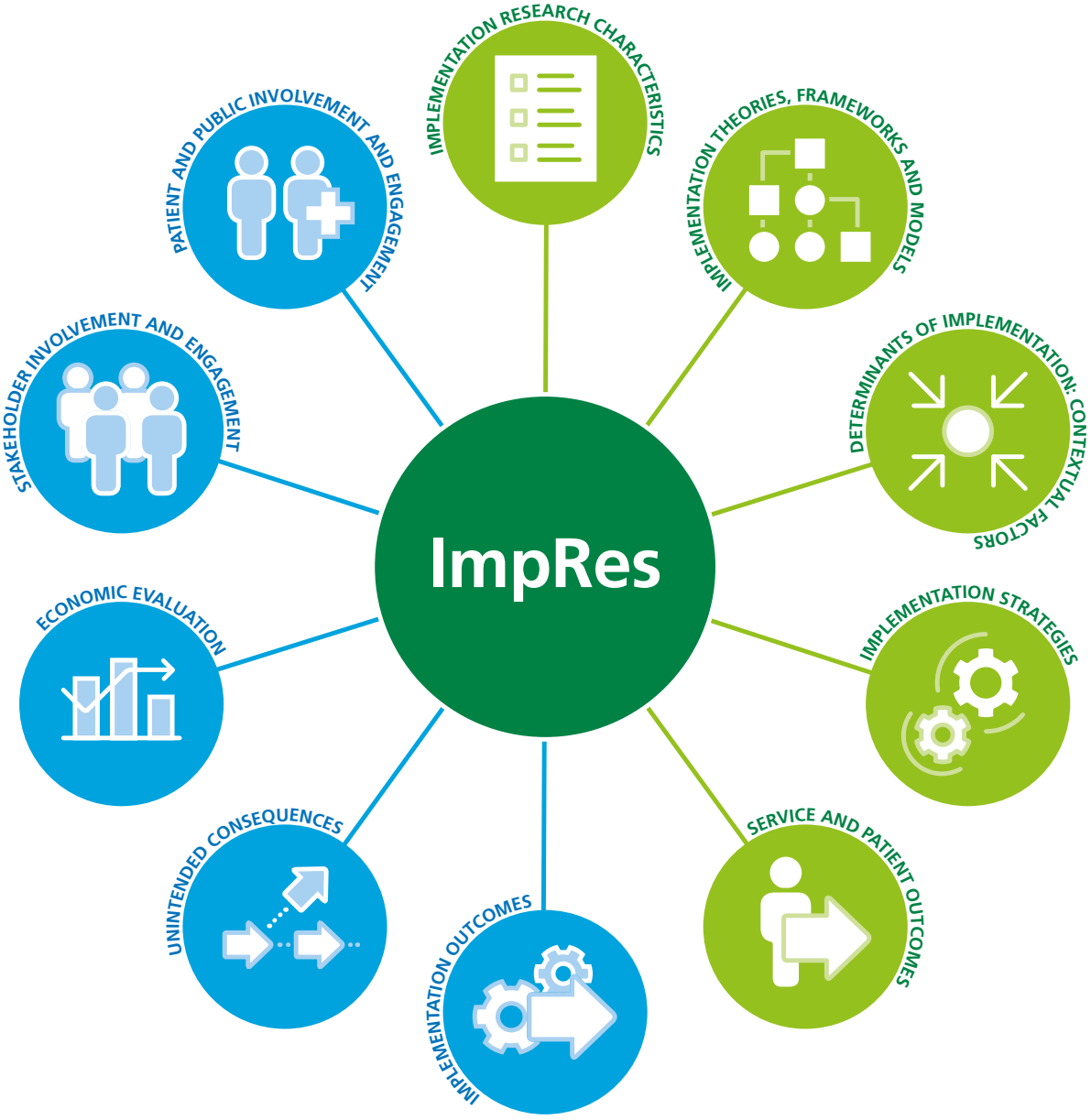
2 Powell et al. Methods to Improve the Selection and Tailoring of Implementation Strategies. J Behav Health Serv Res. 2017;44(2):177–194. www.ncbi.nlm.nih.gov/pubmed/26289563.

Evidence-informed and expert-derived

ImpRes was developed following a scoping review of the implementation science literature, to identify the core principles of implementation science, and following an iterative process of consulting international experts in the field of implementation science. See Appendix B for a full list of experts involved in the development and refinement of ImpRes.

ImpRes

ImpRes contains 10 domains that cover the core principles and methods of implementation science that researchers should consider when planning and designing high-quality and rigorous implementation research.



Why use the ImpRes tool?

The ImpRes tool will:

- Provide you with a systematic step-by-step approach to designing high-quality and rigorous implementation science research/ implementation projects.
- Help you to select an appropriate theory, framework or model to guide, understand and/or evaluate implementation.
- Help you to understand the determinants (i.e. barriers and facilitators) to implementation.
- Help you to develop an implementation strategy to optimise adoption, implementation and sustainment.
- Help you to identify appropriate implementation outcomes and health economic outcomes to measure.
- Help you to engage stakeholders and patients and the public in your implementation project.
- Help you consider unintended consequences of implementation efforts.

Testimonials

Researchers and project teams that have used the ImpRes tool to-date agreed that:

- It is a useful tool for self/project team reflection regarding implementation research.
- It is a useful tool to identify project areas where implementation science is lacking.
- It is a useful tool to strengthen implementation science in projects.
- Giving project teams feedback on their project based on ImpRes would be useful for improving the quality of implementation research.

> "I'm new to the field of implementation science and the advice and guidance I had from the team on using the 'ImpRes tool' enabled me to build my knowledge of implementation science and helped simplify the planning process for my project. This has made my project more scientific and evidence based, strengthening my work.'
> Kate Daley, Clinical psychologist, Darzi Fellow,
> Health Innovation Network

Implementation science: what is it?

> Implementation science in healthcare has been defined as 'the scientific study of methods to promote the systematic uptake of clinical research findings and other evidence-based practices into routine practice, and, hence, to improve the quality and effectiveness of health services… It includes the study of influences on healthcare professionals and organisational behaviour.' Eccles and Mittman, 2006.[3]

> Implementation science 'supports innovative approaches to identifying, understanding, and overcoming barriers to the adoption, adaptation, integration, scale-up and sustainability of evidence-based interventions, tools, policies, and guidelines'. National Institutes of Health, 2015.

Implementation science aims

> Develop reliable strategies for improving health related processes and outcomes; facilitate widespread adoption of these strategies.

> Produce insights and generalisable knowledge regarding implementation process, barriers, facilitators, strategies.

> Develop, test and refine implementation theories and hypotheses; methods and measures. Mittman, 2016.[4]

3 Eccles et al. Welcome to Implementation Science. Implement Sci. 2006;1:1. https://implementationscience.biomedcentral.com/articles/10.1186/1748-5908-1-1.

4 National Academies of Sciences, Engineering, and Medicine. 2016. Applying an implementation science approach to genomic medicine: Workshop summary. Washington, DC: The National Academies Press. www.ncbi.nlm.nih.gov/books/NBK356505/pdf/Bookshelf_NBK356505.pdf.

Implementation science: why does it matter?

The World Health Organisation (WHO) has described the implementation of evidence-based practice as one of the greatest challenges facing the global health community and has identified the importance of implementation science in scaling up evidence-based interventions. Peters et al, 2013.[5]

Despite the best treatment and care being readily available evidence fails to be implemented into practice. Closing the so called evidence-to-practice gap is often a complex, time consuming and challenging task. Implementation science investigates factors that hinder or help implementation and aims to address them to optimise implementation.

Embedding implementation science methods and techniques into research can help maximise the likelihood that implementation is successful in improving the quality of healthcare and healthcare services.

Applying implementation science in the context of applied health research can support the wide and rapid scale-up/spread and sustainability of evidence-based practices and interventions post-research evaluation.

Conceptualising implementation success

Proctor et al, 2011[6] propose that implementation success is a function of the effectiveness of the intervention being implemented AND a range of implementation factors. As such, although proven effectiveness of the intervention being implemented is essential, it is not sufficient to ensure implementation success. A range of implementation factors affect the successful implementation of evidence-based interventions. Implementation scientists focus on studying these factors and their impact on implementation success.

5 Peters et al. Implementation research in health: a practical guide. Alliance for Health Policy and Systems Research, World Health Organization, 2013. http://who.int/alliance-hpsr/alliancehpsr_irpguide.pdf.

