Exploring the Process of Sustaining Improvements within Quality Improvement Initiatives

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(PhD)

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Declaration of Originality: This thesis represents my own work, reflections and conclusions. All other ideas and quotations have been references appropriately.

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Abstract

Sustainability of improvement initiatives is recognised as a significant challenge to improving quality in healthcare. Rising demands and limited resources have highlighted the need to understand how sustainability can be supported, to maximise investments and benefits for patients. Unfortunately, relatively little is known about how to support sustainability in practice. The purpose of this thesis is to investigate how healthcare teams influence sustainability of improvement initiatives during the course of implementation and beyond.

A longitudinal mixed methods study was conducted to explore how structured approaches such as tools and frameworks can support sustainability. The application of one such tool, The Long Term Success Tool (LTST), was investigated across multiple QI programmes. The LTST was shown to be associated with a number of benefits (*collaborative working, decision making, action planning, and reflection)* but also a number of challenges (*isolation, critical reflection, confusion, and inability to act)*. These findings highlight the complex nature of applying approaches in practice and the need to thoughtfully consider their impact and facilitation.

To explore how improvement teams influence sustainability throughout initiatives, four case studies were examined. Results demonstrate that the process of sustaining is an ongoing cycle, requiring teams to respond, adapt, and learn continuously. Analysis identified common challenges impacting sustainability: w*orkforce stability, initiative impact, organisational priorities, workload distribution, and patient & public support.* To address these challenges, twelve strategies for navigating sustainability in complex systems were employed. These strategies provide tangible actions for consideration by future initiatives to enhance and promote sustainability in other settings.

Healthcare organisations cannot afford to waste resources. Initiatives must be supported to enhance sustainability where possible; therefore, sustainability research should be prioritised. This emphasises the importance of the contributions made within this thesis, which provide a stepping stone for future research in this area to be conducted.

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Abbreviations

CCG: Clinical Commissioning Group

CLAHRC: Collaboration for Leadership in Applied Health Research and Care

CQUIN: Commissioning for Quality and Innovation (CQUIN) framework

LTST: Long Term Success Tool

NHS III SM: National Health Service Institute for Innovation and Improvement Sustainability Model

NHS: National Health Service

NIHR: National Institute of Health Research

NWL: Northwest London

PRISMA: Preferred Reporting Items for Systematic Reviews and Meta-Analyses

QI: Quality Improvement

RCT: Randomised Control Trial

WISH: Web Improvement System for Healthcare

Key Definitions

Sustainability: The continuation and maintenance of a desirable feature of an improvement initiative and its associated outcomes until such time when they are replaced with new evidence or more favourable interventions or processes.

Sustainability approaches: Published models, checklists, tools, strategies, conceptualisations and frameworks which seek to assess, evaluate or influence sustainability of healthcare initiatives.

Sustainability outcomes: The "subsequent impact (healthcare improvement or public health outcomes) of sustained intervention use".[1]

The 'process of sustaining': The process by which individuals and teams plan for and act to embed initiatives and enhance continuation of initiatives benefits, outcomes and practices. This includes the planning, discussions, relationships and actions undertaken to influence sustainability (before, during and after implementation) overtime and enhance prospects of continued initiative delivery and improvement.

i. Preface

The origins of this thesis

This thesis originated from professional opportunity and previous professional interest in the topic. Prior to working at CLAHRC NWL and Imperial College, I worked as Registered Nurse in Ottawa, Canada. Throughout my nursing training and career I was involved in many 'improvement initiatives'. Some involving the introduction of complex patient pathways and others on relatively simple interventions such as improved hand washing or sterile technique approaches. During this time I noticed there was a pattern emerging in my practice. Colleagues and I discussed how often we were asked to be involved in improvement projects, change our current ways of working and try new processes. Unfortunately, I also observed that we were very rarely updated or informed of the outcomes or impact of these changes. Another concern was the longevity of these changes. Often a new initiative would come along before an old one had a chance to become fully embedded and staff would be asked to abandon one initiative for another. It was evident that our practice was being driven not by our training or professional standards but by the 'flavour of the month' take on what was currently viewed as a priority. This lack of continuation and sustainability of improvements impacted myself and others in multiple ways. Many of my colleagues and I began to see these initiatives as more disruptive than helpful and new attempts to improve became just another project with us less likely to show enthusiasm or support.

This experience led to my initial interest in health services research, particularly staff workload, skill mix and quality improvement. After deciding to expand my knowledge of health services, I undertook a masters in public health at the London School of Hygiene and Tropical Medicine. During my time at LSHTM, I quickly learned that health systems are vastly more complex and hard to manage, than was visible in my everyday nursing work. The organisational and financial considerations lent a new understanding of how and why making change in healthcare systems was so hard. For my MSc dissertation, I examined the impact of potential changes to skill mix changes being made in the Canadian healthcare system. Through this work I was to understand how staffing groups contributed to health outcomes and how this could be potentially maximised. This review showed that while different nurses groups did impact patient outcomes and safety, it also demonstrated the importance of the role of nurses in improvement, leadership and management. Shortly after my thesis submission, I began to work

for CLAHRC NWL as a research assistant. The programmes ethos of making improvements in care with frontline staff really resonated with me and my previous experience.

While working at CLAHRC NWL, I was initially involved in the evaluation and support of QI initiatives, this included evaluating the use of specific QI methods. One such method was the NHS Sustainability Model which had been used by CLAHRC NWL teams for five years. I observed the use of this tool and aided in supporting teams to use it. This experience showed me how difficult it can be for teams to engage with QI tools in practice. Feedback demonstrated that while some teams saw the value in the model, the majority found it difficult to use and engage with on an ongoing basis. Following this feedback in 2013, I was given the opportunity to support the development of a new sustainability tool for the project teams to use. At CLAHRC NWL, we had a unique perspective on the topic as we did not want to predict or evaluate sustained initiatives, our main concern was supporting improvement teams to plan for sustainability and think about embedding their initiatives in their settings throughout implementation. We also wanted to gain insight into how this process took place and how we could potentially support teams to increase the likelihood that they would sustain. As I began this work, I quickly recognised that although people often say sustainability is important, we have little knowledge of how to achieve this or what sustainability means in most cases. I learnt about the complexity of studying and measuring sustainability and found that the literature produced in this area had not yet provided people with any real guidance on what to do or when to do it. There were vast gaps in the literature in terms of how sustainability can be supported, influenced and managed in practice.

Although this is not a challenge that can be tackled in a single thesis, I believe that in-depth study of how sustainability is influenced by improvement teams to achieve or not achieve sustainability will allow us to begin to uncover answers to support and direct future improvement initiatives. The opportunity to examine the concept of sustainability as a prospective process in a longitudinal study is not only unique due to my access and knowledge of the teams but this approach is incredibly important to gaining insight into how to enhance sustainability of improvements. If I can add knowledge or insight into the evidence base of how we can enhance sustainability and maximise impact of improvement initiatives, I would feel I have succeeded. Ultimately, my motivation for this work is twofold. I would first like to ensure worthwhile improvements are maximised and sustained to improve patient outcomes

and experience. Secondly, I would like to ensure the work we ask healthcare staff to take on can be embedded in practice and their ongoing effort and time is optimised.

Chapter 1: Introduction and Background

1.1 Introduction

"Sustainability remains one of the least understood and most vexing issues for implementation research".[2]

Internationally there is a need to continually improve health and care services. New and improved practices and treatments are discovered daily to advance our knowledge of how to best care for patients. These innovations are essential for providing effective evidence-based care and timely benefits to patients and other stakeholders.[3] Nearly $300 billion is spent on biomedical research globally but it has become increasingly apparent that much of this resource is wasted because of poor translation and implementation.[4–6] To support ongoing improvement in care, healthcare organisations engage in a wide range of improvement initiatives which require substantial effort and resources to introduce new clinical knowledge into healthcare organisations.[7] As improvements are implemented, there is evidence that they are often forgotten, changed or replaced in practice.[8–12] This means that many initiatives show low rates of long term impact and fail to sustain to a point where their true benefits can be realised.[8–12]

This constant turnover of activities and interventions may be a sign of progress and advancement but it may also indicate a failure to maintain gains and loss of innovation or improvement.[7,10,12–17] Lack of sustainability poses a significant risk to individuals, healthcare systems, and the wider environment and this 'improvement loss' can have significant consequences for patients, staff and healthcare organisations. [7,10,12–15] Initiatives that fail to sustain are extremely wasteful of human and monetary investments.[8,18] It is also potentially detrimental to future improvement initiatives as staff and public opinion of improvement efforts decline and enthusiasm for engaging in future programmes is lost.[19,20]

Given the current economic climate, health care organisations cannot afford to waste limited resources engaging in unsuccessful improvement initiatives.[21] Rising demands, shifting priorities, and competition for resources have highlighted a need to understand how

sustainability of implemented initiatives can be influenced to ensure the long-term impact of investments.[10,11] Despite increased recognition of the importance of sustainability, relatively little is known about how to support and influence sustainability over time.[22] The purpose of this thesis is to explore this gap in knowledge and investigate how healthcare teams influence sustainability of improvement initiatives during the course of implementation and beyond.

The purpose of this chapter is to set out the background and relevant literature needed to explore the topic of sustainability in healthcare improvement initiatives. This chapter is organised in five sections. The first section describes what sustainability is and how it can be conceptualised in healthcare. I outline the theoretical perspectives which drive current sustainability research: the linear view and the dynamic view. These perspectives have implications for how the topic is assessed, measured and discussed. The second section introduces the field of study and area of interest (Quality Improvement Initiatives). This is followed by a discussion on the current evidence from the published literature on what is known and what needs to be addressed. The fourth section outlines the rationale for this thesis and identifies key gaps in current knowledge which this work aims to address. Finally, the fifth section introduces the research questions that will be explored in this thesis and describes the thesis structure.

1.2. Definitions and Theoretical Perspectives

Although the value of sustainability is consistently reported as a goal for most interventions and initiatives, there is no consensus in the literature on what sustainability means.[8,20,23] Therefore, in order to orient this work, I must first describe what sustainability is and what it means in the context of healthcare. Below, I describe how sustainability is defined in healthcare and introduce two theoretical perspectives which inform how the topic is studied and assessed in practice. I then outline the specific definition and perspective that will be taken throughout this thesis.

1.2.1 Conceptualising Sustainability in Healthcare

The term ‘‘sustainability’’ has various meanings across research disciplines. For many, discussing the topic of sustainability often brings up connotations of sustainable energy, ecosystems, or environments. Many definitions share common characteristics and allude to meeting needs without compromising available resources. For example, an ecological definition connects human needs and ecosystem services, *“meeting human needs without*

compromising the health of ecosystems."[24] From an economic standpoint, sustainability refers to economic activity and its connection to future populations: "*The core requirement of sustainability is that current economic activity should not place a disproportionate burden on future generations."*[25] In international development studies, sustainability refers to both economic viability and financial independence: "*Development that meets the needs of the present without compromising the ability of future generations to meet their own needs".*[26] Environmental studies often emphasise the need for balance and regeneration. Sustainability is *"a condition of balance, resilience, and interconnectedness that allows human society to satisfy its needs while neither exceeding the capacity of its supporting ecosystems to continue to regenerate the services necessary to meet those needs nor by our actions diminishing biological diversity."*[27] While there are some parallels among the diverse perspectives, this thesis will be confined to the topic of sustainability in healthcare, specifically the sustainability of improvements in healthcare.[28]

Unfortunately, having a designated field of study does not provide a clear definition for sustainability. In healthcare, the term sustainability often refers to broad notions of continuation or permanence over time.[8] The terms used in sustainability research prove a significant challenge because of multiple definitions and descriptions.[8] Terms such as maintenance, institutionalisation, integration, and routinisation have all been associated with healthcare initiative continuation.[8,29,30] While these terms are often used interchangeably, there are some notable differences. The word sustainability does not *'limit its manifestations to any particular form'*.[8] For example, unlike institutionalisation and integration, sustainability does not restrict continuation of initiatives to the continuation of activities within an organisation or system.[8]

The field is also complicated by the level at which sustainability can be studied. Sustainability can be viewed from multiple angles in healthcare: *initiative or programme sustainability* (the continuation of a specific initiative and its activities[31]); *service or systems sustainability* (sustainability of a number of initiatives or programmes within a service[32]); *or organisational sustainability* (sustainability of an organisation and how it delivers care and outcomes, including all underlying systems and programmes[33]).

Sustainability is an explicit priority for most improvement initiatives but the concept of what will be sustained is diverse.[8,20,34] Although various definitions of sustainability in healthcare exist, four distinct domains of sustainability definitions have been used within the healthcare

literature: i. Continuation of the *health benefits* from an initiative, ii.Continuation of *initiative activities*, iii. *Capacity built* in the workforce and *iv. Financial viability* of an initiative.[8,33]

i. **Continued Health Benefits:** The first definition refers to the *continuation of the health benefits* which resulted from an initiative (health outcomes remain consistent or continue to improve).[8,35] From this perspective, the sustainability that matters most is the sustainability of benefits and outcomes, regardless of the approach or intervention to achieve them. *"A sustainable intervention should benefit its stakeholders – Once routinized, its assumed sustainability practices are of benefit to all your stakeholders. There would obviously be no point in continuing an intervention unless it provides benefits to stakeholders.*[36] This definition advocates that practitioners should only attempt to sustain interventions that have demonstrated effectiveness in improving outcomes.[28]

ii. **Continuation of initiative activities:** The second definition is related to the maintenance of the intervention practices and activities.[8,28,35] *"The capacity to maintain programme services at a level that will provide ongoing prevention and treatment for a health problem."*[37] This domain incorporates two separate notions of sustainability: institutionalisation and routinisation. Sustainability as 'institutionalisation' of an initiative refers to how new activities become incorporated into organisations and how the associated work becomes embedded.[8,38] Sustainability as 'routinisation' describes the process in which intervention activities are integrated into daily work roles and systems.[38] This perspective highlights that improvements in healthcare cannot be sustained without providing the conditions that support and enable their delivery.[38]

iii. **Capacity built in the workforce:** The third definition is related to the skills gained by staff and other stakeholder involved in initiatives which support high quality care and enable the workforce to continually improve.[8,35] From this perspective, it is argued that staff and stakeholder development can support 'engrained problem-solving abilities' in individuals, systems and communities.[8] This definition focuses on how building capacity may maximise a community's ability to maintain initiatives within their own resources.[39] From this perspective, involvement in innovation and improvement initiatives can build participant expertise, which can be used to enhance initiative effectiveness.[40] This perspective questions the validity of institutionalisation as a measure of sustainability and a goal of program delivery as it disregards the value of capacity building in the workforce if the daily activities are not maintained.[41]

iv. **Financial viability:** Another definition of sustainability is related to the ability of a programme or improvement to become financially viable and independent by not requiring continued investment. This may include the ability to recover a proportion or all associated costs while continuing to provide stated benefits. *"A health service is sustainable when operated by an organisational system with the long term ability to mobilize and allocate sufficient and appropriate resources for activities that meet individual or public health needs/demands."*[32] The appropriateness of assessing sustainability as cost recovery has been questioned, especially within developing countries where many organisations are cost incurring but provide essential services.[33]

Although these domains are frequently presented separately, many researchers have chosen to use combined perspectives to provide comprehensive definitions of sustainbailiy.[14,42–45] For example, Scheirer et al, define sustainability as "*the continued use of program components and activities for the continued achievement of desirable program and population outcomes."*[28] Moore et al. also created a combined definition which incorporates further domains: *"After a defined period of time, a program, clinical intervention, and/or implementation strategies continue to be delivered and/or individual behaviour change (i.e., clinician, patient) is maintained; the program and individual behaviour change may evolve or adapt while continuing to produce benefits for individuals/systems."*[46] Interestingly, this definition also recognised that programmes and individual behaviours may evolve or adapt. Much of the previous research considered deviations from intervention protocols to be implementation failure, even when the setting, population, or circumstances differed substantially from those in the initial research settings.[47,48] Due to growing recognition that institutionalisation of activities may impede organisations or communities from adopting more effective practices, there has been greater acceptance of sustainability as a construct that allows for adaptation and capacity building in response to new evidence or policies.[10,11,18,36,45] As stated by Buchanan and Fitzgerald, *"it is clear that some changes should be allowed, if not encouraged, to decay. Circumstances evolve, and rigid methods that are not adaptable prevent staff from implementing further relevant changes and improvements".*[49] In response, many definitions of sustainability have begun to move away from concepts that imply that long-term implementation is static in nature, toward definitions which recognise the continually evolving contexts into which initiatives are implemented.[11] This perspective has recently gained popularity and produced a fifth potential definition of sustainability which is closely related to the continuation of health benefits.[45,46]

v. **Evolution and Adaptation:** Sustainability requires the recognition that adaptation and discontinuation of programmes, or components of interventions, may be necessary to avoid unnecessary and ineffective initiatives.[18,50] To respond to changing populations and the needs and preferences of patients, interventions and treatments must adapt, evolve and improve to ensure continued delivery of desired health outcomes.[45]

1.2.2 Theoretical Perspectives on Sustainability

The theoretical perspective taken to explore sustainability has implications for how the topic is both defined and approached in practice as well as research. These perspectives manifest in two specific views of studying, assessing and measuring sustainability: *the linear outcomes focused view* and *the dynamic process view*. Below I outline both perspectives, discuss the implications of each, and present the perspective used in this thesis (perspectives are summarised in Table 1).

Table 1: Perspectives on Sustainability_Adapted from NHS Modernisation Agency 2004[51]

Perspectives on Sustainability	
Linear	**Dynamic**
• Sustainability is an outcome or state to be reached: *The service, initiative, or activity is sustained* • Follows implementation stages (e.g. planning, implementation, maintenance) • Continuation of defined interventions, activities and processes • Adherence to protocols, and plans • Requires measures and assessment • Unable to account for how and why sustainability may or may not occur	• Sustainability is a process: *The service, initiative or activity is sustaining* • Sustainability is parallel process to implementation • Continuation of improved practices, benefits and outcomes • Responds and adapts to new evidence, innovations, needs, and issues • Requires resilience, responsiveness and awareness • Unable to provide information on what is or is not sustained

The Linear View: Sustainability as an Outcome or State

In the linear view of sustainability, sustainability is viewed as an outcome or state to be reached (e.g. upon evaluation, intervention activities continue to be delivered as defined in intervention protocols). Assessing or evaluating sustainability as an outcome has been the predominate focus for implementation research to date.[23,52] From this perspective, sustainability is most often viewed as the final stage of implementation associated with 'before and after' evaluations.[8,23,52] This view primarily draws on measures of institutionalisation and

continuation of programme activities.[53] In order to be considered 'sustained', all or at least a high proportion of programme activities should be continued.[23,52,54] Although this perspective has received the most attention in research endeavours, it has little theoretical underpinning. It is mainly supported as a means to justify continued investment from organisations or funders (e.g. to show value for money, a programme must demonstrate its ability to continue to deliver the necessary activities to impact desired outcomes such as patient benefit).

While the literature on this perspective remains sparsely theorised, it has been linked with both theories of 'Organisational Change' and 'Diffusions of Innovations' theory. [55–60] A number of studies have incorporated theories of organisational change to provide insight into how new programs become incorporated into systems and organisations.[55–58] These theories have aided researchers in distinguishing initiatives activities from the mechanisms that support them.[28] Diffusion of Innovations, loosely underpins the linear perspective of sustainability as it views sustainability as the final stage of the initiative life cycle.[59,60] This perspective allows for the exploration of how program benefits and burden will support or be a barrier to program diffusion and what key attributes are needed to maintain innovations over time.[40,61] For example, interactions with 'adopters' can support wider implementation during initiatives and support continued activities after the initiatives ends.[62]

While these theories support understanding of both innovation attributes and conditions necessary for successful adoption, they provide little insight into the intricacies or challenges involved in sustaining initiatives.[40,59,60,63] The linear perspective has been criticised due to its limited capacity to explain or rationalise sustainability outcomes (why they did or did not occur). Sustainability as a 'staged model' following implementation is viewed as unrealistic in practice as it proposes that sustainability naturally follows a successful implementation phase.[23] This perspective does not account for the possibility of recursive or reflective learning during implementation or the possibility for adjustments that may shape sustainability outcomes.[23] These issues suggest that the linear perspective provides little to no insight into how to influence sustainability and may limit lessons that inform other areas of science.[11,23] For this reason, the second perspective viewing sustainability as a dynamic process has been proposed.

The Dynamic View: Sustainability as a Process

In practice, implementation is rarely linear and initial implementation success does not predict sustainability.[12,28,52,64] Implementation often ends with incomplete or limited success and results in varying degrees of sustained practices and outcomes.[65,66] Issues impacting sustainability occur across all stages of initiative planning, implementation and follow-up.[8] This has led many to recognise that in order to achieve sustainable improvements, actions and planning for sustainability must start during initiative implementation, prior to funding termination.[16,23,28] The second perspective views sustainability as an ongoing process.[23,33] This perspective focuses on the need to respond and adapt to emerging needs to promote continuation of improved practices, benefits or outcomes.[53] The importance of decisions and actions taken during initial project planning, as well as support during implementation are recognised.[28] This perspective has gained popularity with researchers and practitioners as it suggests that sustainability can be influenced by individuals throughout initiatives by allowing for continuing development and adaptation in response to the needs of the system.[23,36,67–69]

The dynamic view of sustainability is underpinned by a number of theoretical perspectives including ecological theories, general or open systems theory, as well as complexity theory.[69–73] *Ecological theory* investigates behaviour and how it is influenced by and influences individuals and environments.[70] It suggests that sustainability is a process of ongoing adaptation of initiatives with the fit between initiatives, contexts, and expectations being the focus for ongoing improvement.[11] *General Systems Theory* or *Open systems theory* view an organisation as an organism open to the influence of its environment with adaptation needed to promote survival.[71] People and organisations interact leading to conditions returning to the norm or 'homeostasis' or adapting to the environment to survive.[29,32] *Complexity theory* and *complex adaptive system theory*, represent sustainability as adaptive capacity and the possibility of multiple equilibriums.[69,72,73] They highlight the interactions that occur between an initiative, the setting and the broader organisation and emphasise the constantly changing conditions within complex environments.[72–74] While these theories draw on diverse areas of expertise, all focus on how to persist or adapt through continuous development and how to innovate and transform into new and more desirable configurations.[67–69] This has been represented in the field of sustainability science, as a system's *resilience*.[67–69,75,76]

Proponents of the dynamic view of sustainability also encounter challenges. While many supporters of the linear perspective agree that sustainability outcomes are affected by processes

during all phases of a project and context, they argue that without explicit definitions of outcome variables and measures, knowledge of predictors of sustainability cannot be enhanced.[28] Defining sustainability as a 'process' also creates difficulties when it comes to identifying when a project can be considered 'sustained'.[45] Defining sustainability in terms of processes alone may result in studies that do not last long enough to assess actual continuation of benefits for patients or systems.[28] Without assessment beyond the implementation stage researchers and funders will not know if benefits have continued and if their investment was worthwhile.[28]

1.2.3 My perspective and definitions

The decision on whether to contextualise sustainability as an 'outcome' or a 'process' accompanies a number of strengths and weaknesses. The need for thoughtful assessment of sustainability is emphasised in the above limitations. Inherent in this debate, is the need to balance short-term and long-term considerations and goals. When a 'process' focus of sustainability is used, measurement of outcomes and continued benefits may be missed. When an 'outcomes' focused perspective is taken, results are limited to what remains, with little insight into the why and how this occurred. This thesis will draw on complexity theory to investigate the process of sustainability (how it occurs, possible influencing factors and impact on sustainability outcomes) in complex systems.[77] I will use this theoretical lens to examine the interactions, processes, mechanisms and strategies that shape and influence an initiative's sustainability.[78–80] While this thesis will be informed by complexity theory, I do not aim to expand or further advance complexity theory itself. Instead, I will draw on key concepts within the theory to describe and discuss findings within this work.

The investigation of sustainability throughout implementation will allow for the process of sustaining to be illuminated and revisiting initiatives post-implementation will reveal what has continued, changed or been abandoned.[63] For the purposes of this PhD, the following holistic working definition of sustainability will be used: *Sustainability is the continuation and maintenance of a desirable feature of an improvement initiative and its associated outcomes until such time when they are replaced with new evidence or more favourable interventions or processes*.

1.3 Improving Healthcare Quality and Delivery

There is a need to continually improve and implement innovative practices in healthcare to ensure patients receive timely and effective treatments.[81,82] Healthcare research continuously produces new and innovative findings but often these findings are not efficiently translated into practice or maintained to an extent where benefits reach wider populations.[4,8–12] These issues represent the wider problem of systemic 'research waste' in the production, translation, reporting and sustaining of research evidence.[4] As a result there is often a prolonged time gap between research findings being disseminated and delivered in routine practice.[83] It can also result in unwarranted variation in patient care and outcomes.[83–86]

Improving quality of care by implementing new practice entails changing the established systems or routines of healthcare delivery.[81] Growing interest in this process has resulted in the development and study of an evidence-base for implementation known as 'Implementation Science'.[87,88] Implementation Science refers to the scientific study of methods to promote the systematic uptake of evidence-based interventions into practice and policy to improve health.[88,89] Implementation research is a wide ranging field encompassing diverse topics such as intervention development as well as evaluations of how impact is both achieved and sustained.[88,89] Implementation science also captures the notion that although a given practice may be supported by evidence, the best way to implement that practice requires a research base of its own.[90] Implementation research has highlighted the necessity to enhance quality of care and processes of implementation which has supported the increased study of both evidence-based practices and quality improvement (QI) research.[7,90,91] Quality improvement research seeks to provide guidance about how to apply systematic thinking and problem-solving techniques to improve a wide range of issues in healthcare.[92] No singular or commonly accepted definition of quality improvement exists but some have described it as *"an integrative, sequential, participative, and continuous process that is based on best practices…to enhance an organization's effectiveness, efficiency, and sustainability"*.[93]

To set up and implement improvements in healthcare systems, Quality Improvement initiatives are often established.[94] The number of quality improvement (QI) initiatives is increasing as healthcare organisations attempt to make significant improvements to multiple services and care pathways to improve quality and effectiveness of care.[94–98] QI initiatives can range in scope from those testing innovations and new practices (e.g. assessing a new app to monitor

medication adherance[99]) to those which implement established evidence-based practices and procedures (e.g. Care bundles to reduce central line-associated bloodstream infections[100]).

QI initiatives can offer a valuable mechanism for delivering and testing innovations in healthcare settings. They have demonstrated considerable benefits for healthcare services.[96–98] This includes improving clinical outcomes[101–103], reducing care costs[104], and readmission rates[105], and increasing patient[106,107] and provider satisfaction.[108,109]

While many studies have shown QI initiatives can result in improvements in care, many have questioned whether initiatives are able to maintain or spread positive results.[14,98,110] It has been argued that the overarching concern of QI efforts should be that any intervention or program survives long enough to lead to improvements in patient health that can be measured.[13] To understand the current challenges and successes of improvement initiative sustainability, the current evidence within the literature is discussed below.

1.4 Evidence of Sustainability in Healthcare Improvements

Beginning in the late eighties a number of academics and healthcare practitioners (particularly in public health) began to question the survival of improvements.[8,33,58,111] During the last two decades, researchers have maintained interest in exploring sustainability and its significance for health-related programs.[8] This has led to a number of important studies designed to improve our knowledge of sustainability in healthcare. The first is by Shediac-Rizkallah and Bone who introduced multiple perspectives of sustainability and developed an organising framework for conceptualizing and measuring sustainability with tentative guidelines. This paper was one of the first to combine multiple sustainability definitions (benefits, activities and capacity) and emphasise sustainability as a dynamic process.[8]

Two systematic reviews utilising Shediac and Bone's perspective provided valuable summaries of the empirical literature and placed sustainability on the radar of healthcare policy makers, funders and government agencies. Scheirer's review in 2005, established that although sustainability was a challenge, 'sustainability was possible'.[14] This review looked at 19 empirical studies of the sustainability of American and Canadian health programs. The review identified factors contributing to sustainability, and found that over 60% of the initiatives studied maintained 'at least some part' of the original interventions.[14] This review reported

consistent support for five factors influencing sustainability: *programme modification, champions, programme fit, benefits perceived, and organisational stakeholder support*. Building on this work, in 2012, Stirman and colleagues' conducted a review looking at a systematic review of 125 studies of improvements made in healthcare. This review demonstrated that only 45% of the 125 studies continued delivery of program components, and only 22% of the studies reported information about sustained health behaviours or outcomes.[10] This review also found that the studied initiatives did not maintain all aspects originally implemented with fewer than half continuing interventions at high levels of fidelity.[10] This study highlighted issues in methods for evaluating sustainability and reflected that reporting and measurement within studies was of low quality.

A further narrative review of 14 quality improvement programme evaluations, reflected that securing sustainability was identified as one of the 10 challenges consistently identified across the programmes.[98,112] The study noted that *"unless measures are embedded in wider mechanisms, clinicians' and managers' interest is likely to waiver when they are faced with new, competing priorities"*.[112,113] In 2015, a systematic review on the sustainability of professionals' adherence to clinical practice guidelines demonstrated that adherence to guidelines decreased one year after implementation in over half of the cases (10/18).[114] This study also concluded that the reviewed sustainability studies had limited methodological rigour. The authors noted that although the review showed that the level of the sustainability dropped in more than half of the studies, they believed that sustainability failure was an underestimate as unfavourable results may not be published, and unsuccessful implementation projects may not be evaluated.

1.4.1 The Challenge of Sustaining

Within the systematic reviews described above, individual studies revealed key learning on the difficulties in sustaining benefits within improvement initiatives and the challenges encountered in this process.[7,9,12,13,43,98,112,115] For example:

- In 2002, a national booking programme was evaluated and demonstrated that sustainability was a significant challenge to the programme's success.[116] The study found that although the pilots made substantial progress in increasing booking for day surgery, these outcomes diminished in the year following the study. A key reflection was that programmes will only succeed if the same effort is to put into sustainability as

the initiative launch.[116] These results raised an important issue concerning the potential to sustain quality improvement initiatives.[65] Over the next decade, quality improvement programmes were scrutinized for their potential lasting impact.

- A 2015 study exploring stroke indicator feedback within hospitals, demonstrated that the programme was effective in rapidly boosting performance but this effect did not sustain post-intervention.[12] The authors reflected that '*if we think of the hospital system in the same way as we do a patient with a chronic medical condition requiring ongoing intervention, assessment and management, the realisation that sustained improvement requires some ongoing effort in an environment supportive of change should not be surprising'*.[12]
- Finally, in a study investigating an improvement in a four hour A & E target, authors found that sustainability was variable. Authors concluded that sustaining the improvements was a challenge due to shifting priorities and reduction in monitoring. *"The frequency of monitoring fell, as some changes were believed to be firmly embedded in practices, which made deviations less noticeable…The outcome of ceasing to account for interdependencies is an inescapable erosion of performance."*[115]

1.4.2 Evidence of Sustainability

Although a number of studies have demonstrated the challenges to sustainability, many have also demonstrated that sustainability can be achieved.[13,64,117–119] As well as demonstrating that sustainability is possible, these studies also offer valuable insight into how future sustainability can be promoted.

- In a study looking at improving HIV care quality at 16 Veterans Affairs (VA) healthcare facilities, the effects of computerised clinical reminders and group-based quality improvement collaboratives were compared for one year.[13] The intervention effects were sustained for one year at nearly all the sites (4/5). This study offered recommendations for designing sustainability evaluations and concluded that understanding and implementing desirable changes to an intervention should be part of the overall implementation strategy to promote sustainability.[13]
- An evaluation of a the PPIP (Put Prevention Into Practice) toolkit in five primary care practices revealed that the program has been maintained in four out of five sites, six years after initial implementation.[117] The study noted organisational factors such as the site's institutional strength, the integration of the program within other programs and

services, visibility within and outside the site, planning for the end of grant funding, and presence of a program champion as facilitators to the sustainability process. Interestingly the study also noted that success at the initial implementation stages of the program did not predict sustainability outcomes.[117]

- Another study by Stange et al., investigated a follow-up analysis of an intervention to increase preventive service delivery. This study demonstrated sustained increases in rates of delivery one year after the intervention ended.[64] Tailoring the approach used to introduce the intervention to the individual characteristics of the practices was noted as a possible contributor to continuation of service delivery and sustainability of changes.[64]
- The continued use of a surgical checklist found sustained improvements and reductions in 30-day surgical complications two years after implementation.[118] This study highlighted the role of leaders and champions in the continued success of quality improvement initiatives particularly when resources are limited.[118]
- Finally, a study investigated the sustainability of an improvement initiative to reduce central line associated bloodstream infections 10 years after initiation.[119] This work found that not only was the programme sustained but it was also spread throughout the hospital. Although authors did not formally study why the results were sustained, they describe key factors believed to be associated sustainability including active involvement of hospital leaders and ongoing performance monitoring and feedback.[119]

The reflections from the authors of these papers showing both sustainability successes and failures offer valuable insight into how sustainability may be enhanced. They also demonstrate the need for further work to build on findings and investigate the mechanisms and actions that support these diverse outcomes.

1.4.3 Rationale for Further Study

While a number of the presented studies identified issues restricting their ability to assess, measure and understand sustainability in healthcare, the link between sustainability outcomes and the actions and processes which influenced these outcomes are missing from the majority of studies.[120] For example, a national quality improvement program measured adherence to guidelines in the 'Get With the Guidelines' stroke programme.[120] Results showed the programme was associated with sustained improvements, unfortunately the specific

programme contextual factors relevant to these sustained improvement were not investigated.[120] Therefore, while there is increasing evidence for the sustainability of improvements in healthcare, learning for new programmes seeking to enhance or promote sustainability remains limited.[28]

1.5 Importance of Sustainability in Healthcare

The evidence presented above demonstrates that sustainability is a challenge for many initiatives to achieve and maintain. While there is debate around the correct definition, perspective and measures to use in the study of sustainability, the literature does provide clear and compelling arguments for the importance of continuing to study sustainability in healthcare. The importance of sustainability in healthcare improvements is multifaceted with significant financial, political and ethical implications.

- **Waste:** The first argument is related to the resources that are wasted when an initiative fails to sustain. There are limited human and monetary resources available therefore there is a need to use any investments in healthcare wisely.[8,18] As stated above, billions of dollars are spent on biomedical research globally, but much of this effort is wasted because of poor implementation and lack of sustained outcomes.[5,6,121] The current economic climate makes it even more important that health care organisations do not waste limited resources on ineffective changes to practice.[21,122] It is therefore imperative that more effective ways are developed to ensure investments provide competitive advantage, long-term impact and cost-effective benefits.[7]
- **Variation in care and diminished effectiveness:** The second argument for sustainability is related to the ability to deliver consistent high quality services to the public. When an initiative fails to sustain, this can result in large variation in the practices and care across seemingly similar services.[8,18] As the effectiveness of many interventions is related to their ability to be delivered consistently for an extended period of time, lack of sustainability diminishes our ability to determine intervention impact. To responsibly assess effectiveness we must also collect data on which interventions are most likely to be sustained in practice.[28]
- **Loss of morale and belief in improvement initiatives:** The third argument for sustainability is related to the time and effort needed from healthcare staff to introduce new or improved clinical practices.[7,96,97] Significant time and effort are dedicated to developing educational programs, setting up new work processes and changing policies

and procedures.[7] Improvement efforts which do not sustain over time are detrimental to morale as staff, patient and public opinion of improvement initiatives decline.[19,20] Not sustaining improvements can cause staff to view future innovations negatively and reduce enthusiasm for engaging in future work.[19,20,114]

- **Ethical Considerations:** Finally, there is also growing concern for the ethical implications of failure to sustain health related improvements.[5,28] Some have questioned, *'Is it ethical for funders to develop innovative programs but then expect others to sustain them if they prove effective?*' and *'is it ethical for researchers to build up an intervention in situ and then abandon it abruptly when the research funding ends?*'[28] The social responsibility and ethical considerations to use resources wisely and reduce waste is increasingly seen as a priority for all researchers.[5]

There is an obvious need for sustainable initiatives as they can save resources, improve patient and staff experience, and achieve better health outcomes for both individuals and the population.[28,101–107,123] Although I have focussed on the need to sustain change, it is important to note that sustainability may not always be desirable or necessary. Ideally, improvement initiatives should first be able to demonstrate clinical effectiveness, improved patient outcomes or care efficiency before becoming part of everyday services.[40,112] The multifaceted impact of initiatives which fail to sustain highlight the importance of future research to enhance understanding of how sustainability can be supported and influenced in practice. To identify and explain the influences and mechanisms supporting sustainability outcomes further research is needed.[124,125] Unpacking the mechanisms the which support sustainability requires recognition and exploration of the 'messy' world in which improvement initiatives take place including the context and systems in which they operate.[125,126]

1.6 Studying Sustainability in Complex Systems

The effectiveness of health interventions is recognised as being influenced by both its implementation and the context into which it is implemented.[127] To address the methodological shortcomings within sustainability studies and progress research within this field, many have advocated for research approaches which take into account the healthcare setting in which improvement initiatives take place.[128–130] While context has been recognised as potentially anything that surrounds an improvement initiative, understanding the boundaries between an improvement and its context is often difficult.[131,132] To aid understanding of how context may

impact initiatives, context has been described in four ways: *simple, complicated, complex or chaotic*.[133]

- *Simple* contexts are characterized as having repeating patterns and consistent events which enable identification of cause and effect relationships.[133]
- C*omplicated* contexts are characterised by multifaceted cause and effect relationships that can have more than one right answer. *Simple and complicated* contexts are viewed as static and therefore, patterns are likely to appear, providing a guide to future actions.[133]
- Conversely, *complex* contexts are unpredictable and constantly moving. While understanding can be realised in retrospect, it is necessary to plan for conflict and the emergence of ideas and solutions in the system to learn how it will respond.[133]
- *Chaotic* contexts, are characterised by the inability to determine cause and effect relationships with no manageable patterns. In these conditions multiple actions may be necessary with little time to think.[133]

While different components and systems within healthcare can be characterised as all of the above contexts, healthcare systems are now commonly characterised as complex systems.[66,76,129,134]

Table 2: Properties of Complex Systems

Table 1. Properties of complex systems	**Characterisation in healthcare**
• *Interdependencies:* Multiple interdependent agents interact in non-linear manner, sometimes involving feedback loops, both positive and negative.[66] • *Embeddedness:* Systems are embedded in even larger systems, and are composed of smaller systems.[69] • *Path dependency*: Path-dependent, non-reversible processes have similar starting points yet lead to different outcomes, even if they follow the same rules.[69,135] • *Self-Organisation:* Patterns of behaviour emerge consistently from non-linear interactions among the stakeholders and systems.[66,136] • *Emergence:* The system is dynamic, therefore solutions can't be imposed but instead can arise from the circumstances and interactions between stakeholders.[133]	• *Interdependencies:* Multiple groups (doctors, nurses, pharmacists, patients, carers) interacting and communicating complex messages • *Embeddedness:* Healthcare systems are embedded in larger organisational systems (doctor's office, within a ward, within a hospital, within a trust) Patient rooms, staff offices and wards operate within the larger organisation open to the wider environment • *Path Dependency:* Outcomes are sensitive not only to initial patient conditions but also to choices made during treatment. Patient pathways often have similar start but varying outcomes due to internal conditions and clinician decisions and treatment choice • *Self-organisation:* numerous links and relationships between stakeholders result in patterns of behaviour relevant to the given conditions and situations • *Emergence:* System is dynamic responding to the needs of patients, staff as well as organisational priorities

Health systems require interaction between diverse programmes, actors, organisational practices and interventions which are often dependent on each other.[66] Interactions, interconnections and activities influence behaviours within the system and outcomes continuously.[66,76] These systems are in constant motion allowing them to self-organise and evolve over time to respond to internal and external events and necessities.[66,69,75,136,137] Table 2 highlights the main properties of complex systems alongside an example of how this property manifests in healthcare systems. These conditions create a unique perspective to conceptualise and study sustainability within these settings.

Conceptualising sustainability in complex systems: Considering healthcare initiatives as part of a complex system allows for the *"emphasis of the dynamism of both time and place of interactions between programmes, communities, and other stakeholders to be considered."*[130] In complex systems, sustainability becomes synonymous with ongoing improvement and adaptation which emphasises the need to continuously learn and improve rather than maintain processes or outcomes over time.[134,138] This view closely aligns with the process perspective of sustainability outlined on page 25. As described above, complexity theory emphasizes non-linear interactions among a system's agents under constantly changing conditions where uncertainty, shocks and surprises are inevitable. This perspective emphases the need to persist and adapt through ongoing learning to continuously improve and change to respond to emerging needs of the systems.[67–69,139]

1.6.1 Planning for and Managing Sustainability in Complex Systems

> *"The system sustains perturbations brought on by external and internal events- sometimes haphazardly, with no apparent rhyme or reason."*[76]

Making improvements in complex health systems often results in unpredictable and unexpected challenges as well as unexpected implementation patterns and intervention outcomes.[66] Although complex systems are highly dynamic, responding and adapting continually, they can also remain unchanged despite significant disruptions.[140,141] Well planned interventions often have insignificant impact on systems whilst small informal changes can have large unforeseen consequences.[45,140,142] The ability to plan and influence these environments is challenging as the systems require ongoing coordination between

stakeholders, systems and initiatives.[143] This poses a significant challenge to not only successful implementation of interventions but also to the sustainability of changes within these environments.[10,22] Therefore, healthcare leaders, planners and staff need to thoughtfully consider how they can embed improvements in care.[98]

A complexity lens allows for the recognition of the non-linear development of relationships and practices which often shape sustainability journeys.[128] Rather than planning based on the assumption of predictability, complexity theory prompts the consideration of a range of possible outcomes to continuously examine and respond to.[133,136] Some studies have provided insight into how complex systems can be understood and potentially supported.[129,136] Lanham et al, recommended the need to acknowledge unpredictability, understand local patterns and develop networks and relationships to address the challenges of complex systems.[129] Providing opportunities to reflect and understand multiple view points within systems was also suggested as being beneficial to managing in complex systems.[129] Snowden et al, discussed the need to focus on creating an environment from which good things can emerge rather than trying to bring about predetermined results and possibly missing opportunities that arise unexpectedly.[133] Building on these recommendations, specific properties of complex systems are suggested as particularly important in understanding how sustainability can be supported and influenced in healthcare systems: *interdependencies, sensemaking, self-organisation and emergence*.[69,129] Improved understanding of these properties and how they manifest would provide insight into how sustainability is influenced and supported in intiatives.[2,45,129] These concepts will be explored and discussed throughout this thesis and therefore they have been defined below.

- **Interdependencies:** *"Interdependencies are the structures and processes through which people interact, exchange information and interpret observations."*[129] A complex system cannot be understood by analysing its parts independently.[144] Interdependencies within and between the system and its environment are critical to understanding system behavior.[141]
- **Sensemaking:** The process through which people assign meaning to experiences can be referred to as "*sensemaking"*.[145] Because sensemaking is a social activity, interdependencies affect sensemaking.[145] Sensemaking can help individuals understand initiatives as they progress with real-time insights crucial for effective planning and decision making.[129,146]

- **Self-organisation:** Self-organisation is the process by which individuals and groups mobilise their locally available resources and contexts to effectively complete tasks and meet the specific needs of their unique settings.[129] Some have posited that only through self-organisation can lasting change occur.[77]
- **Problem Solving and Emergence:** Complex contexts require *"actively cultivating and enriching conditions for knowledge assimilation."*[78] Individuals can be, and often are, independent and creative decision makers, therefore solutions to issues and improvements can emerge naturally from the interactions within a complex system.[66,147]

1.6.2 The Role of Structured Sustainability Approaches

As well as the above recommendations for managing sustainability, there are specific models, tools and frameworks which have been designed to support sustainability measurement and conceptualisation in healthcare.[148–150] These approaches are proposed to influence the sustainability process by allowing improvement teams to manage processes, respond to initiative needs and make informed decisions about sustainability risks.[16,18,35,151] Sustainability approaches attempt to remove some of the complexity of studying the topic by breaking the phenomena into manageable factors or constructs.[8,13,19,32,152,153] Therefore, the study of sustainability requires the analysis of sustainability 'by proxy' where certain capabilities or characteristics hypothesized to be precursors of sustainability are identified and assessed.[69] Management of these specific 'sustainability constructs' by staff and health planners throughout initiatives has been recommended to improve sustainability prospects.[13] Although these approaches vary, many suggest that improved understanding from staff and healthcare planners of sustainability constructs will allow potential risks to be better understood and promote actions to enhance outcomes and performance[152,154]

Sustainability approaches potentially offer a valuable mechanism to facilitate self-organisation and sensemaking as many are proposed to encourage the inclusion of multiple stakeholder perspectives and reflection on previous events which may support and enhance sustainability of intiatives.[129,145] Testing of frameworks and tools for sustainability is recognised as an important area for research in this field as few have been evaluated in healthcare practice.[10,153,155] Current understanding on how sustainability is navigated in complex systems and the role of sustainability tools and frameworks in this process has highlighted a number of

gaps in the current literature. The following section highlights these gaps and describes how this thesis will address them.[155]

1.7 Current Gaps in the Literature

Despite the recognition of the importance of healthcare improvement sustainability, the topic has been subject to relatively limited study to date and is rarely investigated, or investigated only at the end of project funding, which is often too late.[11,13,20,156] In 2004, Greenhalgh et al. reported 'near absence of studies focusing primarily on the sustainability of complex service innovations.'[22] Another more recent systematic review echoed these findings, stating that the number of sustainability studies still remains scarce and that the studies are heterogeneous with respect to their methodology.[114] While numerous literature reviews and empirical studies exist that identify and present processes and mechanisms to support and optimise implementation, there has been much less focus on the processes and mechanisms supporting sustainability.[49,59,142] The available research has been described as looking primarily at the 'front end' of the change process with studies focusing on the trialling and roll-out of new interventions and care processes rather than studying initiative continuation or maintenance.[49] As things stand, very little is known about whether new programs continue after the implementation is 'completed' and how these outcomes have occured.[156] Due to these limitations, relatively little is known about how to influence sustainability and how structured approaches and tools may be used to support the long term impact of improvement efforts.[22] Below I outline five gaps in the current literature which will be addressed in this thesis.