6 Proctor et al. Outcomes for implementation research: conceptual distinctions, measurement challenges, and research agenda. Adm Policy Ment Health. 2011:38(2):65–76. www.ncbi.nlm.nih.gov/pubmed/20957426.

Introducing ImpRes

In the preceding section, we have defined implementation science and its goals, and have provided the rationale underlying the development and application of the ImpRes tool.

In the sections that follow, more detailed information pertaining to the implementation elements covered by ImpRes will be explored. We strongly recommend reading the following sections alongside ImpRes to gain a more in-depth understanding of how to apply the tool to your implementation research project.

Throughout this guide we have included a number of features to help you develop high-quality implementation research:

Jargon buster: Definitions of commonly used terms in implementation science.

Top tips: Tips and hints to help you design high-quality implementation research.

Keep an eye out: Research currently being conducted but not yet completed/published.

Linking ImpRes components: Although presented separately, ImpRes domains should be viewed as interlinked and overlapping rather than discrete. Here we make these interlinks explicit.

Useful resources: Resources including blogs, webinars and websites.

Useful references: Peer-reviewed publications.

Implementation research characteristics

ImpRes encourages research teams to design robust implementation research by clearly articulating the implementation aims that the research seeks to address, understanding the activities associated with each implementation stage, and selecting an appropriate study design.

Aims of implementation research

Clearly articulating the aims of implementation research is critical to ensuring that the design, methodologies, measures and overall evaluation of a project are appropriately aligned with these aims.

Stages of implementation

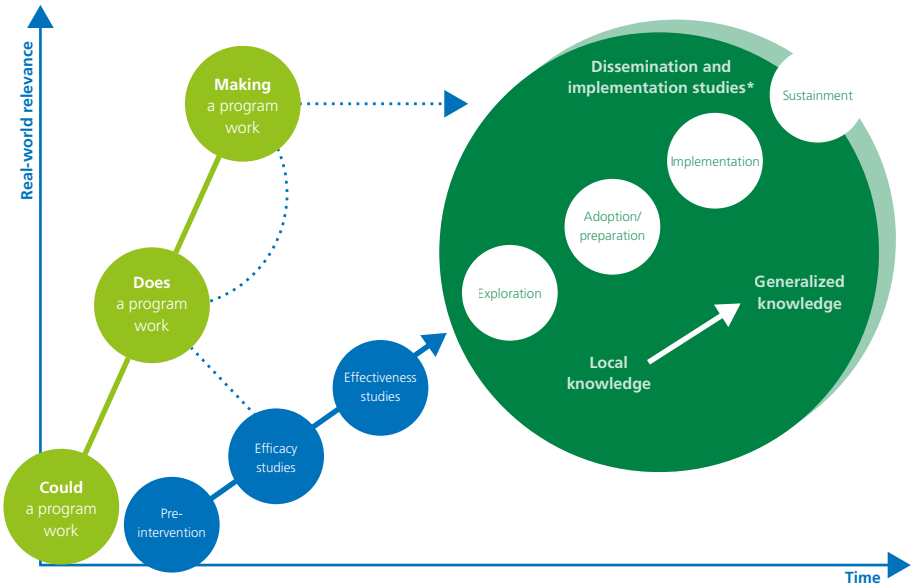
Four stages of implementation have been proposed (Fixsen et al, 2010).[7] Understanding the activities associated and recommended at each stage is considered vital to optimising implementation success. See Table 1 for a summary of the activities associated with each implementation stage.

7 National Implementation Research Network. Stages of Implementation. http://nirn.fpg.unc.edu/learn-implementation/implementation-stages.

Table 1: Stages of implementation and associated activities

Implementation stage	Activities
Exploration	Assess needs; examine intervention components; consider implementation barriers and facilitators; assess capacity to implement
Installation	Acquire resources; prepare organisation; prepare implementation drivers; prepare staff
Initial implementation	Adjust implementation facilitators; manage change; deploy data systems; initiate improvement cycles
Full implementation	Monitor and manage implementation drivers; achieve fidelity and outcome benchmarks; further improve fidelity and outcomes

Figure 1: Translational pipeline from efficacy to implementation studies



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

Adapted from Brown et al, 2017.[8]

8 Brown et al. An Overview of Research and Evaluation Designs for Dissemination and Implementation. Annu Rev Public Health. 2017;38:1–22. www.ncbi.nlm.nih.gov/pubmed/28384085.

Table 2: Design features of effectiveness research and implementation research

	Effectiveness research	Implementation research
Aim: evaluate a/an	Clinical intervention (i.e. clinical/therapeutic practice, or delivery system/organizational arrangement,, or health promotion activity)	Implementation strategy (i.e. a "bundle" of implementation strategies)*
Typical unit of analysis	Patient	Healthcare professional, clinical unit, system
Typical outcomes	Clinical outcomes (e.g. patient symptoms and functioning, quality of life, cost effectiveness)	Provider and/or system level behaviours (e.g. rates of adoption, fidelity to clinical intervention)
Typical unit of randomisation	Patient, clinical unit	Healthcare professional, clinical unit, system

Based on Curran et al, 2012.[9]

*In addition to evaluating an implementation strategy, implementation research might be concerned with, for example, identifying barriers and facilitators to implementation and developing and/or testing implementation theories (see aims of implementation research highlighted in the previous section).

Examples of study designs for implementation research

- Experimental designs (e.g. randomised control trials, hybrid designs; for the latter see below)
- Quasi-experimental designs (e.g. interrupted time series)
- Observational designs (surveys, focus groups, case studies)
- Mixed methods designs

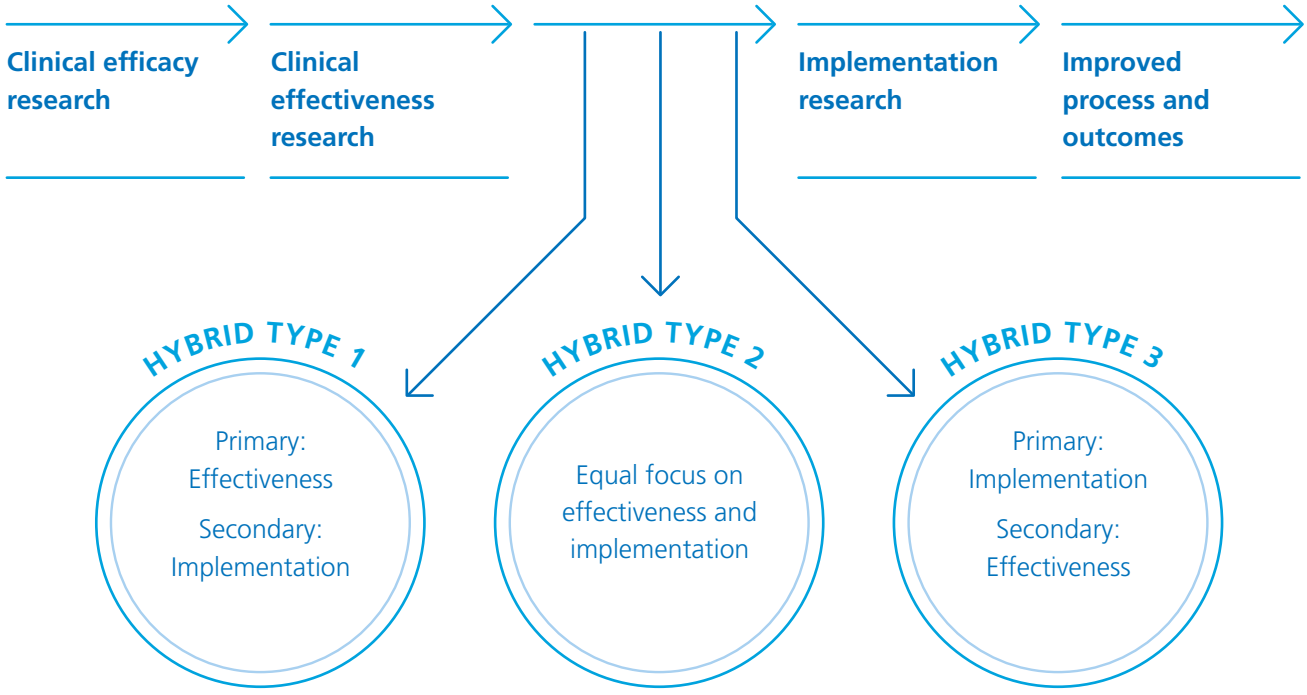
9 Curran et al. Effectiveness-implementation hybrid designs: combining elements of clinical effectiveness and implementation research to enhance public health impact. Med Care. 2012;50(3):217–26. www.ncbi.nlm.nih.gov/pubmed/22310560.

Effectiveness-implementation hybrid designs

Three types of effectiveness-implementation hybrid designs have been proposed (see Figure 2). The inherent difference between the three effectiveness-implementation hybrid designs (types 1, 2, and 3) is the degree of focus placed on evaluating the effectiveness of the intervention and implementation:

- **Type 1**: primary focus on effectiveness; secondary focus on implementation
- **Type 2**: equal focus on effectiveness and implementation
- **Type 3**: primary focus on implementation; secondary focus on effectiveness

Figure 2: Hybrid effectiveness-implementation designs as part of the clinical research continuum



Adapted from Curran et al, 2012.[9]

Implementation theories, frameworks and models: Methods used in implementation research need to be appropriately aligned to the research aim(s) and should be informed by relevant theories/ frameworks/ models.

Brown et al. An Overview of Research and Evaluation Designs for Dissemination and Implementation. Annu Rev Public Health. 2017;38:1–22. Click here to view the article.[8]

Curran et al. Effectiveness-implementation hybrid designs: combining elements of clinical effectiveness and implementation research to enhance public health impact. Med Care. 2012;50:217–226. Click here to view the article.[9]
This paper provides a comprehensive overview of characteristics, key challenges, and ''recommended conditions of use'' associated with each effectiveness-implementation hybrid design, as well as examples of research using effectiveness-implementation hybrid designs.

Implementation theories, frameworks and models

ImpRes encourages research teams to apply an implementation theory, framework or model in implementation research and ensure that research teams have strong justification for their theoretical and conceptual choices.

A theory is defined as 'a set of analytical principles or statements designed to structure our observation, understanding and explanation of the world. A theory is made up of definitions of variables, a domain where the theory applies, a set of relationships between the variables and specific predictions.'

A framework is defined as 'a structure, overview, outline, system or plan consisting of various descriptive categories, e.g. concepts, constructs or variables, and the relations between them that are presumed to account for a phenomenon. Frameworks do not provide explanations; they only describe empirical phenomena by fitting them into a set of categories.'

A model is a 'deliberate simplification of a phenomenon or a specific aspect of a phenomenon. Models need not be completely accurate representations of reality to have value.'

All definitions taken and adapted from Nilsen et al, 2015.[10]

10 Nilsen. Making sense of implementation theories, models and frameworks. Implement Sci. 2015;10:53. www.ncbi.nlm.nih.gov/pubmed/25895742.

A diverse range of implementation theories, models, and frameworks exist to guide, gain insight, and evaluate implementation efforts. Well-known implementation theories and frameworks include: Normalisation Process Theory (NPT),[11] the Consolidated Framework for Implementation Research (CFIR),[12] the Theoretical Domains Framework (TDF)[13] and the Reach Effectiveness Adoption Implementation Maintenance (RE-AIM) Framework[14] – amongst many others published to-date.

Importance of using theories, frameworks and models in implementation research

> Lack of theoretical underpinning has been likened to an expensive version of trial-and-error, with no a priori reason to expect success or to have confidence of being able to replicate success if it is achieved. Eccles et al, 2005.[15]

Nilsen, 2015[10] suggests that implementation theories, frameworks and models can be used to:

- Describe and/or guide the process of translating research into practice (process models).
- Understanding and/or explaining what influences implementation outcomes (determinant frameworks, classic theories and implementation theories).
- Evaluate implementation (evaluation frameworks).

Implementation research characteristics: Depending on the nature and aim(s) of your implementation research, it might be appropriate to use more than one theory, framework or model.

11 www.normalizationprocess.org.
12 www.cfirguide.org.
13 Cane et al. Validation of the theoretical domains framework for use in behaviour change and implementation research. Implement Sci. 2012;7:37. www.ncbi.nlm.nih.gov/pubmed/22530986.
14 http://re-aim.org.
15 Eccles et al. Changing the behavior of healthcare professionals: the use of theory in promoting the uptake of research findings. J Clin Epidemiol. 2005;58(2):107–12. www.ncbi.nlm.nih.gov/pubmed/15680740.

Selecting an appropriate theory, framework or model

60+ implementation theories, frameworks and models have been identified for use in dissemination and/or implementation research (Note: *Dissemination is defined as the 'active approach of spreading evidence-based interventions to the target audience via determined channels using planned strategies'* [Tabak et al, 2012][16]

Selecting an appropriate theory, framework or model can seem like a daunting task but there are a number of publications to help you:

Nilsen P. Making sense of implementation theories, models and frameworks. Imp Sci. 2015;10:53. *This paper presents a taxonomy of implementation theories frameworks and models based on their aims (i.e., describing and/or guiding the process of translating research into practice, understanding and/or explaining what influences implementation outcomes and evaluating implementation).* Click here to access the article.[10]

Tabak R et al. Bridging research and practice: models for dissemination and implementation research. Am J Prev Med. 2012;43:337–350. *This paper organises implementation and dissemination theories and frameworks according to construct flexibility (i.e., definition/flexibility of model constructs), dissemination and/or implementation activities (i.e., focus on dissemination and/or implementation activities), and the socioecological framework (SEF) level (i.e., level of the SEF at which the model operates, e.g., individual, community, system).* Click here to access the article.[16]

Birken et al. Criteria for selecting implementation science theories and frameworks: results from an international survey. Implement Sci. 2017; 30;12(1):124. Click here to access the article.[17]

16 Tabak et al. Bridging research and practice: models for dissemination and implementation research. Am J Prev Med. 2012;43(3):337–50. www.ncbi.nlm.nih.gov/pubmed/22898128.

17 Birken et al. Criteria for selecting implementation science theories and frameworks: results from an international survey. Implement Sci. 2017;12(1):124. www.ncbi.nlm.nih.gov/pubmed/29084566.

Implementation Research Characteristics: The aim(s) of your research should be closely aligned to the implementation theory, framework and/or model that you select. For example, if your research aims to identify barriers to implementation, an implementation determinant framework, rather than an evaluation framework, would be appropriate.

Implementation researchers at the University of North Carolina at Chapel Hill are currently studying the criteria used by implementation researchers and practitioners to select implementation frameworks and theories and are developing a pragmatic tool to guide framework and theory selection. **For more information on the project contact Sarah Birken at** birken@unc.edu.

Implementation Science Exchange contains an interactive website to help select a D&I Model that best fits your research question. www.dissemination-implementation.org.

The Consolidated Framework for Implementation Research (CFIR) website. www.cfirguide.org.

Reach Effectiveness Adoption Implementation Maintenance (RE-AIM) framework website. http://re-aim.org.

Normalisation Process Theory website. www.normalizationprocess.org.

Determinants of implementation: contextual factors

ImpRes encourages research teams to consider and systematically identify factors likely to affect implementation success.

Context has been defined as 'the set of circumstances or unique factors that surround a particular implementation effort.' [Damschroder et al, 2009][18] and 'anything external to the intervention which impedes or strengthens its effects.' [Medical Research Council, 2015][19]

18 Damschroder et al. Fostering implementation of health services research findings into practice: a consolidated framework for advancing implementation science. Implement Sci. 2009;4:50. www.ncbi.nlm.nih.gov/pubmed/19664226.

19 Craig et al. Developing and evaluating complex interventions: the new Medical Research Council guidance. BMJ. 2008;337:a1655. www.ncbi.nlm.nih.gov/pubmed/18824488.