1. ***Sustainability approaches which aim to influence, or support sustainability are under researched with little work done to understand what approaches exist and how they relate to one another.***

To address the complexity of measuring and assessing sustainability and allow improvement teams to conceptualise and study the topic, many sustainability approaches such as tool, models, and frameworks have been developed.[16,18,35,148–151] There is a need to explore what approaches exist, what constructs they explore and how these approaches relate to each other. Testing of frameworks and tools for sustainability is recognised as an important area for research in this field.[155] This work would represent a significant contribution to the field by responding to calls for the development of a knowledge base that is useful beyond specific

healthcare settings and providing a repository of sustainability approaches across healthcare.[28,33,44]

2. ***We have little understanding of where and how sustainability approaches have been used and if they have demonstrated impact on sustainability.***

Evidence for the use of sustainability approaches often relies on individual study findings which have reported anecdotal benefits but these have not provided clear evidence of their value.[148–150] Considerable efforts are invested in the development and application of these approaches. Therefore, there is a need to examine the literature to explore the documented impact of sustainability approaches in supporting sustainability, including the benefits and challenges of their use.[155] This information would aid practitioners and researchers to understand the evidence supporting the use of specific approaches and allow them to determine which approaches may be best suited for their specific settings.[10,45,121]

3. ***There is little understanding of how sustainability approaches contribute to the process of sustaining.***

Sustainability approaches potentially offer a valuable mechanism to facilitate self-organisation and sensemaking but to date few have been evaluated in healthcare practice.[10,129,145,153] There is a need to explore *how* sustainability approaches support or influence sustainability processes or outcomes.[10,153,155] This requires prospective study of the application and impact of a sustainability approach in practice. Findings from this work will provide insight into if and how the process of sustaining within complex systems can be supported by a sustainability tool. The knowledge gained on the benefits, challenges and facilitators encountered in the application of the sustainability approach in practice will inform future tool use.

4. ***We have limited understanding of how the process of sustaining manifests in practice. Specifically, what the process entails and how individuals and teams navigate it.***

Assessing the dynamic process underlying sustainability is viewed as a key challenge in advancing research in this area.[155] Although sustainability issues are increasingly recognised as occurring across multiple stages of initiative implementation and follow-up, much of the sustainability research to date has been descriptive and retrospective and often influenced by short-term budgets.[45] This has resulted in limited knowledge on the influences and actions that lead to sustainable implementation efforts.[8,10,28,45] While the process of sustaining has been

widely discussed and is increasingly understood as an accepted perspective of sustainability, there is no common description of what the 'process of sustaining' entails. Scheirer and Dearing describe the process of sustaining as: *"a set of processes that take place during the earlier stages of a life cycle of a project; these may include decisions during initial project planning or adoption, as well as organisational support and financial strategies during implementation"*.[28] Johnson defines the process of sustaining as a *"change process with specific sustainability action steps to strengthen system infrastructure and innovation attributes that are necessary to sustain a particular innovation."*[36] Unfortunately, these definitions do not provide clear insight into what the process involves and how it is experienced by improvement teams. This knowledge could potentially allow for better identification of how and why sustainability is influenced over time and provide insight into how initiatives conceptualise, plan and act to sustain their improvements.[63] To support investigation of the process of sustaining within this study, I will be using the following working definition which has been informed by the above examples but has been left broad to allow for emerging findings.

> ***The 'process of sustaining'****: The process by which individuals and teams plan for and act to embed initiatives and enhance continuation of initiative benefits, outcomes and practices. This includes any activities undertaken to influence sustainability (before, during and after implementation) over time and enhance prospects of continued initiative delivery and improvement.*

This work will provide a structured look at improvement teams sustainability journeys and describe how the dynamic process of sustaining occurs in practice. These findings will provided better insight into the effort and actions that go into sustaining an initiatives to aid future practitioners to clearly define sustainability and outline how it can be supported.

5. *Little is known about what actions and strategies can be used to enhance long term impact and sustain beneficial or effective healthcare improvements*

While a number of studies provided information about the challenges encountered in attempts to sustain, very few identify or discuss strategies which support or enhance sustainability.[20,49,59,142] With few studies focusing on actions and strategies, there is little direction or practical advice for researchers and practitioners seeking to influence the phenomena over time.[49,59,142] It is recognised that as challenges and changes are encountered,

systems and individuals respond and adapt to improve initiative design and characteristics necessary to sustain particular interventions.[36] This work responds to calls for better understanding of, and preparation for, the challenges associated with sustainability.[2,133] Improved understanding of how improvement teams take action and self-organise to sustain improvements will provide insight into potential strategies to enhance sustainability of future intiatives.[2,45,129]

These gaps in current knowledge are crucial to our understanding of how sustainability can be supported and influenced in practice. They provide an opportunity to draw on the current literature to investigate both available sustainability approaches and strategies to develop a sustainability knowledge base that will inform future design and delivery of improvement intiatives.[10,28,33]

1.8 Thesis Aims and Research Questions

This thesis will investigate how healthcare teams influence sustainability of improvement initiatives. This work provides the unique opportunity to prospectively study both how individuals and teams manage and respond to sustainability challenges and influence sustainability throughout improvement initiatives and how approaches such as tools and frameworks can be used in this process to prompt action and support sustainability. This work aims to significantly contribute to this field of sustainability research and provide valuable information on the processes involved in sustaining improvements as well as insight into how strategies aimed at influencing sustainability are used and describe their potential impact.

Aim and Research Questions

The aim of this PhD thesis is to explore how healthcare teams influence sustainability of improvement initiatives during the course of implementation and beyond. The following overarching research question will be addressed throughout this thesis:

How do healthcare teams influence the sustainability of improvement initiatives during the course of implementation and beyond?

To respond to this overarching question, five sub research questions will be explored:

1) *What sustainability approaches (tools, models and frameworks etc.) have been proposed to assess, evaluate or influence sustainability of healthcare initiatives?*

2) *What are the documented benefits and challenges associated with the use of sustainability approaches and what impact have they shown on sustainability?*

3) *How does the use a specific sustainability approach, the Long Term Success Tool, throughout an improvement initiative impact the process of sustaining across 3 QI programmes?*

4) *How does the process of sustaining manifest in practice?*

5) *What strategies and actions are used by improvement teams to sustain improvements and promote initiative continuation?*

1.8.1 Thesis Organisation and Overview

This chapter has presented the relevant background information needed to explore the topic of sustainability in healthcare improvement initiatives. I outlined multiple definitions for sustainability and presented the two dominant theoretical perspectives for examining sustainability in healthcare: *the linear outcome view and the dynamic process view*. This chapter provided relevant background information on the field of study, and introduced the context and complexity theory underpinning this study. The current evidence base was discussed and identified a number key gaps in the literature were presented. This thesis explores these gaps using a complexity lens to explore if and how sustainability can be influenced and supported in improvement initiatives.

The next chapter (Chapter 2) outlines the methodology, study design, programmes and cases as well as methods used in this study. Chapters 3 to 7 present the key findings of this study. The results chapters will be presented in three sections to respond to the research questions. The first section will outline two structured literature reviews. A systematic review (Chapter 3) will explore the current knowledge on sustainability constructs and approaches and a scoping review (Chapter 4) will then investigate the use and impact of sustainability tools within the published literature. Section 2 will cover a longitudinal mixed methods study conducted to understand the application and impact of using a sustainability approach across the 3 improvement programmes (Chapter 5). Section 3 will include two chapters, the first (chapter

6) exploring sustainability journeys in four individual improvement initiatives cases and the second (chapter 7) outlining a cross case analysis of findings. All result chapters include an introductory section outlining the relevant background, research questions, and summary of methods, as well as main results and discussion of the key findings. The final chapter of this thesis, Chapter 8, brings together the findings from each chapter to outline the main empirical and theoretical contributions of this thesis. It also reflects on the overall methodology and approaches taken to study the topic and discusses limitations, areas for further research as well as implications for policy and practitioners.

Chapter Overview

I. **Chapter 1: Introduction and Background** This chapter outlines the current research problem as well as the available evidence on the topic. This chapter also outlines thesis research questions and structure.

II. **Chapter 2: Study Methodology, Design and Methods** This chapter describes the methodology, study design and methods used to study sustainability throughout this PhD.

III. **Chapter 3: Sustainability Approaches in Healthcare_A Systematic Review This** chapter will present and summarise published sustainability approaches which assess, influence or evaluate sustainability in healthcare settings.

IV. **Chapter 4: Sustainability Approach Application and Impact_A Scoping review** This chapter will explore the available evidence on the application and impact of sustainability approaches in healthcare. A systematic scoping review will be conducted to investigate the documented benefits and challenges of using a sustainability approach in practice and explore the impact sustainability approaches have on specific sustainability outcome variables.

V. **Chapter 5: Exploring the Application and Impact of the Long Term Success Tool_A Longitudinal Mixed Methods** Study This chapter will investigate if and how a sustainability approach can influence sustainability throughout initiative journeys. This chapter will provide insight into how the use the Long Term Success Tool throughout improvement initiatives impact the process of sustaining across 3 QI programmes.

VI. **Chapter 6: Exploring the process of sustaining within Improvement Initiative Case Studies** This chapter provides a background understanding of four improvement initiatives and describes their aims, challenges, achievements and sustainability. This chapter will focus on presenting the sustainability journeys and documenting how the process of sustainability manifested in each case.

VII. **Chapter 7: Identifying Strategies and Actions to Sustain_Cross Case** Analysis This chapter explores how key factors impact sustainability across initiatives and presents consolidated findings of the strategies and actions used to address sustainability issues and influence sustainability across the cases.

VIII. **Chapter 8: Discussion, Implications and Future work** This chapter provides an overarching discussion of the findings and implications of the thesis. It summarises key learning and provides an overview of study limitations and identifies key areas for future work.

Chapter 2: Study Methodology, Design and Methods

2.0 Chapter Overview: This chapter presents the rationale and evidence supporting the methodological approach and paradigms used to study sustainability of improvements throughout this PhD. I discuss relevant ontological paradigms which have impacted and shaped this work. Specifically, the impact of taking a critical realist perspective on study design and methods is outlined. I then describe key recommendations for studying sustainability within healthcare based on current theory, which have also guided the design of this work. The context in which this study took place is described highlighting the multiple systems and organisations (NHS, NIHR CLAHRCS and CLAHRC NWL) involved in this work. This is followed by a description of the methods used within this study along with rationale for these choices. Finally, I outline the techniques for thesis validation, triangulation and researcher reflexivity and discuss ethical considerations for this study.

2.1 Methodology: Paradigms, Ontology and World Views

The study of any health services phenomena, such as sustainability, requires thoughtful attention to how the setting is viewed and how answers to questions can be found. This requires researchers to make explicit the paradigm they are operating from, along with any accompanying assumptions. A paradigm is '*a way of examining social phenomena from which particular understandings of these phenomena can be gained and explanations attempted'*.[157] Paradigms can be thought of as a combination of *ontology* (what is real and what is reality?), *epistemology* (what is knowledge and what can be known?), and *methodology* (how can this knowledge be gained?).[158] Many perspectives inform the study of health services, all of which have diverse views and approaches to gaining knowledge and approaching research questions. While various perspectives could have been chosen to undertake this study, here I will focus exclusively on the ontological views that informed and shaped this work: *Positivism, pragmatism, and realism*.

Positivism

Health services research operates largely in a positivist environment which values traditional research methods such as randomised control trials.[158] *"The mechanistic view of the natural*

sciences continues to dominate the public perception of science, and in turn it affects views of what social research should be."[159] Positivism is associated with a world view where one truth exists (e.g. there is only one right answer) which can be objectively measured and described by researchers(e.g. researchers can find and describe this truth accurately and objectively).[159] Positivists believe that if social research is done well, it can follow a natural science research model and provide clear associations between specific phenomena and its causes.[159] This perspective is valuable as it asserts that with the right knowledge, one can predict social trends and in some cases even control them.[159]

As described in Chapter 1 on page 23, sustainability research often seeks to identify the existence and continuation of programmes and activities after funding has been terminated.[23,52] Many of these studies draw on positivist perspectives, seeking clear cause and effect relationships between 'good implementation' and sustained services.[23,52–54] While this perspective has undoubtedly contributed to scientific knowledge, when applied to real world settings where the interactions between the phenomena, individuals and the environment are the point of interest, it has been questioned.[160] Positivism attempts to gain an understanding of the world by separating experiences from their contextual factors and summarising findings into generalisable results.[159] The removal of contextual considerations poses a challenge for many who wish to explore complex topics such as sustainability. Without recognition and acknowledgement of the diverse conditions and contextual factors influencing sustainability this perspective provides little insight into how sustainability can be achieved or enhanced in practice.[63,158]

Pragmatism

The second paradigm requiring consideration for this thesis is Pragmatism. Working in health services requires decisions to be made and actions to be taken despite imperfect information and diverse views of reality.[161–163] While positivism is fundamentally grounded by concepts of truth and reality, there is increasing demand for research to respond to the needs of societies, organisations and individuals leading to a more practical approach. Pragmatism argues that concepts of truth and reality are not useful and instead focuses on human activity and decision making as its primary consideration.[161–163] Rather than reflecting reality, pragmatists are concerned with how knowledge is produced and put into action.[163] For pragmatists, *"the only sensible yardstick by which to judge a piece of knowledge is whether that knowledge is useful*

for a given interest" (e.g. does this knowledge help us to solve our problems?).[161,163] From this perspective, research should not attempt to most accurately represent reality but instead provide insight into how things are occurring in practice to provide useful information on actions to take and decision to make situations better.[163]

The practical use of any findings from this work is also a fundamental consideration. While findings related to sustainability processes and mechanisms would represent a significant contribution to the research literature, if findings don't aid teams and funders to make sense of their situations and provide insight into how to improve, the work will have little value to frontline teams or healthcare practices. Conversely, there is also a need to understand the potential to provide generalisable lessons and insight to the field. Pragmatism has been criticised for its narrow focus on knowledge to serve only practical purposes and efficient functioning of society.[164] It has also been criticised for not providing information about why things do or do not work, as well as its inability to explain how things work 'since it does not claim to generate explanations'.[165] Therefore, while this lens may provide insight into actions required to solve issues for specific healthcare systems, these findings often serve site specific purposes which cannot add value to the wider academic community.[161] These issues highlight the need for research conducted in this area to consider both the need to inform healthcare practice as well as enable shared learning across the field where possible.

Realism

The issues and shortcomings of positivism and pragmatism led to the exploration of alternative views within *post-positivism*.[159] Realism, is a specific branch of post-positivism, which promotes a scientific approach to knowledge development.[157] Realism suggests that there is a reality to be known, whether it is observed or not.[166] There are multiple types of realism which have slight but notable differences. *Naïve or direct realism*, is more closely associated with a positivistic views assuming there is only one reality and that people can describe the world accurately through their experiences and senses.[157] *Critical realism* challenges this assumption and supports the use of theory to explore and understand how knowledge is informed.[167,168] Critical realists maintain that we should be sceptical of our ability to observe truth and describe realities with certainty (e.g. we can experience reality around us but experiences are not universally understood).[157] Critical realism accepts that while there is a 'real' world, there are also multiple perspectives of it which are informed by our experiences, assumptions and biases.[167,168]

Each of the above paradigms has benefits and limitations and can be argued to be appropriate for aspects of this study. However, this study required a paradigm that would allow me to consider both traditional stances on reality, truth and knowledge as well as pragmatic action-oriented findings. For these reasons, a *critical realist* perspective was taken for this thesis. This perspective allowed me to acknowledge the need for positivist conclusions and practical solutions in the field, while most closely aligning with my world view.[158,169] This perspective also allowed me to adhere to the recommendations for studying sustainability put forth by field experts. Below I outline the rationale for this choice and discuss how this perspective informed study design and execution.

2.2 Critical realism and Sustainability Research

Critical realism accepts that it will not find consistent causal links or truths. Instead, it aims to understand particular questions, theories and phenomenon with the most appropriate research method.[164] In order to design and conduct this thesis, the following assumptions on reality and truth were acknowledged:

Reality does exist but we can only approximate what it is.

Two dimensions of knowledge operate in critical realism: *intransitive knowledge* which is the *real* dimension of knowledge and *transitive knowledge* which is the *socially constructed* view of the world.[168] In the study of sustainability, I need to explore people, relationships, systems and organisations. This can only be done if these concepts are viewed as intransitive knowledge which exist regardless of human perspectives or thought (e.g. I accept these things as real so they are real). Within these dimensions, Bhaskar proposed that knowledge, experiences, and events make up three overlapping domains of reality; the *empirical*, the *actual* and the *real*.[166] Within the *empirical domain* reality consists of events that can be observed. Within the *actual domain* reality is made up of events whether they are observed or not. The *real* domain considers the structures and mechanisms that produce events.[166] In the case of sustainability research, people and organisations are visible but the interactions, relationships and processes are often not. In order to study this phenomena, I must have the ability to explore these events as well as the structures and mechanisms underpinning them, whether they are observed or not.[166]

There is not one correct view of the world and no one truth.

Within this work, I can provide perspectives on the truth but there are many possible truths. There are many ways to view sustainability and interpret the findings. I can observe phenomena and interpret findings but they will never be completely accurate. In studying sustainability, it will be important to speak to the people within the systems of study as they hold knowledge on the topic that may otherwise be undiscovered. Knowledge can be gained by measuring and observing but it will never give a complete answer as there are multiple confounders and unknowable factors.[169] Any knowledge gained is also impacted by my personal experiences, settings and context.

2.2.1 Study Design

Critical realism is not a method in itself but instead a philosophy of how to conduct rigourous scientific inquiry.[170] Critical Realism informs study design, collection and interpretation of data as well as the structure for reporting findings.[170] This approach allowed me to address the ideals of mixed methods research, multiplism and informed my choice of theory to approach the research. This subsection outlines the key impact that this perspective had on my study design.

i. **Methodological pluralism:** Critical realism allows for both quantitative and qualitative enquiry and accepts using whatever methods and techniques are most appropriate to the phenomena being studied.[167,171] This is referred to as 'methodological pluralism'.[167,171] The focus of this thesis lends itself to mixed methods enquiry, because of the need to combine multiple data sources and perspectives for rigorous sustainability research.[10,13,28,172] Therefore, a mixed methods approach was chosen to allow me to conduct comparative research where multiple methods assess the same sustainability processes and outcomes so that the accuracy of findings can be better understood.[28]

ii. **Multiplism:** Critical realism also places its emphasis on 'critical multiplism' which seeks to 'falsify rather than verify' hypotheses.[158] This requires techniques such as collecting contextual information, understanding diverse personal viewpoints and the use of multiple data sources to triangulate findings.[158] Rather than assuming that objectivity is possible, it is considered a 'regulatory ideal' which is monitored by established knowledge within the wider research community.[158] Critical realists advocate for a number of validation practises to ensure that the one's perspective is as close to an accurate representation of reality and truth as possible. Therefore it is

necessary to consider the role of triangulation, respondent validation, and reflexivity in this work.[157,173] These techniques have been incorporated into the study design and are explained in section 2.8 Thesis Validation and Reflexivity.

iii. **In-depth Research Designs:** *S*tudies on sustainability often require a non-experimental approach to examine the relationships and processes relevant to sustainability outcomes.[28] Although Critical Realism promotes methodological pluralism, it often supports in-depth study designs which generate learning and causal explanations through 'intensive' research.[169,170] These intensive research designs often take the form of in-depth case studies.[174,175] This aligns well with previous work which has suggested that case studies can accurately assess whether or not sustainability has been achieved and highlighted what sustained and why.[52,176–179] This thesis employs a case study approach to explore the sustainability journeys, processes and strategies of four improvement teams. Further explanation of this method is provided on page 66.

iv. **Theoretical lens:** Theory is an integral part of a critical realist perspective and research process as it aids in the development of explanations for mechanisms, interactions and outcomes.[169,174] Complexity science focuses on understanding nonlinear phenomena in complex systems.[180] As introduced in the Chapter 1, I will use Complexity Theory to study sustainability and its associated processes, mechanisms and strategies.[77] Complexity Theory holds many similar views with critical realism, both highlighting that no representation of a system is considered complete and no single perspective can describe the whole.[77] Complexity theory also recognises and values alternative representations through reflexivity and appreciation of multiple perspectives.[77,115] This theoretical lens enables the exploration of fundamentals concepts such as self-organisation, emergence, co-evolution, and organisational learning all of which are viewed as gaps in the current sustainability literature.[78–80]

2.2.2 Recommendations for Studying Sustainability

As well as the influence of the paradigm and theoretical framing for this thesis, there are also key recommendations suggested in the literature to enhance quality and rigour of sustainability studies. Sustainability research has been criticised as being too *'naturalistic, descriptive, exploratory, and retrospective'* with decisions of when and how to study sustainability largely driven by practical or financial constraints.[13,45,112] For example, Bowman et al. described how funding challenged their 2008 study, '*because we were limited by funding in our own analysis,*

the follow-up period was artificially restricted to one year past the end of active implementation."[13] Lack of clear operational definitions or rigorous outcome measures of sustainability are identified as a limitation to the research in this field.[10] Self-reported measures overestimate sustainability, with studies using more objective measures of sustainability (such as independent observation) reporting lower rates of continuation.[10,14] Unfortunately, this problem persists as very few studies employ rigorous prospective methods to study sustainability.[45] Due to the previous methodological criticisms and constraints, five recommendations from literature have been proposed. Each of which has shaped and informed the study design of this thesis.

i. **Define the 'right' time period:** Assessing outcomes and sustainability requires a sufficient timeframe.[181] Unfortunately, the time period associated with the concept of sustainability is vague and not well defined.[30,178,182,183] In Scheirer's 2005 review, she established that there was no commonly accepted time point for defining when a program is "sustained."[14] Although some have recommended that sustainability be assessed no sooner than one year after funding source ends, research has been conducted at a variety of time spans, from 6 months to 16 years.[12,28,61,119] The time period appropriate for assessing sustainability is dependent on the context and initiative.[182] Time periods often need to adapt to the health outcomes of interest or complexity of interventions (e.g., *'infections respond more quickly to appropriate interventions than do episodic and chronic illness'*[155]).[13,45,155,182] Ideally, it is recommended that studies should collect an initial pre-defined baseline period of data before the end of funding and then collect data at 1 or 2 additional time points a year or so after the funding ended.[28] This study will employ a longitudinal approach and each empirical study will collect data at multiple time points. See section 2.4 Methods.

ii. **Employ mixed methods** :There is growing consensus about the need for qualitative or mixed methodologies for the assessment of sustainability.[10,13,28,172] Proctor et al., recommends mixed methods, *"including both quantitative (e.g., procedure cores, dates of training, and intervention deployment) and qualitative data (e.g., case study narratives of sustainable and unsustainable scenarios)*."[155] For example, May et al. used a mixed methods approach for the evaluation of telemedicine services in the United Kingdom and concluded that quantitative methods were key in measuring ongoing performance, but observations and interviews provided the necessary 'texture

and detail' to describe intervention sustainability.[172] Each empirical study within this thesis has employed mixed methods to provide rigour and validity to the results. Section 2.4.3 Longitudinal Mixed Methods Study, provides full details on the methods used in this study.

iii. **Take a longitudinal (case study) approach:** Similar to the critical realist perspective, the sustainability literature also advocates for in-depth research designs which allow for ongoing and systematic monitoring of initiatives to more accurately assess how sustainability has been achieved.[178] The use of in-depth case studies has specifically been advised to enable the processes underlying sustained initiatives to be observed.[52,176,177] As stated above, in this thesis a case study approach is used to explore the sustainability journeys of four improvement teams (see 2.4.4 Case Study Approach on page 66)

iv. **Consider prospective measurement:** Although some perspectives imply that sustainability cannot be studied until full implementation is achieved, it is recommended that intervention research and sustainability research can and should proceed in parallel.[28] Using prospective investigation of sustainability as well as post hoc approaches supports understanding of the relationship between sustainability factors and outcomes.[10,13] The prospective measurement of sustainability factors throughout this thesis is described in section 2.6 Data Collection.

v. **Triangulation to validate findings:** A key limitation to sustainability research has been the retrospective and subjective nature of data collection.[10] The need for triangulation and multiplism in sustainability research is outlined as a key requirement for any new research efforts.[28] Ideally, multiple measures of sustainability outcomes (e.g. sustained changes in health outcomes and continued program implementation), along with routine data (e.g. staff satisfaction, costs) can be collected and measursed.[2,45] Data collection within studies should also be validated by using multiple respondents or informants within inititiaves.[2,28,45] Comparing the diverse perspectives of those involved with initiatives (*'e.g. administrators, providers, patients or clients, frontline support staff, and treatment/procedure developers and researchers'*[155]) has been recommended.[28] This recommendation aligns well with the ideals of critical realism and complexity theory.[77,115,157,173] These recommendations have been incorporated into

the data collection and validation which are described in sections 2.6 and 2.8 Thesis Validation and Reflexivity.

2.3 Study Context

In the following section I describe the setting in which this research took place, discuss the organisational context for the work, and outline previous local research which informed this thesis.

2.3.1 The NHS and the Need for Change

In the UK, healthcare has been delivered through the National Health Service since 1948.[184] The NHS operates with 3 core values: *to meet the needs of everyone; be free at the point of delivery; and be based on clinical need, not ability to pay*.[185] The service cares for approximately one million people every 36 hours and is internationally respected, ranking first among comparable countries for quality, access and efficiency.[186,187] While the NHS has been referred to as a *"world leading example of commitment to health and health care as a human right"*, there is an on-going need for improvement.[187] The NHS is facing unprecedented funding pressure as there have been consistent increases in service demands and healthcare costs but funding has remained largely constant.[122,188,189] This places a number of national care targets at risk.[188,190] The 5 Year Forward View projected a deficit up to £30 billion by 2020 if the NHS is unable to improve its productivity and efficiency.[122] If the NHS is not able to match funding levels with system needs, this could result in *'worse services, fewer staff, more deficits and restrictions on new treatments'*.[122]

Fortunately, improvement and change are not new for the NHS. Throughout the last 70 years, the NHS has continued to adapt, evolve and modernise to ensure it meets the populations' health and care needs.[122,188,190] Continually improving the quality of health services is an ongoing requirement within the NHS, supported by initiatives such as Quality Accounts and the Commissioning for Quality and Innovation (CQUIN) payment framework.[98,191] To respond to budget restraints, aging populations and long-term care needs as well as meet expectations of more personalised and integrated care, the NHS is developing new ways of working and engaging in widespread improvements.[189,192]

2.3.2 NIHR and CLAHRCs

To address the need for improvement within the NHS, the National Institute for Health Research (NIHR) established the Collaboration for Leadership in Applied Health Research and Care (CLAHRC) programme in England to accelerate the translation of evidence into practice. The NIHR CLAHRCs aims are multifaceted and include[193]:

> • *Developing and conducting applied health research to translate research findings into improved outcomes for patients;*
> • *Improving patient outcomes locally and across the wider NHS;*
> • *Creating and embedding approaches to research and its dissemination which take into account the way that health care is delivered across local Academic Health Science Networks (AHSNs)*

Each CLAHRC is hosted by a NHS organisation or provider of NHS services, a University, and the relevant AHSN.[193] Each CLAHRC has autonomy to decide how they approach improvement and the translational gap.[193–195]

It was an NIHR requirement that improvement interventions which had been successfully implemented and evaluated locally should be sustainable, and spread across the CLAHRCs and the wider health services.[196] Although there is evidence from the CLAHRCs that they had some success in scaling up projects, a report by Soper et al. in 2015, found that further work was required to advance understanding of the processes and mechanisms needed to support the sustainability of these implementation projects. They suggested that future research address *'what factors support, and what factors hinder, the sustainability and scale-up of successful implementation projects?'*[197] The Directors of the CLAHRC programmes identified '*maintaining and sustaining'* resources was a key challenge for the programme.[198] Despite this recognition, the role CLAHRCs play in supporting sustainability has continued to receive little attention.[181] It has been recognised that assessing outcomes and sustainability requires a timeframe which may be difficult to expect from NIHR funded evaluations.[181] However, it has also been acknowledged that there is an opportunity to develop and share learning on sustainability and initiative impact across the CLAHRC Programme.[181]

2.3.3 CLAHRC Northwest London

This PhD study was hosted by the NIHR CLAHRC for Northwest London (CLAHRC NWL). Like all CLAHRCs, CLAHRC NWL is a 5-year funded program (10 years funded to date) supporting frontline care teams to implement evidence-based practice. The programme aims to close the 'second translational gap' (the disconnect between the development and the implementation of new interventions or improvements in practice).[85] Specific programmes of work are supported for a period of 18-24 months but explicitly aim to have any improvements made during implementation sustain beyond the period of funding. As highlighted in section 1.3, QI initiatives can take many forms, with some testing new innovations, and others implementing evidence-based practices. All CLAHRC NWL initiatives specifically focus on implementing established research evidence and evidence-based interventions in care, with each initiative providing rationale and evidence of effectiveness prior to funding. CLAHRC NWL initiatives cover diverse disease areas (e.g. chronic obstructive pulmonary disease, asthma and diabetes etc.) and take place across various healthcare settings including primary, secondary, and community care. CLAHRC NWL aims to bring together healthcare practitioners along with patients, carers, community members and academic partners in project teams to translate evidence into practice in their local systems.[199]

To support multidisciplinary teams to successfully implement and embed changes, CLAHRC NWL advocates and supports the use of an 'iterative systematic approach to improvement'.[199] This includes using a collection of quality improvement tools and methods such as the model for improvement, action-effect diagrams, plan-do-study-act (PDSA) cycles, process mapping, statistical process control, and stakeholder mapping, along with real-time iterative evaluation, to guide and support the implementation process.[95,199–202] The approach also focuses on the need to assess and take action to improve the chances of new practices becoming a sustained part of care delivery. The programme studies the impact and uptake of these approaches throughout implementation. Formative findings guide ongoing research and support adaptation to the QI methods to continually improve the programme's systematic approach. Through this work, the CLAHRC NWL programme developed three strategic principles:

1) ***Act scientifically and pragmatically:*** Combine existing evidence with local knowledge and adapt interventions to respond to and learn from emerging system needs.

2) ***Embrace complexity:*** Identify and address any problems with usual care which may include many interdependent parts of the system.
3) ***Engage and empower:*** Commitment and insights from those with experience of the local system (staff and patients) is needed to understand motivations and concerns related to change and evidence translation.[199]

As the NIHR seeks to identify mechanisms to support sustainability and spread, the CLAHRC NWL programme explicitly sought to study the use of specific sustainability approaches with their improvement teams.[196]

2.3.4 CLAHRC NWL Sustainability Research

From the outset of the programme, sustainability assessment was felt to be essential and initially (from 2009 to 2013) CLAHRC NWL sought to utilise a sustainability approach developed by the NHS Institute for Innovation and Improvement, The NHS III Sustainability Model (SM). The SM was designed to be a self-assessment tool which details key factors that increase the likelihood of sustainability and continuous improvement.[16] Factors within the model included: *Staff involvement and training, Staff attitudes, Senior leadership engagement, Clinical leadership, Fit with the organisation's strategic aims and culture, Infrastructure for sustainability, Benefits beyond helping patients, Credibility of the benefits, Adaptability of improved process*, and *Effectiveness of the system to monitor progress*. The aim of the model was to raise awareness of these factors within improvement initiatives, prompt teams to consider how their initiative was progressing and promote action to increase the likelihood of sustainability.[16] The experience and evaluation of the use of the SM by CLAHRC NWL was described in two previous publications.[16,148] These publications reported that while the SM raised awareness of determinants of sustainability and prompted some action, engagement and on-going use was a challenge, with teams reporting difficulty in understanding the questions and applying the model in healthcare practice.[148,200] Consistent concerns related to the user-friendliness of the model (particularly the design and suitability in clinical settings as well as the language and lack of as clarity of the factors) were raised.[148] Feedback from participants revealed some found the model took too long to complete and found the data difficult to interpret. Based on this feedback, CLAHRC NWL aimed to work with potential end-users to design a tool *'that responds to user needs and is cognisant of the practical challenges encountered in improvement initiatives'*.[35]

CLAHRC NWL sought to develop a sustainability approach that would address these concerns and improve uptake. CLAHRC NWL undertook a programme of work over a 12 month period with healthcare practitioners and managers as well as patients to design a new tool (Figure 1 provides a summary of the development of the new tool). This work resulted in the development of the Long Term Success Tool, which was rolled out for use by all active CLAHRC NWL teams in January 2015. Full methodological development, and description of the tool can be found in the publication '*What makes a sustainability tool valuable, practical and useful in real-world healthcare practice? A mixed-methods study on the development of the Long Term Success Tool in Northwest London*' which was published in 2017 (Appendix A).

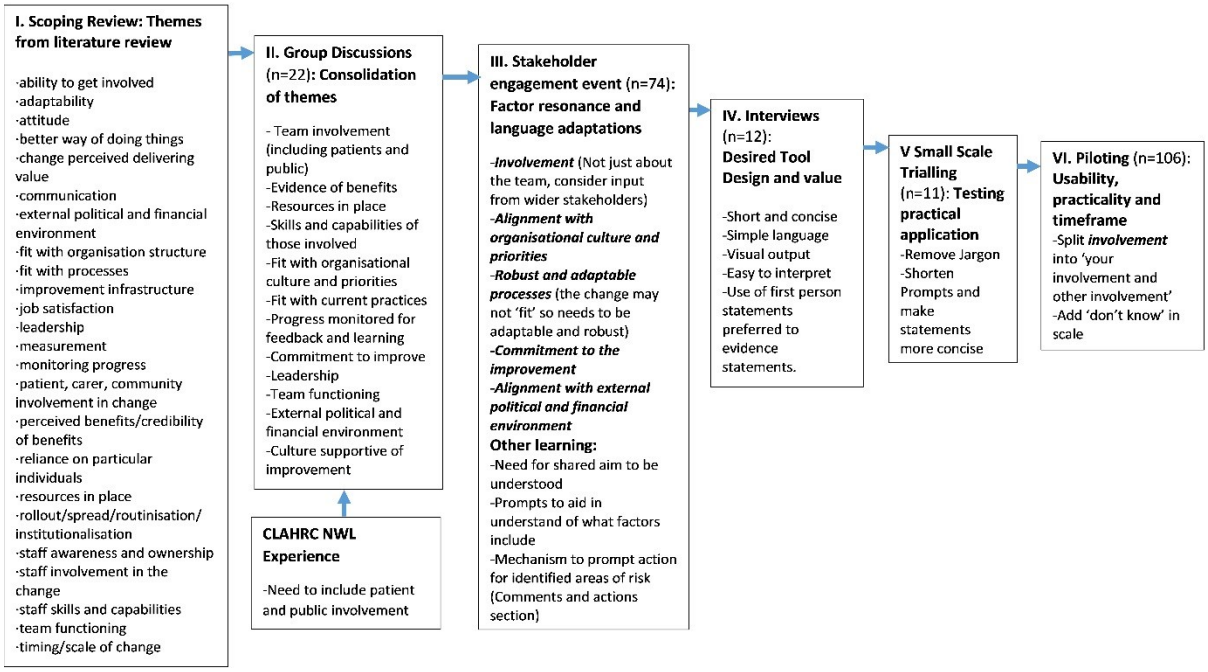


Figure 1: LTST Development (Image reproduced with permissions from Lennox et al. 2017 BMJ Open[35])

2.3.5 The Long Term Success Tool

As outlined in the research questions in chapter 1, this thesis will investigate how a sustainability approach may contribute to the process of sustaining. The Long Term Success Tool (LTST) will be specifically studied to explore its contributions to supporting sustainability within complex systems.[35] The choice to study the LTST as opposed to other available sustainability approaches was mainly a practical and pragmatic one. As set out in the above section 2.3.3 CLAHRC Northwest London, the NIHR sought to identify mechanisms to support sustainability and spread, therefore CLAHRC NWL aimed to study the use of specific

sustainability approaches with their improvement teams.[196] The LTST was an explicit component of the systematic approach and would be used by all improvement teams. Therefore, the decision to study the LTST was both logical (as it provided an opportunity to study a sustainability tool which was going to be applied consistently in practice across multiple improvement initiatives) and necessary (as the programme needed to assess and report its impact and use to the NIHR). While comparison and study of other approaches would have provided further insight into the use and impact of sustainability approaches in general, this exploration was beyond the scope of the thesis. Below I outline the tool content and approach (full description available in Appendix A).

Content and Approach:

The LTST is a structured sustainability approach which aims to *'support those implementing improvements reflect on 12 key factors to identify risks and prompt actions to increase chances of sustainability over time'*.[35] The LTST includes a framework which identifies and describes 12 factors for sustainability along with a questionnaire to assess these factors (Appendix B and Appendix C). The factors assessed within the tool are: *"Commitment to the improvement, Involvement, Skills and capabilities, Leadership, Team functioning, Resources in place, Evidence of benefits, Progress monitored for feedback and learning, Robust and adaptable processes, Alignment with organisational culture and priorities, Support for improvement, and Alignment with external political and financial environment"*.[35] A full description of each of the factors is located in Table 3.

The LTST aims to create a platform for people to share their own views on sustainability as well as learn about the different views held within their team. Individual scores are collated to produce team reports which include simple statistics, visual charts as well as comment lists for each factor to prompt discussions and actions to enhance sustainability. Figure 2 shows an example of the visual chart produced by the tool highlighting risks and differences in opinions. Table 4 shows an example of aggregated comments and actions highlighted within the tool. A full LTST data report can be found in Appendix D. To prompt awareness of systems and team changes, the tool is intended to be used at multiple times during an initiative. The recommended time frame is approximately every three months to assess progress and identify emerging risks regularly. Section 2.6 Data Collection, describe the tools application and use in this thesis.

Table 3: Long Term Success Factors and Descriptions (Adapted with Permissions from Lennox et al.2017 BMJ Open [35])

Factor	Description
People	
Commitment to the Improvement	Encourages teams to reflect on both personal and team commitment to the initiative. It asks if a shared aim has been established and whether people know what the initiative is trying to accomplish.
Involvement (A and B)	Reflects upon who has been involved and who may need to be engaged further for the initiative to achieve long term success. This factor has two parts a) Asks about personal involvement and contribution to the initiative and b) Explores the involvement of patients, carers and members of the public who are impacted by the changes being made.
Skills and capabilities	Explores whether the staff and other people delivering the change have the skills to do so successfully and whether training of new members of the team has been planned for.
Leadership	Asks team members if they have strong leadership in place and if the leaders are approachable, available and able to garner support for the initiative.
Team functioning:	Explores the accountability and responsibilities for the workload involved in the initiative and ask if the team is working well together.
Practice	
Resources in place	Explores if the necessary resources such as staff time, equipment and facilities have been dedicated to the initiative.
Progress monitored for feedback and learning	Encourages teams to consider what systems are in place to monitor the initiative over time and how this information will be used to inform staff of further changes needed.
Evidence of benefits	Asks if and how the benefits of the initiative are communicated to both staff and patients over time.
Robust and adaptable processes	Reflects upon the need for initiatives to be adapted to local processes and emerging needs. It also asks about the process for recording successes and failures of changes made.
Setting	
Alignment with organisational culture and priorities	Encourages teams to consider the need to align improvement initiatives to organisational strategies to gain executive buy-in and support as well as have the initiative become part of organisational policies and procedures.
Support for Improvement	Explores the values and beliefs held within organisations related to continuous improvement and looks at the support given to staff and patients to be involved.
Alignment with external political and financial environment	Looks at the need for teams to be aware of the potential political and financial changes that may impact the initiative.

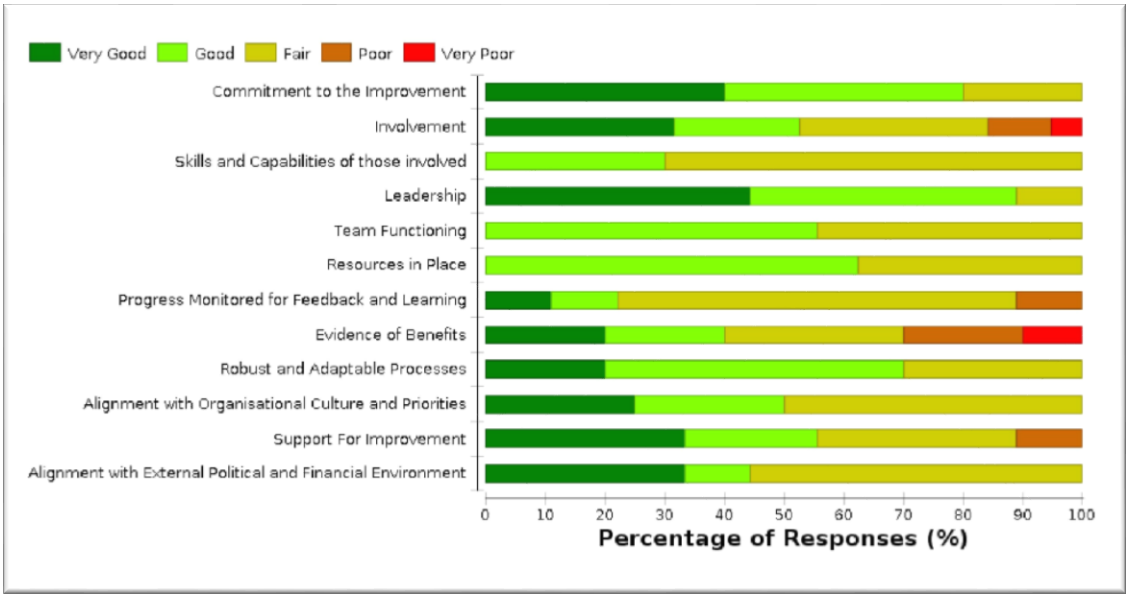


Figure 2: Team level graph highlighting strengths, weaknesses, and differences in opinion (Image reproduced with permissions from Lennox et al 2017 BMJ Open[35])

Table 4: Example output of comments and actions provided by team members during scoring (Image adapted with permissions from Lennox et al 2017 BMJ Open[35])

Factor	Comments and Actions
Commitment to the Improvement	** Clear summary of project components and effects now in place from last time* ** make sure all stakeholders attend meeting* ** Need to look at those engaging with the project*
Involvement	** Difficulties moving forward as until all stakeholders are engaged - unable to move forward* ** need to consider who is not involved and who would bring influence and value to the project* ** more patient/parent engagement at local level helpful*
Skills and Capabilities of those involved	**capacity issues potentially can limit progress* ** not enough nursing staff employed to deliver project currently* ** needs consultant/ GP and nurse shadowing and specific training*

2.4 Methods

To answer the proposed research questions a number of research methods were employed (Figure 3). Two literature reviews were conducted for this thesis. The first was a systematic review outlining published sustainability approaches such as tools, models and frameworks (2.4.1 Systematic Review). The second was a scoping review to explore the documented use and impact of these approaches in healthcare settings (2.4.2 Scoping Review). Two empirical studies were conducted to respond to the research questions set forth by this thesis: a

longitudinal mixed methods study investigating the application and impact of the LTST (2.4.3 Longitudinal Mixed Methods Study) and Case Study Approach to explore the process of sustaining in four improvement initiatives and investigate shared strategies and actions to sustain(2.4.4 Case Study Approach). The description and justification for the methods chosen for each study is discussed below.