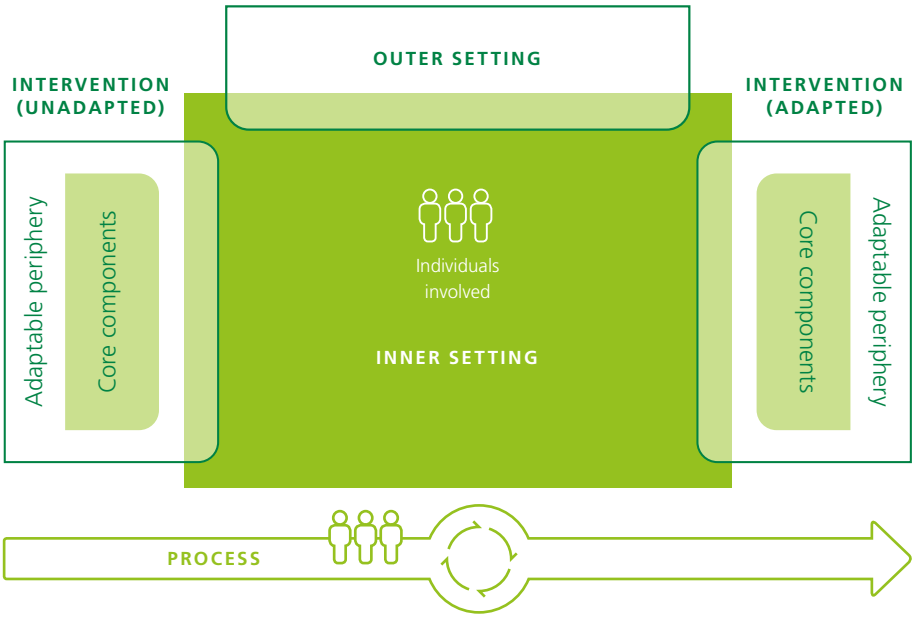
Importance of identifying and understanding contextual factors likely to affect implementation success

Many factors are likely to affect the successful implementation of a given evidence-based practice. Without a clear understanding of these factors, implementation strategies to overcome barriers and maximise facilitators will not be optimised, thereby reducing the likelihood of implementation success.

Several frameworks, taxonomies, and checklists exist that can be used to systematically identify factors that might affect the successful implementation of an evidence-based practice or intervention.

One of the mostly widely used frameworks for investigating context is the Consolidated Framework for Implementation Research (CFIR). See Figure 3 below.

Figure 3: Consolidated framework for implementation research



Adapted from Damschroder et al, 2009.[18]

CFIR is a 'meta-theoretical' framework consisting of 37 constructs organised over 5 domains (see Table 3 below). It is acknowledged that complex interactions exist both within and between domains that will influence implementation success.

Table 3: CFIR dimensions and constructs

CFIR dimension	Constructs
Intervention characteristics	Evidence strength and quality; cost; intervention source; relative advantage; trialability; complexity; design and packaging; adaptability.
Individuals involved	Knowledge and beliefs about the intervention; individual identification with the organisation; other personality traits; individual stage of change; self-efficacy.
Inner setting	Networks and communication; structural characteristics; culture; implementation climate (tension for change, compatibility, relative priority, organisational incentives and rewards, goals and feedback, learning climate); readiness for implementation (leadership engagement, available resources, access to knowledge and information).
Outer setting	Patient needs and resources; external policies and incentives; peer pressure; cosmopolitanism.
Process	Planning; engaging (opinion leaders, formally appointed internal implementation leaders, champions, external change agents); reflecting and evaluating; executing.

Based on Damschroder et al, 2009.[18]

Health Foundation. Perspectives on Context: A selection of essays considering the role of context in successful quality improvement. Click here to access the essays.[20]

Chaudoir et al. Measuring factors affecting implementation of health innovations: a systematic review of structural, organisational, provider, patient, and innovation level measures. Implement Sci. 2013;8:22. Click here to access the article.[21]

Damschroder et al. Fostering implementation of health services research findings into practice: a consolidated framework for advancing implementation science. Implement Sci. 2009;4:50. Click here to access the article.[18]

Flottorp et al. A checklist for identifying determinants of practice: A systematic review and synthesis of frameworks and taxonomies of factors that prevent or enable improvements in healthcare professional practice. Implement Sci. 2013 Mar 23;8:35. Click here to access the article.[22]

Nilsen P. Making sense of implementation theories, models and frameworks. Imp Sci. 2015. 10:53. *Taxonomy listing process models, determinant frameworks (classical theories, implementation theories) and evaluation frameworks.* Click here to access the article.[10]

Health Foundation webinar: Quality Improvement and the role of context and how to manage it. Webinar exploring the important of context when attempting improvement, and what skills best help professionals to manage context effectively. Watch the webinar here: www.health.org.uk/webinar-quality-improvement-role-context-and-how-manage-it

Consolidated Framework for Implementation Research (CFIR) website. www.cfirguide.org

20 Perspectives on Context: A selection of essays considering the role of context in successful quality improvement. The Health Foundation. 2014. www.health.org.uk/sites/health/files/PerspectivesOnContext_fullversion.pdf.

21 Chaudoir et al. Measuring factors affecting implementation of health innovations: a systematic review of structural, organizational, provider, patient, and innovation level measures. Implement Sci. 2013;8:22. www.ncbi.nlm.nih.gov/pubmed/23414420.

22 Flottorp et al. A checklist for identifying determinants of practice: a systematic review and synthesis of frameworks and taxonomies of factors that prevent or enable improvements in healthcare professional practice. Implement Sci. 2013;8:35. www.ncbi.nlm.nih.gov/pubmed/23522377.

Implementation strategies: Contextual factors should inform the appropriate selection of discrete implementation strategies and the development of an overall implementation strategy.

The Seattle Implementation Research Conference's (SIRC) Measures Project is in the process of identifying measurement instruments and mapping them to the CFIR and an outcomes framework; over 400 instruments have been identified and the SIRC is in the process of evaluating each instrument. Click here regularly for updates.[23]

A revised version of CFIR is currently being developed. Keep an eye out for the CFIR v2. Click here for more information: www.cfirguide.org.

23 Society for Implementation Research Collaboration. Instrument Review Project. https://societyforimplementationresearchcollaboration.org/sirc-instrument-project.

Implementation strategies

ImpRes encourages research teams to carefully select implementation strategies to maximise implementation success by ensuring that the rationale for selection and tailoring of implementation strategies is robust.

> Implementation strategies are 'methods or techniques used to enhance the adoption, implementation, and sustainability of a clinical programme, practice or intervention'. [Proctor et al, 2013][24]

Implementation strategies have been described as the active ingredient of the implementation process and the 'how to' component of changing healthcare practice. [Proctor et al, 2013][24]

> Implementation researchers have identified 73 discrete implementation strategies for use in healthcare and health services. These have been categorised into nine conceptually different groups (see table 4 below).

> Typically, a number of discrete implementation strategies are bundled and packaged together to create an overall implementation strategy.

24 Proctor et al. Implementation strategies: recommendations for specifying and reporting. Implement Sci. 2013 8:139. www.ncbi.nlm.nih.gov/pubmed/24289295.

Table 4: Implementation strategy categories and discrete strategies

Implementation strategy categories	Examples of discrete strategies
Use evaluative and iterative strategies	Assess for readiness and identify barriers and facilitators; audit and provide feedback; develop a formal implementation blueprint
Provide interactive assistance	Facilitation; provide local technical assistance; provide clinical supervision
Adapt and tailor to context	Tailor strategies; promote adaptability; use data experts
Develop stakeholder interrelationships	Identify and prepare champions; inform local opinion leaders; identify early adopters
Train and educate stakeholders	Conduct ongoing training; distribute educational materials; create a learning collaborative
Support clinicians and healthcare professionals	Remind clinicians; develop resource sharing agreements; revise professional roles
Engage patients/ service users	Involve patients/consumers and family members; prepare patients/consumers to be active participants; increase demand
Utilise financial strategies	Alter incentive/allowance structures; use other payment schemes; develop disincentives
Change infrastructure	Mandate change; create or change credentialing and/or licensure standards; change liability laws

Based on Waltz et al, 2015.[25] See Appendix A for a full list of implementation strategies.

25 Waltz et al. Use of concept mapping to characterize relationships among implementation strategies and assess their feasibility and importance: results from the Expert Recommendations for Implementing Change (ERIC) study. Implement Sci. 2015;10:109. www.ncbi.nlm.nih.gov/pubmed/26249843.

Selecting and tailoring implementation strategies

Selecting appropriate implementation strategies and developing an overall implementation strategy requires some consideration on the part of the research/ implementation team.

There a number of guiding principles to help in the selection of implementation strategies:

> Select strategies to address the context and setting of a change effort, to overcome barriers to implementation and/or harness facilitators to implementation.

> Select strategies that have an adequate and relevant evidence base.

> Engage stakeholders (e.g. healthcare professionals and patient and the public) in selection and tailoring of strategies.

> Select strategies based on expert ratings of importance and feasibility. E.g. Most important strategy: Assessing readiness and identify barriers and facilitators; Least important strategy: Changing liability laws; Most feasible strategy: Developing educational materials; Least feasible strategy: changing liability laws).

Implementation strategies should not be viewed as fixed; research teams should constantly explore the effectiveness of an implementation strategy and whether modifications could enhance its effectiveness.

A number of publications are available to help you develop an appropriate overall implementation strategy:

Powell et al. Methods to improve the selection and tailoring of implementation strategies. J Behav Health Serv Res. 2017 44(2):177–194. *This work suggests a number of different methods that can be used to select and tailor implementation strategies.* Click here to access the article.[2]

Waltz et al. Use of concept mapping to characterise relationships among implementation strategies and assess their feasibility and importance: results from the Expert Recommendations for Implementing Change (ERIC) study. Implement Sci. 2015;10:109. *This work groups the 73 implementation strategies into nine different categorises and provides rating, based on expert opinion, on the importance and feasibility of each implementation strategy.* Click here to access the article.[25]

Proctor et al. Implementation strategies: recommendations for specifying and reporting. Implement Sci. 2013;8:139. *Useful guide to report implementation strategies but possibly helpful in developing an implementation strategy.* Click here to access the article.[24]

Determinants of implementation: Selecting and developing an appropriate overall implementation strategy is very much dependent on the context of a given implementation effort and the systematic identification of implementation determinants (i.e. the barriers and facilitators to implementation).

Implementation outcomes: Implementation strategies should be selected to target and improve implementation outcomes (e.g. developing educational material may increase intervention fidelity).

A team of implementation scientists are currently developing the Implementation Technique Selection tool to 'guide the selection of individual strategies that can be bundled or packaged together into an overall implementation strategy'. For more information click here: https://cfirguide.org/choosing-strategies.

Service and patient outcomes

Researchers working in the field of applied health research will be familiar with and understand the importance of identifying, assessing and measuring relevant service and patient outcomes *(more commonly referred to as client outcomes in the US)* to determine the effectiveness of interventions. Unless conducting 'pure' implementation research (see Figure 2 in the 'Implementation Research Characteristics' section of this guide), implementation outcomes (introduced in the next section) will be collected in addition to service and patient outcomes.

Figure 4: Types of outcomes in implementation research

Type 1: Service outcomes	**Type 2: Patient (client) outcomes**	**Type 3: Implementation outcomes**
Efficiency; safety; effectiveness; equity; patient centredness; timeliness	Satisfaction; function; symptomatology	Acceptability; adoption; appropriateness; costs; feasibility; fidelity; penetration; sustainability

Adapted from Proctor et al, 2011.[26]

26 Proctor et al. Outcomes for implementation research: conceptual distinctions, measurement challenges, and research agenda. Adm Policy Ment Health. 2011;38(2):65–76. www.ncbi.nlm.nih.gov/pubmed/20957426.

Limitations of only assessing service and patient outcomes in implementation research

Whilst the assessment and measurement of service and patient outcomes are essential to determine the clinical effectiveness of an intervention, they are not sufficient for understanding implementation success, or failure.

As highlighted in the 'implementation research characteristics' section of this guide, implementation research and effectiveness research are very distinct in their focus and seek to answer very different research questions.

Implementation research characteristics: The focus placed on service and patient outcomes, in addition to implementation outcomes, in implementation research should be guided on the strength and quality of the evidence-base for an intervention. For example, if there is strong evidence that an intervention is effective, less focus can be placed on measuring service and patient outcomes in favour of more focus on implementation outcomes. See Curran et al (2012) for additional guidance.[9]

Stakeholder involvement and engagement: Selecting service and/or patients outcomes to assess and measure should be informed by involving stakeholders. Measuring and assessing outcomes important to stakeholders can have a significant impact on adoption, implementation and sustainment of evidence-based practice.

Implementation outcomes

ImpRes encourages research teams to measure implementation outcomes in addition to service and patient (client) outcomes in implementation research.

> Implementation outcomes have been defined as 'the effects of deliberate and purposive actions to implement new treatments, practices, and services and are distinct from service and client (patient) outcomes.' [Proctor et al, 2011][26]

Proctor et al, 2011 propose 8 conceptually distinct, but interrelated, implementation outcomes (see Table 5).

Table 5: Implementation outcomes, definitions and commonly used synonyms

Implementation outcome and definition	Commonly used terms
Acceptability: The perception among implementation stakeholders that a given treatment, service, practice, or innovation is agreeable, palatable, or satisfactory.	Satisfaction with various aspects of the innovation (e.g. content, complexity, comfort, delivery, and credibility)
Appropriateness: The perceived fit, relevance, or compatibility of the innovation or evidence based practice for a given practice setting, provider, or consumer; and/or perceived fit of the innovation to address a particular issue or problem.	Perceived fit; relevance; compatibility; suitability; usefulness; practicability
Feasibility: The extent to which a new treatment, or an innovation, can be successfully used or carried out within a given agency or setting.	Actual fit or utility; suitability for everyday use; practicability
Adoption: The intention, initial decision, or action to try or employ an innovation or evidence-based practice.	Uptake; utilisation; initial implementation; intention to try
Fidelity: The degree to which an intervention was implemented as it was prescribed in the original protocol or as it was intended by the program developers.	Delivered as intended; adherence; integrity; quality of program delivery
Cost (incremental or implementation cost): The cost impact of an implementation effort.	Marginal cost; cost-effectiveness; cost-benefit
Penetration: The integration of a practice within a service setting and its subsystems.	Level of institutionalisation; Spread; Service access
Sustainability: The extent to which a newly implemented treatment is maintained or institutionalised within a service setting's ongoing, stable operations.	Maintenance; continuation; durability; incorporation; integration; institutionalisation; sustained use; routinisation

Based on Proctor et al, 2011.[26]

Although Proctor et al's implementation outcomes framework is popular among implementation researchers, due to the emerging nature of implementation science and the breadth of disciplines it covers, implementation outcomes have been defined in different ways. More recently, implementation researchers have moved towards using the 37 constructs outlined in the Consolidated Framework for Implementation Research (CFIR) in addition to using Proctor et al's implementation outcomes framework.

Importance of measuring implementation outcomes

> Assessment and measurement of service and patient (client) outcomes are essential but not sufficient for understanding implementation success, or failure.

> Implementation scientists propose that all implementation research should assess or measure implementation outcomes in some form.

> Proctor et al, 2011[26] suggest that implementation outcomes serve three important functions: 1) They serve as indicators of implementation success; 2) They are proximal indicators of implementation processes; 3) They are key intermediate outcomes in relation to service system or clinical outcomes in treatment effectiveness and quality of care research. Because an intervention or treatment will likely be ineffective (or, at best, partly effective) if poorly implemented, implementation outcomes serve as necessary preconditions for attaining subsequent desired and/or hypothesised changes in clinical or service outcomes.

Implementation outcomes measurement methodologies

> Many implementation outcomes are amenable to both qualitative (e.g. interviews; focus groups) and quantitative measurement (e.g. surveys; audit; administrative data).

> A list of available measurement methodologies associated with each implementation outcome is available here.[26]

A number of instruments have been developed to capture implementation outcomes quantitatively. If you are considering using pre-existing instruments, or intending to develop your own instrument, it is important that you evaluate the psychometric strength (e.g. the validity and reliability) of the instrument(s) that you intend to use in your research/project. A number of systematic reviews have been conducted examining the psychometric quality of implementation outcomes instruments. See useful references for relevant articles.

Implementation outcomes measurement considerations

Stakeholder groups: Evaluating implementation outcomes across stakeholder groups (e.g. patients, healthcare providers, organisations) is extremely important to optimise implementation success, scale-up and sustainability; what might be perceived as an acceptable treatment, service, practice, or innovation among one stakeholder group (e.g. providers) might not be perceived as favourably across other stakeholder groups (e.g. patients). Similarly, implementation costs might not be perceived as equally important across all stakeholder groups (e.g. patients versus managers).

Stage of implementation: It has been suggested that particular implementation outcomes and likely to be of greater importance at certain and multiple stages of implementation. For example, it has been proposed that acceptability is important at the early stages of implementation (affecting adoption), throughout implementation (affecting penetration) and late stages of implementation (affecting sustainability). Thus, it is recommended that implementation outcomes should be evaluated at different and multiple stages of implementation.