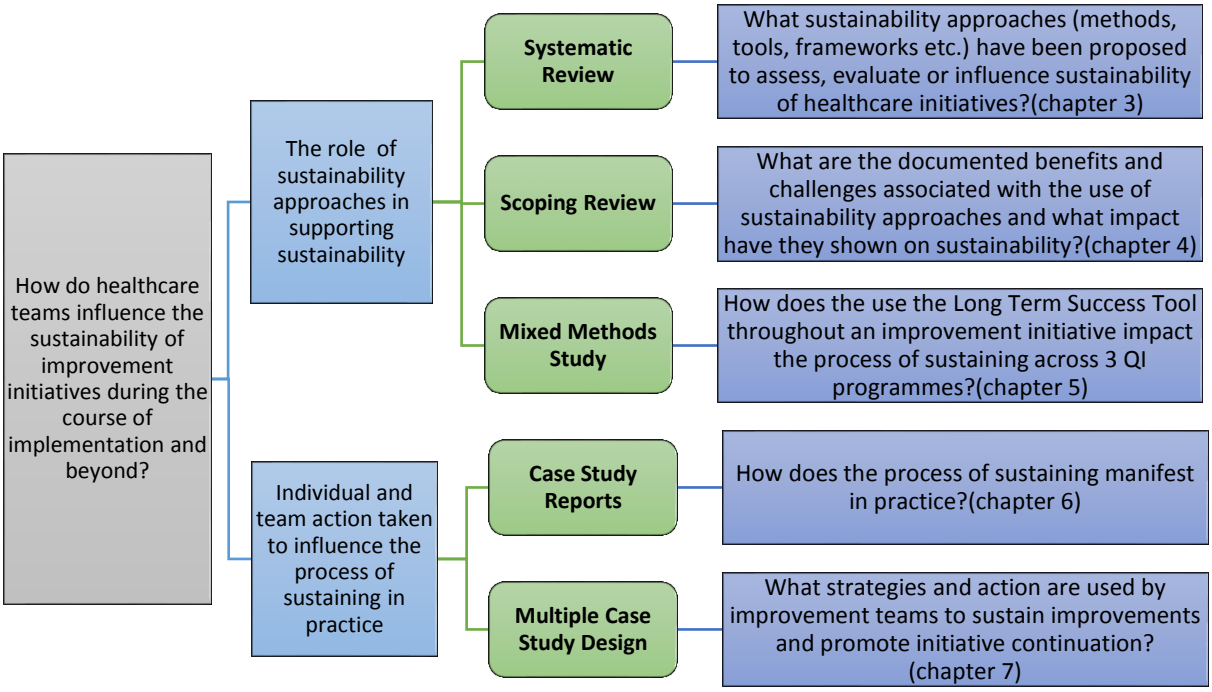


Figure 3: Outline of research methods

2.4.1 Systematic Review

A systematic review was conducted to respond to the research question: *What sustainability approaches (methods, tools, frameworks etc.) have been proposed to assess, evaluate or influence sustainability of healthcare initiatives?* This work aimed to summarise published sustainability approaches in healthcare settings to understand what learning could be gained through their examination and consolidation. A systematic review is a review of the literature which explicitly, rigorously, and transparently documents the methodology used.[59] To ensure the rigourous documentation of methods in this review, it was guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) reporting standards.[203] Below I outline the six steps used to conduct this review. Full methods used can be found in the published article in Appendix E.

i. **Search and Information sources:** The selection of databases, search terms and search strategy was supported by a medical librarian at Imperial College London to enhance quality and coverage of the systematic review. The search was carried out on Embase, Health Management Information Consortium, and Ovid MEDLINE. Key words included sustainability terms (sustain*, institutionalisation, routinisation, maintenance, integration, normalisation, embed*), and approach terms (model, framework, tool, plan, checklist, scale, strategy, theory, conceptualisation) and 'health or healthcare'. A snowballing approach was also taken where references from included papers were analysed and retrieved if deemed relevant.

ii. **Data collection process and study selection:** I sought sustainability approaches aiming to influence or assess sustainability within healthcare settings. The level or type of influence and assessment was left deliberately broad to include assessment, planning, evaluation, and monitoring. Papers within peer-reviewed journals and published in English, introducing a tangible and clear approach for sustainability were included. Approaches identifying a larger system process or staged process (for example an implementation model including sustainability as the final stage) were excluded. Commentaries, editorials, poster presentations, protocols, conference papers or proceedings, and perspectives were also excluded.

iii. **Quality Assessment and Data extraction strategy:** A data extraction form was developed for the retrieved articles. Existing quality assessment tools did not meet the exploratory nature of this review.[204–206] The aim of the data extraction was to report descriptions and study information not to ascertain validity of constructs. To ensure the studies met inclusion criteria and provided sufficient information, each article was assessed with a structured data extraction form. Data extraction included: *Approach name, Purpose of use, Healthcare Setting, Level of Use, Description of Use (system, organisation or intervention), Sustainability constructs included, Scoring Mechanism, Target user, Definition of Sustainability, Theoretical underpinning, Sustainability Perspective (linear or dynamic) and Method development details*. I extracted the data from the articles which was then independently checked against the full-text articles by a second reviewer.

iv. **Data synthesis and presentation:** To examine the sustainability constructs within each approach, articles were uploaded to Nvivo 10 software for analysis.[207] I used template analysis to establish a coding structure to guide the analysis process.[208] Shediac-Rizkallah & Bone's conceptual sustainability framework, was used as the baseline

template for coding.[8] This framework was chosen due to its broad definition of sustainability and high citation record in the literature. This technique allowed all approaches' constructs to be compared and contrasted and additional constructs to be identified. The preliminary coding structure was iteratively adapted with any new constructs added and codes refined as necessary. I conducted the initial coding with input from my supervisor on coding structure, and construct labels. To assess coding clarity and reliability, 25% of the articles were coded by a second reviewer independently and an inter-rater reliability score (Kappa Coefficient) was calculated. Discrepancies between coders were used to refine construct definitions and specificity. Results within the chapter have been summarised using ratios and narrative summaries.

v. **Risk of bias in individual studies and across studies:** This review aimed to explore the development and description of sustainability approaches. Results other than the description of the approach in individual studies were not included in this review. As this review focused on published approaches, publication bias may have affected the results of this study. Methods available in the grey literature were identified but not included in this review.

vi. **Registration:** This systematic review was registered on the PROSPERO database under the registration number: CRD 42016040081 in June 2016.[209]

2.4.2 Scoping Review

A scoping review was conducted to expand results from the systematic review and explore the available evidence on the application and impact of sustainability approaches in healthcare. This review addressed the research question: *What are the documented benefits and challenges associated with the use of sustainability approaches and what impact have they shown on sustainability?* A scoping review was considered the right approach for this exploration of the literature for a number of reasons. First, there was consideration of the potential to conduct another systematic review based on the previous review findings. Unfortunately, the generic terms used to name the sustainability approaches, made conducting a traditional database word search very difficult due to the number of retrieved studies. For example, searching for the name of one framework such as Sarriot et al.'s 'sustainability framework' resulted in thousands of hits which were not relevant to the use of this particular framework in healthcare studies.[149] A scoping review allowed me to follow specific tools and frameworks in the literature through citation tracking and snowballing, which resulted in more relevant studies being retrieved. A

scoping review was also deemed to be the appropriate method as it allowed for examination of the '*extent, range and nature of research activity'* in the use and impact of sustainability approaches.[210] It also allowed for summary of research findings across diverse sustainability approaches which varied in their study designs, setting, and healthcare area.[210] To ensure rigorous and well documented methods, Arksey and O'Malley's 5 stage framework for scoping reviews was followed. PRISMA guidelines and reporting standards were also used to ensure clarity of reporting.[211]

i. **Research Question(s):** The following research questions were explored in the review:
    a. *What sustainability approaches have demonstrated application in healthcare practice within peer-reviewed publications?*
    b. *What are the documented benefits and challenges associated with the use of sustainability approaches?*
    c. *What impact have sustainability methods shown on sustainability outcomes?*

ii. **Relevant Studies:** Relevant studies were retrieved through electronic citation tracking and snowballing.[212] Each paper introducing a sustainability approach was identified and the citation tracking function within the relevant databases were used to determine their use in further peer-reviewed publications. Snowballing of reference lists was also employed to locate further relevant papers.

iii. **Data collection process and study selection:** Eligibility criteria included: publications in the English language, within a healthcare setting, and documented use of a sustainability approach with the study methods. The retrieved papers underwent initial abstract and title screening. Protocols, editorials, commentaries and conference proceedings were excluded. Following initial screening, full-text screening was conducted for all papers.

iv. **Data Extraction, Data items and Data synthesis:** A data extraction table was designed to record the key components and information from the retrieved papers. This data extraction table also allowed for structured analysis and interpretation. Data extraction included: *Author(s), journal, year of publication, country of study, study methodology, sustainability approach used, purpose of use, description of use, healthcare setting (primary, secondary etc.), timeframe, measurement, documented benefits and challenges, reported sustainability outcome.* Data was independently extracted by myself on an excel spreadsheet which was continuously updated

throughout the research project and after the quality assessment phase of the study. Data extraction was then independently conducted and checked by a second author. Although scoping reviews do not consider critical appraisal tools mandatory, the lack of rigour of much of the sustainability research, prompted me to use a quality assessment tool within this study.[28,210,213] To establish study quality, the Mixed Method Appraisal Tool (MMAT) was used.[214] A second author performed quality assessment independently which was then reviewed against the full-text articles myself. Only studies meeting the standards set forth in the MMAT were included in the review.

v. **Collating, Summarising and Reporting the Results:** Following the quality assessment, final selected papers were summarised using descriptive statistics and narrative summaries to show the studies characteristics, purpose of use, the benefits and challenges of use as well as impact on sustainability outcomes. As this review focused on published sustainability approaches, publication bias may have affected the results of this study. The time scales of publication may have also created a bias within the results as older approaches have had more time to accumulate evidence on use and therefore may appear stronger than newly published approaches.

2.4.3 Longitudinal Mixed Methods Study

A longitudinal mixed methods study was conducted to respond to the research question: *How does the use the Long Term Success Tool throughout an improvement initiative impact the process of sustaining across three QI programmes?* A longitudinal mixed methods approach was chosen for a number of reasons. Specifically this approach:

i. Recognised that the study and assessment of sustainability requires using mixed methodologies to capture the necessary information on how and the why sustainability occurs and how this can be influenced.[10,13,28,155,172] The use of mixed methods not only responded to the criteria recommended by my critical realist stance but also enabled key sustainability measurement to be collected along with the necessary detail to describe initiative sustainability.[167,171,172]

ii. Permitted a longitudinal approach for data collected over multiple time points capturing both variation and learning.[10,155] Previous studies have also been criticised due to the short timeframes considered and their lack of in-depth focus on long-term processes.[30,197] A longitudinal approach allowed for the ongoing monitoring of

initiatives through the LTST to more accurately consider how sustainability was being influenced and achieved.[178]

iii. Enabled the prospective study of the longitudinal use of a sustainability tool to capture its application and results and impact on wider system actions and planning as suggested by the literature.[45,181] Assessing sustainability at multiple time points was also suggested in section 2.2.2 Recommendations for Studying Sustainability to capture nonlinear trends related to sustainability.[10,14,45,155,183]

2.4.4 Case Study Approach

For this thesis I employed case study approach which used both single cases as well as multiple case design.[215]

Single Case Design

Single case reports were used to respond to the research question: *How does the process of sustaining manifest in practice?* Case studies provide an in-depth understanding of the sustainability journeys within specific initiatives. This approach was particularly important to my research questions as it:

i. Provided an non-experimental 'intensive' research design to examine the relationships and processes relevant to sustainability.[28,174,175] Case study approach aligned well with previous recommendations which suggested that case studies can accurately assess whether or not sustainability has been achieved and highlight what sustained and why.[52,176–179]

ii. Enabled a holistic examination of the complex social processes and mechanisms underpinning sustainability across healthcare contexts.[215] This approach was viewed as specifically appropriate as the boundaries between phenomenon being studied (sustainability) and context (healthcare) were not clearly evident.[215] It also lent itself to the explanatory questions of this study which explore the process of sustainability and how teams navigate this process in practice.

iii. Allowed for flexibility and consideration of both anticipated findings and emerging themes and results.[216] This was particularly important given the complexity lens chosen for this thesis which acknowledges the importance of emerging solutions and strategies. The case study approach enabled the exploration of fundamentals concepts of interest for this thesis such as self-organisation, emergence, and sensemaking.[78–80]

Multiple Case Study Design

Multiple case study design was used to respond to the research question: *How do improvement teams manage and respond to issues influencing sustainability in order to sustain improvements?* This approach was seen as particularly important as it:

i. Enabled more reliable theory building, which was necessary to unpack the shared learning across initiatives to build knowledge on the actions and strategies undertaken to sustain improvements.[217]

ii. Enabled the use of multiple sources and data collection techniques to provide different perspectives on the phenomena being studied as well as triangulation of findings.[218] All of which are recommended in the study of sustainability in healthcare (see section 2.2.2 Recommendations for Studying Sustainability).[28,45,155] A key limitation of sustainability research has been the subjective nature of data collection.[10] The use of multiple case studies allowed for triangulation and multiplism in my research and allowed data collected within my studies to be validated through the use of multiple respondents within and across inititiaves.[2,28,45]

2.5 Programmes and Cases

All empirical data for this thesis was collected from three QI programmes. Below I outline how and why programmes were selected for the empirical LTST study followed by how and why individual initiatives were selected for the case studies. I then describe the process for gaining access to participants in each programme.

2.5.1 Programme Selection

The QI programmes included in this study were purposively selected for both theoretical and pragmatic reasons. Due to the longitudinal nature of the work, multiple opportunities for contact and data collection using the LTST were necessary. While a number of QI programmes used the LTST during the study period, only the selected programmes met the inclusion requirements and were able to provide multiple data collections points. The selected programmes had also agreed to participate in the research work and permitted access to the LTST reports from the programme. The LTST was used within three diverse Quality Improvement (QI) Programmes across the UK from January 2015 to July 2017. Programme 1, CLAHRC NWL, acted as the primary setting of study, allowing for in-depth investigation with ongoing interactions and observations. Programmes 2 and 3, were investigated in less depth

and accessed intermittently throughout the study to provide broader contextual information on the use of the tool from a larger number of improvement teams across multiple settings. Studying multiple programmes enabled the tool's application and impact across different contexts and settings to be examined and provided insight into the potential generalised learning on its benefits and challenges.

A brief description of each programme is presented below in Tables 5-7. Each programme's aims, initiatives, and approach to QI are described. Each programme was delivered through a number of improvement initiative teams. The initiatives teams from each Programme are summarised in Table 8.

Table 5: Programme 1 Description

Programme 1- CLAHRC NWL
Programme 1 was a research program supporting frontline care teams to implement evidence-based practice. The Programme has been described above in section 2.3.3 CLAHRC Northwest London and is summarised below. • **Aim:** The programme aims to close the 'second translational gap' (the gap between development of innovative interventions and processes and their implementation in clinical practice).[85] The tool was used at designated time points throughout all initiative journeys (initially at 3 months post initiative start followed by use every quarter thereafter). Tool responses and scores were collected using the programme's online QI reporting system. • **Initiatives:** The programme supported improvement initiatives across a diverse range of health topics and disease areas in different healthcare settings. Initiatives covered an 18-24 month period with the aim to have established improvements that will sustain thereafter. • **Approach to QI:** The programme advocates a systematic approach to quality improvement which includes the use of specific QI methods and tools including the Model for Improvement, Measurement for Improvement, and Action Effect Method.[35,95,200,219] The approach also explicitly included the use of the LTST at quarterly intervals to bring attention to actions needed and improve the chances of new practices becoming a sustained part of care delivery and practice.[35]

Table 6: Programme 2 Description

Programme 2- Improving Unscheduled Care

Programme 2 was a government led initiative that involves supporting and implementing unscheduled care improvement teams in hospitals. This programme followed on from a national initiative, the Unscheduled Care Collaborative Programme (UCCP), which was launched in May 2005 to reduce waiting times in accident and emergency (A&E) across Scotland.[115]

- **Aim:** The programme aimed to improve care pathways as well as meet a four hour A&E target across Scotland.[220] This programme engages and supports healthcare teams to overcome challenges and provides targeted investment to support improvement with the use of local improvement teams.
- **Initiatives:** The Scottish government recognised that in order to ensure sustainable improvement a new approach was needed in unscheduled care. This led to the creation of a programme which involved supporting and implementing local 'Unscheduled Care Performance Improvement Teams' in hospitals. Teams were set up within the Scottish health boards with each team representing a specific region.
- **Approach to QI:** The programme drew on Lean thinking and QI concepts to manage patient flow areas (minor injury and illness, acute assessment, medical admissions, and surgical admissions). The approach followed collaborative methodology which highlighted the interdependencies between departments and processes within acute hospitals. Improvement Teams attended learning and improvement workshops where innovation and best practices were shared, and QI skills were developed. Teams were introduced to the LTST at improvement workshops beginning in July 2015.

Table 7: Programme 3 Description

Programme 3- Clinical Innovations in Healthcare

Programme 3 was a Master's Programme set up in partnership between a health education network and an academic institution in Oxford.

- **Aim:** The programme aimed to promote continuous learning to support innovation adoption at scale throughout the NHS. All programme participants were managers and clinicians from NHS organisations. The programme aimed to support participants to develop the tools and skills necessary to approach clinical innovation adoption within

their organisations. The programme consisted of two modules, which ran from February 2016 to June 2016 and September 2016 to January 2017 respectively.

- **Initiatives:** Participants designed and implemented an innovation project within their workplace settings. Project topics were wide ranging. Some sought to improve service quality (e.g. Developing better practice in day services at a local Hospice or improving run through labelling to process blood samples taken in GP practices) while others aimed to introduce new practices (e.g. Establishing a nurse led preoperative anaemia clinics or introducing a Unit-Dose drug distribution system).
- **Approach to QI:** The programme took a continuous learning approach to support innovation adoption. To support participants in developing the skills they would need to approach clinical innovation, the programme advocated a number of QI methods and tools through the module with sessions on: stakeholder mapping, process mapping, Driver Diagrams as well as Sustainability and the LTST.

Table 8: Initiatives within each Programme

	Programmes			
	Programme 1	**Programme 2**	**Programme 3**	
Initiatives	1. MedRev 2. Wellbeing 3. Allergy 4. Heart Failure 5. Asthma Bundle 6. Breatheasy 7. Alcocare 8. HeartBeat 9. Wellbaby 10. SurgPrep 11. DrinkUp	1. Alpha 2. Beta 3. Gamma 4. Delta 5. Epsilon 6. Zeta 7. Theta 8. Iota 9. Kappa 10. Lambda 11. Mu 12. Nu 13. Xi 14. Omicron 15. Pi 16. Rho 17. Sigma 18. Tau 19. Upsilon	1. Stitchup 2. MyPathway 3. Clarity 4. MedRead 5. SpineClinic 6. Independence 7. Palliation 8. EngagingU 9. FluReview 10. WashUp 11. Together 12. Collective 13. Medtranslation 14. Medport 15. TelelCinic 16. Better Blood 17. No Pressure 18. Photocare	19. NoFalls 20. MedDirect 21. IVdesign 22. Mederror 23. Checkit 24. Uri-Protocol 25. Vacdressing 26. Workforce

2.5.2 Case Selection

All cases for the case study came from Programme 1, CLAHRC NWL. This selection served both pragmatic and theoretical purposes. From a theoretical point of view, my goal in doing case study research was to expand and generalise theories (analytic generalisations) on the

process of sustaining and not to produce statistical generalisations.[215] A multiple case study approach allowed for more empirical evidence and multiple perspectives to be examined to increase the possibility of generalisability and validity of findings.[215] Selecting cases from the same programme allowed me to look for 'literal replication' in cases to uncover patterns of shared learning and strategies to sustain.[215]

For pragmatic reasons, I had the necessary access and proximity to study CLAHRC initiatives in sufficient detail to respond to my research questions. This study required ongoing observations and data collection and therefore continual access to teams was crucial to my findings. I aimed to prospectively measure sustainability of initiatives and undertake follow-up interviews at least one year post funding. Therefore, the need for appropriate time for investigation and follow up directed case selection at CLAHRC NWL. At the beginning of this PhD thesis, CLAHRC NWL was rolling out a new round of initiatives. Six improvement initiatives had commenced in September 2014 and would run for approximately 18 months. Data collection initially began for all six initiatives, two initiatives became less active and did not establish teams or use the LTST, and were excluded from the study. The four remaining initiative teams were included is the study. The diverse aims and settings of the initiatives was key to understanding if analytic generalisations and cross site learning could be found.

The four cases cover a range of clinical conditions and healthcare settings. All case interventions came from established evidence, which demonstrated the potential improvements to patient care and/or outcomes.[221–224] The first case study is *Wellbeing*, which aimed to improve the documentation and communication of physical health assessment for patients admitted with an acute mental illness. The second is the *Allergy* initiative, which aimed to improve allergy care for children in secondary services. The third is the *Heart-Failure* initiative, which utilised a heart failure care bundle to improve care for patients with heart failure. The fourth is *MedRev*, which aimed to improve medication reviews in patients over the age of 70 within acute care settings. Background information for each case is presented in Table 9. Each initiative worked within the CLAHRC NWL's systematic approach (described in section 2.3.3 CLAHRC Northwest London) and were supported by members of the CLAHRC NWL team with QI expertise.

Table 9: Case Description and Background

Overview of the Four Case Studies				
	Wellbeing	**Child Allery**	**Heart Failure**	**MedRev**
Initiative aim	To improve the physical health of people with severe mental illness that are admitted to a specific acute admissions ward.	To improve delivery of specialist allergy services in a secondary care setting.	To improve the health, quality of life and experience of care for patients with acute heart failure	To undertake a structured medication review for patients ≥70 years who were potentially on inappropriate medicines
Intervention(s)	Physical health assessment form, training for staff on assessment and interventions, patient-held health record	Diagnosis and treatment training sessions; nurse-led asthma clinics, allergy network meetings, updated A&E and school referral pathways	Heart Failure Care Bundle	Multidisciplinary team meetings, medication review tool, education and training of undergraduate pharmacists and junior doctors
Organisational setting	Acute admission ward	Site A- integrated care trust Site B- Acute hospital	Acute hospital	1 acute teaching hospital, 4 care of the elderly wards
Resource	Funded by a grant from a charitable organisation. CLAHRC NWL provided resources in the form of QI staff support and expertise.	Site one was a commissioned service. Site 2 was funded by a CQUIN to reduce asthma admissions. CLAHRC NWL provided resources in the form of QI staff support and expertise.	Funded an initial grant over 18 months by CLARHC NWL, staff time and resources were match funded by the host organisation.	Funded an initial grant over 18 months by CLARHC NWL, staff time and resources were match funded by the host organisation. Roll-out sites received additional funding for pharmacy time and participation.
Improvement Team	Led by Clinical Psychologist and a Psychiatrist. Team included doctors, nurses, ward manager, community nurses, QI manager, and service users.	Led by 2 consultant paediatricians. Teams included clinical nurse specialists, community nurses, project manager, data analyst, QI manager, nutritionists, and GPs.	Led by a cardiologist and a nurse. Team included: heart failure nurses, data analyst, service manager and QI manager.	Led by a Pharmacist. Team included: staff pharmacists, doctors and nurses, administration staff, patient representatives, and QI manager.

2.5.3 Gaining Access

Gaining access to participants and data for the empirical studies required different approaches across each programme. As a recognised researcher within Programme 1 (CLAHRC NWL), gaining access to the initiative documents, interviewees and observations was straightforward. All CLAHRC NWL initiative teams had consented to participate in research activities over the period of the programme. This 'insider' status allowed me to build relationships prior to the start of the study and readily have access to key leaders and team members as well as initiative meetings and relevant documents.[225] This was supported further by my knowledge of the CLAHRC NWL structures, acronyms, and history with the sites involved in the new initiatives. For these reasons, I was able to quickly familiarise myself with any initiative details prior to data collection for this work.[226] Access to individuals and teams was a natural progression of contact, as I had been involved in supporting initial initiative events where project set up and initiative aims were established. I was therefore familiar with a number team members. Programme 1's LTST data was collected as part of the systematic approach within the programme via an online QI portal.[219] As a researcher within this programme, I had administrative rights to view and access this data freely. The impact of this 'insider' status is discussed further within the research reflexivity section on page 90.

Access to participants in programmes 2 and 3, required more formalised and planned interactions. The lead for Programme 2 reached out to CLAHRC NWL for support in sustainability teaching at their improvement workshops. For Programme 2, the LTST was used within their QI workshops along with introductory teaching on sustainability. I gave this teaching and introduced the tool to participants within the workshops. This allowed me to gain access to and re-visit the participants at two following improvement workshops. At these workshops, I was able to undertake observation of the tool in use as well as collect LTST scores from the participants. Programme 3 also reached out to CLAHRC NWL for recommendations on teaching and assessing sustainability within their innovation initiatives. The course director arranged three sessions related to sustainability as part of the course curriculum. Similar to Programme 2, this allowed me the opportunity to gain access to the participants through the multiple teaching sessions and observe the tool use and feedback as well as collect LTST results. Access to interviewees in both Programmes 2 and 3, was guided by the programme leads who acted as gatekeepers to participant emails and contact information. Each lead initially contacted participants within their programmes to ask if I could get in touch with them

regarding an interview on the LTST and sustainability of their initiatives. If they consented, I was then permitted to contact them via email to request and set up an interview.

2.6 Data Collection

The data collection for this PhD took place through a number of complementary methods across the empirical studies (Figure 4). Below I summarise how each method contributed to the empirical studies and outline the process for data collection.

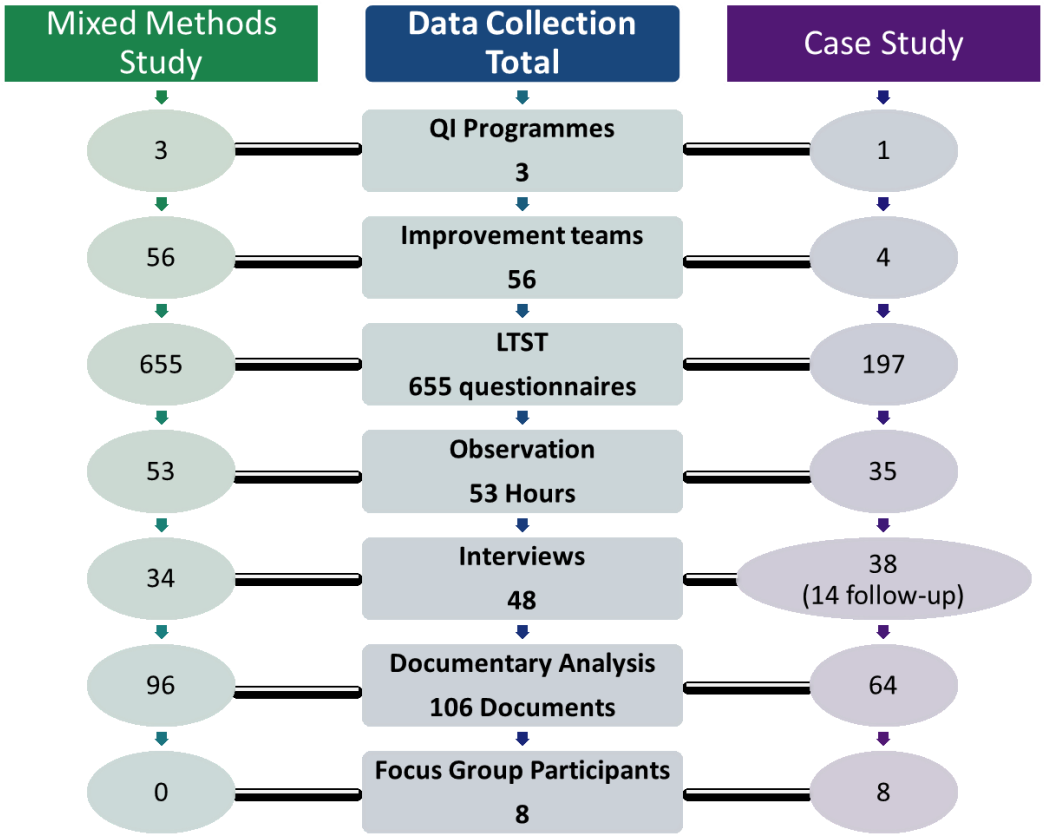


Figure 4: Data Collection Methods across Empirical Studies

Longitudinal Mixed Methods Study The longitudinal mixed methods study used multiple programme data to investigate the use and impact of the LTST. Data was collected from improvement teams across all three Quality Improvement programmes. The LTST was used across programmes and LTST reports were collected. I conducted observation at meetings and workshops where the tool was used and where results were discussed. Semi-structured interviews were conducted to gain in-depth understanding of perceptions of the tool as well as sustainability challenges and facilitators. Documents such as meeting minutes and initiative

reports were also consulted to enhance knowledge of the programmes and associated infrastructures, policy issues and supporting evidence.

Case Study Approach The case study approach used a focused lens on the data to concentrate only on the sources relevant to the sustainability journeys of four improvement initiatives cases. All four case study teams were followed from initiative inception to at least one year post funding. Data sources for the cases included LTST reports, observations, semi-structured interviews, documentary analysis as well as a focus group. Data was used to obtain both retrospective and real-time accounts by those people experiencing the phenomenon of interest.[227]

I. Long Term Success Tool

The LTST was used to collect data on and assess 12 factors for sustainability across the programmes and intiatives.[35] The LTST questionnaire consisted of 12 questions rated on a 5 point Likert scale (Very good-Very poor) as well as 'no opinion' and 'don't know' options (Appendix C). The questionnaire was a helpful mechanism to collect standardised information from diverse groups of people and was useful way to identify themes or patterns across large groups of people and organisations.[228] The LTST was used by the QI programmes at varying intervals throughout the duration of their initiatives (Full information on tool application can be found in the Chapter 5). Tool responses were collected on a paper questionnaire form, online Qualtrix survey or on an online QI system for healthcare.[219,229]

A description of the Long Term Success Factors can be seen in Table 3 on page 59. Each question includes an area for free text comments for each factor. Team scores are collated to produce reports which include simple statistics such as range and mean, visual charts as well as comment lists for each factor. LTST data collection across the programmes is summarised in Table 10.

Table 10: LTST Data collection

	Programme 1	**Programme 2**	**Programme 3**	**Total**
Number of Teams	11	19	26	**56**
LTST questionnaires	350	126	182	**658**
LTST Reports	50	34	36	**120**
LTS comments	927	803	620	**2350**

II. Observation

Participant and non-participant observation of improvement teams took place to identify how teams discuss sustainability within their projects and how the LTST was used in practice. Observations were conducted at facilitated workshops, working sessions, teaching sessions and routine meetings where the LTST was used and where results were discussed and where initiative planning and development took place. Within the workshops and teaching session I was a participant observer as I responded to questions and interacted in conversations.[230] In the team meetings, working sessions and reviews, I was a non-participant observer and did not take part in discussions or activites.[230] As alluded to above in section 2.5.3 Gaining Access, the programmes required slightly different approaches to observation. Observation at Programme 1 was relatively straight forward, consisting of identifying upcoming meetings and relevant events from my colleagues. In the cases of programmes 2 and 3, the observations were limited to specific sessions or events I was invited to attend (training sessions and workshops) where the LTST was used and discussed. This arrangement was a pragmatic response to constraints of accessing wide ranging and geographically disparate teams. I was able to observe key areas of sustainability planning and discussion, and I felt this was adequate in ensuring that sufficient and relevant observation data was gathered in each site. Conducting observations allowed an understanding of how sustainability was discussed within teams and how participants were navigating and acting to address sustainability challenges.[231,232] The ability to observe and revisit the teams on multiple occasion enabled me to follow the programmes and initiative projects to understand their development and attempts to embed initiatives in organisations.

Recording observations and field notes: An observation schematic was designed to frame observations and guide observation topics of interest (Figure 5). This schematic condensed the large amounts of fieldwork data into manageable chunks linked to my research questions and maintain focus on the main areas of interest throughout diverse meetings. Observations were recorded in a field notebook. Specific meetings were also audio recorded (e.g. review meetings) and transcribed. Each observation included the date, time, meeting/event being observed, location and the initials of attendees where possible.

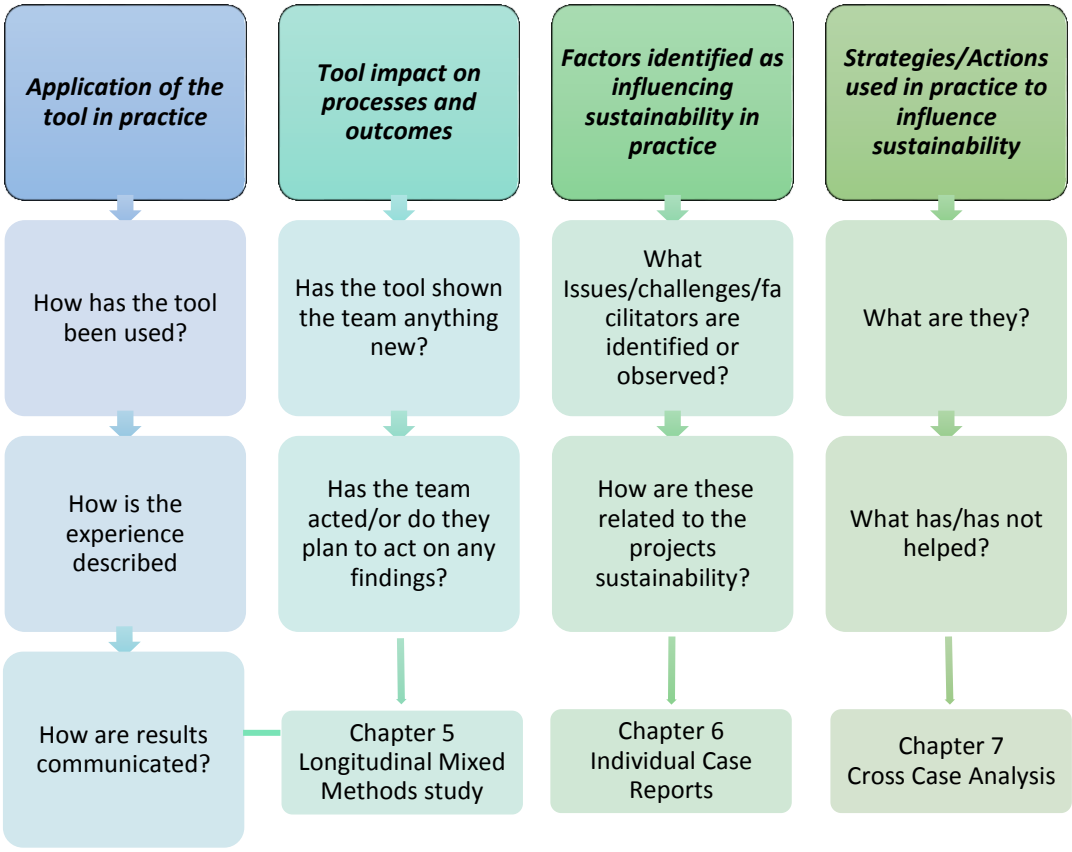


Figure 5: Observation Schematic

In total 53 hours of observation took place (Table 11). The mixed methods study (chapter 5) drew on observations from all teams across the three programmes of study (53 hours). The case study approach (chapters 6 and 7) drew only from observations within the four cases of interest within programme 1 (35 hours).

Methodological Reflection: At the start of observation meetings, I or the clinical lead etc. would briefly explain the study and ask for verbal consent of the participants. Throughout the study all participants consented, allowing all meeting I attended to be observed. Visibility of observation of participants is known to have an impact on the situations being observed, even if the researcher is considered an impartial onlooker.[231] Throughout the study, my presence potentially impacted the behaviour of individuals, particularly when those being observed may not have overtly discussed sustainability. On several occasions, my presence may have prompted the team to more explicitly discuss the issues related to sustainability. This was made clear to me on a few occasions where those discussing sustainability would look in my direction, give me a nod or smile to acknowledge the topic of my interest had come up. However, my presence was also equally overlooked in other cases where discussions followed

the planned agendas with no explicit mention of sustainability and participants appeared to continue in their normal patterns of behaviour.

Table 11: Observation Log

Programme	Date	Initiative	Meeting type	Time	Observation hours
1	27/11/2014	MedRev	Team meeting	12:00-14:00	2
1	20/01/2015	AlcoCare	Team meeting	15:00-16:30	1.5
1	26/01/2015	Allergy	Team meeting	9:00-12:00	3
1	12/06/2015	Wellbeing	Team Meeting	15:30-17:00	1.5
2	17/07/2015	All	Workshop	9:30-12:30	3
1	12/08/2015	Allergy	Team meeting	11:30-14:00	2.5
1	13/08/2015	MedRev	Team meeting	9:30-11:30	2
1	23/10/2015	Allergy	Review meeting	16:00-17:00	1
1	02/11/2015	Heart Failure	Team meeting	15:30-17:00	1.5
1	15/11/2015	Wellbeing	Team meeting	15:30-17:00	1.5
2	16/11/2015	All	Workshop	9:30-12:30	3
1	25/11/2015	MedRev	Programme support meeting	9:00-11:00	2
1	02/12/2015	Allergy	Review meeting	15:30-16:30	1
1	27/01/2016	Heart Failure	Programme support meeting	9:00-11:00	2
1	13/02/2016	Heart Failure	Team meeting	15:00-17:00	2
1	18/02/2016	DrinkUp	Team meeting	10:30-12:30	2
1	02/03/2016	Allergy	Review meeting	15:30-16:31	1
1	04/03/2016	Allergy	Review meeting	15:00-16:00	1
1	17/03/2016	MedRev	Team meeting	10:00-11:00	1
3	17/03/2016	All	Teaching session	11:15-13:15	2.5
1	06/04/2016	Wellbeing	Programme support meeting	9:00-10:30	1.5
1	08/04/2016	Wellbeing	Team Meeting	15:30-17:00	1.5
3	19/05/2016	All	Training session	10:00-12:30	2
1	20/07/2016	MedRev	Learning event	13:40-14:40	1
1	21/07/2016	AlcoCare	Learning event	11:30-12:30	1
3	17/11/2016	All	Training session	10:00-12:30	2.5
1	22/02/2017	Wellbeing	Programme support meeting	9:00-10:00	1
1	17/11/2017	Heart Failure	Team meeting	15:30-17:00	1.5
2	05/12/2017	All	Training session	12:30-15:15	3
1	16/01/2018	Heart Failure	Team meeting	16:00-17:00	1
	Total				**53**

III. Interviews

Semi-structured interviews were conducted to gain in-depth understanding of sustainability planning, discussion, decision making, as well as processes and actions. Semi-structured interviews are the most widely used method of collecting qualitative data.[233] Their flexible framework provides a loose structure of open ended questions to explore attitudes and experiences of partcipants.[233] In this study, the interviews enabled an in-depth exploration of the phenomena being studied and facilitated understanding of perspectives on sustainability experiences including the process of sustaining, challenges and facilitators encountered as well as impact of the LTST.[234]

For this thesis two rounds of interviews were conducted. The first round of interviews were used to explore questions for both empirical studies (n=34). The interview questions explored perceptions on challenges and facilitators to sustainability as well as the role and impact of the LTST within initiatives. The second round of interviews were conducted to follow-up with the four cases within CLAHRC NWL only (n=14). These interviews explored initiative progression and sustainability outcomes. Interviewees were specifically asked about how the main perceived challenges reported in the first interviews had impacted the initiative and if any action had been taken to address these issues. Interview guides used for both rounds of interviews can be found in Appendix F.

Sampling: A purposive sampling strategy was used to recruit interviewees from across improvement teams.[226,233] Participants were selected based on their role within the improvement projects and their level of knowledge and specific expertise related to the project. This approach aimed to maximize the diversity of perspectives gained from the interviews.[235]

Individuals were approached in person or via email by either myself or the programme leads where appropriate (2.5.3 Gaining Access on page 73). Potential participants were sent a copy of the study information sheet and an interview time and venue was set at the convenience of the individual. Interviews primarily took place in the participants' workplaces or a familiar location to them, to ensure they were in a relaxed environment.[234] For the follow-up interviews with the four case studies, original participants within the cases were approached to see if they still had an active role in the initiative. Several participants (n=8) had left their roles during the

follow up period, therefore further participants with a role in the ongoing initiatives were recruited using snowball sampling.

In total, 48 interviews were carried out with 41 individuals (Table 12). Average interview length was 52 minutes. This included 34 interviews carried out for the longitudinal mixed methods study and 38 interviews were carried out for the Case Study. Interviews were carried out in face-to-face interviews (n=32) or via Skype (n=2) or telephone (n=14). In general, participants were receptive to being involved in the research and the large majority consented to be interviewed (52 approached 48 accepted). All participants responded to initial invitations but four were unable to participate given availability within the data collection period. All interviews were audio recorded and professionally transcribed.

Methodological reflection: Interviews for this study were carried out by four interviewers from Programme 1 (CLARHC NWL). This was for both strategic and pragmatic reason. As I was involved in the development of the LTST and was recognised as a sustainability-focused educator, it was recommended in the early stage upgrade of this PhD, that I involve other researchers as well as myself to conduct interviews. This was meant to mitigate possible biases related particularly to responder bias.[236] I performed the majority of the interviews (n=33) while my colleagues performed the remaining 15. This also served a pragmatic purpose as multiple research studies within the programme drew on the same initiatives. Therefore, in order to not over burden participants with multiple requests for interviews, where possible research studies requiring interviews were coordinated and interview guides were combined (e.g. a participant would be asked about sustainability as well as another QI method such as Process Mapping).

Table 12: Interviewee list

Programme	Participant ID	Initiative	Role/professional role	Study (Longitudinal Mixed Method, Case Study or both)	First round interview	Second round interview
Programme 1	**I1**	Wellbeing	Clinical Lead	Both	Yes	No
	I2	Wellbeing	Clinical Lead	Both	Yes	No
	I3	Wellbeing	Service User	Both	Yes	yes
	I4	Wellbeing	Nurse	Both	Yes	No
	I5	Wellbeing	Service User	Both	Yes	No
	I6	Wellbeing	QI Manager	Both	Yes	yes
	I38	Wellbeing	Doctor	Case Study	No	yes
	I39	Wellbeing	Project Manager	Case Study	No	yes
	I7	MedRev	Project Manager (site 1)	Both	Yes	No
	I8	MedRev	Patient representative	Both	Yes	No
	I9	MedRev	CLAHRC Theme lead	Both	Yes	No
	I10	MedRev	QI Manager	Both	Yes	No
	I11	MedRev	Pharmacist, Project manager Site 2	Both	Yes	No
	I12	MedRev	Pharmacist, Project manager Site 3	Both	Yes	No
	I13	MedRev	Clinical lead	Both	Yes	No
	I14	MedRev	Clinical Lead	Both	Yes	No
	I15	Allergy	Project manager (all sites)	Both	Yes	No
	I16	Allergy	Doctor (both sites)	Both	Yes	No
	I17	Allergy	Embedded researcher	Both	Yes	yes
	I18	Allergy	Clinical Lead (Site B)	Both	Yes	yes
	I19	Allergy	Nurse (Site B)	Both	Yes	Yes
	I20	Allergy	QI Manager	Both	Yes	No

	I41	Allergy	Nurse (Site B)	Case Study	No	Yes
	I37	Allergy	Nurse (Site A)	Case Study	No	Yes
	I40	Allergy	Clinical Lead (Site A)	Case Study	No	Yes
	I21	Heart Failure	QI Manager	Both	Yes	No
	I22	Heart Failure	Service Manager	Both	Yes	Yes
	I23	Heart Failure	Patient Representative	Both	Yes	No
	I24	Heart Failure	Data analyst	Both	Yes	Yes
	I25	Heart Failure	Project Manager	Case Study	No	Yes
	I26	Heart Failure	Data analyst	Case Study	No	Yes
Programme 2	**I33**	Tau	Programme lead	Mixed Methods Study	Yes	n/a
	I34	Xi	Project Manager	Mixed Methods Study	yes	n/a
	I35	Sigma	Nurse	Mixed Methods Study	yes	n/a
	I36	Director	Clinical Director	Mixed Methods Study	yes	n/a
Programme 3	**I27**	Module lead	Programme lead	Mixed Methods Study	yes	n/a
	I28	Workforce	Nurse	Mixed Methods Study	yes	n/a
	I29	Photocare	Nurse	Mixed Methods Study	yes	n/a
	I30	Medport	Project Manager	Mixed Methods Study	yes	n/a
	I31	Better Blood	Nurse	Mixed Methods Study	yes	n/a
	I32	Uri-Protocol	Project Manager	Mixed Methods Study	yes	n/a

IV. Documentary Analysis

Documentary analysis was used to provide in-depth understanding of the cases under investigation.[237] In order to explore each initiative's aims, progress and accomplishments, I analysed materials produced through routine meetings and initiative work, for example minutes of team meetings, sources describing the improvement project, or presentations/diagrams depicting internal progress and infrastructure. These materials were also used to investigate perspectives and contextual factors influencing the use of the LTST such as programme reports or webpages. Initiative and programme review reports were used to investigate key achievements and challenges encountered during the initiatives and identify actions (planned and/or executed) related to sustainability or the use of the LTST. These documents identified further risks and issues related to sustainability and provided contextual information. Table 13 outlines the documents collected for this study.

Table 13: Documentary Analysis Sources

	Programme 1					**Programme 2**	**Programme 3**	
Initiative	MedRev	Wellbeing	Child Allergy	Heart Failure	Other P1 Initiatives	All	All	Total
Meeting minutes	15	13	10	7	8	0	0	**44**
Review reports	3	2	3	3	24	0	1	**12**
Presentations	2	1	3	3	0	3	3	**15**
Webpages	0	0	1	0	0	3	0	**4**
Total	**20**	**16**	**16**	**13**	**32**	**6**	**4**	**106**

V. Focus Group

As noted above, for follow-up interviews, the four case studies were approached to participate in follow-up interviews. One case, MedRev, expressed the desire to have a focus group as the clinical lead and project manager believed it would be beneficial to get the team back together from across the sites to facilitate discussion about how the initiative was doing. A focus group was deemed to be a complementary method as it had the ability to draw on group dynamics to stimulate discussion and explore the topic in greater depth.[238] It was also believed to be a good technique to bring people together to discuss the initiative progress across the sites and enhance understanding of project journeys using open ended questions similar to those in the interview guide.[238] The focus group was attended by nine team members with one moderator (Table 14). The moderator was a Programme 1 team member (information analyst), known to the team but

not involved directly in the study. A series of questions and prompts were presented to the focus group (on PowerPoint slides) to encourage input and discussion from all. The focus group was audio recorded and professionally transcribed and observational notes were taken.

Table 14: Focus Group Participants

Participant ID	Role
I7	Project Manager/Pharmacist
I8	Patient representative
I10	QI Manager
I11	Pharmacist
I12	Project manager/Pharmacist
I13	Pharmacist
I14	Clinical Lead
I42	Former QI Manager
I43	Research Student

2.7 Data Analysis

Critical realist methodology calls for a systematic approach using clear justifications and reflexivity when analysing data.[173] The approach to data analysis taken within this thesis are described below.

2.7.1 Quantitative Analysis

Quantitative data from the Long Term Success Tool from all programmes was used to measure ongoing performance against the 12 sustainability factors over the study period. LTST Scores for all samples were extracted from Qualtrix and the online QI system into a central Excel database where the Likert ratings were normalised in a numeric scale (5=Very Good to 1=Very poor). Team scores were aggregated and compared across time points with an overall Long Term Success Score calculated for each initiative at specific intervals. The calculated score compares the scores given to the maximum possible score for each factor (maximum score is calculated by multiplying the number of people scoring a factor by the max score of 5). Table 15 shows an example Long Term Success Score calculation for one factor.

Table 15: Example Long Term Success Score Calculation

Factor	Rating	Numeric Value	Respondent Count (n)	Translated Score (X)=(n*Value)	Maximum Score (5n)	Long Term Success Score= (X)/(5n) x 100
Progress Monitored	Very Good	5	0	0	0	(25/35)x100
	Good	4	5	20	25	
	Fair	3	1	3	5	
	Poor	2	1	2	5	
	Very Poor	1	0	0	0	
Total	-	-	7	**25**	**35**	71.4%

This allowed for LTST scores of each initiative or programme to be represented over time within each of the 12 factors and for each initiative to be given aggregate LTST scores over the period of study. For example, Figure 6 displays Allergy's LTST scores for each factor throughout their initiative. LTST data was used as mechanism to understand where to focus initial exploration and enquires in the qualitative data. Results are summarised using descriptive statics plus summary charts and graphs within the result chapters.

Qualitative comments for the LTST were used to provide contextual information on teams as well as explore actions and plans identified within the reports. These comments were uploaded to NVivo with other qualitative data for analysis of the full dataset.

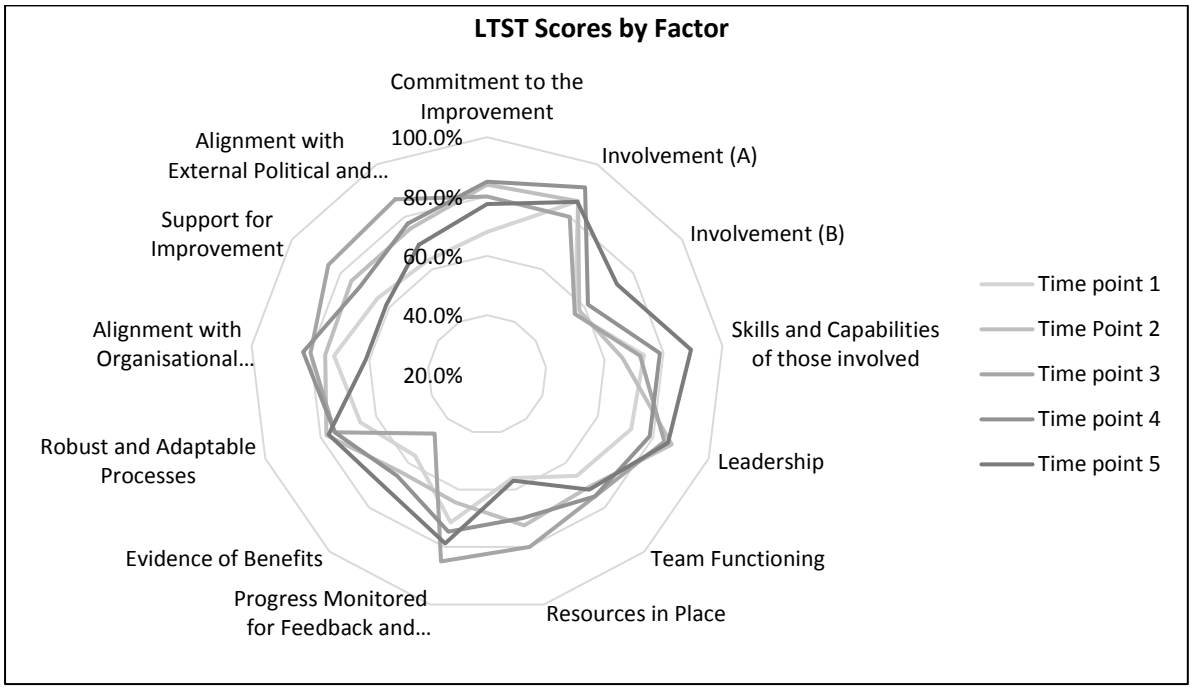


Figure 6: Example Initiative LTST scores for each factor throughout their initiative

2.7.2 Qualitative Analysis

The numerous sources and depth of qualitative information collected, is a significant challenge to analysing and summarising qualitative data.[218,239] This process can be supported through breaking data into an overarching classification system to organise and manage data.[240] My research questions required a broad perspective of sustainability and its associated constructs. To accommodate multiple conceptualisations as well as diverse factors, thematic content analysis was deemed to be the most appropriate technique to begin analysis.[241] Thematic analysis is widely used and supported in sustainability research as it enables categorisation of the data into recurrent and common themes and provides a graphic representation of how raw data fed into themes demonstrating rigor in qualitative research.[61,227,242–244]

Two qualitative analysis databases were developed using Nvivo 10 to conduct both the mixed methods study and case study analysis.[207] Each analysis began in the same way and used both a deductive and inductive approach. LTST reports, documents and observation field notes were imported into Nvivo 10 for analysis.[207] The analysis broadly proceeded in a number of recognised stages which guide thematic analysis.[245–247] The first stage of analysis was familiarisation which involved reading each source and revisiting and modifying (correcting transcription errors, fixing spelling mistakes etc.) material as necessary. A preliminary coding structure was developed using the Consolidated Framework for Sustainability Constructs in Healthcare (see Chapter 3 section 3.3.3 Sustainability Constructs page 111).[209] The coding framework was then applied to all qualitative data sources by coding the data to the established nodes.[247] Coding structures were iteratively developed, integrated and refined as further data were added to the dataset.[248] This process allowed for the development of themes specific to the research questions to be inductively derived.[209] The data was then summarised to highlight reoccurring themes, experiences and perspectives allowing for general inferences to be explored.[239,247] This process facilitated abstract thinking and theorising about the constructs underpinning sustainability conceptualisation, planning and actions.[239] Throughout analysis, the coding construct definitions (Appendix G) were used as a reference to define and bound each construct. Inductive analysis was used to add new constructs/themes and provide greater specificity within the nodes where necessary. This process allowed greater understanding where new themes were necessary and refining and consolidation of themes was needed. The evolution and adaptations to the framework are discussed in the Discussion chapter in Table 46.

2.7.3 Case Study Analysis

Case study analysis drew on the Qualitative and Quantitative analyses and followed specific stages (Figure 7) of production. The process began by establishing a case study protocol. This involved establishing case study aims, objectives, and research questions and describing the case of interest and the potential data collection procedures as well as study propositions (Table 16). These study propositions were developed to frame and guide the analysis and reporting of the multiple case study which is reported in Chapter 7.[215]

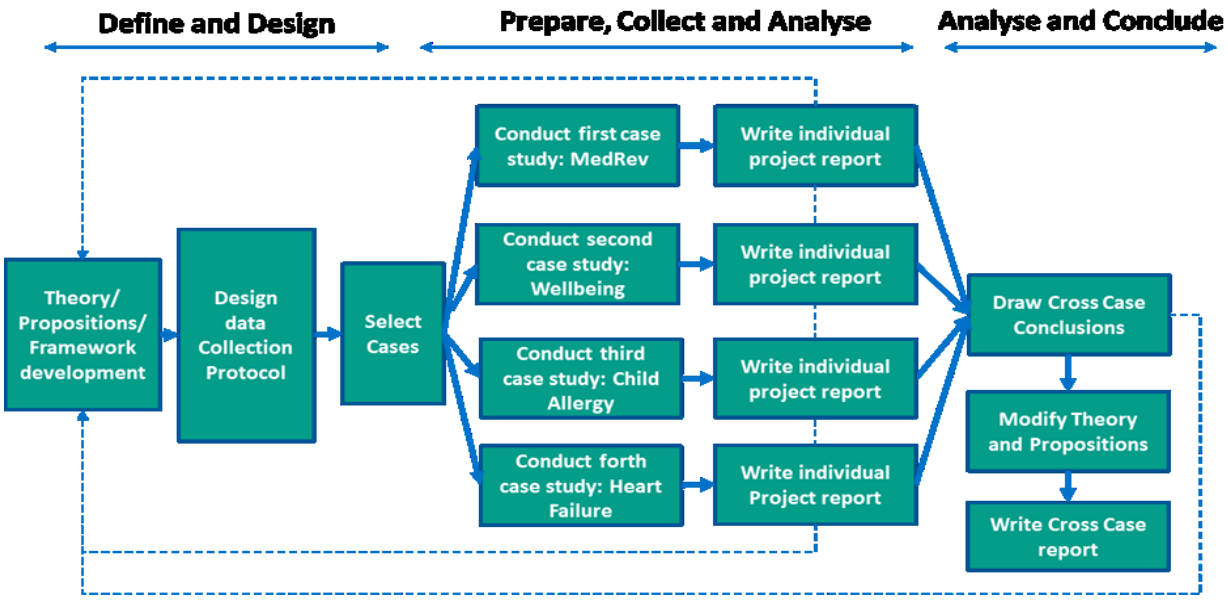


Figure 7: Case Study Design Diagram (Adapted from Cosmos Corporation in Yin et al. Page 60)

Table 16: Study Propositions

Study Propositions:	
i.	*Sustainability is an ongoing dynamic process which changes over time, requiring responsiveness and action from teams to sustain improvements*
ii.	*Common challenges to sustaining improvements will be identified across different initiatives and settings*
iii.	*Common strategies are used across teams to influence and improve chances of sustaining*
Rival Propositions:	
i.	*Sustainability is a linear process following successful implementation*
ii.	*Team encounter unique challenges specific to their settings as organisations*
iii.	*Team actions and strategies to influence sustainability will be context and site specific*

Following analysis of both the LTST scores and the qualitative data, individual case reports were drafted for each of the four case studies to respond to the research questions (Chapter 6).

The individual case reports broadly follow a linear analytic structure, where brief background is provided for each case, but the majority of the reports focus on describing only specific information needed to respond to the research questions of interest.[215] The individual case reports and Nvivo coding nodes were used to construct 'word tables' and matrices which allowed for commonalities and differences to be seen across the cases.[215] An example of a coding matrix can be seen in Table 43 in chapter 7, which highlights the coding of challenges and facilitators across the cases. This format was used as it facilitated the development of cross case analysis tailored to my specific interests.[215]

2.8 Thesis Validation and Reflexivity

Validating data analysis and interpretation of findings is a key component of a critical realist perspective as it allows for refinement and validation of findings to promote more accurate representations of the phenomenon of interest.[167,173] Four techniques were used within this thesis to support accuracy and reliability of findings: *methodological triangulation, validation exercises with participants, receiving feedback from academic peers* and *reflecting upon my own conduct and perspectives as the researcher*.

Methodological Triangulation

A key limitation to sustainability research has been the subjective nature of data collection.[13,45,112] Triangulation seeks to ensure a researcher's account approximates the truth as closely as possible, by balancing and negating the weaknesses and biases of each method.[241,249] Triangulation is also key to the methodological pluralism of critical realism (section 2.2.1 Study Design).[171] Triangulation of data sources, data types and researchers is a primary strategy that can be used to support critical examination of a phenomena from multiple perspectives.[250,251] This study specifically employed 'methodological triangulation' where each method of data collection (LTST reports, documents, semi-structured interviews and observations) brought a diverse yet complementary perspective to the research questions.[249] For example, meeting minutes provided a documented record of discussions while observations allowed for undocumented interactions or emotions to be captured.

Validation with Research Participants

Undertaking respondent validation and member checking was an essential component of the validation process for this thesis.[173,252] Firstly, debriefing of results at workshops and meetings, at CLAHRC NWL was used in order to have the data and research process reviewed by those familiar with the intiatives.[253] Initial findings were presented at internal meetings as well as research meetings attended by representatives from the cases themselves. These sessions provided feedback from participants in the study (team members, QI mangers and CLAHRC core team members), including reflections on the presentation and conceptualisation of the data. This fed into the analysis process while writing up the findings of this study.

I also endeavoured where possible to share learning and early findings with participants. Draft case reports were sent to participants to ask for any feedback or comments on the reports. Participants were asked if the account was realistic and accurate and if the interpretation of the data resonated with their experiences. I sent the report to 13 participants (project managers, clinical leads and QI managers) and six responded. Their feedback included comments on clarity and feedback on results, a number of participants provided follow up information and additional details. All participants commented that the reports reflected their work well and gave generally positive feedback. All feedback given was reviewed and incorporated into later versions of the case reports where possible. I also presented summary findings at CLAHRC NWL learning events, attended by participants as well as other improvement teams. A number of participants spoke with me following the presentations and noted that they appreciated seeing how the work was developing and commented that it was reassuring to know other initiatives were also struggling with similar issues.

For participants from Programmes 2 and 3, summary reports on key LTST findings and reflections following each workshop or teaching sessions were provided via email to the course coordinator and programme lead. Comments were requested on accuracy and presentation of the data. Neither programme lead made extensive comments but both reflected that the results 'felt right' and that the exercise had been illuminating for their programmes.

Academic Review and Critique

To understand the potential contribution of this work to the academic community, I had a number of opportunities to present my early findings for critique. This enabled feedback from

peers who were new to both the study and myself and could provide objective and independent review.[253] The systematic review and scoping review (Chapters 3 and 4) were presented at the BMJ International Forum for Quality and Safety: Improvement Science Symposium in 2016, The International Society for Quality in Health Care as well as The Global Implementation Conference in 2017. The systematic review was published in Implementation Science in February 2018. Comments and suggestions, from expert reviewers were invaluable in ensuring methodological rigour and enhancing clarity of findings. Early findings from the mixed methods study of the LTST in practice (Chapter 5), were presented at the Canadian Knowledge Mobilisation Forum in 2016. An updated paper with final analysis was subsequently presented at the Organisational Behaviour in Healthcare Conference (OBHC) in Montreal in May 2018. This paper will be published in the OBHC conference book (yet to be titled) in late 2019. The peer-review process for this publication highlighted the importance of this work and provided feedback on clarity and suggested key messages to focus reporting of the findings. The Case Study findings (Chapters 6 and 7) were presented at the Quality Improvement Research Network (QIRN) in 2018. At this meeting, I was able to present my main findings and discuss results with academic mentors and peers. The presentation of my early findings was key to understanding how my results were perceived by the field and enabled me to make further connections to relevant literature.

Researcher Reflexivity

A researcher's background and experiences influences what and how they choose to investigate topics as well as how they communicate results and frame conclusions.[254] Therefore it was essential to acknowledge my impact on the research and recognise potential biases throughout this thesis.[173,241] As beliefs, assumptions, and biases are often unknown or unrecognised to the researchers themselves, this required continual reflexivity during both data collection and analysis.[173,239,255] One of the main areas of concern related to reflexivity was related to my professional role and perspective. As an employee of CLAHRC NWL, I was an 'insider' with several roles: educator, researcher, nurse, colleague, friend.[256] While this insider status supported data collection and access to participants, it posed a challenge in remaining objective as there was little room for 'emotional distance'.[225] Recognising my own epistemological assumptions was a key step in my reflexivity process.[257] The critical realist approach for this study prompted recognition and acceptance of my internal experiences and biases. This means

I can recognise that my account of findings may be biased but they can still represent my interpretation of the truth and the reality I observed.

The use of multiple data sources and triangulation of data provided some assurance that I was approximating the truth as much as possible given the limitations. I also used a personal reflective diary throughout data collection and analysis, with real time notes on questions to consider, as well as possible areas for further exploration. Reflections ranged from quick notes on interviewee comments to longer entries on methods of interpretation and questioning assumptions made by myself or others (an example can be seen in Table 17). Reflecting upon experiences, allowed me to make sense of my data and acknowledge any discomfort felt, or judgements made, during interactions and data interpretation. It also allowed me to reflect on my conduct as a researcher to learn from my mistakes as well as recognise potential biases.

Table 17: Sample reflective diary entry

Reflective Diary Entry-*14/06/2016*
Two interviews yesterday and today with I15 and I7…I7 was very enthusiastic during the interview. She mentioned some issues with the tool such as people are often scoring different things…I feel a tension at times where I want to caveat the work done or explain how it should be viewed and I have learned this is not my place and to hold my tongue…I recognise this risk and it becomes easier to try to remain as impartial as I can. I am now very happy that another colleague is conducting some interviews for me as this allows more rigour in the work and I believe the other researchers will not feel this tension…

2.9 Ethics

This study was approved by the NHS Health Research Authority (IRAS 188851). This study was part of a larger research application for CLAHRC NWL. The full study protocol and approval can be found in Appendix H. Although the potential for distress or risks for participants in this study was low, ethical considerations for consent, confidentiality and data protection were made. Below I describe these aspects in more detail.

Consent

Participants were given information sheets about the study and consent forms prior to interviews and the focus group (Appendix I and Appendix J). Participants using the LTST were made aware that the information provided may be used for research (also stated on every LTST questionnaire). Participants were also given the option to not return their LTST questionnaire

if they did not want their information included in the study. As this study involved interviewing staff about their professional roles as well as their involvement in an improvement initiative, I was aware that participants may be uncomfortable sharing experiences or responding to questions if they felt they were being negative towards other colleagues or the organisation. To mitigate this potential discomfort, I endeavoured to build rapport with each participant and began interviews by reminding participants about their ability to stop the recording and withdraw from the study if necessary. I also reminded them that all data would be anonymised and never attributed to named individuals. Although no participants chose to withdraw their data, there were a number of occasions, where participants wished to say things 'off the record', so on these occasions I stopped the recording and the participants spoke freely. In all cases I assured participants that identifiable quotes would not be used and we continued the interviews leaving out specific names and details where they felt necessary.

Confidentiality and Data Protection

To ensure confidentiality, names of participants were not audio recorded during the interviews and each participant was assigned a unique identifier. All recorded and transcribed information as well as names and contact details were kept in separate, password protected files stored on Imperial College secure servers. Access was only permitted to myself and other approved researchers. All data remained fully confidential and findings are reported in an aggregated manner without reference to individuals' names. I have also attempted to maximise confidentiality of individual participants by using generic job titles such as doctor or nurse instead of specific grades or specialty titles.

2.10 Conclusion

This chapter outlined the ontological paradigms which drive current sustainability research, and described how critical realism specifically has impacted and shaped this work. This chapter also presented how a critical realist perspective and recommendations for studying sustainability, informed study design and methods used. The diverse methods used to explore the research questions were discussed along with the rationale supporting their use. Within this chapter I have also outlined how my personal views and potential biases may impact the interpretation and reporting of findings. Further limitations and personal reflections will be discussed in Chapter 8.

The following five chapters present my study findings. Chapter 3, presents and summarises published sustainability approaches which assess, influence or evaluate sustainability in healthcare. Chapter 4, explores the available evidence on the application and impact of these sustainability approaches in healthcare settings. Chapter 5 presents results for the mixed methods study describing the application and impact of the LTST on sustainability within three QI Programmes. Chapter 6 describes the four improvement initiative cases, highlighting initiative aims and achievements as well as sustainability conceptualisations and goals. Chapter 7 presents the cross-case analysis, describing shared experiences and common strategies and actions taken by teams to support sustainability.

Chapter 3: Sustainability Approaches in Healthcare_A Systematic Review

3.0 Chapter overview: This chapter presents findings from a systematic review outlining available sustainability approaches and their characteristics and constructs. For the purposes of this work 'sustainability approaches' refers to published models, checklists, tools, strategies, conceptualisations and frameworks which seek to assess, evaluate or influence sustainability of healthcare initiatives. A substantial number of approaches exist, with 62 identified and included in this review. Constructs across approaches were compared and contrasted and 40 individual constructs were identified. No two approaches contained the same combination of constructs nor did any single method capture all 40 constructs. Although variation was seen across approaches, results show that consistent constructs are observed across approaches regardless of the proposed intervention, setting or application. Six constructs were included in over 75% of the approaches: '*General Resources'*(90%), '*Demonstrating effectiveness'*(89%), *'Monitoring progress over time'(84%), 'Stakeholder participation'(79%), 'Integration with existing programs and policies'(79%) and 'Training and capacity building' (76%).*Given the homogeneity of the approach constructs, an overarching resource representing the sustainability constructs to consider in healthcare initiatives was developed. *The Consolidated Framework for Sustainability Constructs in Healthcare* is presented with constructs organised under six emergent themes: *The Initiative Design and Delivery, Negotiating Initiative processes, The People Involved, Resources, The External Environment, and The Organisational setting*.

'Sustainability approaches' are published models, checklists, tools, strategies, conceptualisations and frameworks which seek to assess, evaluate or influence sustainability of healthcare initiatives.

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*This chapter has been summarised and published in short form in the journal of Implementation Science in January 2018. Excerpts from this publication have been expanded and included here with the permission of the journal and in agreement with the copyright standards: CCE. The full published paper can be found in Appendix E. I conceived of the study and was responsible for the design and search strategy. I conducted the search, data extraction, analysis and produced the results. A co-author performed secondary data extraction. The results and interpretation were prepared by myself then

circulated among supervisors and co-authors for comments and revisions. This chapter will also be summarized in the 'Handbook of Implementation Science' to be published by Elgar Publishing in a chapter called 'Implementation Sustainability'.

Aim and research questions: The aim of this chapter is to present and summarize published sustainability approaches which assess, influence or evaluate sustainability in healthcare settings. The second aim of this chapter is to analyse and consolidate constructs within the approaches to produce an overarching conceptual framework for sustainability constructs in healthcare. The following research questions will be explored:

1. *What sustainability approaches have been proposed to assess, evaluate or influence sustainability of healthcare initiatives?*
2. *What sustainability constructs are examined in each sustainability approach?*
3. *What learning can be gained through the examination and consolidation of sustainability constructs across approaches?*

3.1 Background

It is well recognized that sustaining improved outcomes and processes poses a significant challenge to improvement initiatives staff and stakeholders.[7,10,12–15] Many reason for failure to sustain have been postulated to contribute to whether improvement efforts succeed or fail.[258] Problems are described at all stages from initial planning, implementation and maintenance which influence sustainability over time.[8] This makes it exceedingly complicated for researchers, practitioners and other stakeholders to understand or influence sustainability in practice. The numerous definitions for sustainability (discussed in chapter 1) which are often related but not entirely similar, add further complexity to measuring and interpreting what sustainability means.[10] To address the challenges associated with conceptualizing, measuring and influencing sustainability, many have begun conceptualising sustainability as multiple interacting factors or constructs.[8,19,32,153] Breaking the concept down into 'manageable' factors or constructs is suggested to aid researchers and practitioners in navigating this complex topic.[8,13,152] In order to assess the individual constructs for sustainability, many researchers and healthcare practitioners have developed sustainability approaches, such as frameworks, models and tools to assess sustainability in their initiatives or settings.[22,28] The use of sustainability approaches in improvement work has become increasingly popular.[11,28,35,45] With this rise in

popularity, a gap in the literature has been recognized with little work done to understand what approaches currently exist, where have they come from and how they relate to one another.[20]

Like many other healthcare and research organisations, CLAHRC NWL has interpreted and studied sustainability factors with the aid of frameworks, tools and models. Specifically of note, is the use of the one sustainability method, The National Health Service Institute for Innovation and Improvement Sustainability Model (SM), which was used by CLAHRC NWL from 2008-2013.[148] The SM is a self-assessment tool that details key factors that increase the likelihood of sustainability and continuous improvement.[16] The model is used to raise awareness of 10 factors for sustainability, and prompt teams to consider actions to increase the likelihood of sustainability.[16] Application of this model demonstrated that the SM was perceived as valuable but improvement teams encountered difficulty in applying the model routinely.[148] In response to this feedback, CLAHRC NWL designed a sustainability approach which aimed to be user-friendly and applicable to their improvement context. (See Chapter 2 section 2.3.4 CLAHRC NWL Sustainability Research) A scoping review was conducted to create the LTST which identified 15 available sustainability approaches.[35] This work then fed into a protocol for this full systematic review on available sustainability approaches in healthcare.[209]

Investigating and testing theories and frameworks for sustainability is recognised as one of the key research areas needed to advance research on sustainability.[155] The first step of this endeavour is understanding what sustainability approaches have been developed for healthcare initiatives. In 2015, Shigayeva et al. reviewed 29 conceptual frameworks for analysis of sustainability in health systems. This review found that frameworks studied tended to assume sustainability in health systems was a 'somewhat linear and predictable' process.[69] This work concluded that the frameworks studied did not address how health systems function in practice, specifically how integration of programmes within health systems may impact sustainability of interventions or programmes.[69] While this study represented an advance in understanding conceptual frameworks for sustainability, it also highlighted the need to explore further sustainability approaches which may account for emergent and dynamic processes of sustainability.

With no consensus on how to influence sustainability, new definitions, constructs and approaches continue to be produced by individual researchers and studies.[28] It is recognised that diverse healthcare settings "use similar processes to achieve adoption, implementation,

and sustainability" but research has not yet identified a common set of constructs that influence sustainability across diverse contexts.[28] With little work conducted to consolidate general learning across settings, there is an opportunity to draw from the current literature to develop a sustainability knowledge base that is useful beyond specific settings or interventions in healthcare.[10,28,33] To respond to this gap in knowledge I sought to systematically review available approaches for sustainability across healthcare settings to provide a comprehensive list of available approaches and consolidate constructs for sustainability of healthcare inititiatives.[28,36,69]

3.2 Methods

A systematic review was conducted to summarize published sustainability approaches in healthcare settings. The review was guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) reporting standards.[203] I sought methods that aim to assess, influence or evaluate sustainability within healthcare settings. The review was carried out on Embase, Health Management Information Consortium, and Ovid MEDLINE. A data extraction form was developed for identified articles and template analysis was used to guide the analysis of sustainability constructs within each method.[208] Full method details can be found in Chapter 3 section 2.4.1 Systematic Review as well as the full text article (Appendix E).

3.3 Results

Database searches identified 2889 articles with the key search terms. Deduplication was conducted and resulted in 1748 articles. Snowballing of references and electronic citation tracking identified a further 121 publications for possible inclusion. Titles and abstracts were screened, and 229 articles were retrieved in full text for full documentary analysis. In total 62 papers identifying sustainability approaches were included in this review (Figure 8). Results are presented in two sections below. The first presents the 62 sustainability approaches, their characteristics and theoretical underpinnings. The second section presents and describes constructs included in each, and discusses variation and comparison across the approaches. Finally, a consolidated framework is introduced.

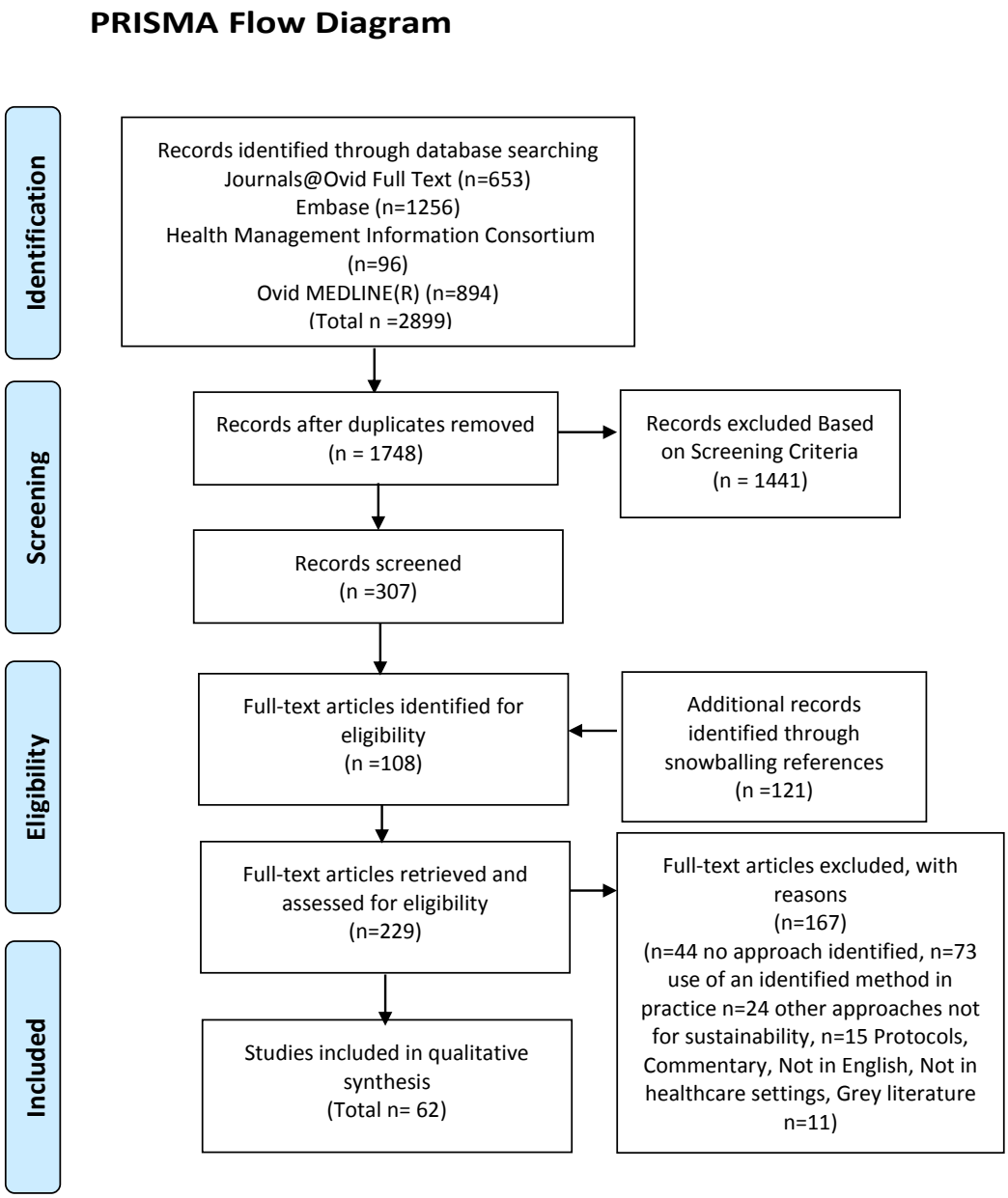


Figure 8: PRISMA Flow Diagram (reproduced with permissions from Lennox et al. 2018 Implementation Science[44])

3.3.1 Sustainability Approaches

The 62 sustainability approaches included in this review are listed in Table 18. Three approaches (19-20, 33-34, 46-47) were identified as updated and adapted versions of previous approaches. I have listed each individually below to acknowledge changes and adaptation in names and to content. This work has found that sustainability approaches have been consistently developed since the late eighties with an average of two new approaches created every year (Figure 9). Over 50% of the approaches were published in the last seven years, suggesting increased interest and use of a structured approaches to sustainability assessment.

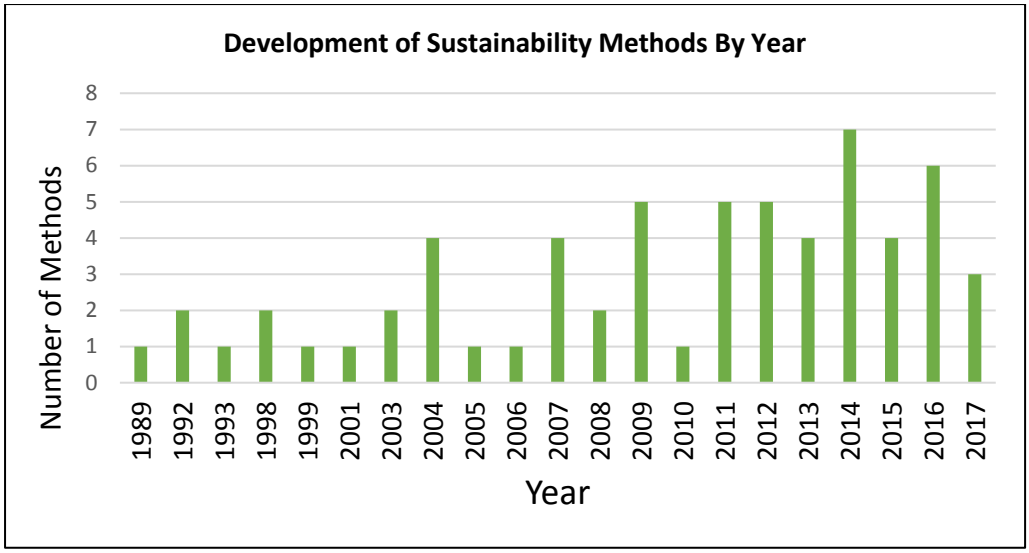


Figure 9: Development of Sustainability Methods By year (reproduced with permissions from Lennox et al. 2018[44])

Table 18: Sustainability Approaches included in review (reproduced with permissions from Lennox et al. 2018 Implementation Science[44])

Author	Year	Name	Purpose
1. Alexander, J.A. et al.[259]	2003	**The model for community health partnership sustainability**	*To provide practical guidelines for partnership sustainability*
2. Amaya, A. et al. [260]	2014	**Conceptual framework for sustainability**	*To identify themes and relationships emerging from the data to identify recommendations to inform decision-makers on priorities*
3. Ament, S. et al. [261]	2014	**Strategies to sustain improvements in hospital practice**	*To suggest post-implementation strategies which are valuable in sustaining implementation successes*
4. Atun, R. et al.[262]	2010	**A conceptual framework for analysing integration of health interventions into health systems**	*To analyse and map for different health programmes the nature and extent of integration in different settings, along with the factors that influence the integration process*
5. Azeredo, B.T. , et al.[263]	2017	**Framework for investigating the sustainability of ARV provision**	*To structure data collection and analysis*
6. Blackford, J. & Street, A.[264]	2012	**The Advance Care Planning-Service Evaluation Tool (ACP-SET)**	*To assist community-based palliative care services to establish a sustainable system-wide Model relevant to their local context*
7. Blanchet, K. & Girois, S.[160]	2013	**The Sustainability Analysis Process (SAP)**	*To conceptualise and measure sustainability of health systems in low-income countries and fragile states*
8. Bray, P. et al.[265]	2009	**Sustainability Pyramid Model**	*To propose a series of practice characteristics that constitute critical elements for QI sustainability activities which are weighted by importance*
9. Brinkenhoff & Goldsmith[33]	1992	**The analytical framework for Institutional sustainability**	*To analyse the generic conditions for sustaining institutions in general and provide suggested strategies*
10. Chambers, D. et al.[11]	2013	**The Dynamic Sustainability Framework**	*To maximise the fit between interventions, practice settings and the broader ecological system over time*
11. Dauphinee, W. & Reznick, R.[266]	2011	**Framework for guiding change and managing and monitoring a successful multicentre network**	*To identify success factors that can facilitate the adoption of a national simulation network for use in professional credentialing and licensure*
12. Dominick, G.M. et al.[267]	2016	**ENRICH Sustainability Survey**	*To identify Residential children's homes (RCHs) that sustained PA promoting environments.*
13. Dorsey, S. et al. [268]	2014	**NINR Logic Model for Centre Sustainability**	*To provide guidance for those who wish to develop and sustain a centre or plan for sustainability.*
14. Edwards, J. C. et al.[269]	2007	**Catholic Healthcare partners HF-GAP Sustainability Assessment (AHRQ)**	*To trigger planning for sustainability early in a project's design*

15. Feldstein, A.C. & Glasgow, R.E.[270]	2008	**Practical, Robust Implementation and Sustainability Model (PRISM)**	*To enhance implementation and sustainability and to help conceptualize, implement, and evaluate health care improvement programs*
16. Finch, T.L. et al.[271]	2012	**Technology Adoption Readiness Scale (TARS)**	*To contribute to the successful normalisation of e-health, either as a 'diagnostic' tool or for evaluation purposes.*
17. Fleiszer et al. [30]	2015	**Framework for the sustainability of healthcare innovations**	*To guide data collection and content analysis*
18. Ford, J.H. et al. [272]	2015	**Strategies to Sustain Use of A-CHESS**	*To suggest strategies to be used to sustain the use a mobile app*
19. Fox, A. et al. [273]	2015	**The sustainability of innovation theoretical framework**	*To guide research, determine variables, influence data analysis*
20. Goodman et al.[29]	1993	**Level of Institutionalisation (LoIn) Scale**	*To measure the extent of program integration into an organisation*
21. Goodman, R. & Steckler, A.[55]	1989	**Model for Program Institutionalisation**	*To demonstrate how health promotion programs may become institutionalise to guide program design and evaluation*
22. Gruen, R.L. et al. [18]	2008	**Model of health-programme sustainability**	*To provide a model of health-programme sustainability based on context and resource availability*
23. Hanson, D. et al.[39]	2005	**A systematic ecological framework to design sustainable interventions**	*To design sustainable, community-based, safety promotion interventions*
24. Hodge L.M. & Turn, K.[61]	2016	**A Conceptual Framework of Supporting Factors**	*To guide and evaluate capacity building in EBP implementation and sustainment in low-resource community settings*
25. Isabalija, S.R. et al.[274]	2013	**Framework for e-medicine sustainability**	*To facilitate the development, implementation, and sustainability of e-medicine by providing professionals with information on which to build their sustainability efforts.*
26. Iwelunmor, J. et al. [74]	2016	**A conceptual framework**	*To bring attention to sustainability as a core component embedded within the overall life cycle of an intervention that evolves through time.*
27. Johnson et al [36]	2004	**A Sustainability Planning Model**	*To address two sets of sustainability factors known to be associated with success in sustaining an innovation*
28. Knight, T. et al.[275]	2001	**A framework for evaluating the sustainability of collaborative working**	*To provide formative evaluation of future collaborative initiatives and analysis of collaborative working.*
29. Leffers, J. & Mitchell, E.[276]	2011	**Conceptual Framework for Partnership and Sustainability in Global Health Nursing**	*To offer guidance and a framework for partnership and sustainability for nurses who participate in global efforts.*

30. Lennox et al. [35]	2017	**The Long Term Success Tool (LTST)**	*To support those implementing improvements reflect on 12 key factors to identify risks and prompt actions to increase chances of sustainability over time*
31. Luke, D.A.[42]	2014	**Program Sustainability Assessment Tool (PSAT)**	*To assess and plan for sustainability risks and develop an action plans. Instrument for assessing the capacity for program sustainability of various public health and other programs.*
32. Maher, L. et al.[16]	2010	**NHS III Sustainability Model**	*To predict the likelihood of sustainability and guide teams to things they could do to increase the chances that the change for improvement will be sustained*
33. Mancini, J.A. & Marek, L.I. [151]	2004	**Model of community-based program sustainability/Program Sustainability Index (PSI)**	*To evaluate community-based program sustainability*
34. May, C. & Finch, T.[277]	2009	**Normalisation Process Theory**	*To explore the social organization of the work (implementation), of making practices routine elements of everyday life (embedding), and of sustaining embedded practices in their social contexts (integration)*
35. May, C. et al.[278]	2006	**Normalisation Process Model**	*To assists in explaining the processes by which complex interventions become routinely embedded in health care practice*
36. Melnyk, B. & Fineout-Overholt, E. [279]	2011	**The ARCC (Advancing Research and Clinical practice through close Collaboration) model**	*To provide health care systems with a conceptual framework to guide system-wide implementation and sustainability of EBP for the purpose of improving quality of care and patient outcomes.*
37. Nelson, D.E. et at.[280]	2007	**The five basic elements of program sustainability**	*To suggest five basic elements of program sustainability for tobacco control programs, to understand the factors associated with success*
38. Nystrom, M.E. et al.[281]	2014	**Strategies to facilitate implementation and sustainability of large system transformations**	*To provide an approach to implement and sustain a large national change program.*
39. Okeibunor, J. et al.[282]	2012	**A model for evaluating the sustainability of community-directed treatment**	*To provide critical indicators of project performance to evaluate sustainability*
40. Olsen, I. T.[32]	1998	**Sustainability of health care: A framework for analysis**	*To study the sustainability of health services in developing countries*
41. Parand, A.[283]	2012	**Strategies to sustain Safer Patient Initiative (SPI)**	*To recommend strategies to facilitate the sustainability of a quality and safety improvement collaborative*
42. Persaud, D. [284]	2014	**The ELIAS (Enhancing Learning, Innovation, Adaptation, and Sustainability) Performance Management Framework**	*To improve the sustainability of health care organizations.*
43. Rasschaert, F. et al.[37]	2014	**Conceptual framework on sustainability of community-based programmes**	*To explore the data retrieved and to identify factors influencing the sustainability of the CAG Model*

44. Racine, D.P.[40]	2006	**Model of sustaining innovations in their effectiveness**	*To suggest a comprehensive conceptual framework of programmatic, organizational, and environmental factors that may shape the circumstances for sustaining and replicating effectiveness.*
45. Roy, M. et el. [285]	2016	**Framework for Sustained Retention**	*To understand sustained retention, highlight barriers specific to sustained retention, and review interventions addressing long term, sustained retention.*
46. Rudd, R. E. et al.[286]	1999	**A five-stage model for sustaining a community campaign**	*The five stage model offers a mechanism for expanding the life of a campaign.*
47. Sarriot, E.G. et al. [149]	2004	**Child Survival Sustainability Assessment (CSSA) framework and process**	*To provide a process for a participatory sustainability assessment with communities and local partners*
48. Sarriot, E.G. et al.[287]	2008	**The Sustainability Framework**	*To organize thinking about sustainability as well as inform planning, management, and evaluation of activities in order to improve and maintain health outcomes at a population level*
49. Saunders, R.P.[54]	2012	**LEAP Sustainability Assessment**	*To assess sustainability of the Lifestyle Education for Activity Program (LEAP)*
50. Savaya, R. [52]	2009	**Projected Likelihood of Project's Continuation**	*To examine projected sustainability and its predictors along a continuum of forms.*
51. Schalock, R. et al. [93]	2016	**Sustainability model**	*To consider what factors drive the organization's ability to both adapt successfully to change*
52. Scheirer, M. & Dearing, J.W. [28]	2011	**A Generic Conceptual Framework for Sustainability**	*To guide the sustainability research agenda*
53. Schell, S.F. et al.[288]	2013	**Capacity for sustainability framework**	*To provide a framework on sustainability capacity, identifying organisational and contextual characteristics necessary for successfully sustaining programs over time*
54. Shediac-Rizkallah, M.C. & Bone, L.R. [8]	1998	**Conceptual framework for planning for sustainability of community based health programs**	*To conceptualise and measure sustainability and provide guidelines to facilitate sustainability in community programs*
55. Shigayeva, A. & Coker, R.[69]	2015	**Conceptual framework to support analyses of sustainability**	*To support analyses of sustainability of communicable disease programmes*
56. Sivaram, S. & Celentano, D.D.[62]	2003	**Conceptual framework to develop a strategy that will facilitate sustainability**	*To develop a strategy that will facilitate sustainability of outreach worker efforts in AIDS prevention*
57. Slaghuis, S.S. et al.[38]	2011	**A framework and a measurement instrument for sustainability of work practices in long-term care**	*To analyse sustainability of actual changed work practices and evaluate improvement projects.*

58.	**Song, B. et al.** [289]	2016	**The framework for sustainability evaluation of Community based LTC programmes**	*To evaluating community-based LTC programmes from the sustainability perspective*
59.	Sridharan, S. et al. [290]	2007	**Analysis of strategic plans to assess planning for sustainability of comprehensive community initiatives**	*To assess planning for sustainability*
60.	**Stefanini, A. & Ruck, N.**[111]	1992	**Conceptual framework to monitor the performance of externally-assisted health projects**	*To monitor a project's efforts towards sustainability*
61.	**Story et al.**[291]	2017	**Conceptual framework for institutionalization of community-focused maternal, new born & child health strategies**	*To encourage collaboration and contribute to program planning and policy making for the institutionalization of community-focused health strategies*
62.	**Tuyet Hanh, T.T. et al.**[292]	2009	**Framework for Evaluating the Sustainability of Community-based Dengue Control Projects**	*To provide a framework and tool for assessing sustainability.*

3.3.1 Approach Characteristics

Development: The first area investigated was how the approach was developed. Approaches were developed through several methods often using mixed methodology (e.g. literature review and interviews) (Figure 10). Sixty-one per cent (38/62) were developed through literature or systematic reviews. This was followed by 26% (16/62) which used 'professional expertise' (e.g. an advisory panel) and 24% (15/62) interviews. Few studies used qualitative approaches such as observation (3/62) or case studies (2/62).