The Society for Implementation Research Collaboration (SIRC) Implementation Outcomes Repository. For more information click here: https://societyforimplementationresearchcollaboration.org/sirc-instrument-project. (Note: need to pay for access).

Grid-Enable Measures (GEM) database, a web-based collaborative tool containing behavioural, social science, and other relevant scientific measures. For more information click here: https://www.gem-beta.org/Public/Home.aspx. (Note: free access).

Webinar: Advanced Topics for Implementation Science Research: Measure Development and Evaluation. To watch the webinar click here: https://www.youtube.com/watch?v=dGXVhRQXiz4.

Proctor et al. Outcomes for implementation research: conceptual distinctions, measurement challenges, and research agenda. Adm Policy Ment Health. 2011;38:65–76. Click here to access the article.[26]

Lewis et al. Outcomes for implementation science: an enhanced systematic review of instruments using evidence-based rating criteria. Implement Sci. 2015;10:155. *Systematic review identifying more than 100 implementation outcome instruments for use in mental healthcare, psychometric quality assessed*. Click here to access the article.[27]

Clinton-McHarg et al. Psychometric properties of implementation measures for public health and community settings and mapping of constructs against the Consolidated Framework for Implementation Research: a systematic review. Implement Sci. 2016, 11:148. Click here to access the article.[28]

Implementation strategies: Implementation strategies should be selected to target and improve implementation outcomes (e.g. developing educational material to improve intervention fidelity).

Researchers at the Centre for Implementation Science, King's College London are currently conducting a systematic review to identify and assess the psychometric quality of implementation outcome measures developed for use in physical healthcare. Click here to read the systematic review protocol. [29]

27 Lewis et al. Outcomes for implementation science: an enhanced systematic review of instruments using evidence-based rating criteria. Implement Sci. 2015;10:155. www.ncbi.nlm.nih.gov/pubmed/26537706.

28 Clinton-McHarg et al. Psychometric properties of implementation measures for public health and community settings and mapping of constructs against the Consolidated Framework for Implementation Research: a systematic review. Implement Sci. 2016 8;11(1):148. www.ncbi.nlm.nih.gov/pubmed/27821146.

29 Khadjesari et al. Implementation outcome assessment instruments used in physical healthcare settings and their measurement properties: a systematic review protocol. BMJ Open. 2017;7(10):e017972. https://www.ncbi.nlm.nih.gov/pubmed/28993392.

Unintended consequences

ImpRes encourages research teams to be mindful of and explore the potential unintended consequences (both positive and negative) of implementation efforts.

Unintended consequences are defined as 'outcomes that are not anticipated and intended at the time of intervention implementation; they can be both positive and negative'. [Merton, 1936] [30]

Three types of unintended consequences exist:

1 | **Unexpected benefit**: A positive, unexpected benefit.

2 | **Unexpected drawback**: A negative, unexpected detriment occurring in addition to the desired effect.

3 | **Perverse result**: A perverse effect contrary to what was originally intended.

30 Merton R. The unanticipated consequences of purposive social action. Am Sociol Rev 1936;1:894e904. www.jstor.org/stable/2084615?seq=1#page_scan_tab_contents.

Importance of exploring unintended consequences

Implementing evidence-based practice is often a complex and challenging task. It can also be **unpredictable and haphazard**.

Even if the anticipated benefits of an implementation project are achieved, it is very likely that unanticipated and undesirable consequences will also occur. Therefore, the idea that implementation efforts can, and often, have unintended consequences should not be overlooked.

Implementation research characteristics: It is important to be mindful of and explore whether any unintended and unanticipated consequences occur as a result of implementation efforts. As such, research projects should be designed to allow for the identification and effective management of unintended consequences.

Free online module providing an introduction to unintended consequences developed by HealthIT in partnership with Agency for Healthcare Research and Quality (AHRQ).
Click here to access the FREE online module.[31]

Merton R. The unanticipated consequences of purposive social action. Am Sociol Rev 1936;1:894e904.
Click here to access the article. [30]

31 www.healthit.gov/unintended-consequences/content/module-i-introduction-unintended-consequences.html.

Economic evaluation

ImpRes highlights the importance of including an economic evaluation in implementation research. It can provide insight on whether specific implementation efforts are likely to be a cost-effective use of limited health care resources. It is critical for decision-makers and thus for widespread implementation and scale-up/spread of evidence-based treatments and practices

Economic evaluation is a decision making tool that involves the identification, measurement and valuation of the resource use, costs and outcomes (including health-related outcomes) arising from alternative courses of action (Drummond et al 2005).

Table 6: Implementation costs and definitions

Implementation outcome and definition	Commonly used terms
Implementation project costs: Resources required for developing and delivering the implementation project (e.g. project labour, clinicians' time away from clinical practice, engaging with project, travel expenses).	Set-up costs; fixed costs of implementation.
Intervention costs: Cost of increased patient exposure to intervention.	
Wider systems impact: Intended or unintended consequences for performance and resource use locally and across the wider system and other agencies.	Secondary impacts, societal consequences or impacts; "knock-on" consequences or impacts.
Net intervention cost: Number of additional patients exposed to recommended intervention *multiplied* by Cost of recommended intervention per additional patient.	
Net implementation cost: Implementation costs *plus* Net intervention Cost plus any wider system costs arising in consequence of implementation.	
Health benefits: E.g. quality adjusted life years gained (QALYs).	Health outcomes; health-related quality of life impacts.
Net implementation health benefit: Number of additional patients treated with recommended intervention *multiplied* by QALY gains per patient treated with recommended treatment.	
Implementation cost-effectiveness: Net implementation health benefit *minus* Net implementation cost.	Return on investment; Incremental cost-effectiveness ratio; policy cost-effectiveness; cost benefit ratio.

Importance of economic evaluation

Implementation strategies will inevitably draw on limited resources that could be put to other socially productive uses within the health care system or the wider economy. Investing in strategies that promote improved implementation success could therefore also involve significant "opportunity costs".

Economic evaluation uses comparative analysis of the cost consequences and the benefits arising from improved implementation success (including better health outcomes for patients) to determine whether an implementation strategy has been worthwhile, or "cost-effective".

It can therefore add significant value to implementation research, by increasing the relevance of the evidence it generates for practitioners and policy makers who are faced with difficult choices over how best to allocate the limited resources they have at their disposal.

Measurement methodology in economic evaluation

Economic evaluation considers the *incremental* impacts of implementation strategies over and above what would have been expected in their absence.

> Economic evaluation therefore requires a comparative research design so that costs and outcomes with and without an implementation strategy can be established. Economic evaluation should therefore be dovetailed into a wider implementation research design based on experimental, quasi-experimental or hybrid research approaches described earlier. (See Implementation Project Characteristics section).

> A purely empirical economic evaluation would draw exclusively on data on costs and outcomes collected as part of a wider implementation research project. However, decision modelling approaches can also be used to simulate costs and outcomes. This requires evidence-based assumptions regarding variables determining the value and scale of resource use and beneficial outcomes. Examples of where this would be applicable include: extrapolation of the impact of implementation strategies beyond the immediate period of study; analysis of wider systemic impacts of an implementation strategy (which might not be directly measurable within an implementation research project); and assessment of the costs and benefits of spreading or scaling-up specific implementation strategies evaluated locally.

> It is essential that the measurement requirements to support a robust economic evaluation are considered at the early design phase of a project. Failure to do so will risk compromising the quality and value of research outputs for decisions makers. Of particular importance will be deciding which measures of implementation outcomes and effectiveness will be translated into measures of impact of economic relevance (e.g. improved health outcomes for patients) and that resource use and costs are accurately captured in a way reflecting accepted methodological standards for economic analysis.

Thompson et al (2016)[32] describe a useful conceptual framework that summarises the principle variables of relevance for designing and embedding an economic evaluation within a wider implementation research strategy. It also demonstrates the relationship between wider evidence generated from implementation research and implementation cost-effectiveness, including the importance of implementation outcomes.

32 Thompson et al. The cost-effectiveness of quality improvement projects: a conceptual framework, checklist and online tool for considering the costs and consequences of implementation-based quality improvement. J Eval Clin Pract. 2016;22(1):26–30. www.ncbi.nlm.nih.gov/pubmed/26201387.