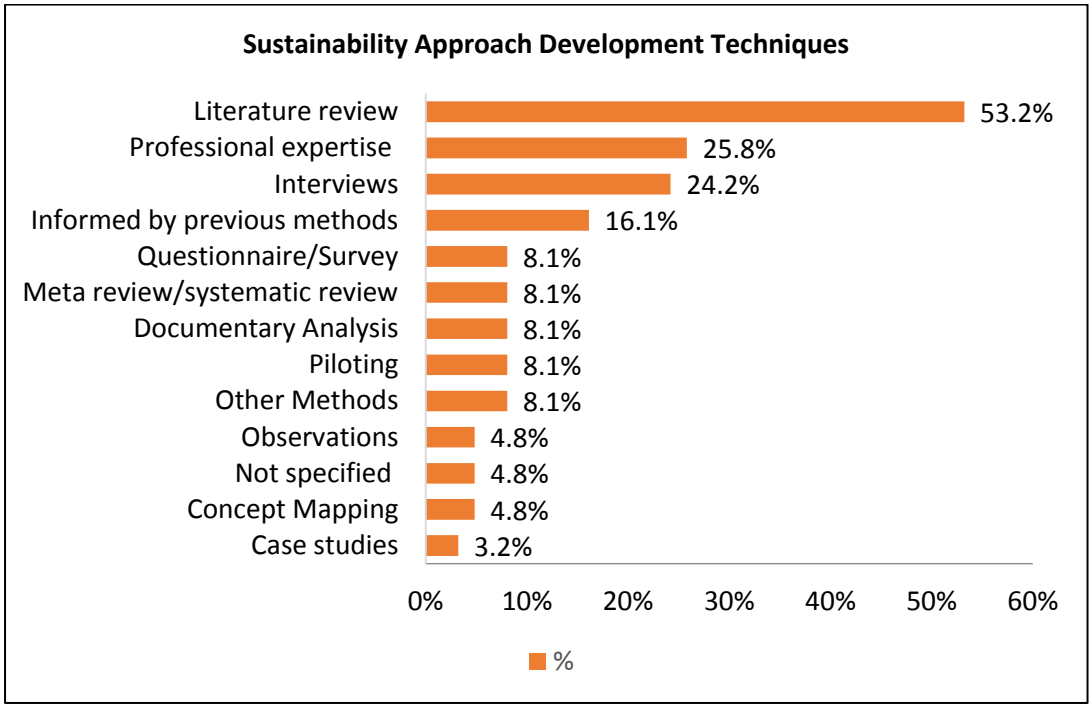


Figure 10: Sustainability Approach Development Techniques (reproduced with permission from Lennox et al. 2018 Implementation Science[44])

Type of Approach: The sustainability approaches were in different forms (Figure 11). This review included 32 frameworks/conceptual frameworks, 16 models, 8 tools, 4 guidance strategies, 1 checklist, and 1 process.

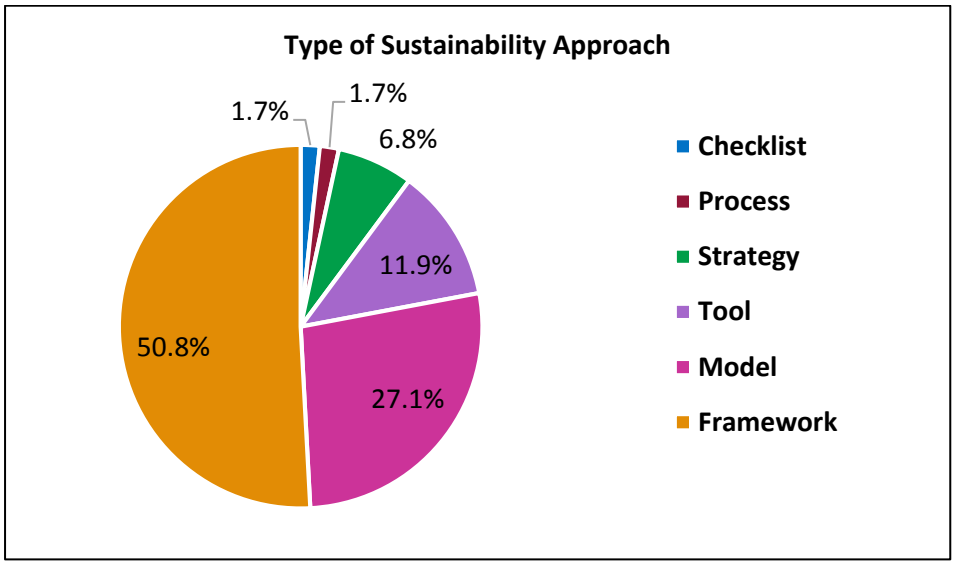


Figure 11: Type of Approach (reproduced with permission from Lennox et al. 2018 Implementation Science[44])

Purpose: The third metric studied was the main purpose of each approach which fell into four categories: planning (to design a programme to achieve sustainability), guidance (to direct study design, data collection, discussion etc.), analysis (to examine and interpret data in relation to sustainability) and evaluation (to appraise sustainability of an existing programme assessment or to measure constructs for sustainability) (Figure 12). The highest proportion of approaches 39% (24/62) aimed to *evaluate* sustainability. Twenty-three per cent (14/62) aimed to support *planning* for sustainability. Guidance was the purpose of 11.3% (7/62) of approaches while 27.4% (17/62) were a combination of *evaluation, planning and guidance.*

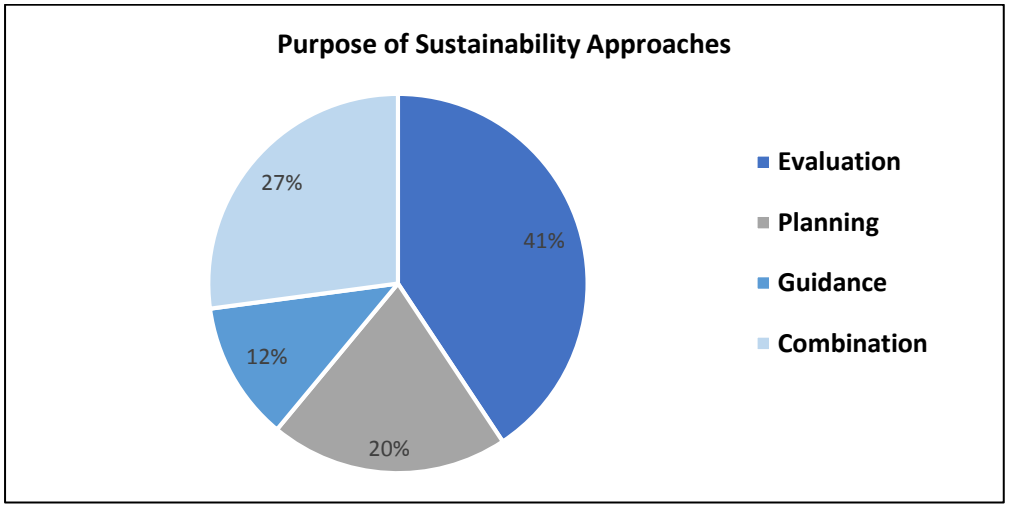


Figure 12:Purpose of Sustainability Approaches (adapted with permission from Lennox et al. 2018[44])

Level of use: To understand where each approach was targeting health systems, the level of use was explored. This exploration revealed two distinct categories: approaches designed to target a *specific intervention* or approaches aimed at an *organisational or system*. The majority, 82% (51/62), were designed to examine or influence sustainability at a specific *intervention or programme level* (e.g. a single improvement project).[149] The remaining 11 approaches aimed to examine sustainability at an *organisational or systems level (e.g. a long-term care organisation)*.[38]

Setting: The setting of each approach was also explored (Figure 13). Thirty-seven percent (23/62) were designed for use in any healthcare settings and did not specify a specific setting. Public Health (e.g. health promotion and disease prevention programmes) was specified in 31% (19/62) of the approaches, followed by Community Healthcare (e.g. home care and community health campaigns) in 26% (16/62). Only a small number specified that they were designed for use in acute 3% (2/62) or e-health settings 3% (2/62).

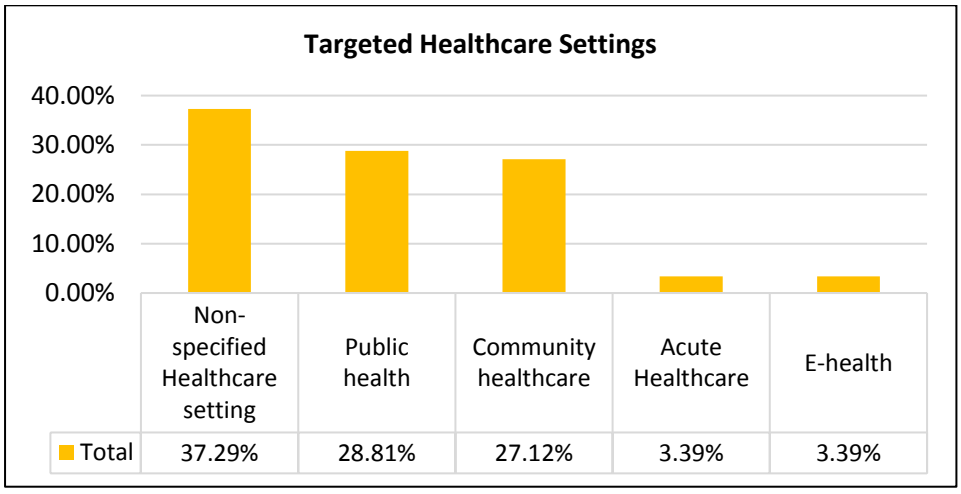


Figure 13: Healthcare Settings for sustainability approaches(reproduced with permission from Lennox et al. 2018 Implementation Science[44])

Scoring Mechanism: Most (46/62) of approaches did not have a scoring mechanisms as they were either models or frameworks. Of the approaches with scoring or assessment mechanisms, 16% (10/62) used Likert scales ranging from scales from 1-3 to 1-6 options. Ten per cent (6/62) used ratings or weighted scores to assess sustainability factors.

Suggested Users: To understand who could potentially use and benefit from the use of the approaches, results also explored the proposed users for each of the approaches. Suggested users were specified in 55% (34/62) of the approaches (Figure 14). A large proportion have been designed for use by either healthcare practitioners 37% (23/62) or researchers 36% (22/62). Most of these methods have been designed for use by more than one group. Three methods specified the type of healthcare practitioners (nurses) who should be the users of the method.[264,276,293] Only two methods specified they could be used by community members or patients.[8,35]

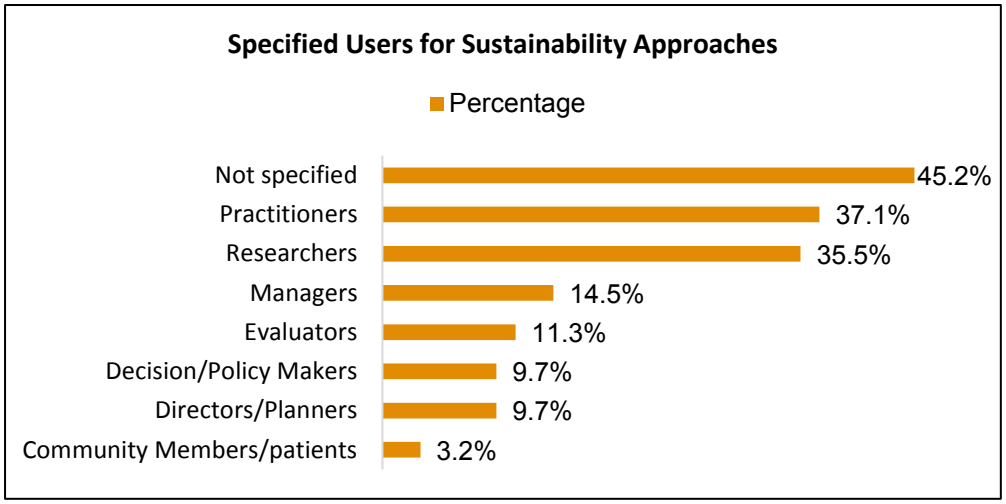


Figure 14: Suggested Users for Approaches (reproduced with permission from Lennox et al. 2018[44])

Definitions of Sustainability: Definitions for sustainability were explicitly stated in 76% (47/62) of methods and implicitly deduced from the remaining 24% (15/62). Multiple definitions were found with five distinct domains for definitions identified: *continued programme activities, continued health benefits, capacity built, further development (adaptation), recovering costs*. Over half of the approaches 56% (35/62) defined sustainability as a single domain. The majority of the approaches using a single domain defined sustainability exclusively as *continued programme activities* 48% (31/62). Forty–five percent (28/62) defined sustainability as multiple (2 or more) domains. Twenty-four percent (15/62) included two domains, 16% (10/62) included three domains and 5% (3/62) included four domains. Each domain is described in Table 19 along with an example from the retrieved approaches.

Table 19: Sustainability Definitions used across approaches

Definition	% of Approaches using Definition	Example from Approach
Continued Programme Activities	86% (53/62)	*"Sustainability is a moving goal, in which the task of maintaining clinically led change must be made compatible with the need to respond to changing expectations and priorities from external stakeholders."*[20]
Continued Health Benefits	44% (27/62)	"*Sustainability is the ability to sustain population health outcomes*."[287]
Capacity Built	19% (12/62)	*"Our conceptualization of sustainability was on the inter-organizational relationships that might serve as a basis of the collaborative problem-solving capacity."*[290]
Further development (adaptation)	16% (10/62)	"*Adapting successfully to change and providing a range of valued service delivery opportunities and practices in an effective and efficient manner*." [93]
Recovering costs	3% (2/62)	"*It is the ability of an organization to produce outputs of sufficient value so that it acquires enough inputs to continue production at a steady or growing rate."*[33]

Theoretical Perspectives: The theoretical perspectives for each approach was studied and revealed a diverse theoretical basis for the approaches. These theoretical perspectives influenced how sustainability was defined, how it was viewed within healthcare systems and also how assessment of sustainability was considered. Although 37% (23/62) did not have an explicit link to theory, the majority did describe this. Numerous theories were identified within the remaining approaches. While numerous theories were found, four theories were common across multiple sustainability approaches covering 45% of the retrieved papers (Table 20). These included: Diffusion of Innovations Theory, Complexity Theory, Ecological Theory, and Open Systems Theory **(**Other theories included *Organisational Learning Theory, Organisational Change Theory, Network Theory, Catastrophe Theory, Behavioural Theory,* and *Theory of Organisational Routines* which informed development of select approaches.[8,30,294–298]) A brief description of the most common perspectives and their links to the sustainability approaches are outlined below**.**

Table 20: Theoretical underpinnings for the sustainability approaches

Theory	Number of Approaches Drawing on Theory
Diffusion of Innovations	10
Complexity theory/Complex Adaptive Systems	9
Ecological theories	5
General/Open Systems Theory	4
Continuous Quality Improvement	2
Intervention (program) theory	2
Other Theories	7
No Link to theory	23

I. ***Diffusion of innovations*** was widely cited and informed the development of 10 approaches.[8,28,40,55,60–62,262,269,270,273] Within this theory sustainability is viewed as the final stage of initiative life cycle.[28,55] Taking this perspective allowed approach authors to explore both program benefits and burden to understand what will support or hinder program continuation and diffusion.[61] This theory was seen as helpful in highlighting the attributes initiatives should have to appeal to users.[40] Within approaches using this perspective, the role of adopters of the initiatives were seen as key to success, specifically the involvement and interaction with adopters to achieve wider reach during initiatives and maintain activities after the initiatives come to an end.[62]

II. ***Complexity theory*** was drawn on in nine approaches.[8,11,18,69,74,149,262,284] Complexity theory highlights the interactions that occur between an initiative, the setting, the broader organisation and the sociocultural context.[74] Within approaches taking this perspectives improvement initiatives were often viewed as components being introduced to Complex Adaptive Systems (CAS).[69,262] These systems were recognized to change and adapt in response to interactions with the environment, individuals and wider context.[262] This viewpoint sees introducing an improvement initiative as a nonlinear process where change, adaptation and uncertainty are expected.[69,74,149,262] Within methods using complexity theory, concepts such as resilience and learning were viewed as key to enhance sustainability of initiatives.[69] The complex systems approach enabled authors of approaches to account for the interactions that occur between components of the initiative itself as well as with the sociocultural context in which it is implemented and the influence of broader organisational and policy considerations.[74]

III. ***Ecological theory*** underpinned five approaches.[11,39,285,286,299] This perspective focused on behaviour and how it is influenced by and influences individuals and environments.[70] Approaches adopting this perspective suggest that sustainability is a process of ongoing adaptation of initiatives. The fit between initiatives, contexts, and expectations is the focus for ongoing improvement.[11] This perspective views sustainability as an ongoing and dynamic process that occurs throughout implementation emphasising the need for adaptation to ensure sustainability of improvements.[45,64,65]

IV. ***Open systems theory*** underpinned four approaches.[29,32,259,280] This perspective views an organisation as an organism open to the influence of its environment with the need to adapt to survive.[71] Approaches using this perspective to assess sustainability,

explored perceived benefits and burden of an initiatives, availability of support for initiatives, and leadership within organisations.[61]

Prospective or Retrospective Process: The final characteristic I explored was whether sustainability was a process to be influenced or an outcome to be assessed. This was largely informed from the theoretical perspective taken by each approach. If the approach viewed sustainability as an ongoing or dynamic process open to adaptation and change (*Complexity Theory, Ecological Theory, Open systems theory*), then it was more likely to support the prospective measurement of sustainability as a process. If the approach viewed sustainability as a linear process following a staged model like in the *Diffusions of Innovations Theory*, then these approaches were more likely to assess sustainability as a retrospective outcome to be evaluated. The highest proportion, 66% (41/62) of approaches, viewed the sustainability as a *prospective process* to be explored throughout implementation. For example, a sustainability approach can be used throughout an initiative to *'predict the likelihood of sustainability and guide teams to things they could do to increase the chances that the change for improvement will be sustained'*.[16] Nine methods viewed sustainability as a *linear process* with sustainability being studied retrospectively after implementation has been 'completed'. For example, one method stated that sustainability at follow-up assumes successful implementation at earlier phases, concluding that it is not possible to maintain an intervention that was not fully implemented initially.[54] The remaining 12 approaches combined a specified they could be used both prospectively and retrospectively, during implementation or following implementation.

3.3.3 Sustainability Constructs

Once approach characteristics were ascertained, the constructs within each were examined. To assess coding clarity and reliability an inter-rater reliability score (kappa Coefficient) was calculated between two coders using the NVivoPro coding comparison function.[300] The test showed a high level of agreement between scorers with an inter-rater reliability score of 0.94.[301,302] The number of sustainability constructs examined in each approach ranged from eight to 31 with an average of 17 constructs per approach. Constructs across approaches were compared and contrasted with 40 individual constructs found. No two approaches contained the same combination of constructs nor did any single method capture all 40 constructs. Appendix G provides a description of all 40 constructs for sustainability and provides a definition and an example for each. Although variation was seen across approaches, consistent

constructs are observed regardless of the proposed intervention, setting or application. Six constructs were included in over 75% of the approaches: '*General Resources'* (90%), '*demonstrating effectiveness*' (89%), *'Monitoring progress over time' (84%), 'Stakeholder participation' (79%), 'Integration with existing programs and policies' (79%) and 'Training and capacity building' (76%).*

3.3.4 Consolidated framework for sustainability

An overarching resource representing the sustainability constructs to consider in healthcare initiatives was developed. To build this framework I combined constructs across approaches that were overlapping in definition, meaning or function. The constructs were organised under six emergent themes: *The Initiative Design and Delivery, Negotiating Initiative processes, The People Involved, Resources, The External Environment, and The Organisational setting*. ***The Consolidated Framework for Sustainability Constructs in Healthcare*** is presented in Table 21 (Reproduced with permission from Lennox et al. 2018[44]). The percentages within the table summarise the frequency of sustainability constructs across the approaches. For example, the construct: demonstrating effectiveness appeared in 89% of the reviewed approaches.

Table 21: Consolidated Framework for Sustainability Constructs in Healthcare

The Initiative Design and Delivery	Negotiating Initiative processes	The People Involved	Resources	The Organisational Setting	The External Environment
•Demonstrating effectiveness 89%	•Belief in the initiative 63%	•Stakeholder participation 79%	•General Resources 90%	•Integration with existing programs and policies 79%	•Socioeconomic and political considerations 63%
•Monitoring progress over time 84%	•Accountability of roles and responsibilities 56%	•Leadership and Champions 73%	•Funding 68%	•Intervention Adaptation and receptivity 73%	•Awareness and Raising the profile 45%
•Training and Capacity Building 76%	•Defining Aims and Shared Vision 53%	•Relationships and collaboration and networks 65%	•Infrastructure 26%	•Organisational Values and Culture 71%	•Urgency 5%
•Evidence base for the initiative 52%	•Incentives 31%	•Community participation 56%	•Staff 26%	•Organisational Readiness and Capacity 56%	•Spread to other organisations 5%
•Expertise 23%	•Workload 27%	•Staff involvement 42%	•Time 6%	•Support Available 40%	
•The Problem 15%	•Complexity 24%	•Ownership 26%		•Opposition 5%	
•Project duration 8%	•Job requirements 19%	•Power 18%			
•Improvement Methods 6%		•Patient involvement 16%			
•Project Type 2%		•Satisfaction 11%			

Diversity in Construct Assessment: Although common constructs were found across approaches, each displayed diverse mechanisms to investigating and defining individual constructs. The top five most common constructs are presented in more detail below to highlight how similar constructs are assessed differently across approaches.

I. **Resources:** The construct of 'resources' was made up of a combination of potential types of resources to consider. Resources fell into four categories: *Funding, Infrastructure, Staff and Time*. While most approaches explicitly stated the need to assess resources, many did not indicate the type of resource to assess. Many approaches highlighted the importance of an initiative both *gaining and maintaining* resources over time. [42,62,69,111,151,280,283,292] The need for *stable sources of income was* noted in a number of approaches.[36,39,42,263,269,280,288] The capacity of an initiative to *share resources* with partners and other organisations[111,268], find *diverse and supplemental resources*[28,52,272,285], and/or use *multiple sources of funding* [8,42,52,289] were all noted as important to overall sustainability.

II. **Demonstrating effectiveness:** A number of perspectives were taken to assess how an initiative could demonstrate impact or effectiveness. A number of approaches assessed *initiative performance*[38,42,278,284,288] while others specifically evaluated whether the initiative was *functioning* as expected.[42,69,280] The ability of the initiative to *produce* intended benefits was also assessed in a number of approaches.[11,18,30,35,61,149,160,262,272,275,282,293] A few approaches took a broader perspective of effectiveness and investigated the *value* of the benefits to stakeholders.[8,16,93,259,266,269,278]

III. **Monitoring progress over-time:** This construct appeared in 84% of the approaches. It required the assessment of diverse metrics such as *having appropriate data to document progress*[54,260], maintaining *a measurement or monitoring system to track outcomes*[16,40,69,262,291], *and* having *consistent reporting and feedback mechanisms.*[61,74,264,268,272,284]

IV. **Involvement and participation from stakeholders:** This construct was included in 79% of approaches. Proposed stakeholder groups varied across approaches (e.g. staff, community members, patients or carers). Within this construct various metrics were described such as the need to: *value stakeholder perspectives*[16,18,35,69,74,259,262,279], *include diverse stakeholder participation across multiple areas and disciplines*[29,40,284,292], explore *methods for engagement (such as public meetings,*

community events, seminars)[52,259,281,283] *and promote continuous involvement throughout initiatives.*[11,268,284,286,287]

V. **Integration with existing programs and policies:** Integration also appeared in 79% of the approaches. This construct unpacked the need to ensure an initiative was embedded into organisational structures, programmes and policies. According to the reviewed approaches this may include assessing: *'fit' with the organisation*[11,16,28,61,74,275,277,303] *alignment with strategic plans*[8,268,269]*, alignment with stakeholder expectations*[262]*, alignment with existing programmes*[8,42,278,283] *and initiative integration into policies.*[28,36,269,289].

Prospective vs Retrospective Approaches: To understand potential difference between approaches viewing sustainability prospectively versus retrospectively, I compared the top ten constructs for approaches examining sustainability throughout an initiative (prospective assessment) versus after implementation (retrospective assessment) (Table 22 Differences shown in Bold). Prospective approaches are used for a combination of planning, guidance, and evaluation. For this reason, prospective approaches demonstrate greater emphasis on *building networks and relationships* and garnering *stakeholder buy-in* throughout an initiative. These approaches also highlighted the role of *initiative adaptation* to ensure they align with stakeholder and setting needs. Retrospective methods were more often designed for evaluation purposes, emphasising the need for *shared vision* and *accountability* to deliver the initiative. These approaches were more likely to specifically examine *funding* and highlight the need to have a *defined aim* to show evidence of sustainability of an initiative once it has been 'completed'. Retrospective approaches therefore tend to focus on delivery and evidence for continuation of initiatives while prospective approaches focus on building an initiative into an organisation, getting people on board and garnering networks that may support sustainability.

Table 22: Comparison of prospective vs retrospective approaches (reproduced with permission from Lennox et al. 2018 Implementation Science[44])

Retrospective Assessment (9 methods)	Percent	Prospective Assessment (41 Methods)	Percent
1. Demonstrating effectiveness	100%	1. Resources_general	93%
2. Resources_general	89%	2. Demonstrating effectiveness	85%
3. Leadership and Champions	89%	3. Monitoring progress over time	83%
4. Accountability of roles and responsibilities	78%	**4. Stakeholder participation**	83%
5. Belief in the initiative	67%	5. Integration with existing programs and policies	81%
6. Defining Aims and Shared Vision	67%	6. Training and Capacity Building	78%
7. Funding	67%	**7. Intervention Adaptation and receptivity**	73%
8. Monitoring progress over time	67%	8. Leadership and Champions	73%
9. Training and Capacity Building	67%	9. Belief in the initiative	68%
10. Integration with existing programs and policies	67%	**10. Relationships and collaboration and networks**	68%

3.4 Discussion

This chapter identified available sustainability approaches which assess, influence or evaluate sustainability in healthcare settings and explored what sustainability constructs were examined in each. A substantial number of approaches exist with 62 identified and included in this review. Each approach provided a unique perspective on sustainability with no two being exactly alike but most having similar constructs.

Reflections on Sustainability Measurement

The results show that sustainability is most often defined and assessed as the *continuation of programme activities*. While multiple definitions were found, there was a reliance on this definition, as previously described.[304] In a review of American and Canadian health-related programme sustainability, 95% of studies (18/19 studies reviewed) examined whether program activities were sustained but the use of this measure was criticized.[14] Reviewers questioned the robustness of such a measure as it was often only assessed in a single question within a questionnaire or interview asking the respondent whether the program was maintained and therefore could not be rigorously verified.[14]

Measuring continuation of programme activities is important to assessing sustainability but relying solely on this measure may risk missing other key sustainability variables.[14,28,304] For

example, it may result in the continuation of ineffective or undesirable practices if health outcomes and benefits are not taken into account. This was observed in a public health program to reduce drug use in students in American, the Drug Assistance Resistance Education program.[305] The programme demonstrated little impact on prevention or reduction on drug use by students but continued to be implemented in schools.[305] Failure to examine effectiveness of the programme on key outcomes meant that an ineffective and potentially detrimental programme was continued.[40,305] Examining continuation of activities as the sole measure of sustainability also risks initiatives being inaccurately reported as failing to sustain. If activities are adapted to fit organisational changes or context, many could say the initiative has failed to sustain due to changes in the programme activities. If a broader definition of sustainability is used such as continuation of benefits, adaptation could also signify sustained improvement if the adaptations contributed to maintenance or increase in health benefits. These examples highlight the need for careful consideration of what will be sustained.[40] All definitions identified in the review represent interrelated facets of what sustainability means in practice, therefore exploring the breadth of available sustainability definitions and applying a multifaceted definition may aid in the accurate representation of sustainability processes and outcomes.[18]

Reflections on Theory

The reviewed approaches were underpinned by a number of different theoretical perspectives which highlighted the diverse nature of measuring and planning for sustainable initiatives. As noted in the introduction to this chapter, previous work exploring conceptual frameworks for sustainability found that *"most frameworks proposed tend to be deterministic in nature where sustainability is viewed as an end goal"*.[69] In contrast, this review found that 66% of approaches viewed sustainability as a process rather than an end state. This may indicate a shift in the recognition of sustainability as an on-going process opposed to a linear sequence. This shift supports prospective planning, assessment and action to influence sustainability over time.[23,36] As prospective approaches to sustainability gain popularity, there is a need to consider any possible associated risks. For example, without data collection past implementation stage, funders will be unable to assess the continuation of initiative activities or outcomes.[28] This conclusion has important implications for how sustainability processes and outcomes are measured in sustainability studies. Later in Chapter 6, I will explore how both sustainability processes and outcomes can be examined and assessed in practice.

This work has also highlighted the need for the purpose of sustainability approaches to be clear to users before it is applied. While some approaches explicitly aim to assess sustained activities and outcomes, others are meant to influence and promote action over time. Therefore, the aims and potential results from approaches should be understood to ensure people are able to realistically assess the outcomes they desire.

Building a Consolidated Sustainability Knowledge Base

The continuous development of 'new' approaches for sustainability restricts the conclusions that can be drawn from the literature as a whole.[10] The possibility of developing a standardized assessment for sustainability in programmes as diverse as quality improvement initiatives is limited (and perhaps undesirable) due to diverse contexts, disease areas and timeframes. However, it is recognized that *"we are frequently reinventing the wheel"* because researchers from diverse areas of specialized diseases are often not familiar with sustainability research undertaken in other specialities.[10,20,28] While there are benefits of approaches created for specific initiatives and settings, there is also a risk in 'new' methods having similar constructs divided by slight semantic variations or individual interpretations of the current evidence.[28,33] Given homogeneity of the individual constructs found across the approaches, there is value in having an overarching resource and summary, indicating the breadth of possible sustainability constructs to consider for sustainability in healthcare settings. Aggregating findings on sustainability constructs across fields allows practitioners and researchers to understand the common constructs to consider and supports the development of a knowledge base across healthcare contexts and settings.[33] For these reasons, *The Consolidated Framework for Sustainability Constructs in Healthcare* was developed.

The Consolidated Framework for Sustainability Constructs in Healthcare (see Table 21 on page 112) provides a summary of the literature on sustainability approaches permitting teams or individuals to review the available evidence and more effectively use and understand the research conducted in this area. This list of available approaches may act as a sense check for those considering creating a sustainability approach in their own setting as continuous production may lead to further division in the literature and result in fewer studies on the available approaches.[28] There is a need for future authors to describe how new models, tools or frameworks fit within the available evidence presented here. There is also a need for authors

to rigorously describe how these have been developed to provide necessary background information and improve reporting on available approaches.

Strengths and limitations: This review is the first to consolidate the evidence on the available approaches for sustainability across diverse healthcare settings. This review can provide a valuable resource to researchers, managers, healthcare practitioners, community members and decision makers by presenting available sustainability approaches and outlining their key characteristics. While this review provides a valuable summary of the current literature, there are a number of limitations to note.

Publication bias is a limitation of this study. Some publications may have been missed due to the search limits and criteria. Further sources within grey literature were not included, but future work could locate and update these findings with supplemental sustainability approaches. Another limitation of this work is the disproportionate number of frameworks from the public and community health settings. These areas have been noted as leading this area of research so further work may be needed to explore sustainability in other acute and chronic care settings.[273] The use of one author to conduct the data extraction and coding is also a limitation of this work and may have resulted in bias in inclusion or exclusion or resulted in missing or erroneous information being collected. To address this limitation a second author screened 20% of the retrieved articles and also checked coding consistency in 25% of the studies. Data extraction was also checked against full text articles for all included papers.

Another key limitation of this work is that I cannot attribute value or accuracy of constructs from each approach. I sought to provide an overview of available approaches for sustainability, making no judgment on whether these approaches contained constructs which were 'accurate' or 'sound'. Although my assessment of frequency of constructs indicated some consensus across approaches, this does not indicate that assessing these constructs will achieve sustainability in practice or that they are correct or comprehensive in any case. In order to understand the validity or soundness of these constructs, the approaches must be assessed in practice. Chapter 4 will present a scoping review which will explore if and how these approaches have been used in practice, to ascertain if their constructs accurately represent sustainability in specific settings, and if they have fulfilled their stated aims. The accuracy and validity of the constructs in the proposed consolidated framework will be assessed throughout Chapters 5, 6 and 7.

Future work: Many approaches presented in this review recommend that they be used and evaluated further within healthcare initiatives to explore their applicability and any further development needed.[11,35,42,273] This demonstrates a need to explore the currently literature on the application and impact of sustainability approaches in healthcare settings to understand their impact on sustainability outcomes. Chapter 4 will investigate the current evidence on the use of available approaches in practice to understand the application processes and assess the overall impact of their use.[28] The second area for future work is around testing the consolidated framework in practice. The Consolidated Framework presented in this chapter was developed exclusively from the literature. To test validity and understand how representative the framework is, it must be applied to real improvement initiatives in healthcare settings. The Consolidated Framework provides an overarching conceptual framework for the analysis and interpretation of the later chapters. The consolidated framework will be used within chapters 5-7 where it is applied to prospectively investigate the sustainability of diverse improvement team initiatives. This process aims to iterate, validate and improve the framework to increase relevance and applicability to healthcare improvement initiatives.

Contribution to overall Thesis: This study directly addresses the gap in the literature identified in Chapter 1 for further investigation into available sustainability approaches and consolidation of knowledge on sustainability constructs. This study has demonstrated that there are numerous sustainability approaches which have similar and overlapping constructs deemed to influence sustainability. This study sets the foundation for the upcoming chapters presented within this thesis. The next chapter will explore how these sustainability approaches have been used in practice to aid in our understanding of their application and impact.

3.5 Conclusion

Sustainability of improvements has been recognised as a challenge for some time and while there is diversity in the literature on how it is defined and how it can be influenced there is one clear and compelling message: sustainability of initiatives requires thoughtful planning and attention. Using a sustainability approach to support this process has become increasingly popular but the diverse approaches reported in the literature pose a challenge to those looking to influence sustainability. Understanding the purpose, perspectives, and constructs within each may aid potential users to make the most of the available approaches and tailor application to their desired perspectives and outcomes. Further investigation into the potential impact of

sustainability approaches would allow researchers and practitioners to understand their contribution to sustainability outcomes.

Chapter 4: Sustainability Approach Application and Impact_A Scoping review

4.0 Chapter overview: This chapter describes a systematic scoping review which examines the application and impact of sustainability approaches in healthcare settings. The 62 sustainability approaches introduced in Chapter 3, were tracked through the literature to establish benefits and challenges associated with approach use and describe their demonstrated impact on sustainability outcome variables. Only 27% (17/62) of the approaches have demonstrated use in peer-reviewed publications. Benefits of using a sustainability approach include facilitating the development of a vision for programs, building consensus and ownership by involving local partners, and improving engagement and negotiation between local stakeholders. Challenges include the time consuming and complex nature of approaches and inability to modify or address issues. The majority of the articles, 79%, (54/68), did not report impact on the seven sustainability outcomes of interest. Of those which did report a sustainability outcome, the majority report the continuation or partial continuation of initiative activities. The seven proposed outcomes did not account for all sustainability outcome variables reported in these retrieved publications. Therefore two new potential outcomes are introduced: *Adaptation and responsiveness to change* and *Ability to garner resources*.

Aims and Research Questions: The aim of this chapter is to explore the available evidence on the application and impact of sustainability approaches in healthcare. A systematic scoping review was conducted to investigate the documented benefits and challenges of using sustainability approaches in practice and explore the impact sustainability approaches have on specific sustainability outcome variables. Three research questions will be explored:

1. *What sustainability approaches have demonstrated application in healthcare practice within peer-reviewed publications?*
    a. *Where have they been applied and for what purpose are they used?*
2. *What are the documented benefits and challenges associated with the use of sustainability approaches?*
3. *What impact have sustainability methods shown on sustainability outcomes?*

4.1 Background

In the current healthcare climate of increasing demands and competing priorities for resources there is a growing interest in understanding and influencing sustainability of improvement initiatives as healthcare planners and stakeholders seek to ensure the long-term impact of their investments.[10,11] This increased interest has highlighted a need to understand how sustainability of improvement initiatives can be influenced.[10,11] As discussed in Chapter 3, sustainability approaches have been proposed as a way to improve knowledge of constructs that facilitate sustainability to support improvement teams to manage processes, respond to needs and make informed decisions about sustainability risks.[16,18,35,148–151] In chapter 3, 62 sustainability approaches were documented and their development, as well as their aims and constructs, were outlined. The number of sustainability approaches in use continues to grow, with 50% being created in the last seven years (see section 3.3.1 Sustainability Approaches on page 98).

Evaluating frameworks and tools for sustainability is a key research area to advance the field.[155] There is emerging evidence for the use and impact of a small number of sustainability tools, but to date these have only been evaluated in small pilot studies.[35,42,45,306–308] The evidence for the use of sustainability approaches relies heavily on individual studies which have reported anecdotal benefits of use such as improved understanding of the barriers and risks to sustainability, and improving involvement of stakeholders.[148–150] Along with reported benefits, challenges associated with applying sustainability approaches have also be documented.[11,309–312] Issues with tool or framework design and content have been described as barriers to their use in healthcare settings.[11,309–312] Specifically, poorly designed constructs, inadequate coverage of factors, and lack of clear definitions have impacted application and outcomes in past use.[309–312] As discussed in chapter 2, the NHS Institute for Innovation and Improvement Sustainability Model (SM) was studied from 2008-2013 within CLAHRC NWL (2.3.4 CLAHRC NWL Sustainability Research on page 56).[148,200] This demonstrated that while the SM raised awareness of determinants of sustainability and prompted some action, improvement teams often found it difficult to understand and apply in practice.[148,200] The overall approach was seen as valuable but there was concern about the language used and clarity of the concepts (e.g. concepts were either considered difficult or too vague, causing discussions to get bogged down in debates on the meaning of questions).[148,200] This study highlighted the considerable time and effort which are invested in the application of sustainability approaches. This demonstrated the importance to understand not only the potential benefits of using a

sustainability approach but also the potential challenges. This knowledge will enable users to realistically consider application, and weigh potential problems with expected impact to make an informed choice on use.[10,45,121]

In the available literature, it is not currently known if, or how, these approaches are contributing to sustainability. As noted in Chapter 1, measuring sustainability poses a significant challenge to researchers and practitioners due to the multifaceted and interrelated definitions of sustainability. In a systematic review, Stirman et al., demonstrated the complexity of reporting sustainability in healthcare studies, and described a variety of outcomes. The outcomes reported within the review included: proportion of sites or providers sustaining, the proportion of eligible patients receiving an intervention, changes in the rate of recipient outcomes, and increases/decreases in desired outcomes. This study found that less than half (57/125) of the studies reviewed presented sustainability outcomes. The remaining studies reported data in such a way that it was not possible to determine the extent to which an intervention or practice was continued.[10] Of the 57 studies that reported outcomes, 51 described the proportion of sites sustaining or discontinuing an intervention. Twenty-seven (22%) of the studies reported sustained increases/decreases in desired outcome.[10] This review recognised that measurement of outcomes as a simple answer of 'yes' or 'no' responses is insufficient and unhelpful to sustainability research. Authors suggested more rigorous measurement and conceptualisation of sustainability was needed for *'methodological objectivity and interpretability'* of findings.[10,28]

Proctor et al. defined *sustainability outcomes* as the *"subsequent impact (healthcare improvement or public health outcomes) of sustained intervention use."*[1] To add rigour to testing and measurement in sustainability studies, specific sustainability outcome variables have been suggested. Below I describe seven sustainability outcome variables, six of which have come directly from Scheirer and Dearing's work and a 7th variable proposed in other literature.[28] Understanding if and how sustainability approaches impact these outcomes will help researchers and practitioners to critically appraise their value to improvement initiatives.

The sustainability outcome variables of interest include:

I. *Benefits or outcomes for consumers, clients, or patients continue*
II. *Programme activities or components of the original intervention continue*
III. *Maintenance and continuity of partnerships or coalitions developed during the funded programme*
IV. *Maintenance of new organisational practices, procedures, and policies that were started during program implementation*
V. *Attention and awareness of the problem or issue is continued or increased*
VI. *Replication, roll-out or scale up of the initiative*
VII. *Capacity built (skills and capabilities) within staff, stakeholders and communities developed throughout an initiative continue to be utilised*

Although not part of Scheirer and Dearing's original six variables, 'capacity building' is another variable proposed as being necessary for an initiative's sustainability and a potential variable which is sustained following initiative implementation.[8] Capacity building refers to the development of strengths, skills and abilities of staff, stakeholders and communities to maintain new organisational practices, procedures, and policies that were started, through their involvement with an improvement initiative. A community's readiness and capacity for improvement, communication, and collaboration is seen as a valuable sustained outcome that could lead to a new set of activities or benefits for consumers.[313]

While there is growing evidence of the use and application of sustainability approaches in healthcare improvement studies, little work has been done to understand the application of available methods and their impact in healthcare settings.[10,18,35,148,153] As the majority of sustainability approaches have not been studied in healthcare practice there is little evidence of if, or how, they may influence initiative sustainability.[10,153] This has resulted in a gap in the literature related to which of the approaches have demonstrated positive impact for programs, settings or circumstances.[10] This work explores the available evidence on the application and impact of sustainability approaches in healthcare.

4.2 Methods

A systematic scoping review was designed to search for peer-reviewed publications detailing the use of the sustainability approaches in practice. Searches were performed through electronic citation tracking and snowballing of references. Articles were obtained through Web of Science and Google Scholar. PRISMA guidelines directed the search strategy, and quality assessment was performed using the Mixed Method Appraisal Tool (MMAT).[211,214] Full method details can be found in Chapter 3 section 2.4.2 Scoping Review.

4.3 Results

The electronic citation tracking for the 62 sustainability approach publications identified 2938 publications for potential inclusion. Abstract and title screening identified 109 articles which underwent full-text screening. All full-text articles were then reviewed using the MMAT to examine their methodological approach which led to the exclusion of 41 additional articles which did not pass the MMAT screening questions that identified them as non-empirical studies. A total of 68 articles were included in the review (Figure 15).

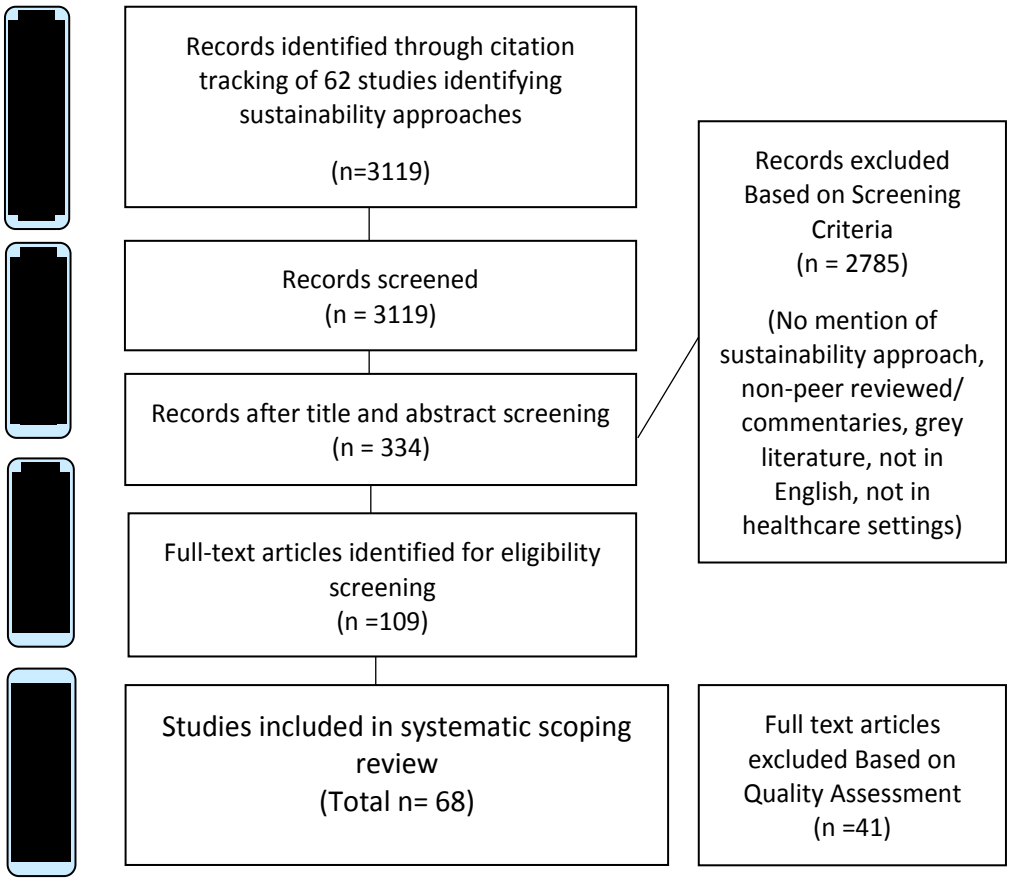


Figure 15: PRISMA Diagram for the Scoping Review

4.3.1 Sustainability Approaches Used in Practice

Of the 62 approaches identified in Chapter 3, only 27% (17/62) demonstrated use in peer-review publications. The review included 68 articles demonstrating the application of the 17 approaches in practice. Table 23 provides a list of the sustainability approaches used within the articles. Results demonstrate an increase in the use of sustainability approaches in peer-reviewed sustainability studies (Figure 16).

Table 23: Number of publications by sustainability approach

Sustainability Approach	# of Articles
1. Normalisation process theory[277]	30
2. Normalisation process model[278]	8
3. Level of Institutionalisation (LoIn) Scale[29]	5
4. Program Sustainability Assessment Tool (PSAT)[42]	4
5. Program Sustainability Index (PSI)[151]	3
6. NHS III Sustainability Model[16]	3
7. Slaghuis's Framework and Instrument for sustainability[38]	2
8. The ARCC (Advancing Research and Clinical practice through close Collaboration) model[279]	2
9. Conceptual framework for planning for sustainability of community-based health programs[8]	2
10. Leffer's Conceptual Framework for Partnership and Sustainability[276]	2
11. Atun's Conceptual Framework for analysing integration of targeted health interventions into health systems[262]	1
12. Shell's Capacity for sustainability framework[288]	1
13. Fox's sustainability of innovation theoretical framework[273]	1
14. Conceptual framework for sustainability of public health programs[28]	1
15. Gruen's Model of health-programme sustainability[18]	1
16. The Sustainability Analysis Process (SAP)[160]	1
17. Fleiszer's Framework for the sustainability of healthcare innovations[30]	1
Total	**68**

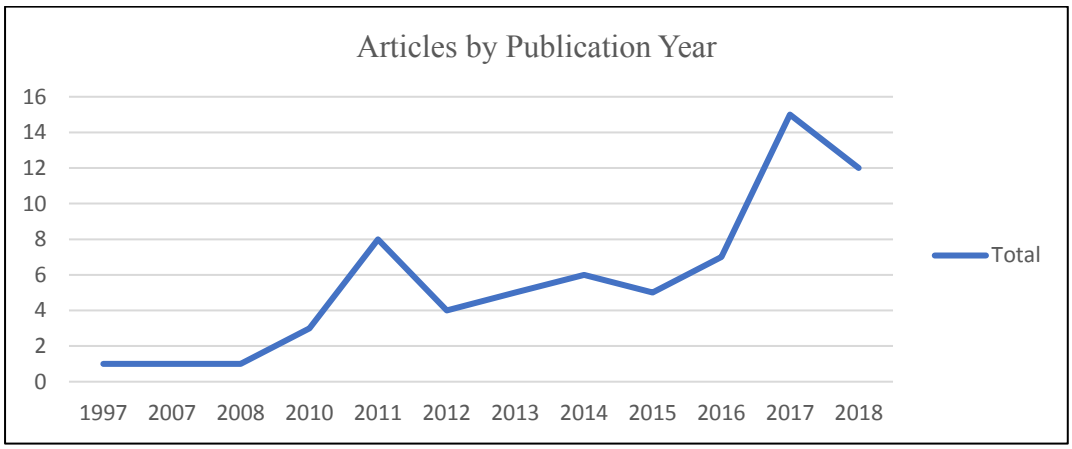


Figure 16: Number of articles describing the application of a sustainability approach by year

Description of application

Healthcare Setting: Sustainability approaches have been applied in a range of healthcare settings (Figure 17). Most, 53% (36/68), were based in primary care settings (e.g. primary care trusts, GP surgeries, clinics etc.). Fewer approaches were used within tertiary care 13% (9/68) or secondary care settings 10% (7/68). Five specified that they were used in community healthcare initiatives and three approaches were used in nursing education initiatives.

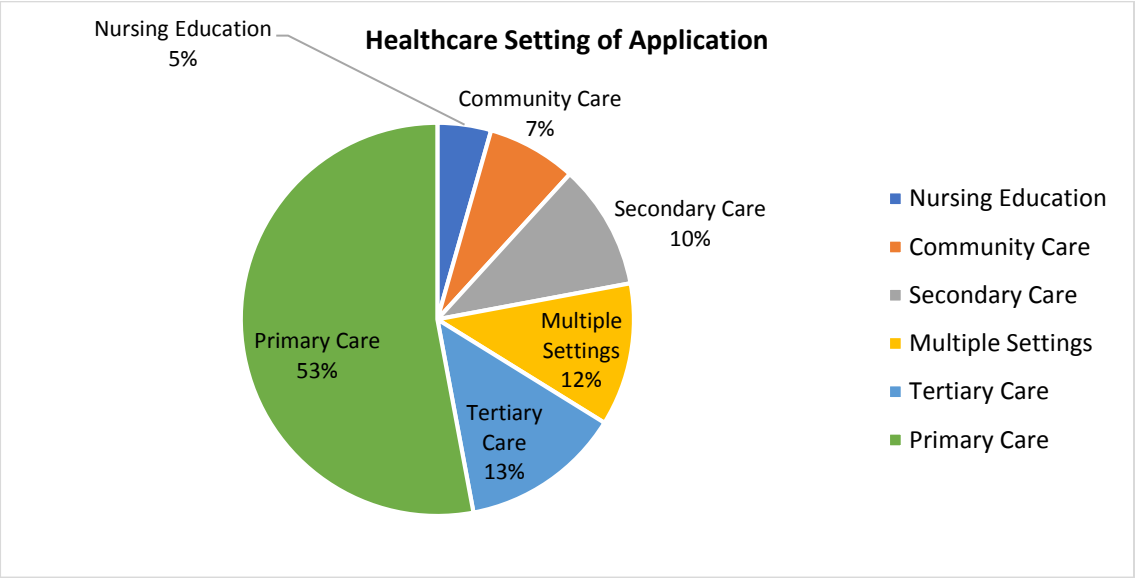


Figure 17: Percentage of publications by healthcare setting

Geographical location of study: Sustainability approaches have been applied in over 19 countries (Table 24). Most were conducted in the United Kingdom 34% (23/68), followed by 15% (10/68) in the United States. Commonly, studies were undertaken within one country, but a small proportion, 4% (3/68), took place across multiple countries.

Table 24: Number of publications by country location

Country	# of Publications	Country	# of Publications
United Kingdom	23	Mozambique	1
United States	10	Kenya	1
Australia	8	Belgium	1
Canada	4	Uganda	1
The Netherlands	4	Niger	1
Pakistan	2	Denmark	1
South Africa	2	Ireland	1
Colombia	1	Dominican Republic	1
Zambia	1	Sweden	1
Cuba	1	Multiple Countries	3

Study designs and Site Application: Multiple study designs were found in articles detailing the application of sustainability approaches (Figure 18). Qualitative methodology was the most common study design with 59% (40/68) of the studies employing methods such as interviews, focus groups, and participant observation. This included four case studies[242,312,314,315], two ground theory approaches[316,317] and 1 ethnography.[318] This was followed by 28% (19/68) which were mixed-method studies, and 13% (9/68) which were quantitative study designs using questionnaires, regression analyses, weighted scales, or electronic surveys. Most studies, 79% (54/68), explored the application of the sustainability approach, across multiple sites or organisations. For example in Campbell et al. applied Gruen's Model of health-programme sustainability to describe the sustainability of a hospital-based smoking cessation program across six Canadian hospitals.[319] Twenty-one percent (14/68) were used within single sites (e.g. intensive care units, care homes, GP clinics etc.).

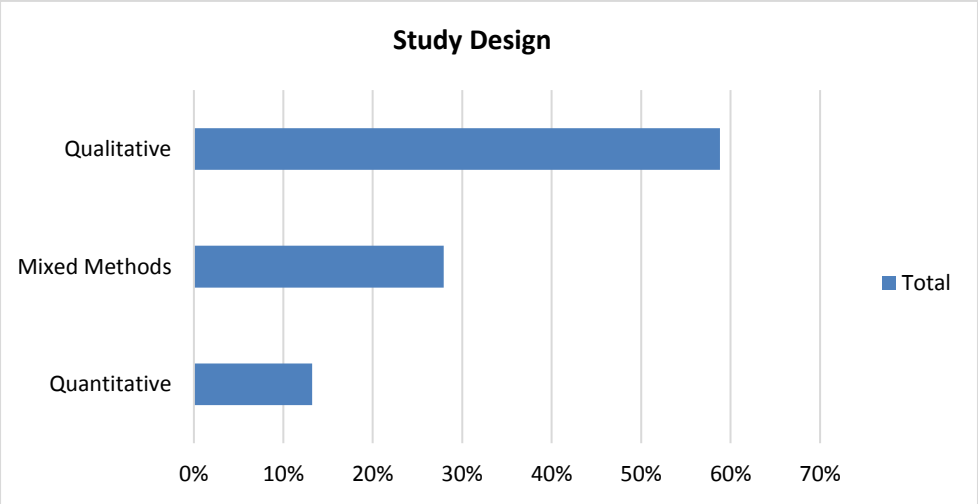


Figure 18: Percentage of publications by study type

Timeframe for study: For a large proportion, 49% (32/68), of the studies the timeframe for which sustainability was being studied was not clear or was not stated (Figure 19). Fifty-three percent (36/68) of the studies did identify a timeframe. The timeframes used to apply the sustainability approaches ranged from two months to four years post implementation. The most common timeframe for assessment was between 12-18 months.

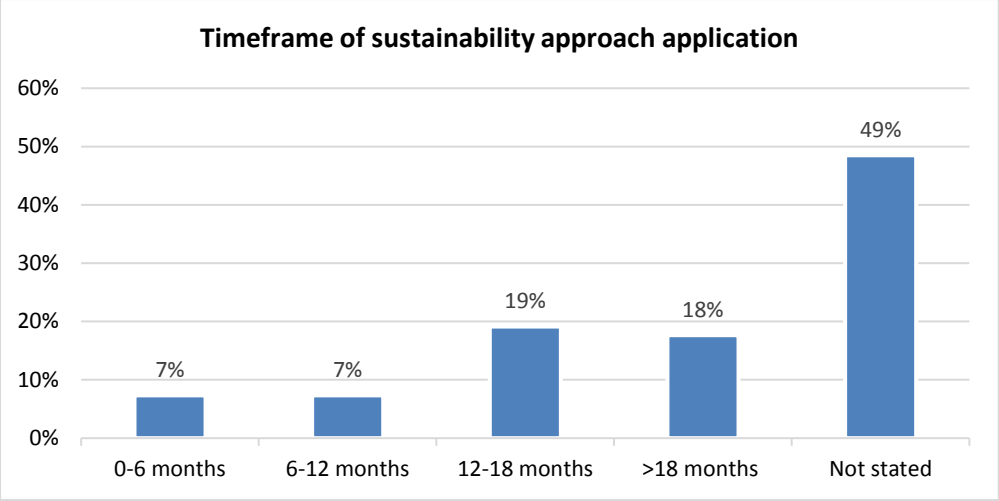


Figure 19: Timeframe for sustainability approach use

Purpose of Application: Twenty-six (38%) articles used a sustainability approach for more than one purpose such as planning and evaluation or guidance and analysis (Figure 20). The use of a sustainability approach for multiple purposes was seen in Johnson et al.'s study which used NPT to both guide and assess implementation of an intervention to improve the nutritional care of preterm infants.[320] Nineteen of the articles (28%) used a sustainability approach for assessment. For example, in Cramm et al.'s study, Slaghuis's Framework and Instrument for Sustainability was used to assess connections between partnership functioning and sustainability of innovative programmes in community care.[321] Fifteen studies (22%) used an approach to inform data analysis for the study (e.g. in Toledo Romanib et al.'s study the LoIn scale was used to guide content analysis for the study[322]). No study used a sustainability approach exclusively for planning for sustainability, but planning was reported in combination with other purposes.

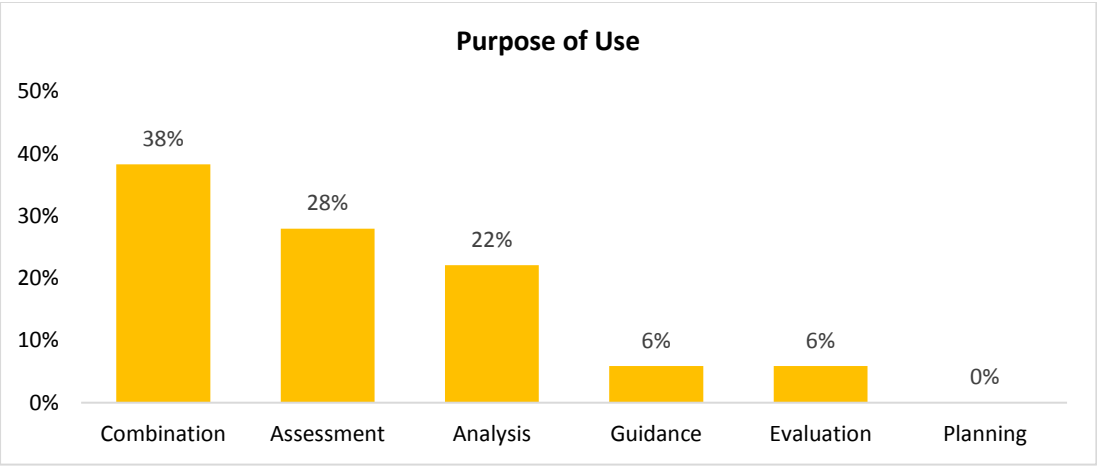


Figure 20: Purpose of use described in articles

4.3.2 Benefits and Challenges

Results outlined several potential benefits and challenges associated with using a sustainability approach in practice. Benefits related to the use of an approach included: facilitating the development of vision for programs[150], building consensus and ownership by involving local partners[287], improving engagement and negotiation between local stakeholders[299] and analysing implementation from multiple perspectives[323]. Challenges were also reported in the use of approaches. These include: time consuming and complex nature of approaches[324], inability to modify or address issues identified[325], difficult wording and response options.[148] Table 25 reports findings on the benefits and challenges for individual approaches. Below six common themes related to the benefits and challenges which were found across multiple approaches are discussed.

Benefits of Use

Detail on and documentation of the application of the sustainability approaches varied. Thirty-five percent (24/68) of articles did not identify benefits associated with the use of particular approaches. For the 65% (44/68) which did describe benefits of use, three main benefits were found: 1) Improved conceptualisation of sustainability, sustainability constructs and their impact on systems, 2) Improved ability to organise, analyse and interpret sustainably data, and 3) Providing focus and highlighting areas for improvement.

1) **Improved conceptualisation of sustainability, sustainability constructs and their impact on systems: 37% (25/68)**

The most common benefit reported from the use of sustainability approaches was the improved understanding of sustainability and sustainability factors. Twenty–five articles stated they were able to improve conceptualisation of sustainability of interventions through the use of a sustainability approach. For example, Deconinck et al. applied Atun's *Conceptual Framework for Analysing Integration of Targeted Health Interventions into Health Systems*, and found that the approach provided a systems lens that increased understanding of pathways for integration to help sustain coverage of effective interventions.[262,326] A number of articles also explicitly reported gaining a better understanding of barriers and facilitators to sustainability of their initiatives through the use of an approach. The Program Sustainability Assessment Tool (PSAT) was used to help predict an initiatives' integration in Scudder et al.'s study which found barriers in financial support and implementation funding.[42,327] Blanchet et al. noted that

The Sustainability Analysis Process (SAP), highlighted the need for participation of major stakeholders as a facilitator to promote sustainability within the rehabilitation sector.[328]

2) **Improved ability to organise, analyse and interpret sustainably data: 26% (18/68)**

Many of the approaches were used to guide study design and analysis. In this process, many authors noted that the approaches aided in the organisation, analysis and interpretation of data. For example, within Sanders et al.'s article, the NPT was used to organise their semi-structured interview data on a new system for patients with lower-back pain.[329] Authors noted that the NPT not only aided in the design of the interview but also guided thematic analysis on improving uptake of the new system for general practitioners in the study.

3) **Providing focus and highlighting areas for improvement: 9% (6/68)**

The final benefit noted in the use of sustainability approaches was the ability of an approach to improve focus and highlight areas for further work to support sustainability. This was highlighted within Ford et al.'s study using the NHS III Sustainability Model. This study found that the model provided a measurement indicating where a component in the organisation needs improvement for sustainability.[330] Similarly, Mair et al. highlighted that the NPT focused attention on the work that people need to do to implement and integrate new technologies.[318]

Challenges of Use

Challenges associated with the use of a sustainability approach were not reported in 66% (45/68) of the studies. In the 23 remaining papers, key challenges were reported and included: 1) issues with Approach Constructs, 2) difficulty in application and 3) need for adaptation or improvement.

1) **Issues with Approach Constructs: 16% (11/68)**

The most common challenge associated with the use of sustainability approaches was associated with approach constructs. Issues such as applicability, relevance, overlap or missing constructs were encountered across a number of studies. For example, a common problem found with the NPT was the difficulty in discerning the differences between the constructs which were often reported to overlap in content and concept. In their studies, both Drew et al. and Gillespie et al. found that the overlapping nature of

the four constructs meant the data could be coded into more than one construct.[310,331] Another noted issue with constructs was the ability of the included constructs to cover all the relevant areas needed for studies. This was an issue with Leffer's Conceptual Framework for Partnership and Sustainability, where Underwood et al. found the model did not explore nurse partner factors or resources.[332]

2) Difficulty in application: 9% (6/68)

It was noted within six papers that authors encountered some difficulty in applying the approaches. In Winterton and Chambers' study, they found that Shediac-Rizkallah and Bone's conceptual framework was difficult to apply to initiatives in certain ethnic populations.[8,242] Doyle et al. reported similar findings with the NHS III Sustainability Model. In this study, users reported concerns over aspects of the model design and only 12 of the 19 teams found it acceptable for routine use.[148,200]

3) Need for adaptation and improvement: 9% (6/68)

Numerous articles stated that although the approaches were able to aid in the conceptualisation of sustainability, the authors also noted that they were often unable to use the approach as originally designed or they suggested improvement needed in the future. For example, the Program Sustainability Index (PSI) was used by Ahmad and Abu Talib in a study of local institutional capacity to assess community capacity. During the application, authors stated that the index was adapted to suit the study needs.[333] A number of studies also recommended that improvements were needed to some approaches. Bamford et al. suggested that the NPT may require further development to explore links to the theoretical constructs of NPT and specific behaviour change techniques to increase the practical value of the theory.[243]

Table 25: Benefits and Challenges reported for Individual Approaches

Sustainability Approach	Benefits	Challenges
1. Normalisation process theory (NPT)	• Helped to expose the 'hidden work 'that needs to occur to create health promoting systems • Understanding the barriers to implementation and identifying potential strategies to address barriers • Provided framework to organise findings • Facilitated analysis of implementation from multiple perspectives and understanding of experiences of health care workers at the individual, and organisational level • Drawing planners' attention to potential problems to address them during implementation	• Further development needed to link constructs to specific behaviour-change techniques • Overlap and difficulty of discerning the difference between the constructs • Based on perceptions of people, therefore risk of leaving some contextual factors beyond the scope
2. Normalisation process model (NPM)	• Allowed the identification of barriers and facilitators impacting the programme • Provided framework to organise findings • Facilitated a deeper and more dynamic analysis	• Difficult to assign to a single category to the data as categories overlap
3. Level of Institutionalisation (LoIn) Scale	• Allowed an aspect of continuous evaluation by measuring whether intervention is becoming institutionalized • Insight on implementation problems in routine settings • Exploration of program sustainability at different levels of care • Identified risks and barriers to sustainability	• More work is needed to test with larger samples and different health promotion programmes • Do not measure the processes leading to institutionalization, only whether structural components are present or not present • Wording and response options may need to be modified to fit with specific contexts
4. The ARCC (Advancing Research and Clinical practice through close Collaboration) model	• Improved outcomes of believing in the value of EBP and increased reported use of EBP implementation behaviours • Positive effects on nurses' perceptions of EBP organisational culture and readiness, beliefs and implementation, job satisfaction, group cohesion	• The model should include a cost component and patient outcomes to evaluate potential savings
5. Program Sustainability Assessment Tool (PSAT)	• Provided an overview of sustainability strengths and weaknesses • Determined program elements intended to sustain for the long term • Enabled team to demonstrate accomplishments, tell their story, and build connections	• The brevity and simplicity of the tool may not capture the nuances of the setting and situation.

		• Facilitated the development of a vision and mission for the program	
6.	**Program Sustainability Index (PSI)**	• Provides evidence of the supporting role of effective collaborations in sustainment across different service systems • Provided a form of measurement	• Scales may require adaptation for use
7.	**NHS III Sustainability Model**	• Provided an understanding of determinants of sustainability • Relevant for examining implementation processes across a range of clinical settings	• Aspects of the SM's design that should be considered to include a more user-friendly design and further • Needs greater emphasis on the political and economic environment as well as patient and public engagement
8.	**Slaghuis's Framework and Instrument for sustainability**	• Strong relationships connect partnership functioning, synergy and the sustainability of innovative programmes in community care • Short and long-term improvements in quality of chronic care delivery predicted program sustainability	• Lack of relevance of specific subscales
9.	**Shell's Capacity for sustainability framework**	• Highlighted key strengths and weaknesses, as well as levers within programmes	• Some domains need further conceptual refinement • Hard to categorize domains as entirely positive or negative, due to the many nuances involved
10.	**Leffer's Conceptual Framework for Partnership and Sustainability**	• Provided the structure for deeper understanding of distinctive views regarding the engagement processes and partner factors for effective collaboration • Model constructs offer a platform to engage in dialogue with partners to gain context-specific insights • Useful in guiding study to examine global health partnerships	• Model did not explore nurse partner factors, resources, or sustainability therefore, applicability of the model with other host partners, professions, and contexts needs to be investigated • Not generalisable to other countries outside of the US
11.	**Gruen's Model of health-programme sustainability**	• Provided greater insight into the sustainability of interventions • Provided insight into issues affecting program sustainability, and may foster development of a sustainability plan	Not stated
12.	**Fleiszer's Framework for the sustainability of healthcare innovations**	• Aided in the identification of characteristics of program sustainability	• May benefit from further investigation to examine the long-term sustainability and discontinuation of different kinds of innovations in diverse settings
13.	**The Sustainability Analysis Process (SAP)**	• Supported participants to clarify the boundaries of their systems, define sustainability, and identify sustainability indicators	Not stated

14. Conceptual framework for planning for sustainability of community-based health programs	• Useful for analysis • Provided an understanding of how programme sustainability is impacted by different components in and out of the community	• Framework could not address cultural specificity
15. Atun's Conceptual Framework for analysing integration	• Provided a systems lens for increasing integration can help sustain effective interventions	Not stated
16. PRISM (Practical, Robust Implementation and Sustainability Model)	• Provided valuable data that helped develop a detailed implementation plan and facilitated the implementation process	Not stated
17. Conceptual framework for sustainability of public health programs	• Useful in explaining sustainability	• Not able to explain all financial sustainability strategies

4.3.3 Impact of Approaches on Sustainability Outcome Variables

The majority, 79% (54/68), of the articles did not report impact on sustainability outcomes. Only 21% (14/68) of the articles reported one or more of the sustainability outcomes of interest. The reason for few articles detailing outcomes was attributed to how the approaches were used in practice and why they were applied. Many articles applied approaches to aid analysis and conceptualisation of sustainability, therefore impact on outcomes were not assessed within these studies. The 14 articles which included outcomes used a variety of sustainability approaches (Table 26). Below I describe the reported impact from the 14 available studies.

Table 26: The number of articles that used the approach reported by each variable

Approach	# articles with sustainability outcomes	Benefits	Activities	Partnerships	Practices or procedures	Attention to the issue	Diffusion	Capacity Building
NPT	3	✓	✓		✓			
NPM	2		✓					
PSAT	2		✓	✓		✓	✓	
LoIn Scale	4		✓		✓			
NHS III SM	1	✓						
SAP	1				✓			
Shediac & Bone's Conceptual Framework	1			✓		✓	✓	✓

I. Whether benefits or outcomes for consumers, clients or patients are continued (3/14)

Three articles reported continued benefits to patients.[320,334,335] Higuchi et al. found that there were sustained organisational perceptions of benefits five years after their initial initiative to introduce multiple nursing guidelines[334] and Johnson et al. found that their intervention resulted in high guideline compliance and demonstrated improvements in protein intake and weight gain of preterm infants.[320] A number of studies described the benefits to other stakeholders affected by the programme, such as their staff, communities and carers.[320,330,336]

II. Continued programme activities or components of the original intervention (8/14)

The most common outcome reported was continuation of programme activities or components, with eight articles exploring the continuation of initiative activities.[311,322,327,335,337–340] This included three articles detailing partial continuation of activities.[338–340] In Redman et al.'s study they found low to moderate levels of routinisation were achieved which suggested that the programmes had embedded into the host organisations.[337] In one of the studies on partial

continuation, Van acker et al. found that of all organisations involved in the '10,000 Steps' programme, 50% continued.[339] Ibrahim et al. also discussed partial continuation while investigating the continuation of grip strength measurement programme over a nine month period across five acute medical wards. Their results demonstrated that weekly coverage ranged between 65% and 100% (average 80%) in one site and between 0% and 93% (average 40%) in another site.[340]

III. Maintenance of community-level partnerships or coalitions developed during the funded programme (3/14)

Three articles reported the maintenance of partnerships and described how it was beneficial or challenging for the continuation of the programme. The maintenance of partnership was highlighted in Diaz del Castillo et al.'s study where champions were a core part of the improvement delivery. This team found the programme was grounded in the work of its champions, who would continuously advocate, garner further resources, recommend strategies, and implement activities.[341] Scudder et al. also discussed the importance of partnerships in sustaining a parent-child interaction therapy (PCIT) programme. They noted that a number of initiatives had developed leadership groups or steering committees involving key stakeholders during the maintenance period which was seen as aiding sustainability.[342] On the other hand, while Moreland-Russell et al. (2018) found similar importance of developing strong partnerships, they were unable to maintain these relationships in the long term. This was largely due to conflicting levels of interest in staff and restrictive funding.[343] A fourth article detailed the importance of partnerships but concluded that impact on sustainability could not be ascertained as causal relationships between partnership functioning, synergy and programme sustainability could not be known.[321]

IV. Maintenance of new organisational practices, procedures, and policies that were started during program implementation (5/14)

Maintenance of new practices were highlighted in five articles.[311,320,322,328,344] Four studies demonstrated practices and procedures were maintained, while one study showed that practices were not sustained in the study period. Toledo et al.'s study using the LoIn scale found that institutionalization of the intervention was reaching saturation by the end of the study period. The authors noted that elements of the intervention had lost their separate identity and had become part of the programme's regular procedures.[322] In Blanchet et al.'s paper, authors followed two rehabilitation sectors using the Sustainability Analysis Process for two years. At

follow up, they noted that although there were differences in the structure of social networks, the programme continued.[328] Gask et al. reported the difficulty in maintaining new procedures to implement a new clinical governance programme. They found that clinical governance in primary mental health care settings had not yet become part of the procedures and policies.[344]

V. Sustained attention to the issue or problem (2/14)

Two studies highlighted that attention to the issues or problem was sustained.[341,342] Diaz del Castillo reported that their programme was able to sustain attention to the issue by involvement in national campaigns. The implementation of their programme, Healthy Habits and Lifestyles Program, was included in the Ten-Year National goals.[341] Scudder et al.'s study also reported maintaining attention to the issue.[342] Attention was maintained through a number of strategies, including '*word of mouth'* and TV campaigns.[362]

VI. Programme diffusion and replication in other sites (2/14)

Two studies reported on programme diffusion or replication.[327,341] Scudder et al.'s study demonstrated diffusion of the PCIT programme across the United States.[342] The authors noted that although the original PCIT was not fully replicated, the strategies for integration of the PCIT were adapted and differed by the needs of other systems, organisations or populations involved. Diaz Del Castillo et al. also reported that their programme grew from 12 locations in 1996 and to 31 locations in 2005. They reported that the *"programs have lasted more than 10 years, scaled-up locally/nationally, and exist in similar forms elsewhere."*[341]

VII. Capacity building (1/11)

Diaz del Castillo et al.'s study was the only article to highlight the continuation of capacity built or skill gained in the initiative. This study used both Shediac-Rizkallah and Bone, and Scheirer and Dearing frameworks.[341] Authors reported that programs had expanded and been maintained due to the quality of the instructors which was seen to impact both people's continued attendance and perceived benefits. The programme maintained training for staff with a 'Teachers' Academy' created to select and train instructors for the programme.[341]

4.4 Discussion

Many sustainability approaches are available, however only 27% (17/62) have demonstrated their use in peer-reviewed publications. The approaches have allowed users to assess, evaluate, analyse and guide sustainability measurement and research.

This review has demonstrated that the use of sustainability approaches is associated with both benefits and challenges. Notable benefits include identification of issues and risks associated with sustainability constructs and improved conceptualisation and organisation of sustainability data. The use of these approaches was not without its challenges, which included difficulty in applying the tools in practice and the need to adapt the tools for use in specific studies. Although several articles detailed the benefits and challenges of using sustainability approaches, the impact of use on behaviour, practices and actions to sustain remains unclear. Articles detailed how approaches highlighted areas of concern but provided little insight into how this shaped sustainability planning or actions. For example, in Ford et al.'s study they used the NHS III Sustainability Model to identify areas of weaknesses in the programme. Staff awareness and outdated information were highlighted as potential risks but the study provided no indication if these findings led teams to take action to improve conditions. Future work in this area should allow for the impact of approaches on sustainability process and actions to be better understood.

Challenges in measuring sustainability outcomes

Measuring sustainability outcomes is a quantifiable way to understand the success of a project and intervention.[28,45] Although sustainability approaches are intended to support long term impact, few studies reported if improvements were sustained. The available evidence shows few approaches can demonstrate their impact on sustainability outcomes in practice with only 21% (14/68) of papers detailing one or more of the outcomes of interest. This is similar to the results reported by Stirman et al. in their systematic review, which found only 22% of studies reporting information about sustained outcomes.[10] It is necessary to note that many of the articles reviewed may have also achieved one or more of the other sustainability outcomes but did not report them. These findings highlight that although the use of multiple variables to report sustainability outcomes is recommended, it is not common practice. Methodological issues may contribute to the difficulty in assessing sustainability outcomes which were highlighted within the reviewed studies. These issues included:

i. **Inability to connect outcomes with the approach used:** A number of studies predicted that the use of the approach may impact future sustainability but found difficulty in demonstrating this connection. For example, Levin et al. predicted that the use of The ARCC (Advancing Research and Clinical practice through close Collaboration) model may lead to less attrition rates in healthcare systems but they were not able to state whether this happened during the study period.[345] Doyle et al. found similar challenges as that their data indicated that the teams who were more engaged with the NHS III Sustainability Model took more action to promote sustainability but they could not say that the model itself had prompted these actions.[148]

ii. **Lack of time or resource to continue to study the initiative:** Authors also described the difficulty in determining sustainability outcomes as they were hard to assess given time constraints and ability to follow-up with sites. For example in Moreland-Russel et al.'s study they found that sites had not completed a sustainability assessment since funding ended in 2013, so they could not know whether states sustained the approach in the long term.[343] In another study by Dickinson et al., the interview sample used was deemed to be too small to explore differences between which services continued and those which failed after initiative implementation.[346]

iii. **Lack of clear definitions or outcome measures:** A third explanation for the low reporting of sustainability outcomes is the persisting difficulty in measuring and defining sustainability.[45] A common issue across analysis was the inability to judge what authors meant by normalisation, continuation, or sustainability. For example, in Leon et al.'s study they concluded that *"the new PITC intervention became embedded in practice (normalised) during a two-year period (2006 to 2007)."*[311] Information on what was embedded, what specific activities were continued, and what other variables were sustained were not discussed. This made ascribing outcomes of interest difficult for these studies. Future work should endeavour to clearly describe and outline projected sustainability outcomes and consider the use of multiple outcomes to capture comprehensive sustainability outcomes. Issues with defining sustainability were also seen in a number of studies which highlighted the difficulty in assessing sustainability as a binary state (sustained vs not sustained). It has been recognised that studying sustainability is more likely to be measured on a gradient rather than a simple yes/no response.[28] Stolldorf et al. found that hospitals' sustainability within their study were

within a wide range suggesting that teams had demonstrated a level of maintenance at some sites but had not become fully integrated and sustained in certain hospitals.[338] Another article found that sustainability hadn't been achieved 'yet' so needed more time for clinical governance to become normalised.[344]

iv. **Use for analysis and conceptualisation purposes:** The final issues observed in this study was the use of sustainability approaches for largely analysis and conceptualisation purposes. This meant that the approaches served to aid in interpretation and organisation of data and sustainability outcomes were not reported. This does not reduce the value of these studies but highlights the challenge of establishing impact in the field. For example, the aim of the NPT is to help understand how complex interventions can embed change and become normalised in practice.[277] Although the aim of this approach specifies its potential to assist in explaining how complex interventions become routinely embedded in healthcare practice, the published evidence shows that most often it is used to assess implementation processes only. Therefore, its impact on sustainability outcomes remains unclear. Future studies applying these approaches may benefit from reporting on all aspects of the approaches, including embedding and integration.

Implications for future measurement of sustainability outcome variables

Throughout data extraction, it was noted that select articles report sustainability outcome variables that did not fit into the seven variables identified in previous literature. Two outcomes of interest were of particular note as they appeared in multiple studies.

1. **Resilience and Adaptation -The ability to respond to challenges:** The first variable is related to fidelity and flexibility of initiatives and the ability to respond and adapt to challenges and changing needs. This was highlighted in a number of studies. The first was Scudder et al.'s study where they found that while initiatives were actively sustaining, no clear strategies were linked to their success but rather, *"the common theme across initiatives was the importance of being responsive to existing needs and challenges"*.[342] The authors noted the strategies for integration of the programme were adapted and differed by the needs of other systems, organisations or populations involved.[342] Diaz del Castillo also found that for both programs in their study there was *"a need and willingness to be flexible"*.[341] Flexibility, in this case meant, adapting

programs to people's preferences, funding changes, and diverse scenarios/conditions.[341] Blanchet et al., also noted how adaptation and resilience played a part in the sustainability of improvements with two rehabilitation sectors. They noted that *"the structure of the rehabilitation system characteristics evolved over time and helped understand the changing nature of relationships between actors and their capacity to work as a system. This aided in the creation of consensus on a common vision of sustainability."*[328]

2. **Ability to garner further funding:** The second outcome variable identified is related to an initiatives' ability to garner further funds to continue the initiative and maintain gains. This was also highlighted in the Diaz Del Castillo study where they described how 19 of 32 departments had co-funded programs, and six programs operated using their own resources. They highlighted that *"the creation of a specific PA (Physical Activity) unit in 2011 led to a dedicated budget, resources, goals and a capacity to translate policy into action."*[341] In another article, Volker et al., discussed how the need for recurrent funding for prevention activities was a fundamental barrier to the intervention approach being adopted as usual practice.[347] Blanchet et al. also identified gaining further resources as a mechanism indicating sustainability and noted that *"financial support by an international organization facilitated advancement toward self-identified sustainability goals."*[328]

These additional outcomes of interest may lend a new understanding of how sustainability outcomes can be viewed and assessed in practice. Given the evidence within the review and potential gaps in understanding diverse sustainability outcomes, these outcomes will be added to future enquiries within this thesis to assess their potential in describing and measuring sustainability outcomes. For this purpose, an updated Sustainability Outcome Framework will be used in the following chapters (Table 27).

Table 27: Updated Sustainability Outcome Framework

Updated Sustainability Outcome Framework		
I.	**Outcomes and Benefits**	*Outcomes or benefits for patients, staff and stakeholders continue*
II.	**Activities**	*Initiative activities or components of the original intervention continue*
III.	**Relationships, partnerships and networks**	*Maintenance of relationships, partnerships or networks developed during the funded programme*
IV.	**Procedures and policies**	*Maintenance of new organisational procedures, and policies that were started during program implementation*
V.	**Attention and awareness**	*Attention and awareness of the problem or issue is continued or increased*
VI.	**Spread**	*Replication, roll-out or scale up of the initiative*
VII.	**Skills and capabilities**	*Capacity built (skills and capabilities) within staff, stakeholders and communities developed throughout an initiative continue to be utilised*
VIII.	**Innovation and Adaptation**	*Adaptation in response to new or changing populations, evidence, policies, or other contextual influences*
IX.	**Garnering Funding**	*Ability to garner further funds to continue the initiative and maintain gains.*

Implications for Practice: Practitioners and researchers should have clear and realistic expectations when using a sustainability approach. Results have shown potential benefits of use but very little information on impact to sustainability outcomes is available. Therefore, users must be conscious of the time and effort required to use approaches in practice and assess whether the benefits outweigh the potential challenges of use.

Strengths and Limitations: This is the first review to examine the application and impact of sustainability approaches in healthcare and the first review attempting to understand the impact of sustainability approaches on sustainability outcomes. This review provides a better understanding of the complexity of these approaches by outlining where they are most often used in healthcare, their challenges and benefits, and the impact they have had on outcomes.

There are limitations associated with this systematic scoping review which are necessary to acknowledge. The first is the potential for publication bias. This may have manifested in two ways. The first is through the search strategy which may have missed published articles if they had not referenced the use of an approach within their study or if it was not properly cited. The second possibility of publication bias is related to the fact that many of the approaches have been recently published so the articles detailing use have had less time to be made available. A

third limitation is the disproportionate inclusion of studies using the NPT. This may have skewed the results to be more applicable to the use of the NPT. Attempts to balance results were made by providing narrative examples and descriptions for multiple sustainability approaches throughout the manuscript. The final limitation is the potential generalisability of these findings. The extent to which all approaches produce the reported benefits or challenges is unknown. Future work should seek to identify and describe if and how these benefits and challenges are seen for specific approaches.

Future research: The evidence for the use of sustainability approaches requires further work as few have demonstrated use in practice. This means we are currently unclear as to the full contribution of these approaches to sustainability processes or outcomes. Of the retrieved full-text articles, 68 out of 109 passed the quality assessment. Lack of clear research questions and methods of data collection resulted in the exclusion of many possibly relevant papers due to methodological concerns.[214] This signifies issues in the overall quality of sustainability research reporting. In order to fully understand an initiative's sustainability, research papers require appropriate study designs and research questions which are congruent with the chosen design.[28] It is also important to note that although 14 articles did mention sustainable outcomes, reporting of these outcomes was often hard to ascertain and required some reader deduction. This indicates a need for more rigorous empirical research in studying sustainability outcomes in healthcare. Full details on the application of sustainability approaches would improve our knowledge of the links of approach use, and sustainability processes and outcomes.

Although this work has demonstrated that there is some evidence of the application and impact of sustainability approaches, it has also shown remaining gaps in the literature. With few studies demonstrating any relationship to sustainability outcome impact, the continued support for the use of these approaches relies on studies which have demonstrated largely subjective benefits of use. This means we are currently unclear as to the full contribution of these approaches and unclear of how they are adding value to sustainability. To address this gap future research should consider three areas:

I. The first is the need for future studies to provide clear and rigorous accounts of the application of sustainability approaches. This should include clear rationale for use, description of how approaches are used and the impact of using the approach on specific sustainability outcome variables of interest.

II. The second consideration for improving research in this area is for future work to describe how sustainability approaches contribute to sustainability planning, decision making and actions in practice and how they influence sustainability throughout initiative journeys. Providing insight into how approaches impact and influence ongoing sustainability processes and actions over time would be a significant contribution to the field.

III. Related to the above consideration, is the need to explore the process of sustaining itself and how it manifests in practice. There is still little understanding of the process we are trying to impact with such tools. We regularly create sustainability approaches but little work has been done to advance knowledge on the process of sustaining, including what it entails or how it is influenced in practice. In order to more accurately understand the role of tools, there is a need to describe and make explicit what 'sustaining' looks like. This may enable us to understand when tools may have the greatest impact and provide insight into why their use has not shown a significant increase in sustained initiatives. The process of sustaining will be the subject of Chapter 6.

Contribution to overall thesis: This review addressed the gap in sustainability research identified in Chapter 1 to describe the current evidence on the application and impact of sustainability approaches in healthcare. It highlights the potential benefits and risks of using a structured approach to assess sustainability and outlines the reported impact of use. This chapter also highlighted the remaining gaps in the literature associated with rigorous and well documented use of sustainability approaches in practice and identified two further sustainability outcome variables which can be assessed in upcoming chapters. In the next chapter, I will explore the longitudinal application and impact of a specific sustainability approach, The Long Term Success Tool, within three QI programmes. This work will seek to provide a rigorous account of the process of applying an approach to provide insight into both how a sustainability approach is used in practice and if and how it contributes to sustainability within these programmes.

4.5 Conclusion

Given the vast number of approaches available, choosing a sustainability approach to use in projects can be difficult; therefore, this review can provide healthcare professionals and researchers with the current evidence on the approaches including the benefits and challenges

that arise through their use and the outcomes they have contributed to. The evidence for the application and impact of sustainability approaches requires further work as the majority have yet to demonstrate use in practice. Results have shown some benefits but very little impact on sustainability outcomes. Therefore, users must be realistic in their expectations and conscious of the time and effort required to apply an approach in practice.