Figure 5: Conceptual framework for economic evaluation in a health service implementation context

Implementation cost-effectiveness = B – C Where:

$$B = E *(Q*v)$$

B = Health-benefits of implementation

E = The effectiveness of an implementation strategy – specifically the number of additional patients treated with a new treatment. This is an implementation outcome and would need to be evaluated as part of a wider implementation research strategy.

Q = The quantity of health gain expected per additional patient treated. In a health service context quality adjusted life years (QALYs) are generally the most appropriate measure of health improvement for assessing cost-effectiveness. Evidence on Q would ideally be extracted and synthesised from existing empirical evidence using published clinical trials of treatment effectiveness and cost effectiveness. It could also be obtained directly from hybrid research designs aimed at evaluating implementation and health outcomes impacts combined. The transferability of wider research evidence on Q to specific contexts, and the potential impact of important implementation outcomes (e.g. treatment fidelity) on Q should be a consideration.

v = The £ value placed on each unit of health gain (each QALY) by policy makers. For example, in England the National Institute for Health and Care Excellence (NICE) values a QALY at between £20,000 to £30,000.

$$C = Ic + (Tc * E)$$

C = Incremental costs of implementation

Ic = Implementation project costs. These would need to be measured as part of a wider research strategy around implementation.

Tc = Treatment/intervention cost per additional patient exposed to recommended practice (this should be estimated net of any secondary system wide cost impacts that might result in consequence of increased use of a new treatment). As with Q, this data would normally be determined using existing evidence and, again, consideration should be given as to whether wider evidence on treatment cost impacts are applicable to relevant to specific implementation contexts.

If B – C is > 0 then an implementation strategy can be regarded as "cost-effective".

By design this framework is most relevant for conducting an economic evaluation that sets out to examine the cost-effectiveness of implementation strategies that are expected to increase patient or population health through increased exposure to evidence-based health care.

However, in certain cases, the focus might be on evaluating the implementation of new approaches to delivering health care that have been shown to be equivalent in terms of health outcomes but could reduce costs through a more efficient use of resources. In this case the key issue is whether any quantified cost savings through more efficient practice outweighs the actual costs of implementing the change.

Thompson et al. The cost-effectiveness of quality improvement projects: a conceptual framework, checklist and online tool for considering the costs and consequences of implementation-based quality improvement. J Eval Clin Pract. 2016;22(1):26–30. Click here to access the article.[32]

Mason et al. When is it cost-effective to change the behavior of health professionals? JAMA. 2001;286(23):2988–92. Click here to access the article.[33]

If you plan to include an economic evaluation in your implementation research, we strongly recommend that an experienced health economist is part of the research team.

Implementation outcomes: Key interdependencies between implementation outcomes and important economic variables are likely to exist. For example, penetration will impact the number of additional patients exposed to recommended practice, thereby impacting on intervention costs and health benefits. Fidelity to best practice will impact on health benefits (and potentially intervention costs) for patients exposed to recommended intervention. It is therefore potentially important that the translation of implementation outcomes into QALY gains (or surrogate indicators for health gains) are identified, which means measuring outcomes in a way that will allow this

Blog: Theory and practice: Finding common ground between health economics and implementation science. Click here to read the blog.[34]

Checklist and Online Resource (PCEERT) for Considering the Value of Implementation-Based Quality Improvement. Click here to access the checklist.[32]

33 Mason et al. When is it cost-effective to change the behavior of health professionals? JAMA. 2001;286(23):2988–92. www.ncbi.nlm.nih.gov/pubmed/11743840.

34 https://blogs.biomedcentral.com/on-health/2014/12/18/theory-and-practice-finding-common-ground-between-health-economics-and-implementation-science.

Stakeholder involvement and engagement

ImpRes encourages research teams to view implementation research as a genuinely collaborative undertaking between research teams and stakeholders.

Involvement refers to the active involvement between researchers and stakeholders who, for example, deliver services (e.g. frontline clinicians), rather than the use of stakeholders as participants in research. Engagement refers to where information and knowledge about research is provided and disseminated, for example at conferences.

Importance of involving and engaging stakeholders

Rycroft Malone and colleagues (2013)[35] argue that involving stakeholders is critical to:

- Developing knowledge and evidence that is more implementable
- Increase relevance and impact of implementation activity

Service and patient outcomes: Selecting appropriate service and/or patient outcomes to measure should be informed by involving stakeholders.

Implementation strategies: Engage stakeholders to select appropriate implementation strategies.

35 Rycroft-Malone et al. Collaborative action around implementation in collaborations for leadership in applied health research and care: Towards a programme theory. J Health Serv Res Policy. 2013 18(3 Suppl):13–26. www.ncbi.nlm.nih.gov/pubmed/24127357.

Rycroft-Malone et al. Collaborative action around implementation in collaborations for leadership in applied health research and care: Towards a programme theory. J Health Serv Res Policy, 2013; 18, 3(supplementary): 13–26. Click here to read the article.[35]

Blog: Where are the stakeholders in implementation science? Click here to read the blog.[36]

36 Where are the stakeholders in implementation science? http://nirn.fpg.unc.edu/where-are-stakeholders-implementation-science.

Patient and public involvement and engagement

ImpRes aims to encourage research teams to view implementation research as a true collaboration between research teams and patients and the public.

Whilst, patient and public engagement and involvement is part of wider stakeholder involvement, we encourage and advise research teams to distinguish and consider patient and public involvement (PPI) in isolation to other stakeholder involvement because of its critical importance in facilitating the implementation of research evidence into clinical practice and thus maximising patient benefit and reducing health inequalities.

Involvement refers to 'active involvement between people who use services, carers and researchers, rather than the use of people as participants in research (or as research 'subjects'). Many people describe involvement as doing research with or by people who use services rather than to, about or for them.' Two forms of involvement exist: Collaboration which involves the 'active, on-going partnership with members of the public in the research process'; Consultation which involves 'asking members of the public for their views about research, and then using those views to inform decision-making'.

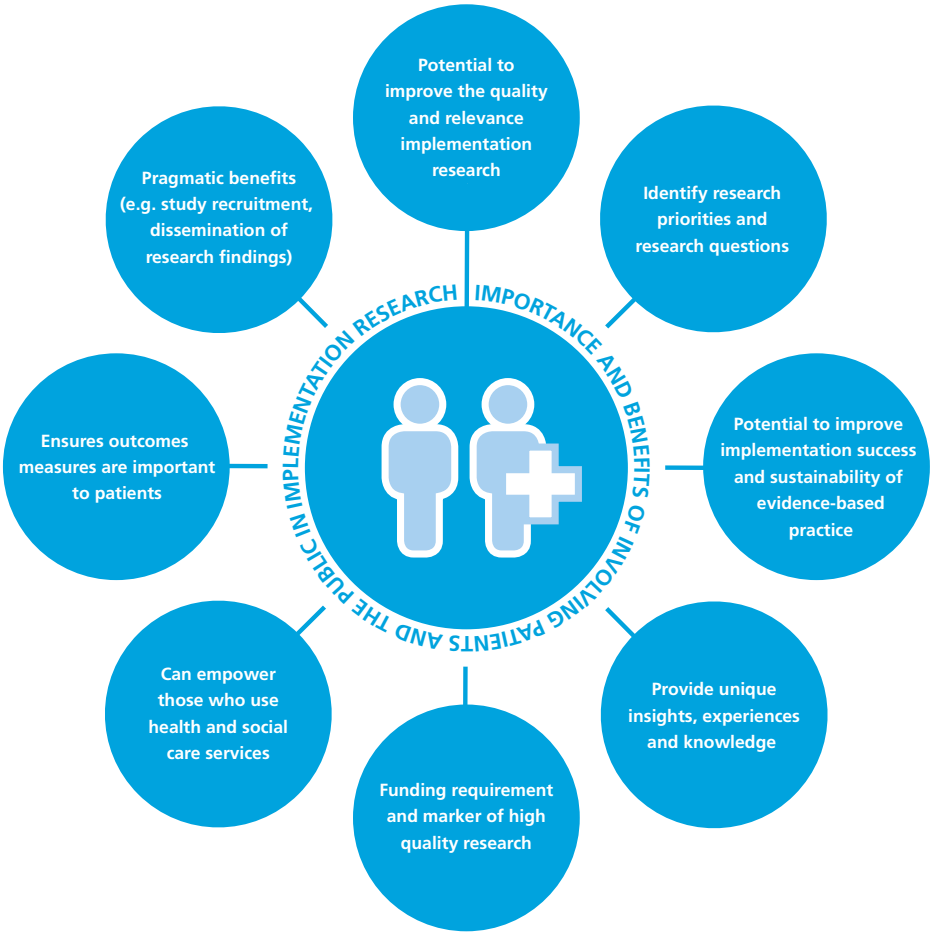
Engagement refers to 'where information and knowledge about research is provided and disseminated, for example science festivals, open days, media coverage'.