Chapter 5: Exploring the Application and Impact of the Long Term Success Tool_A Longitudinal Mixed Methods Study

5.0 Chapter Overview: In the two previous chapters, I have introduced the published sustainability approaches in healthcare, described how they have been applied in practice and reported their impact on sustainability outcomes. In this chapter, I explore the prospective application of one sustainability approach, the Long Term Success Tool (LTST[35]), across three Improvement Programmes. The LTST was used to aid in planning for long term success, identify needs and risks, and diagnose initiative progress. The tool was applied in various ways based on individual programme purposes and requirements. The use of the LTST throughout initiatives supported four benefits: *1) Building relationships and collaborative work 2) Decision making, 3) Action planning and 4) Reflection on progress and development.* These findings provide insight into *how* a tool can support the process of sustaining within complex systems. However, challenges to tool use were also reported including *isolation, critical reflection, confusion and inability to act*. The identification of both positive and negative impact highlights the need to thoughtfully consider the use and facilitation of the LTST in future initiatives. Suggestions and recommendations for future use as well as implications for findings are discussed.

Aims and Research Question: This chapter aims to describe the application of the LTST across three QI programmes and investigate if and how it supports the process of sustaining throughout initiative journeys. The research questions I will address are:

1. *Why is the LTST used and how is it applied across programmes?*
2. *What impact does the LTST have on improvement initiatives including their attempts to sustain?*
    a. *What are the benefits, challenges and facilitators of using the tool in practice?*

5.1 Background

It is well recognised that proven success of an initiative does not ensure a program's maintenance beyond its initial funding.[12,52] Therefore, healthcare managers and planners have become increasingly interested in understanding how sustainability of initiatives can be influenced to maximise both resources and impact.[10,11] As discussed in Chapters 3, numerous models, frameworks and tools have been proposed to aid improvement teams to conceptualise sustainability and enhance prospects of long term impact.[9,11,13,31,69,130,270,288,348] Unfortunately, as described in Chapter 4, the majority of sustainability methods have not been studied in healthcare practice and evidence for their impact continues to rely on individual study findings, which have reported benefits such as: improved understanding of sustainability constructs, improved ability to organise, analyse and interpret sustainably data, and improved focus on sustainability issues.[148–150] While these benefits provide some rationale for the continued use of these approaches, they provide little information on *how* sustainability approaches support or influence the process of sustaining or sustained outcomes.[10,153] For example, sustainability approaches may provide a valuable mechanism to facilitate self-organisation and sensemaking as they can promote inclusion of multiple stakeholders and gather perspectives risks, but we have no evidence of their role in these processes.[129,145] As considerable efforts are invested in the development and application of sustainability approaches, there is a need to explore how using a structured sustainability tool may influence improvement initiatives and their process of sustaining.[155] This information would provide much needed evidence to support their continued use and justify the time and effort required to implement them in practice. The aim of this chapter is to investigate the application of a sustainability approach across three QI programmes to explore if and how it supports the process of sustaining throughout initiative journeys.

Supporting sustainability with The Long Term Success Tool

This chapter will investigate the application and impact of one sustainability approach, *The Long Term Success Tool, (LTST)*.[35] The LTST was developed at CLAHRC NWL in 2015.[35] Full details on the tool can be found in Chapter 2 section 2.3.5 The Long Term Success Tool. The LTST was one approach included in the systematic review in Chapter 3 and was categorized as a prospective tool which investigated sustainability concurrently with implementation. This prospective lens seeks to allows the learning, changes and continuous adaptations that define the sustainability process to be made visible.[67–69]

The LTST aims to: *'support those implementing improvements reflect on 12 key factors to identify risks and prompt actions to increase chances of sustainability over time'*.[35] The tool includes a framework which identifies and describes 12 factors for sustainability and a questionnaire to assess 12 factors: *Commitment to the improvement, Involvement, Skills and capabilities, Leadership, Team functioning, Resources in place, Evidence of benefits, Progress monitored for feedback and learning, Robust and adaptable processes, Alignment with organisational culture and priorities, Support for improvement, and Alignment with external political and financial environment*.[35] The LTST has the explicit aim to not only assess the 12 factors but also to:

- *Bring together the views of diverse stakeholders*
- *Create a platform for discussion*
- *Prompt stakeholders to plan actions to enhance sustainability over time*

The ability of sustainability tools to allow diverse perspectives to be shared, promote group working or team discussion and mitigate sustainability risks is unknown.[10,153,155] Understanding how the LTST may support teams to address issues of complexity by uncovering self-organisation or encouraging sensemaking and problem solving would provide support for the role of the tool in practice. To understand if and how the LTST fulfils its stated objectives and explore its contributions to supporting the process of sustaining within complex systems, the tool must studied in practice.[35] This study describes the application and impact of the LTST across three QI programmes. The following research questions will be addressed within this chapter:

I. *Why is the LTST used and how is it applied across programmes?*

   In order fully understand the impact of the LTST, clear and rigorous accounts of its application is needed. This question provides key information related to the context of each programme and explores differences in application and rationale for use.

II. *What impact does the LTST have on improvement initiatives and their attempts to sustain?*

   a) *What are the benefits of using the tool in practice?*

      This research question builds on previous findings reported in chapter 4, which demonstrated that sustainability approaches were seen to support the development of a vision for programs, build consensus and ownership, and improve engagement and negotiation between local stakeholders. [150,287,323] To explore the impact of LTST, I will investigate if and how the LTST supports the process of sustaining within the

initiatives. This will enable me to describe the contribution of the tool in improvement initiatives and unpack how it may or may not support sustainability.

b) *What are the challenges and facilitators of using the tool in practice?*

The consistent use of QI tools has been a challenge for improvement teams with issues in implementation and application noted in a number of studies.[148,201] Throughout implementation of the improvement initiatives, CLAHRC NWL evaluates and studies the use of the systematic approach to improvement, including the use of the model for improvement, PDSA cycles, action-effect diagrams, process mapping, statistical process control, and stakeholder mapping.[199] The programme recognises that although QI tools and models are designed to improve team knowledge, identify risks and enhance action, they can also be complicated to use, hinder team working, and take substantial amounts of time.[35,201,243,309–312,333,349–352] For example, QI tools such as PDSA cycles have been associated with challenges for teams, related to difficulty in application and misunderstanding the need to adhere to fidelity of use.[201,349,351,352] Process mapping has also been shown to result in challenges associated with staff ability to participate in mapping exercises and the need for proper facilitation.[353] Additionally, Action Effect Method has been noted to be 'conceptually difficult' requiring significant expertise in the methodology.[354] Chapter 4 highlighted that the use of sustainability approaches specifically resulted in difficulty in application and the need for adaptation or improvement to an approach. This research question will allow me to explore perceptions of the tool and document issues encountered during application, as well as explore how the use of the tool was supported by teams.

5.2 Methods

Data was collected across three QI programmes from January 2015 to July 2017. A brief description of each programme is presented below and full Programme details can be found on page 67.

- Programme 1, CLAHRC NWL, is a London based research program supporting frontline care teams to implement evidence-based practice using QI methods.
- Programme 2, Improving Unscheduled Care, is a government led initiative implementing improvement teams in hospitals to improve care pathways and meet a four hour A&E target across Scotland.
- Programme 3, Clinical Innovations in Healthcare, is an MSc Programme set up to promote continuous learning and innovation adoption throughout the NHS.

Full detail of methods chosen for this study can be found within Chapter 2 section 2.4.3 Longitudinal Mixed Methods Study. The LTST results were collected from each programme throughout the study period. Observation was conducted at meetings and workshops where the tool was used and where results were discussed. Semi-structured interviews were conducted to gain in-depth understanding of perceptions of the tool as well as its impact on sustainability processes and actions. Documents, such as meeting minutes and initiative reports, were used to enhance knowledge of the programmes and their associated infrastructures.

5.3 Results

During the study period, the LTST was used by 56 improvement teams across the three programmes (the 56 initiative teams are listed in Table 8 on page 70). In total, 658 responses were collected, and 120 team LTST reports generated for analysis which included over 2350 qualitative comments. Interviews were conducted with 34 improvement team members along with 53 hours of observation. Results are reported in two sections, each addressing one of the research questions. The first describes the application of the LTST across the programmes including rationale for use, description of use and programme LTST results. The second examines the impact of the LTST on improvement initiatives including the benefits, challenges and facilitators of tool application.

5.3.1 Application of the LTST across QI Programmes

Analysis of LTST results and observations across teams demonstrates that application of the tool varied across the programmes based on individual programme purposes and needs. Use of the tool ranged from two to six times within the data collection period (Table 28). Number of respondents per improvement team ranged from 1-24 with an average of five respondents per LTST report (Figure 21). In the following section I provide a summary of the application and results for each programme.

Table 28: Summary of Tool Application

Application	Programme 1	Programme 2	Programme 3
LTST completed	350	126	182
LTST Reports	50	34	36
LTS comments	927	803	620
Times used	3-6	1-3	1-2
Initiative teams	11	19	26
Respondents (Average)	6	4	6

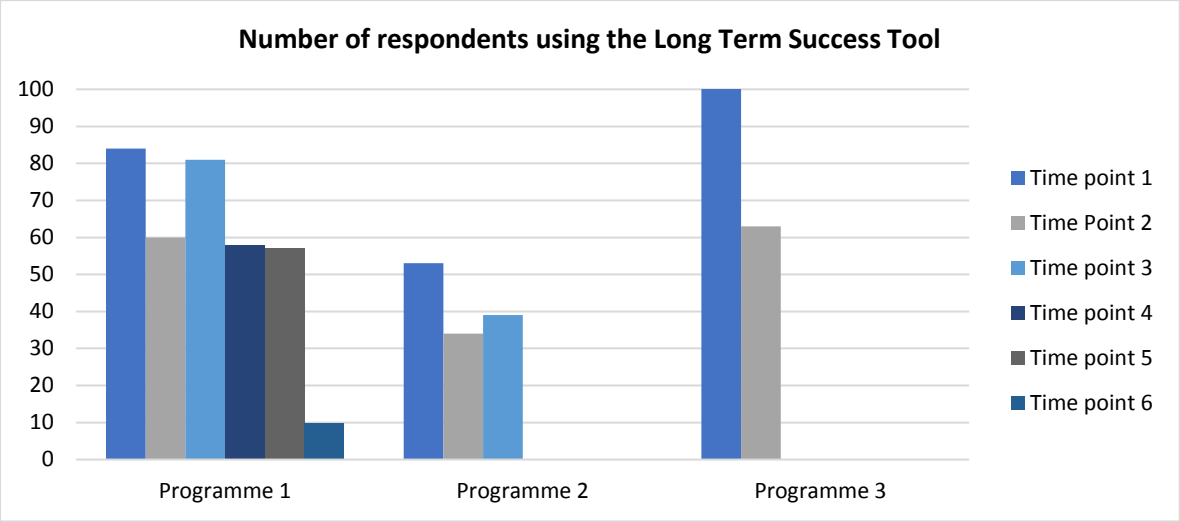


Figure 21: Number of respondents using the Long Term Success Tool

Programme 1- CLAHRC NWL

Rationale for use: CLAHRC NWL advocates and supports the use of an iterative systematic QI approach as detailed in Chapter 2 section 2.3.3 CLAHRC Northwest London.[199] This approach includes the use of the LTST throughout all initiatives to identify issues to sustainability and aid in planning for long term success.

> *"We used the long term sustainability tool…that was a way of focusing on the issues that were likely to come up at the end of the project…the tool really allowed us to focus on how we build sustainability into the project."*
> *(I16_ Doctor_Project Allergy)*

Description of Use: The tool was used at designated time points throughout CLAHRC NWL initiatives (initially at three months during implementation followed by use every funded quarter thereafter up to 24 months). Tool responses and scores were collected using the

programme's online QI reporting system, Web Improvement Support for Healthcare (WISH).[219] Multiple approaches were taken to feeding back results which varied depending on time, team member attendance and availability of meetings. Feedback format ranged from formal feedback with presentation of the graphs and comments to more informal discussions around the issues brought up in the tool.

Programme LTST Results: Figure 22 show aggregated LTST scores for the 11 initiatives using the tool between November 2014 and July 2017. Consistently, the highest rated factors (factors with the highest percentage of 'Very Good' ratings) across this programme are: Involvement A: involvement of individual (87.6%), Commitment to the Improvement (87.0%) and leadership (86.6%). The lowest scoring factors are Involvement B (involvement of stakeholders, patients, carers and the public) (72.9%), Resources in Place (74.8%) and Evidence of benefits (75.7%). Investigation into team comments provides further insight into these findings. Highly rated factors were supported in comments as teams felt positively about their personal involvement and contribution to the initiative. *"There are various platforms for me to express my ideas such as the core care bundle meetings, local meetings involving other professionals and I can post comments for consideration on the online WISH tool."*(LTST comment_Project Alcocare)

Teams also expressed that commitment to the improvement was good with many saying the initiative was widely supported and needed *"The team are working hard together for success and are constantly working on improving processes."(LTST comment_Project Heart Beat)* Team comments also reinforced the issues which resulted in lower rated factors. For example, the difficulty in involving stakeholders, particularly patients and carers was expressed by a number of participants. *"The team I think are able to input into the project but we need to expand to include patients and stakeholders. We have a plan for patients but less clear on stakeholder involvement."(LTST comment_Project Breatheasy)* *Evidence of benefits* was also a lower rated factor within this programme. This was often related to the inability to show outcomes in a timely fashion and to the right audience *"Not sure at the moment if the benefits so far have been cascaded to frontline staff and whether the frontline staff feel the benefits and how these can be captured."(LTST comment_Project Alcocare)*

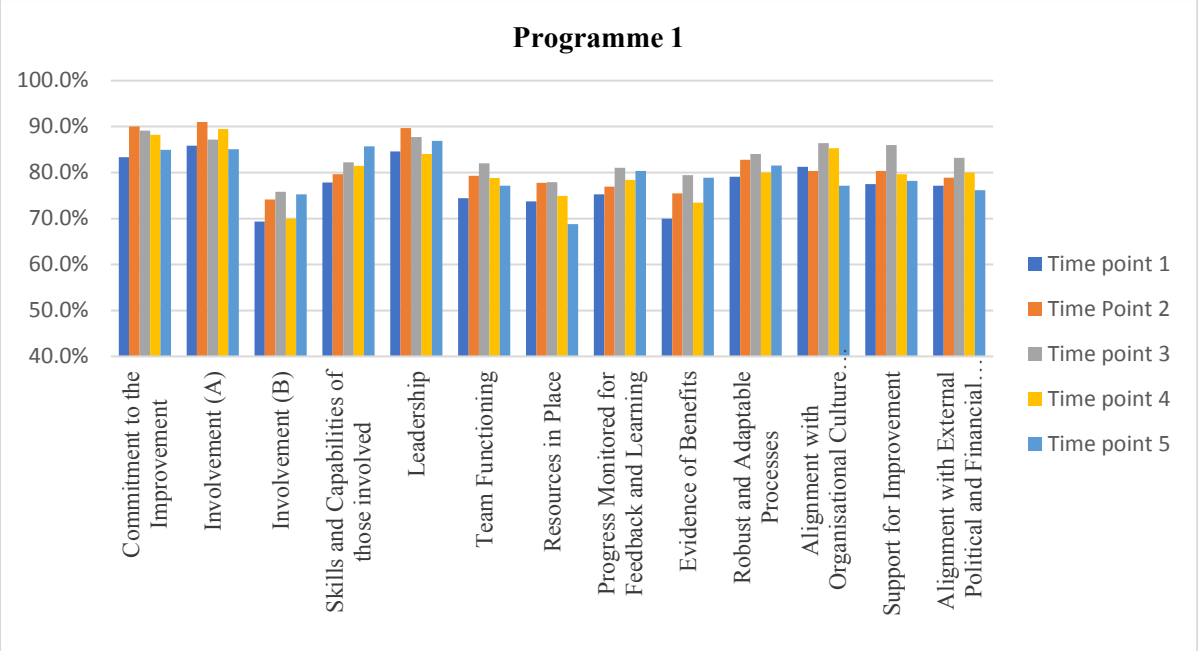


Figure 22: Programme 1 aggregated LTST results

Role of the Tool: Analysis of LTST across programme 1 demonstrated that teams used the tool for multiple purposes. While the tool allowed the teams to share perspectives on the factors it also was used to *update on progress, voice concerns, and discuss engagement needs.*

i. ***Update on progress:*** The LTST in this programme was often used as a mechanism for communication between team members. Team members shared how the initiative was performing and updated each other on important milestones or challenges being faced. Comments also provided updates on whether specific actions had been taken and reported what impact this had on the initiative progress. *"The team have identified they need more administrative support and we have agreed to give some funding from CQUIN projects to support this."(LTST comment_Project Heart Failure)*

ii. ***Voice Concerns:*** A number of tool comments highlighted how the LTST was being used to share issues being faced by team members as well as their concerns for how the initiative was developing. "*The project team is adequately resourced, however to secure long-term success there is a lack of clinical team/administration resource to enable the (intervention) being integrated into busy emergency care pathways."(LTST comment_Project Asthma Bundle)*

iii. ***Increasing engagement:*** Multiple participants used the tool to highlight the need to find ways to increase or continue engagement with relevant stakeholders to increase buy-in and support was identified. *"We still need to involve residents and carers -*

action needed to identify and present at the next residents and carers meeting." (LTST comment_Project Drinkup)

Programme 2- Improving Unscheduled Care

Rationale for use: Programme 2 used the LTST to support teams to identify needs related to sustainability and recognise areas for progress.

> *"What we were really keen to do was to…get the team to think about how…to be a team and then to feel that they had the tools in place, so leadership, ownership…and get them to think about it and identify where some of their gaps were." (I33_Programme lead_Project Tau)*

Description of Use: Teams were introduced to the LTST at an improvement workshop in July 2015. The session included a 20-minute presentation introducing components of LTST. A facilitated activity followed to allow teams to discuss their project goals and fill out the tool questionnaire individually. Data was entered into a survey software, Qualtrics, for analysis and team aggregation by the improvement team.[229] LTST Reports were returned to teams on the same day for teams to collectively discuss their results and discuss actions and next steps. The teams then used the LTST at two follow-up workshops in November 2015 and December 2016. At each workshop teams were presented with their past results and completed the tool based on perceptions of the progress they had made.

Programme LTST Results: Aggregated LTST results for the 19 Programme 2 teams are shown in Figure 23. The factors with the highest ratings were *Alignment with Organisational Culture and Priorities (81.5%) and Support for Improvement (78.3%)*. *Involvement B (55.9%) and Resources in Place (62.3%)* were the lowest rated factors within this programme. Comments supported these findings with teams highlighting that the alignment with current policies to improve unscheduled care process was a *'clear organisational priority.'(LTST comment_Project Theta).* Teams noted that due to the initiative being aligned with organisational priorities, they received ongoing support and commented that there was "*Strong local focus on improvements."(LTST comment_Project Xi)* However, a number of participants highlighted that they struggled to work within the available resources particularly related to time and staff availability: *"Sometimes difficult to get clinical input due to lack of protected*

time for them. Need to fire fight but generally supportive when able to be."(LTST comment_Project Epsilon) The LTST results also demonstrated challenges in involving patients and the public. Although there were many comments recognising the need to involve patients, this issue remained unresolved for the majority of teams throughout the initiatives and this was reflected in the ratings. *"Good involvement from hospital services and teams. Little patient/carer involvement- how to involve? Who is appropriate?"(LTST comment_Project Upsilon)*

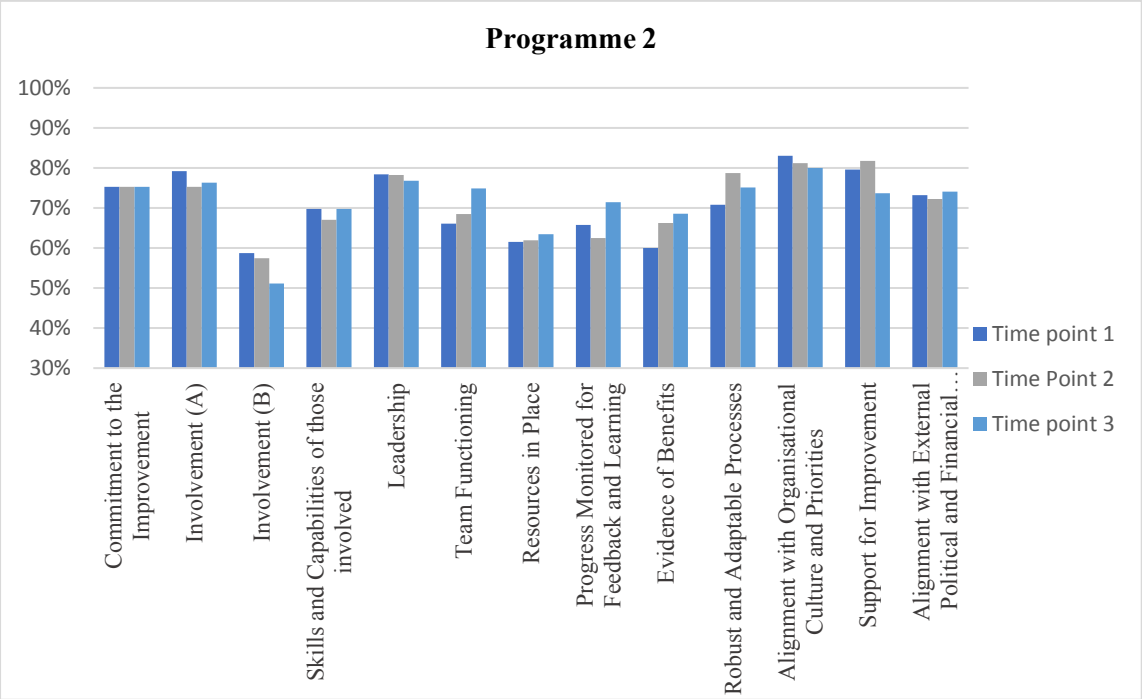


Figure 23: Programme 2 aggregated LTST results

Role of the Tool: Analysis of LTST across Programme 2 demonstrated the tool was used to for multiple purposes across the teams. This included the use of the tool to: *identify needs, seek clarification and raise difficult issues.*

i. ***Identify needs:*** As this programme used the tool at specific improvement workshops a number of the respondents used the tool to highlight where they believed more training was required from the programme. *"Committed and skilled staff involved. Training and development needs and available training and development need to be matched." (LTST comment_Project Xi)*

ii. ***Seek clarification:*** The improvement workshops allowed teams to communicate team members they often did not have regular contact with. This resulted in a number of

participants using the tool to seek clarification of issues or asking for more information from colleagues. Specifically, the topic of role allocation and responsibilities was highlighted by a number of participants. "*Sometimes there is lack of clarity regarding responsibility and how this is linked to authority to make decisions."(LTST comment_Project Mu)*

iii. ***Raising difficult issues:*** In this programme, the LTST was also used to highlight a number of difficult issues that did not have another forum to be expressed. For example, team members commented on lack of support from staff and unrealistic expectations from the programme. "*There is still a lack of recognition of how difficult life is at front line-political ambitions outweigh what is realistic with given financial resources."(LTST comment_Project Theta)*

Programme 3- Clinical Innovations in healthcare

Rationale for use: In Programme 3, the tool was used as a method to help participants assess progress against the 12 factors for sustainability.

> "I was really wanting…to…find some way of…equipping students with knowledge and skills that would help them to know early on whether or not something was worth progressing…. because there's no point pursuing something if it's not got legs. (I27_Programme 3 Course director)

Description of Use: Participants in this programme were introduced to the LTST in a teaching session on sustainability in March 2016. Students were given the opportunity to complete the questionnaire individually and then use the LTST in their workplaces to have their project teams complete it as well. Team members uploaded their responses to the online Qualtrics survey for initiative aggregation.[229] A second session was conducted in May 2016 to review LTST reports and discuss results. The LTST was then used again in October 2016 by participants, with team report discussed in a final session in November 2016. Use of the tool in this programme varied across project teams with an average of six users per report. The tool was used once by 26 teams and only used a second time by 10 teams. The decline in use was largely due to many students having to change their project aims or directions so they did not want to approach team members or stakeholders to fill out the questionnaire. A number of participants also commented on the difficulty in identifying team members, as they were a 'one

man team'. I reflected on these comments in my reflective diary notes taken after the November session (Table 29).

Table 29: Reflective Diary Entry

Reflective Diary Entry
17/11/2016 *Went to observe the (programme 3) students today. Responses were collected for only half of the student teams (about 10 teams)…A number of students explained that they had decided to change their project and were re-starting engagement and planning. They felt that because of the early stage of the new project they did not want to approach team members until they had a clear plan in place for the work.*

Programme Results: The results for this programme show varied viewpoints across the teams but aggregation of the data demonstrated areas of similarity (Figure 24). *Alignment with Organisational Culture and Priorities (88.0%) and Commitment to the improvement (82.2%)* were scored highly within this programme while *Resources in place (62.3%), Involvement B (66.9%) and Team functioning (70.7%)* received lower ratings across teams.

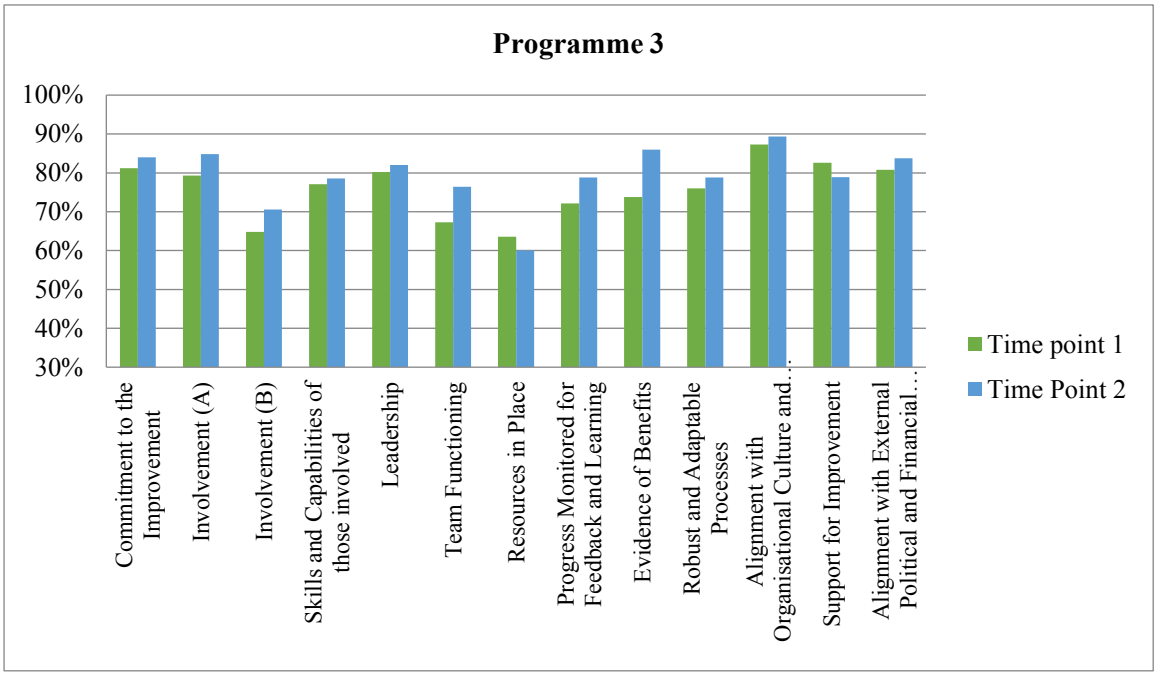


Figure 24: Programme 3 aggregated LTST results

The majority of scores were very high for commitment to the improvement as team members were implementing an innovation of their choice which was seen as valuable to their workplace setting *"A lot of people keen to see project up and running."(LTST comment_Project Stitchup)*. Most of the participants also felt that the improvement was supported within their

organisational priorities. *"This project supports/contributes to the organisation's local priorities and needs."(LTST comment_Project EngagingU)* Similar to programmes 1 and 2, this programme also showed lower scores in involvement of patients and carers. Comments relating to this factor highlighted that actions to involve patients were often considered something to do later. *"No public engagement at this stage, something to consider for the future."(LTST comment_Project IVDesign)* As the initiatives within this site were led by individuals participating in the MSc programme, resources were often not allocated to the initiatives. This was a clear areas of struggle for the group with both scores and comments reflecting this issue. *"This project has been established with minimum funding and will rely largely on the continued commitment of staff generating the training."(LTST comment_Project MedDirect)* Team functioning issues were also highlighted in a number of comments. Participants reported ongoing issues with engaging colleagues and reflected that they were undertaking the initiative largely on their own: *"Currently being pushed by myself- hope to bring in more active involvement. Some passive resistance."(LTST comment_Project Together)*

Role of the tool: The use of the tool across Programme 3 varied but the tool was consistently used to: *identify initiative needs*, *plan next steps* and *offer praise and affirmation to colleagues.*

i. ***Identify initiative needs:*** Participants in programme 3 used the tool to comment on the work needed to advance initiatives. For example, the need to produce and communicate benefits of the improvement was highlighted by a number of participants to support buy-in and interest from staff and patients. "*Evidence of benefits is there but not visible to users at the moment."(LTST comment_Project Checkit)*

ii. ***Plan next steps:*** The tool was also used by a number of participants to record plans for next steps and actions. These plans ranged from setting up measurement and communication strategies to recording ideas for engagement and training. "*Have the skills but need refreshing. Plan to run a rolling training programme."(LTST comment_Project Together)*

iii. ***Offering praise:*** In this setting, many participants used the tool to encourage the initiative delivery and praise those leading the work. The LTST provided participants with a way to offer their support to the team and highlight when good practice was taking place. "*(Project manager) has had real enthusiasm and is a motivated individual and has a need to make change which has been very influential."(LTST comment_Project MedDirect)*

5.3.2 LTST Impact on the process of sustaining

Through the study of the LTST across the programmes, its impact on initiatives was explored. Results revealed that the LTST had multifaceted impact on the programmes studied. Results have been organised into three sections. The first outlines the main benefits and the second the main challenges encountered. These findings have been summarised in Figure 25. The third section examines the facilitators to the use of LTST in practice.

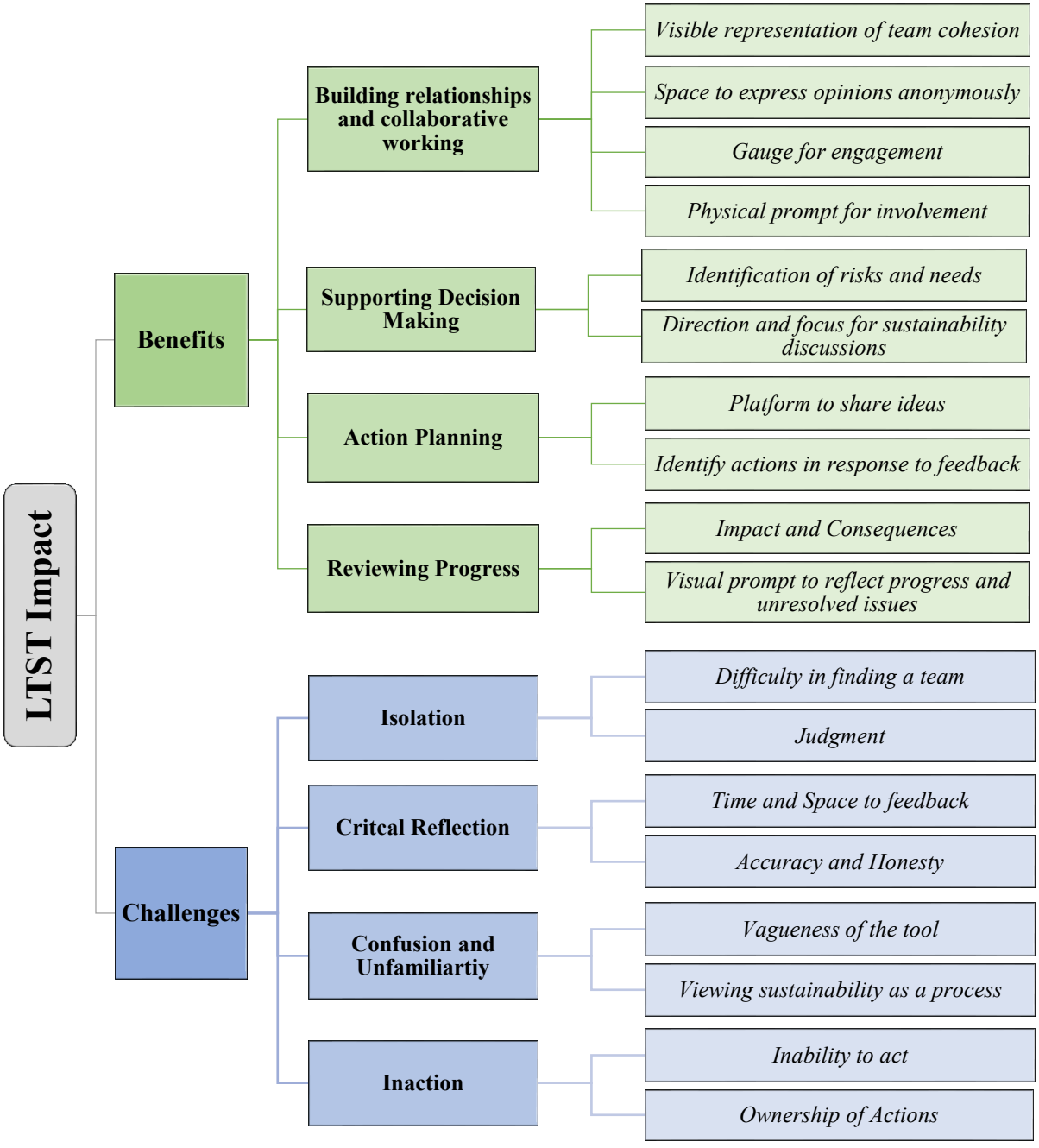


Figure 25: Benefits and Challenges of the LTST

Benefits of the LTST

The use of the LTST throughout initiatives supported four main benefits: *I) Collaborative working II) Decision making, III) Action planning and IV) Reflection on progress and development (Fig 3).* The benefits are achieved through the following mechanism which are discussed below.

I. Collaborative working

The use of the LTST promoted and encouraged collaboration within improvement teams. Bringing together multiple stakeholders was related to having the ability to reveal important links and interdependencies which would have otherwise remained hidden. The tool allowed teams to explore the interconnected relationships and systems that were involved in the delivery of their initiatives by revealing the perspectives held by diverse stakeholders. The tool provided *a visible representation of team cohesion, a space to express opinions anonymously, a gauge for engagement, as well as a physical prompt for involvement.* All of which supported teams to either build relationships or enhance collaborative working.

i. **Visible representation of team cohesion:** The LTST graphs and aggregated scores acted as visible prompts displaying similarities and differences in opinions which allowed team members to understand multiple perspectives held within their teams (Figure 26). This visual prompt enabled discussion of these differences which was valued by the teams. *"So people were extremely pleased and thought we did a fantastic job whilst others were completely upset about the fact that we didn't manage to go out in the community…That really comes through the tool because people will be really, really green and really happy with what they're doing and other people would be really red and really unhappy.(I15_Project Manager_Project Allergy)*

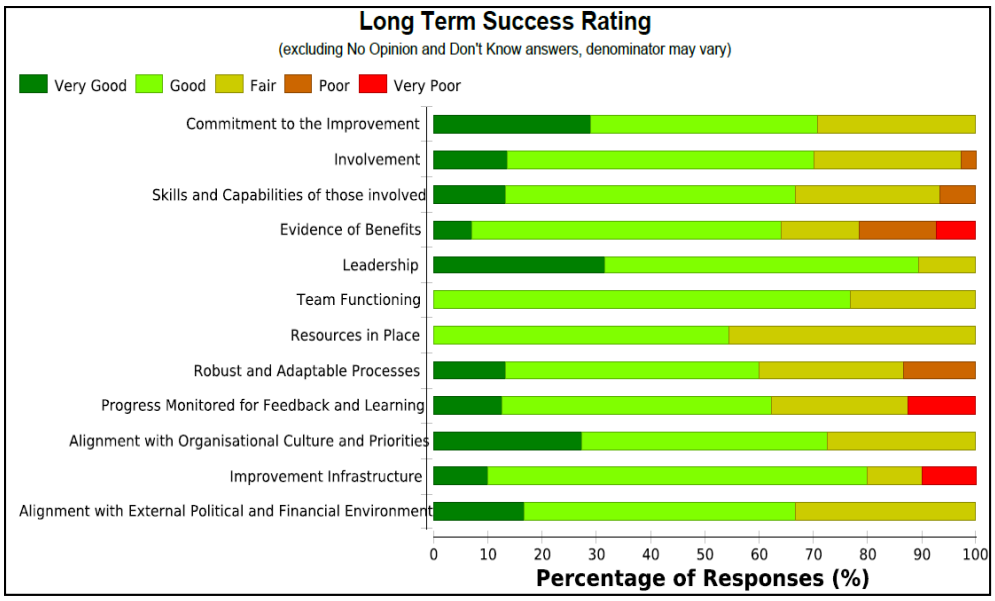


Figure 26: LTST report Project Allergy (n=10)

Several users commented that the tool also allowed them to see they weren't alone in their opinions and that others had similar concerns. In some cases, discussing results created a forum for teams to come together and recognise shared experiences, which allowed for a sense of team cohesion and support. *"It's a great method of showing that actually everybody thinks the same thing. It's not just me. We obviously had one or two differences but the majority of cases…would score something roughly in the same way."(I35_ Nurse_Project Sigma)*

ii. **A space to express opinions anonymously:** The tool was also observed to be beneficial to teams as it permitted people to anonymously voice their opinions and share concerns. *"The comments section has been completed by people who feel they can't say things in a meeting and they say it in the comments section instead…It was very simple but it then took that ownership away from that person that made the comment."(I6_QI Manger_Project Wellbeing)* Participants commented it allowed some less confident or quieter team members to voice concerns without criticism which added to the openness of conversations. *"It's the anonymity of it as well…as a team member I'm quite outspoken but there's a lot of people who aren't and the fact that there is nobody that can interfere with your thoughts when you're completing that form is really important."(I15_Project Manager_Project Allergy)* This also shifted the focus off individuals and allowed teams to concentrate on the processes and delivery of the initiatives. *"It's a way of objectively coming to them without…pointing the finger at*

anything. You're just concentrating on the process rather than individuals on the process."(I35_Nurse_Project Sigma)

iii. ***Gauge for engagement*:** The very act of getting a team together to complete the LTST prompted reflection on the need for further engagement. *"It (the tool) makes you think wider and makes you see where actually really engaged people are going to take it forward because... with a tool to get people to do it, you really got…how resistant they were."(I30_Project Manager_Project MedPort)* A number of teams recognised they weren't getting a full picture of the initiative activities or systems when key stakeholders were not present to fill out the tool. This prompted teams to consider their current engagement strategies and the need to expand engagement to promote sustainability of their initiatives. *"I think for us it definitely gave us food for thought about how we get a wider reach…When we sat and looked around before filling it in, it did make me think a) do you have two local improvement teams in each area because we don't have two local teams in each table completing this form. So what do we need to do about that, how do we…make sure that we're engaging the right people?"(I34_Project Manager_Project Tau)*

iv. **A physical prompt for involvement:** Some participants reported that awareness of their projects was often poor, making stakeholder engagement difficult. Participants expressed how the use of the tool allowed them to speak to their colleagues about the project and provided them with the opportunity to engage members of their team who were less involved. *"It's quite difficult for them to raise their projects or to go and talk to people, just to cold call about the project, but the tool was a vehicle that they could hang a conversation on about their projects." (I27_ Programme 3 Course director)* The tool was highlighted as a mechanism to aid this process as it gave team members something tangible to begin interactions and discussions about the initiatives. This also allowed team members to spread the word about their work. *'One senior clinician said I've never heard of it (the project) when filling out the LTS tool. But the tool reminded him of the project. This clinician did comment that infusions used to be a big issue but he hasn't heard about any problems in the last year when the project was going on'. (Programme 3_Observation note_07/11/2016)*

II. Supporting decision making

The second benefit associated with the LTST was its ability to support team decision making by promoting the *identification of risks and needs* as well as providing *direction and focus for sustainability discussion*s. The LTST played a role in allowing teams and individuals to step back from their everyday environments and make sense of the complex issues they were facing. It supported users to understand the day-to-day struggles and the events influencing the initiatives as well as how these situations were seen from their team member's perspectives.

v. **Identification of Risks:** Participants recognised the importance of identifying potential risks to sustainability in order to understand how best to avoid pitfalls. The tool played a key role in identifying these issues and the associated needs to mitigate the challenges throughout initiative journeys. *"The tool itself obviously is not a solution for fixing your risks or for avoiding your risks but…that helped me to reflect about them, I could plan before the risk happened."(I28_Nurse_Project Workforce)* Comments made concerning lack of support from staff and unrealistic expectations helped teams to understand deeper issues which impact sustainability. "*Whilst the organisation emphasizes the need to improve, there is some reluctance amongst some staff to support new initiatives."(LTST comment_Project Iota)*

vi. **Direction and Focus for sustainability discussions:** The tool was seen as a way of focusing and strategically planning for risk factors. It provided a point of direction for considering sustainability and highlighted the importance of maintaining attention to the issues over time. *"Are you focusing enough on this thing that you always knew you had to do that maybe you've lost sight of a little bit? I think that's extremely valuable because it's easy to get caught up in something and forget about other things that are important."(I1_Clinical lead_Project Wellbeing*)

III. Action Planning

The third benefit supported by the LTST is related to the ability of individuals and teams to share ideas and employ actions to support sustainability over time. The decision to take action was supported by the risks reported from team members as well as their ideas to mitigate these issues. The tool provided a *platform for teams to share ideas* as well as *identify actions in response to feedback* to enhance prospects of sustainability.

vii. **Platform to share ideas:** The tool provided a way of collecting team perspectives on where action was needed and what actions would be beneficial to the initiative. Participants shared ideas on what actions may be necessary and also suggested potential solutions to problems. *"I got ideas from them (LTST comments) because they would say, oh they did something similar at such and such place and we do this in clinic and we find it quite successful, so they'd give me ideas." (I29_Nurse_Project Photocare)*

viii. **Identify actions in response to feedback:** Participants also were prompted to take action to respond to suggestions. Actions included designating tasks and responsibilities to improve work distribution, using teaching to build the project into everyday practice, and taking steps to improve patient engagement. *"They did action a couple of things in regards to educating other staff. So they had MDTs* (multi-disciplinary team meetings) *where they started to educate the other nurses that weren't involved in the project on what they were doing."(I21_QI manager_Project Heart Failure)* These actions were seen as crucial to sustainability as it allowed teams to proactively respond to issues and address problems that may hinder the sustainability of the project in the future. *"The comments that were provided to me by my stakeholders, I've used them and responded accordingly and based my actions from their response…because it's like having a customer, if you don't know what a customer needs you don't know what to provide the customer."(I32_Project Manager_Project Uri-Protocol)*

IV. Reflecting on Progress and Development

The fourth benefit of the tool relates to the ability to revisit and assess previous results. This allowed teams to assess progress by comparing their LTST scores over time. Repeated use allowed participants to recognise the impact of their actions and review the consequences of actions taken.

ix. **Review impact and consequences:** Throughout initiatives teams identified a number of actions to improve and enhance prospects of sustainability. Many actions were taken and teams reflected that these actions resulted in improving organisation and delivery of the initiative. For example, one initiative saw that their LTST scores demonstrated

that they were struggling to engage junior doctors in their work. They then decided to target this area for improvement by engaging with the junior doctor representative and using teaching to build the project into everyday practice. The team reflected that these actions resulted in improved working relationships with the junior doctors as well as improved recording of initiative measures and delivery. "*We had more difficulty with a middle cohort (of junior doctors) who were less engaged. This led us to make a renewed effort to engage the medical trainees and making links with the trainee year 'rep' –this has paid real dividends, with clear evidence of improvements in performance from the beginning of August onwards." (Programme 1_Review Report_Project Wellbeing)*

x. **A visual prompt to reflect on progress and unresolved issues:** The tool provided teams with the means to review impact and consequences of the actions they had taken as well as reflect on ongoing or unresolved problems. The tool provided LTST scores over time in visual charts which were considered valuable in allowing team members to assess their progress (Figure 27). *"I think what's really worked is that when that information's presented back to the teams…it has been useful for looking over time at how things have changed."(I6_QI Manager_Project Wellbeing)* These LTST charts aided teams to understand where teams had taken action and where issues continued.