Definitions taken from INVOLVE's jargon buster[37]

37 www.invo.org.uk/resource-centre/jargon-buster/

Despite the importance of involving patients and service users in implementation research, it is widely recognised that PPI remains a largely untapped resource in implementation research. [Burton et al, 2015].[38] Evidence suggests that patient and public involvement in implementation research is lagging and has not matured to the same extent as PPI in research. [Rycroft-Malone et al, 2013][35]

Importance and benefits of involving and engaging patients and the public in implementation research



Based on Burton et al,[38] Callard et al[39] & Ocloo et al[40].

38 Burton et al. An Untapped Resource: Patient and Public Involvement in Implementation Comment on "Knowledge Mobilization in Healthcare Organizations: A View From the Resource-Based View of the Firm". Int J Health Policy Manag. 2015;4(12):845–7. https://www.ncbi.nlm.nih.gov/pubmed/26673471

Burton et al. An Untapped Resource: Patient and Public Involvement in Implementation. Int J Health Policy Manag. 2015;4(12):845–7. Click here to access the article.[38]

Callard et al. Close to the bench as well as at the bedside: involving service users in all phases of translational research. Health Expect. 2012;15(4):389–400. Click here to access the article.[39]

Ocloo J et al. From tokenism to empowerment: progressing patient and public involvement in healthcare improvement. BMJ Qual Saf. 2016;25(8):626–32. Click here to read the article.[40]

INVOLVE are a national advisory group in England that is funded by and part of the National Institute for Health Research (NIHR) and works to involve patients, service users and their families in health matters. Click here to view the INVOLVE website.[41]

INVOLVE have developed briefing notes for researchers wishing to involve patients and the public in research. Click here to access. [42]

NIHR Report: Going the extra mile: improving the nation's health wellbeing through public involvement in research. Click here to read the report. [43]

Patient and service outcomes: Selecting appropriate patient and/or service outcomes to measure should be informed by involving patients and the public.

Implementation strategies: Involving and engaging patients and service users is one of the nine implementation strategy categorises proposed (see implementation strategy section) to increase adoption, implementation and sustainability of evidence-based practice.

39 Callard et al. Close to the bench as well as at the bedside: involving service users in all phases of translational research. Health Expect. 2012;15(4):389–400. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5060629/pdf/HEX-15-389.pdf

40 Ocloo et al. From tokenism to empowerment: progressing patient and public involvement in healthcare improvement. BMJ Qual Saf. 2016;25(8):626–32. https://qualitysafety.bmj.com/content/25/8/626.long

41 www.invo.org.uk/

42 www.invo.org.uk/resource-centre/resource-for-researchers/

43 www.nihr.ac.uk/patients-and-public/documents/Going-the-Extra-Mile.pdf

Additional resources

Implementation Science. Open-access journal devoted to implementation science research. Click here to access the journal.[44]

Implementation Science Exchange. A one-stop resource for implementation science researchers. Contains resources relating to: *Getting informed:* tutorials, learning and other resources; *Getting funded:* Sample grants, grant writing resources, funding opportunities; *Getting published:* Journals, academic publishing, beyond peer-reviewed publication; *Getting connected:* Conferences, networking, collaboration, newsletters, twitter; *Getting resources:* Tools, sources of evidence, measures, theories and frameworks.Click here to be directed to the website.[45]

44 https://implementationscience.biomedcentral.com.
45 https://impsci.tracs.unc.edu.

Reporting implementation research

A number of standards, guidelines and checklists to improve the reporting of interventions, implementation strategies and implementation and quality improvement studies have been developed and are listed below:

- Standards for reporting implementation studies (StaRi)*
- Standards for QUality Improvement Reporting Excellence (SQUIRE 2.0)*
- Template for intervention description and replication (TIDieR) checklist and guide*
- Workgroup for Intervention Development and Evaluation Research (WIDER) recommendations for reporting of behaviour change interventions*
- Standards for specifying and reporting implementation strategies. Click here to access the standards.[24]
- Criteria for Reporting the Development and Evaluation of Complex Interventions (CReDECI)*
- A checklist to improve reporting of group-based behaviour-change interventions*
- Reporting standards for studies of tailored interventions*

*Reporting guideline, standard or checklist identified and available via the EQUATOR (Enhancing the QUAlity and Transparency Of health Research) Network Library (www.equator-network.org). Search performed 15/10/2017.

Under development

Adapting TIDieR checklist for reporting public health, health systems and social and environmental policy interventions (UNTIDieR) (www.equator-network.org/library/reporting-guidelines-under-development/#43)*

Reporting guidelines for implementation research and operational research (www.equator-network.org/library/reporting-guidelines-under-development/#47)*

SUCCEED/SUCCÈS: Standards for reporting trials assessing the impact of scaling up interventions of evidence based practices (www.equator-network.org/library/reporting-guidelines-under-development/#75)*

INDEX – Intervention Development Reporting Guideline (www.equator-network.org/library/reporting-guidelines-under-development/#80)

*Reporting guideline, standard or checklist identified and available via the EQUATOR (Enhancing the QUAlity and Transparency Of health Research) Network Library (www.equator-network.org). Search performed 15/10/2017.

Appendix A: list of implementation strategies

Implementation strategy category	Discrete implementation strategies
Use evaluative and iterative strategies	Assess for readiness and identify barriers and facilitators
	Audit and provide feedback
	Purposefully re-examine the implementation
	Develop and implement tools for quality monitoring
	Develop and organise quality monitoring systems
	Develop a formal implementation blueprint
	Conduct local needs assessment
	Stage implementation scale up
	Obtain and use patients/consumers and family feedback
	Conduct cyclical small tests of change
Provide interactive assistance	Facilitation
	Provide local technical assistance
	Provide clinical supervision
	Centralise technical assistance
Adapt and tailor to context	Tailor strategies
	Promote adaptability
	Use data experts
	Use data warehousing techniques

Implementation strategy category	Discrete implementation strategies
Develop stakeholder interrelationships	Identify and prepare champions
	Organise clinician implementation team meetings
	Recruit, designate, and train for leadership
	Inform local opinion leaders
	Build a coalition
	Obtain formal commitments
	Identify early adopters
	Conduct local consensus discussions
	Capture and share local knowledge
	Use advisory boards and workgroups
	Use an implementation advisor
	Model and simulate change
	Visit other sites
	Involve executive board
	Develop an implementation glossary
	Develop academic partnerships
	Promote network weaving
Train and educate stakeholders	Conduct ongoing training
	Provide ongoing consultation
	Develop educational materials
	Make training dynamic
	Distribute educational materials
	Use train-the-trainer strategies
	Conduct educational meetings
	Conduct educational outreach visits
	Create a learning collaborative
	Shadow other experts
	Work with educational institutions

Implementation strategy category	Discrete implementation strategies
Support clinicians	Facilitate relay of clinical data to providers
	Remind clinicians
	Develop resource sharing agreements
	Revise professional roles
	Create new clinical teams
Engage patients/ service users	Involve patients/consumers and family members
	Intervene with patients/consumers to enhance uptake and adherence
	Prepare patients/consumers to be active participants
	Increase demand
	Use mass media
Utilise financial strategies	Fund and contract for the clinical innovation
	Access new funding
	Place innovation on fee for service lists/formularies
	Alter incentive/allowance structures
	Make billing easier
	Alter patient/consumer fees
	Use other payment schemes
	Develop disincentives
	Use capitated payments
Change infrastructure	Mandate change
	Change record systems
	Change physical structure and equipment
	Create or change credentialing and/or licensure standards
	Change service sites
	Change accreditation or membership requirements
	Start a dissemination organisation
	Change liability laws

Based on Waltz et al, 2015.[25]

Appendix B: experts involved in the development and refinement of ImpRes

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