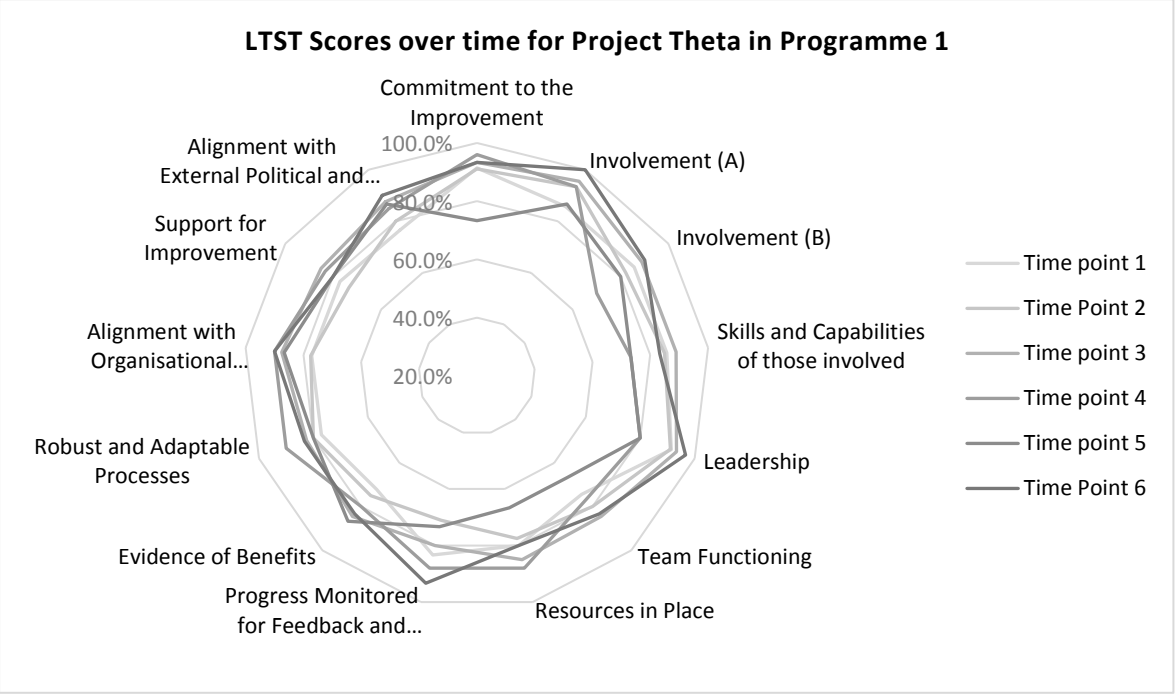


Figure 27: LTST Scores over time for Project Theta in Programme 1

Although teams often identified possible action to take, many did not follow-up on these actions. Teams reflected that the tool allowed them to see where actions had not been taken which often resulted in the continuation of an issue or problem. *"We knew that resources were being kicked up but we didn't turn our attention to it and rectify it and now we're one year on and the issue is still the same…we were too blasé…I kind of thought, there's a responsibility, it's getting embedded, its routinised, its fine and they'll sort it out but it's come back around because it wasn't sorted out properly." (I29_Nurse_Project Photocare)*

Challenges of the LTST

As highlighted in Chapter 4, sustainability approaches can cause difficulties for teams in their application and interpretation. For this reason, I sought to understand not only the potential benefits of using the LTST, but also the challenges of using the tool in practice. While studying the application of the tool, several issues were encountered which impacted the ability and desire for teams to use the LTST. These findings have been organised under the following themes: *Isolation, Critical Reflection, Confusion and Unfamiliarity, and Inability to act*. These are described in more detail below with a discussion on how each manifested in practice and impacted the teams.

I. <u>Isolation</u>

Two key issues occurred in the theme of isolation. Having *difficulty finding a team* and *feeling judged* both led to feelings of isolation for particular individuals.

i. **Difficulty in finding a 'team':** Engaging colleagues to fill out the tool proved challenging for some participants. As many people were running projects on their own or with a small group of colleagues, establishing who was on their 'team' was difficult. Being unable to find a team often meant people were reluctant to use the tool which contributed to feelings of isolation. *"Some participants reflected that it was very difficult to find the right people to do this. Hard to know who to ask and why. Many Participants are not at the stage where they can communicate their aims and project clearly so are hesitant to ask people to fill out the LTS tool." (Programme 3_Observation_17/11/2016)* Many also questioned if respondents were the 'right'

people to fill out the tool. This led some to question if the most useful results were being found.

ii. **Scores used a judgment:** Another challenge encountered in the use of the tool was the perception of feeling judged or having 'good/bad' scores. At times the tool highlighted risks which in some cases were connected with individual roles or responsibilities. The feedback of such results was worrisome to certain participants. *"It was quite nerve wracking for me sitting at the table with the rest of the team filling out this long term success tool because I was leading the QI in work so I felt almost vulnerable as it would be an assessment on me as much as the process." (I35_Nurse_Project Sigma)* This issue required project and QI managers to reiterate the learning and actions needed without focusing on blame.

II. Critical Reflection

Two key issues impacted team's ability to critically reflect: *time and space for reflection* and the *accuracy and honestly of the ratings*.

iii. **Time and space to feedback:** The tool was designed to be filled out in approximately 10 minutes.[35] While this was consistently achieved by all sites, the time required to feedback the results and hold a discussion to plan actions and change practice was noted as a challenge for some teams. This resulted in a number of teams not reporting back results in a timely fashion or fitting the discussion into short time slots in pre-established meetings. Due to time restraints, results were often pushed to the end of the meeting, resulting in less discussion or the discussion being missed. "*(QI manager) presented the Long Term Success results, but because most team members had left already…people did not really comment on or discuss them."(Programme 1_Observation 12/08/2015_Project Allergy)* In other cases, the physical space and infrastructure for feeding back was a noted challenge. "*Room has no projector or computer. Feedback given with a handout of the main graph. (Project Manager) discusses findings as team members flip through the pages of the report."(Programme 1_ Observation 20/01/2015_Project Wellbeing)* These reflections highlighted the need for teams to see the value of the tool in order to prioritise its feedback and continue its use throughout the project duration.

iv. **Accuracy and Honesty:** The ability to be self-critical and honest in responses was seen as a challenge for some teams. The desire to perform well was held throughout teams and therefore the need to be reflective and highlight weaknesses proved to be difficult for some. '*Data from LTS tool showed that the team report that all is going well. However, we know that all is not as the project team would like'. (Programme 1_18 Month Review Report_Project SurgPrep)* This meant that the results from the tool were seen as less valuable as they were not perceived to be reflective of the true state of the initiative.

III. Confusion and Unfamiliarity

The tool encountered issues relating to confusion and unfamiliarity for two reasons. The first was related to the broad nature of the sustainability factors and the second was related to viewing sustainability as a process too early in the initiative.

v. **Vagueness of the tool:** Some found the vague factor descriptions unhelpful or potentially confusing as they did not know what others were interpreting. *"I thought it was quite confusing…certainly to start with. Because…it's not the way that I've thought about things before. So I personally found it, I found it really interesting, but it was quite challenging." (I3_Service User_Project Wellbeing)* This resulted in some users 'guessing' at the most correct answer or disengaging from the exercise. Although the broad nature of the tool was highlighted as a challenge it was also equally supported as it prompted relevant discussion and was a pragmatic approach to keep the LTST short enough to be used by frontline teams. *"I think it's more about the discussion that it prompts rather than how, what you interpret...I just feel like the person who's interpreting and using the tool needs to be aware of that rather than you doing something very, very specific where you're sitting and going through so many questions and then it gets exhausting." (I15_Project Manager_Project Allergy)*

vi. **Viewing Sustainability as a Process:** Although there is growing evidence supporting viewing sustainability as a process, many people still struggled with viewing sustainability prospectively throughout their work. Some thought it was too early and others didn't have a clear view of what was established in order to give an overview of what they would like to sustain. *"They didn't know what they were asking people about...'What am I trying to say here? I don't even know what I'm doing'. So they felt*

that in some ways it was too early in the course to actually do it."(I27_Programme 3 Course director)

IV. Inaction

As noted above the tool did prompt action for some teams. However, there were also many examples of actions which did not take place. This was largely attributed two main issues: teams were either *unable to act* or there was no clear *ownership of actions*.

vii. ***Inability to act*:** For many participants, the tool highlighted areas where they needed to change practice or behaviour. At times, these actions were often seen as out of the control of the team. The inability to act often resulted in lack of enthusiasm, or despondence from the team. *"I think there are some things like...the alignment with organisational culture and priorities that is difficult to shift...you might work on a QI project that isn't an organisational priority...there's not much you can do about that."(I35__Nurse_Project Sigma)*

viii. ***Ownership of Actions*:** Related to the above challenge was the ability to know who owned the actions. Often team members felt that the actions were the responsibility of others, so no action was taken. Designating individuals to take on actions was suggested a way to mitigate this challenge. *"I think it might help to pin point it down a bit...the actions don't really get done because people think, oh that's for that weird high level role and I don't really see the direct benefit of it."(I17_Embedded Researcher_Project Allergy)* These two issues proved to be a challenge across many teams and the tool was seen as less useful if actions were not taken.

Facilitators to the LTST

Although the study identified a number of challenges to the use of the tool, this work also identified a number of actions and activities which teams used to support or enhance the use of the tool in practice. Use of the tool was supported by four facilitators: *Tailored facilitation of the tool, designating a sustainability lead, viewing results over time, and adapting the approach*.

I. **Tailored facilitation of the tool:** Lack of understanding and unfamiliarity led to many questioning how to best introduce and facilitate the tool with their teams. Facilitation was suggested as being key to the success of the tool and allowing participants to get the most out of the tool's use. *"Good facilitation and the people with the right information being present at the table…those are the things that I think influence it."(I16_Doctor_Project Allergy)* Some users also suggested specific facilitation techniques such as one-to-one discussions and facilitated meetings dedicated to the tool. *"So you have to bring it into the meeting, do it on paper form and then say we'll feed it back in a certain time, and that way I found people engaged in it and there was no problems."(I21_QI manager_Project Heart Failure)*

II. **Designating a sustainability lead:** A number of teams identified that having a designated individual on the team responsible for the tool data collection and follow-up meetings aided the use of the tool. This person was seen as key in reminding the team to complete the tool at necessary intervals and in encouraging the tool results to be discussed in follow-up meetings. One participant mentioned that this gave the tool a 'human aspect' which encouraged others to respond to requests and thoughtfully discuss issues. *"It relied on (a team member) being the person who brought that to us and reminded us to do it and pushed it and said, ooh we've got to find time in the meeting to talk about this and brought it, so there was a human element to it as well I think."(I1_Clinical lead_Project Wellbeing)*

III. **Reviewing results over time:** One of the facilitators noted was the impact of being able to reflect on changes to the tool results over time. The ability to see continuous results increased people's interest in the tool and aided in its ability to be viewed as valuable. Participants noted that comparison with previous results was valuable as it allowed them to see how the team had changed and understand where things had gotten better or worse. "*It was helpful to see how everybody in the team felt that…we had improved in quite a lot of things, compared to the first one."(I19_Nurse_Project Allergy)*

IV. **Adapting or tailoring the tool:** A number of participants found they needed to tailor or adapt the data collection method to maximise engagement and responses. Different approaches were taken with some choosing to collect the information via the paper questionnaire, handing out the LTST during meetings, using emails and even one participant who developed their own online survey. "*We had the tool in an excel form*

but...we felt it would probably be better and quicker to put it on a survey monkey…We did reduce it down to the ten questions and that was purely down to what you could get with a free survey monkey trial."(I29_Nurse_Project Photocare) Participants displayed autonomy when considering how to feedback results as well. In one case, the project manager felt the responses were quite negative so decided to adapt how he fed back the information. "*Project manager…commented that some comments may have been perceived as quite negative so he has themed the comments into feedback for the team." (Programme 1_Observation 06/12/2015_Project Wellbeing)* Another participant decided to fill out the tool during coffee breaks with colleagues. "*What I did to make it work was actually sat down with people and gave it to them and said can we do this now I'll make you a cup of tea." (I30_Project Manager_Project Medport)* All of these adaptations were seen as key in making the tool work in practice given the specific team needs.

5.4 Discussion

The aim of this chapter was to investigate the application of a sustainability approach and explore its impact on improvement initiatives. Results demonstrate that the LTST was applied in various ways including: as part of a suite of QI tools used at regular intervals, within improvement workshops and as part of MSc projects in clinical innovations. Analysis of aggregated scores across programmes demonstrated that there are particular factors which represent shared strengths and weaknesses. For example, in all three of the programmes *Involvement B* (involvement of stakeholders, patients, carers and the public) and *Resources in place* received the lowest ratings. Similarly, *Alignment with organisational culture and priorities* received the highest ratings across two of the programmes (Figure 22-Figure 24). Exploration of these factors in individual initiatives will allow for further explanation and rationale for these findings to be better understood. Chapters 6 and 7 will explore four improvement initiative cases to investigate how and why specific factors are perceived to influence sustainability.

The use of the LTST across programmes revealed that the tool is associated with a number of benefits but also a number of challenges. The findings from this study support previous results which have found that sustainability tools can highlight sustainability risks and needs,[312,322,338,355] improve focus on sustainability issues, [318,330] as well as build consensus and improve engagement and negotiation between local stakeholders.[299,306,332] As well as supporting previous findings, this work has also identified further benefits of a sustainability

approach. Specifically, the role of the LTST in supporting collaborative working, sharing ideas and action planning have all been discussed. The challenges identified in the use of the LTST have also been reported in other sustainability approach use. For example, the broad nature of factors have also caused issues in other studies where the clarity constructs caused confusion and difficulty in application.[310,331,332] While this challenge was reported previously, a number of nuanced challenges encountered in the use of the LTST (*isolation, critical reflection and inability to act*) were also identified. These challenges provide insight into the complexity of applying tools in practice and the potential unanticipated issues which they may cause. Considering the above findings, the next section explores the LTST and its impact on the process of sustaining, and outlines potential implications for future use.

The LTST and the Process of Sustaining

The LTST was associated with a number of benefits for teams: *collaborative working, decision making, action planning and reflecting on progress and development.* These benefits provide insight into how the tool contributes to the process of sustaining in complex systems. Below I outline how the LTST provided initiatives with a mechanism for teams to consider collaboration and interconnectivity, engage in sensemaking to understand risks and priorities, share ideas and plan actions and reflect on path-dependency.

Supporting Collaboration and Interconnectivity

Sustainability of interventions is widely recognised as being related to involvement and participation from staff, patients, and the wider community.[8,18,151] The literature has demonstrated that collaboration between diverse stakeholders allows for shared understanding of the problem to be established and aids in the creation of responsive and effective interventions which ultimately impact the belief in, and delivery of, such intiatives.[8,18,151,276] Forming networks and building collaboration may enhance initiative sustainability, but fostering this collaboration can pose a significant challenge to improvement teams.[8,16,35,151,276] Gaining commitment and continued involvement from diverse stakeholders is challenging as the competing ideas and priorities have to be considered.[356,357] The LTST provided initiatives with a mechanism for teams to share their diverse opinions as well as voice concerns and issues. The tool was particularly helpful in supporting *'resourceful sensemaking'*. Which is the *"ability to appreciate the perspectives of others and use this understanding to enact horizon-expanding discourse."*[358] The tool also allowed different perspectives between team members

to be highlighted which created a platform for discussion on issues to begin.

Identifying risks and decision making

It has been suggested in the literature that having a mechanism to assess and judge sustainability risks and plan actions may aid in enhancing sustainability.[36,148] The sustainability of improvement initiatives relies on complex interrelated and wide ranging factors.[8,14,18] It is therefore essential that improvement teams have the ability to identify risks and respond to system needs to sustain changes over time.[266] This process often requires improvement teams to address multiple priorities and conflicting agendas.[145,359] My findings indicate that the LTST has the ability to enhance sense-making of risks within ongoing initiatives and enabled participants to understand the views, concerns and issues within their teams. This was seen in the use of the LTST reports where results allowed team members to identify needs and focus attention for action.

Sharing ideas to promote action

In order to influence sustainability throughout initiatives, improvement teams must take action to respond, adapt and mitigate challenges.[8,16,35] Planning actions has been seen to help the sustainability of initiatives by *"reshaping behaviours and activities, changing and adapting interventions, and reorganising relationships"*.[277,360] The development of such actions also benefits from being informed by multiple stakeholders at various organisational levels.[284] The tool acted as reflective and thought-provoking mechanism connecting different perspectives within teams and directing attention to certain aspects needing improvement. This resulted in specific actions being identified through discussion and reflection on the need for future work. This is often referred to as *'prospective sensemaking',* which is the "*conscious and intentional consideration of the probable future impact of certain actions, and especially nonactions"*.[361] Prospective sensemaking allowed teams to self-organise and take action to change practices and behaviours as well as adapt the initiative's design and delivery to enhance sustainability.

Reviewing Consequences and impact

One of the benefits noted from the study of the tool, was the ability to reflect on changes to the tool results over time. Studies have shown that implementation success and outcomes are often dependent upon previous events, experiences and outcomes.[69,135,362] This concept is referred to as '*path dependency': "Current events and circumstances are influenced by, and sometimes determined by, prior events and circumstances."*[76] The actions taken by stakeholders over time,

and the result of these actions (positive or negative) is an important aspect to understanding how the process of sustaining is informed.[69] The tool provided participants with a mechanism to revisit previous decisions and actions. It gave teams the ability to see progression and change within their scores and aided in teams understanding the impact of their previous action or in-actions.

This work demonstrates how the LTST can support the process of sustaining by providing teams with the ability to consider and navigate specific characteristics of complex systems. Understanding complex systems cannot be achieved by analysing its parts independently but instead requires knowledge of the relationships and connections between processes.[144] Although the supported benefits have been presented separately, they are intrinsically linked in their functions. For example, establishing collaborative working across a team will not necessarily influence sustainability if the team do not have a mechanism to focus attention or identify risks related to sustainability. Similarly, gaining information on risks and strengths of an initiative alone may not enhance prospects of sustainability as complex systems are often characterized by *irreducible uncertainty*, a type of uncertainty which cannot be reduced with information alone.[363] Therefore, planning and action are essential to change behaviours, mitigate challenges and understand their impact.[363] For this reason the benefits of the tool should be considered in conjunction and not in isolation as each is needed to support the process of sustaining (Figure 28).

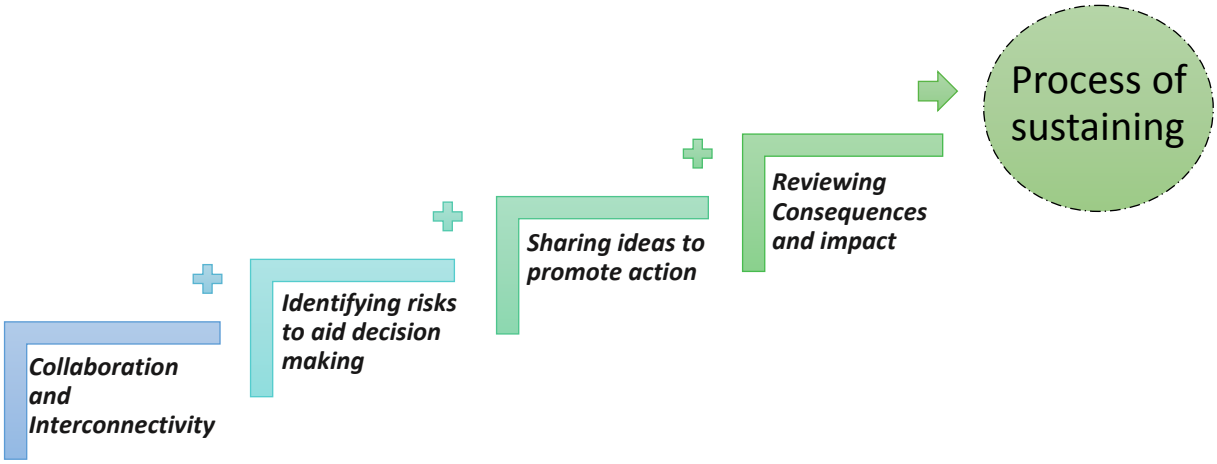


Figure 28: How the LTST can support the process of sustaining in improvement initiatives

Implications for Practice: Balancing the benefits and challenges of the LTST

While there were a number of benefits attributed to the use of the LTST, there are also notable challenges. The identification of both positive and negative impact highlights the need to thoughtfully consider the use of this tool in the future. While tools and models are designed to improve team knowledge and enhance action, it is recognised that tools can be difficult to apply in practice.[201,309–311,349–352] QI initiatives are recognised as requiring substantial time and effort from healthcare practitioners, therefore the use of any QI approach or tool should be weighed against its potential benefits and challenges.[96,97] The challenges reported in this work have highlighted specific recommendations to guide tool use and enhance its value for teams.

- ***A team is needed to understand perspectives and risks:*** The use of the LTST throughout initiatives can support collaboration and reflection by highlighting different perspectives held between team members and providing a forum for sharing diverse opinions. Results have demonstrated that teams are often made of individuals seeking to improve services on their own. This caused issues of isolation, and feelings of judgement. When individuals are unable to find a 'team' or interested stakeholders they often struggle to see issues of interconnectedness or build collaborative relationships. In order for individuals to get the most out of the tool, a team is needed to share views on risks and actions.
- ***Time and space are needed to critically assess risks:*** There were a number of issues which hindered an individual's or teams' ability to understand risks and focus attention. The most prominent reason was the inability to find the time and space to critically reflect or feedback the tool's results. If a team cannot provide honest and critical feedback about their project, the most significant risks will be missed. Lack of time to feedback results hinders a team's ability to use their reflections to plan actions to sustain.
- ***Facilitation may enhance use and feedback:*** Confusion and unfamiliarity will also hinder a team's ability to understand what risks are most important to address or where to focus attention and effort. If the team do not understand the factors for sustainability, they cannot assess where their risks lie. An introductory session or facilitator was suggested to provide adequate information in order to avoid confusion and to discuss questions or concerns from participants.
- ***Consider the team's ability to act:*** Finally, a team's ability to make informed decisions and self-organise to take action is influenced by their ability to understand how to proceed, make the needed change and understand the ownership of actions.[8,16,35] If a team cannot

make sense of how to proceed they will not be able to make changes to improve which can lead to avoidance of the issue. Considering where actions are not possible is an important component in reviewing results of the LTST. Recognition of an inability to act can prompt teams to move on to other issues and mitigate related problems as needed.

Sustainability issues are recognised as occurring across multiple stages of initiative implementation and follow-up but much of the sustainability research to date is retrospective reporting only the continuation of initiatives without insight into how these results were achieved.[45]

Future Research: Sustainability approaches may provide insight into the challenges and risks to sustainability but they often fail to capture how sustainability can be supported and influenced in practice.[49,59,142] This means there is little direction for researchers and practitioners hoping to enhance their initiative sustainability.[49,59,142] This highlights two areas for future work. The first is the need to explore how the process of sustaining manifests in practice. In order to understand how to support sustainability, we must first understand what process of sustaining entails and how it is experienced by improvement teams. This knowledge would provide better insight into how and why sustainability is influenced over time.[63] Chapter 6 seeks to unpack this gap in the literature by describing the process of sustaining across four initiatives case studies within Programme 1.

The second area of future work is related to the need to explore specific strategies or actions which can enhance or support sustainability within initiatives. Understanding how specific actions and strategies support sustainability would provide much needed understanding of how improvement teams can self-organise to sustain improvements to enhance sustainability of future intiatives.[2,45,129] This exploration will be the subject of work presented in Chapter 7.

Strengths and Limitations: This study describes how a sustainability tool can influence and support sustainability throughout improvement initiatives. It provides a better understanding of the role a sustainability approach can play in an improvement initiative and highlights the specific benefits and mechanisms which support sustainability in complex systems. Findings on the challenges associated with the use of the tool reveal areas for consideration and future work.

There are limitations associated with this study which are necessary to acknowledge. The first limitation is that, although this study aided in the exploration of prospective sustainability planning, impact on sustainability outcomes remains unknown. Results suggest having a tool to study sustainability throughout an initiatives' journey may aid in prospective sustainability actions and planning, but it is not known if this will ultimately increase initiative longevity or other sustainability outcomes. Future work following improvement initiatives longitudinally is needed to understand if and how prospective sustainability planning impacts sustainability outcomes. This will be studied further in Chapter 6 where sustainability outcomes across four cases will be explored.

The second limitation is related to the generalisability of study findings. The LTST was tested across three QI programmes with diverse initiatives, but it is unknown if similar results would be achieved in other healthcare contexts (e.g. programmes with little or no QI support). This study can support further research by providing a basis for identifying similar or additional benefits and challenges in other settings. Finally, although many other prospective sustainability tools are available, the extent to which they could support the identified benefits is unknown. Future research in this field should focus on applying the available approaches to understand their application and assess the impact of their use.[28]

There are also methodological limitations to report for this study. The first is the disproportionate sampling of interviewees as well as opportunities to observe across the programmes. As discussed in chapter 2, access to participants varied across the programmes (See section 2.5.3 Gaining Access on page 73). Access to Programme 1 was more straight forward as I was a known local researcher. Access to participants in programmes 2 and 3, was moderated by the programme leads and a smaller sample of both interviewees and observations were collected. This difference in sampling could have resulted in a number of limitations including responder bias. For example, those agreeing to participate in interviews from programme 2 and 3 may have had more favourable things to say regarding their experience of the tool or they may have had a memorable story related to the tool which they wanted to share. Limited observations in programmes 2 and 3 may have also impacted results. In the prearranged sessions, I was able to observe key sustainability planning and discussion as well as see how the tool was used by teams, but this information could have been strengthened through further observations within team's organisations (e.g. at team meetings). Unfortunately, due to access and time restrictions, this was not possible. Although, these

limitations could not be fully addressed, I attempted to mitigate them by corroborating interviews transcripts with observation notes along with the LTST scores to verify experiences and identify inconsistencies in reporting. I also attempted to demonstrate varying perspectives and experiences across the programmes through examples and quotes and the use LTST comments from across all initiatives including those not represented in the interviews.

The second methodological concern is related to the validity of the LTST. The tool was designed with stakeholders and face validity was supported by all teams receiving introduction sessions describing the factors.[35] However, the extent to which all participants judged the factors to mean the 'same' thing is unknown. This meant that construct validity and internal consistency of responses could not be ascertained which may have resulted in a number of participants judging different aspects or misunderstanding factor definitions.[364] I attempted to account for this risk by acknowledging that factors may be interpreted differently by participants. I accepted that the issues faced by teams may be unique and diverse themes and topics may be discussed in each factor. To understand how the factors were interpreted and the themes brought up in the factor ratings, further exploration of LTST reports is needed. This will be discussed in Chapter 6 where I investigate individual initiatives LTST ratings to understand specific challenges faced within the factors. This limitation is also revisited in the Chapter 8 section 8.6 Reflections on Study Design: Strengths and Limitations.

Contribution to Overall Thesis: This chapter prospectively studied the application and impact of a sustainability approach in practice. This work directly responded to a recognised gap in the literature by describing how a sustainability approach can support the process of sustaining in improvement initiatives.[10,153,155] This chapter investigated application of LTST results across programmes. The forthcoming chapter will build on these findings and focus investigation on the LTST results and sustainability journeys of four improvement case studies within Programme 1. This work will describe how the process of sustaining manifests in each case through exploration of initiative aims, challenges, achievements and sustainability outcomes.

5.5 Conclusion

Sustainability is a challenging concept to explore but the use of the LTST can aid those undertaking improvement initiatives to work collaboratively, identify risks, share ideas to mitigate challenges, and reflect on the impact of actions taken. While the LTST may provide a useful approach to assess teams' perceptions of sustainability to prompt planning and actions to increase chances of success, there are reported challenges to its use. Issues related to isolation, judgement, confusion and inability to reflect were all discussed as potential challenges. These findings highlight the need for thoughtful consideration of the potential impact prior to use.

Chapter 6: Exploring the process of sustaining within Improvement Initiative Case Studies

6.0 Chapter Overview: This chapter introduces four improvement initiative case studies to examine how the process of sustaining manifests in practice. All initiatives expressed the desire to sustain specific aspects of their work but each viewed sustainability as a different combination of goals, often mentioning domains unique to their initiative such as the *continued culture change, continued relationships with patients or continued achievements of targets*. The process of sustaining was not linear in any case but required ongoing planning and consideration of persistent sustainability issues. All cases engaged in consistent problem solving, making changes and adjustments to systems, interventions and plans to improve their prospects of sustaining. Each case described how they were able to sustain at least 5/9 outcomes from the updated sustainability outcome framework. Effort and work were continuing for each case with further implementation, improvement and/or spread of the initiative ongoing. Building on the responses and learning in each case, a description of the 'The process of sustaining' is presented. This process is characterised as an ongoing cycle involving: *recognising sustainability risks or opportunities, considering potential responses, decision making to act or not, reflecting on impact, and reassessing to move forward or revisit the risk*.

Aims and Research Question: This chapter aims to enable the process of sustaining to be made explicit. This chapter will focus on presenting the sustainability journey of each case and explore the process of sustaining within individual cases. The chapter will contribute to answering the overarching research question:

How does the process of sustaining manifest in practice?

This chapter provides relevant background information for each of the cases while addressing underlying questions necessary to respond to the above research questions:

i. *What are the initiative aims? (Aims)*
ii. *What risks to sustainability were identified throughout implementation and how were they addressed? (Risks, responses and learning)*
iii. *What was achieved during the initiative and how does this relate to the initiative's sustainability goals? (Achievements)*
iv. *What was sustained/sustaining? (Outcomes)*

6.1 Background

Much of the available research on sustainability focuses on initial implementation and adoption of improvement with far less attention paid to the question of *how* to sustain beneficial or effective healthcare improvements.[49] Understanding and assessing the dynamic process underlying sustainability is viewed as a key challenge facing practitioners and a key barrier to advancing research in this area.[45,155] Many studies offer valuable lessons on what may have influenced sustainability outcomes but this is often only after an initiative has either sustained or failed to sustain.[118–120] As noted in chapter 5, sustainability approaches and tools may provide insight into the challenges and risks to sustainability but they do not capture the mechanisms supporting sustainability.[49,59,142] There is a need to explore how the process of sustaining manifests in practice, specifically, what the process entails and how individuals and teams navigate it in practice. This insight is key in understanding how future improvement initiatives can be designed and supported to enhance sustainability.[20,49,59,142] To support investigation of the following definition of the 'process of sustaining' will be used: *The process by which individuals and teams plan for and act to embed initiatives and enhance continuation of initiative benefits, outcomes and practices. This includes any activities undertaken to influence sustainability (before, during and after implementation) over time and enhance prospects of continued initiative delivery and improvement.*

In complex systems, sustainability becomes synonymous with ongoing improvement and adaptation which emphasises the need to continuously learn and improve rather than maintain processes or outcomes over time.[134,138] Plsek et al. have suggested that *"the only way to know*

exactly what a complex system will do is to observe it: it is not a question of better understanding of the agents, of better models, or of more analysis".[66] Therefore, a prospective approach to capture real-time issues and associated responses within improvement initiatives was taken in this study. This perspective allows for the interactions that occur within and between the initiative, the setting, and the broader organisational context to be observed and described.[74] The investigation of sustainability throughout implementation with the use of the LTST, aims to increase understanding of how and why sustainability is influenced over time and make the process of sustaining, including any decisions making, actions, adaptations and learning to be made explicit.

Challenges to capturing the process of sustaining

There are three recognised issues which hinder rigorous study and reporting of sustainability research.[10,13,28,45,59] The first issue is that many studies fail to report *what an initiative has achieved* and would like to sustain. If benefits or achievements of initiatives are not fully understood, it is unlikely that an accurate representation of sustainability outcomes can be presented. Therefore, the ability to accurately assess sustainability requires first an understanding of what was achieved during the initiative and what should be sustained going forward.[10,28] The second issue is the *inconsistent reporting of sustainability outcomes*.[28,45,59] Sustainability outcomes are often measured dichotomously (sustained or not sustained), making it difficult to determine the extent to which various components of the program were sustained, what may have changed, or shown impact on desired health outcomes.[10,45,365] The third issue is the *reliance on individual participants* to suggest and describe what they believe influenced sustainability retrospectively.[28] The prospective investigation of sustainability throughout implementation is needed to increase understanding of how and why sustainability is influenced over time. Exploring the steps taken to mitigate risks, improve initiative design, and adjust specifics characteristics to sustain initiatives would enable greater understanding of how sustainability is supported in practice.[10,13,28,36] The presentation of the cases in this chapter have been designed to specifically address and minimise these shortcomings.

6.2 Methods

Full Case Study Methodology can be found in section 2.4.4 Case Study Approach on page 66. Four improvement initiative cases are described in this chapter: Mental and Physical Wellbeing (Wellbeing), Child Allergy Pathway (Allergy), Heart Failure Care Bundle (Heart Failure), and

Medicines Review (MedRev). Background information for each case is presented in Table 9 on page 72. Across the four case studies, 38 interviews were conducted in two phases with one focus group of eight participants. All interviews were recorded and transcribed by a professional transcription service. A total of 35 hours of observation were conducted and 64 documents were used to inform the case reports.

Each case will explicitly explore what the teams were able to achieve during the initiative period and what the teams wished to sustain. The initiatives' key challenges and risks will be presented to outline action and learning. To assess progress towards sustainability, the updated framework for sustainability outcomes (created in Chapter 4 page 143) will be will be used to assess the sustainability outcomes in each of the cases (Table 30).

Table 30: Sustainability Outcome Framework

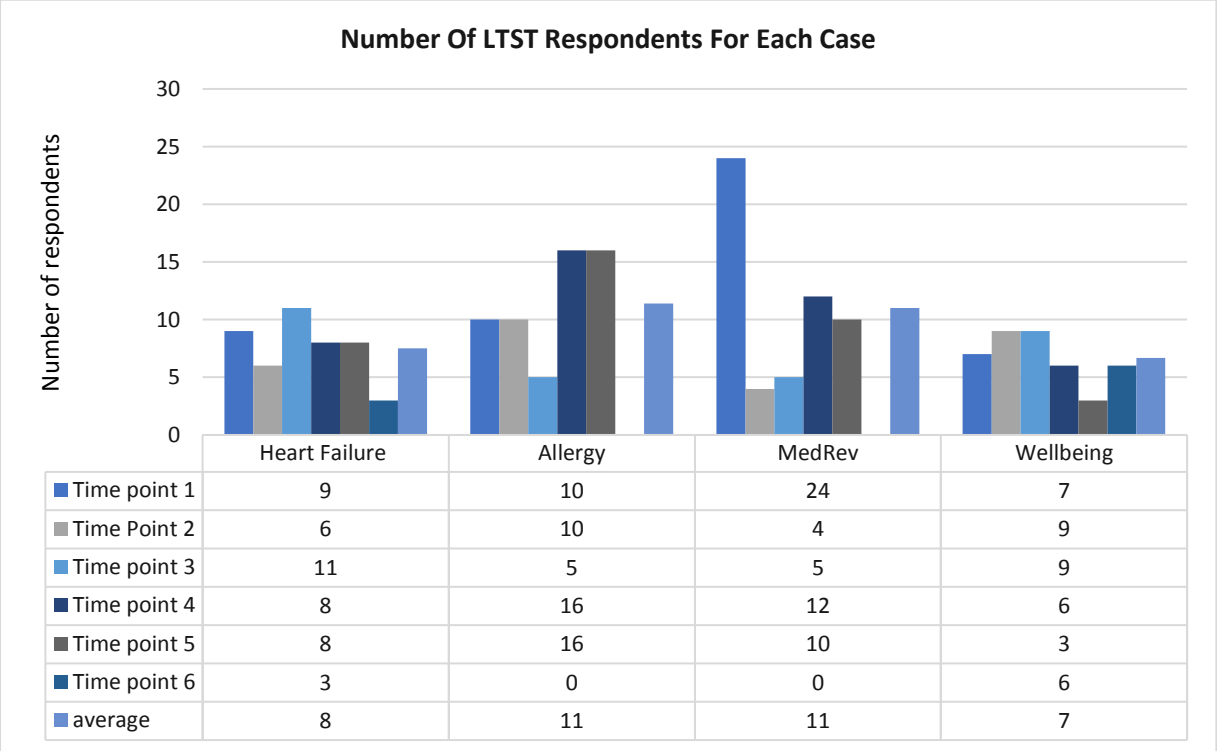
Updated Sustainability Outcome Framework		
I.	**Outcomes and Benefits**	*Outcomes or benefits for patients, staff and stakeholders continue*
II.	**Activities**	*Initiative activities or components of the original intervention continue*
III.	**Relationships, partnerships and networks**	*Maintenance of relationships, partnerships or networks developed during the funded programme*
IV.	**Procedures and policies**	*Maintenance of new organisational procedures, and policies that were started during program implementation*
V.	**Attention and awareness**	*Attention and awareness of the problem or issue is continued or increased*
VI.	**Spread**	*Replication, roll-out or scale up of the initiative*
VII.	**Skills and capabilities**	*Capacity built (skills and capabilities) within staff, stakeholders and communities developed throughout an initiative continue to be utilised*
VIII.	**Innovation and Adaptation**	*Adaptation in response to new or changing populations, evidence, policies, or other contextual influences*
IX.	**Garnering Funding**	*Ability to garner further funds to continue the initiative and maintain gains.*

Many previous studies have been criticised for using only subjective accounts of what has sustained, or not, with little insight into what has maintained, changed or discontinued.[28,45,59] Therefore, in each case the outcomes will be reported using the scale below:

1. ***No evidence:*** No anecdotal or objective documentation
2. ***Some Evidence***: Anecdotal evidence, observation or documents allude to continuation
3. ***Strong Evidence:*** Anecdotal evidence confirmed with triangulation of sources or objective measure of continuation

6.3 Results

Results for each case study are reported in individual case reports below in sections 6.3.1 to 6.3.4. The LTST was used by all four cases with an average of nine respondents for each data collection point (Figure 29). Each case report begins with a brief description of initiative aims followed by aggregated LTST scores, examples of key risks faced, and associated responses and learning. The examples do not describe a comprehensive initiative journey but provide a snapshot of the key issues faced by the teams in their attempts to sustain throughout implementation. Initiatives' achievements are then highlighted along with sustainability goals. A description of the initiatives' sustainability using the sustaining outcomes framework then follows. It is important to note that case reports are not meant to demonstrate that one case is better at 'sustaining' than another, but to highlight the diversity and similarities in sustainability journeys.



	Heart Failure	Allergy	MedRev	Wellbeing
Time point 1	9	10	24	7
Time Point 2	6	10	4	9
Time point 3	11	5	5	9
Time point 4	8	16	12	6
Time point 5	8	16	10	3
Time point 6	3	0	0	6
average	8	11	11	7

Figure 29: Number of LTST respondents for each case

Case 1: Wellbeing

"There's this constant tension between recognising the impact of an intervention and being able to deliver that within the timeframe of a project" (I6_QI Manager)

I. Initiative aims

Within a trust in Northwest London internal audits of physical health assessment for patients admitted with an acute mental illness demonstrated that the trust was below average in monitoring BMI, glucose control, lipids and blood pressure. This audit also showed that a CQUIN (Commissioning for Quality and Innovation[191]) target to improve physical health monitoring in people with severe mental illness was being met less than 80% of the time. This prompted one ward in the trust to begin a quality improvement initiative. The aim of the proposed initiative was to improve the physical health of people with severe mental illness who were admitted to the ward. The initiative developed an improved physical health assessment document in an inpatient ward and a patient-held health record as well as staff training to meet this aim. See Appendix K, Wellbeing AED. The team established a number of measures to monitor progress throughout the initiative (Table 31). The initiative was funded by a national charity which aimed to identify innovations in the NHS that could lead to improvements. The initiative was initially funded to run over 15 months, beginning in June 2014.

Table 31: Wellbeing Improvement Measures

Wellbeing Improvement measures
1. Percentage that received a physical healthcare assessment 2. Percentage where the smoking status was documented in the physical healthcare assessment 3. Percentage where the Body Mass Index was documented in the physical healthcare assessment 4. Percentage where systolic blood pressure was documented in the physical healthcare assessment 5. Percentage where Cardiovascular Risk Score was documented in the physical healthcare assessment

II. Sustainability Risks, Responses and Learning

Through the prospective measurement of sustainability, the team identified a number of factors which influenced sustainability. Figure 30 shows Wellbeing's LTST results. The highest scoring factors (factors with the highest percentage of 'Very Good' ratings) were: Involvement A (Involvement of oneself in the initiative) (93%) and Commitment to the Improvement (91.3%). The lowest scoring factors were Team functioning (79.0%) and Support for

Improvement (79.5%). Although the initiative encountered numerous challenges and discussed a number of risks, here I discuss three main risks to sustainability identified by the team: *workload and reliance on individuals, operating within a shifting organisation and evidence to demonstrate value.* Below I outline these risks along with associated facilitators and actions taken by teams to promote sustainability.

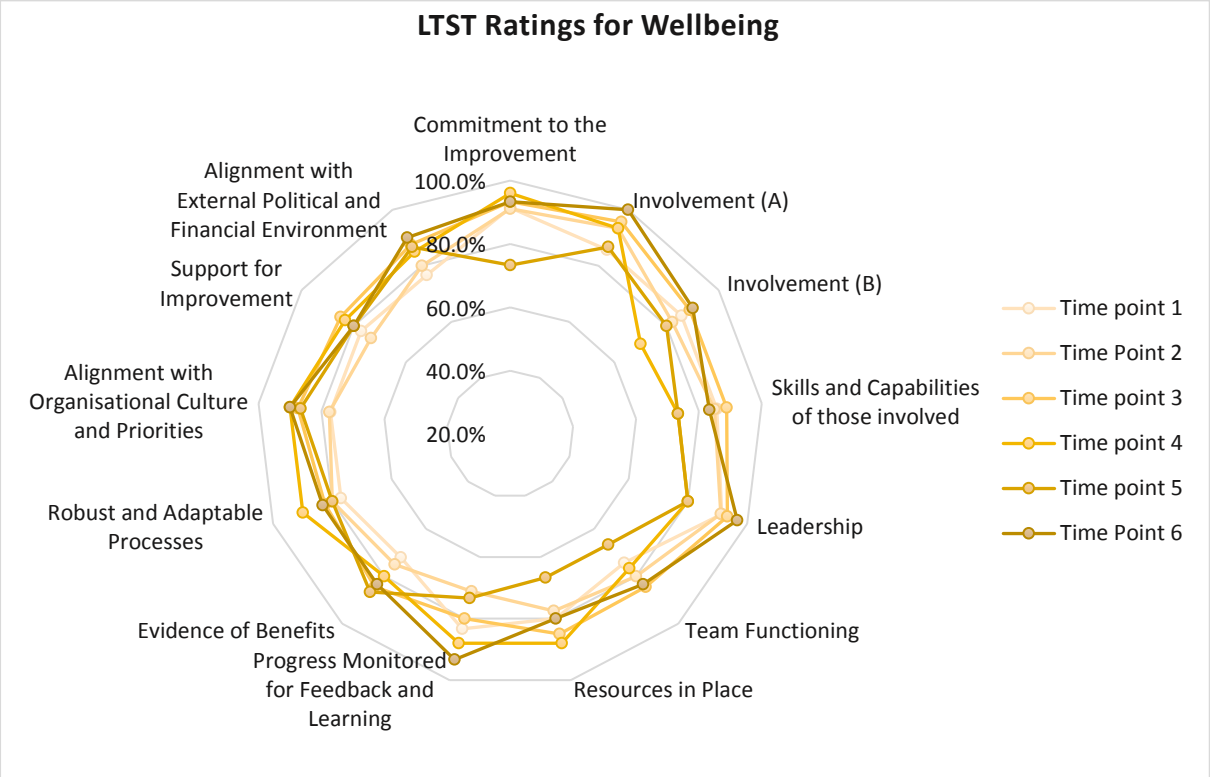


Figure 30: LTST Ratings for Wellbeing

i. Workload and Reliance on Individuals

Risk: Team functioning presented a number of issues for the Wellbeing team. First, the team were concerned about the consistent delivery and measurement for the initiative as accountability for the initiative workload relied heavily on specific team members. *"In the short term you're delivering the improvements in the project, but in the longer term you're going to have a detrimental effect on the sustainability of the project…if it's somebody's job to do it now, then what happens when they're not there or what happens when they leave."(I6, QI manager)* The team were concerned about how this impacted the ownership of the initiative. *"If you're thinking about sustainability, how do you hand over some of the things that you've taken responsibility for as a team, back to the wards, back to individuals, back to the*

organisation? Because I think that that is a real kind of test of how things sustain.(Meeting minutes_ 02/09/2018)

Responses and Learning: To improve prospects of ownership and role responsibilities, the team attempted to ensure the initiative and the assessment forms were recognised as belonging to the ward staff and not just the improvement team. "*This was tackled taking great care throughout to ensure that the project was positioned as belonging to the ward: an example of this has been in recruiting a ward team member to do the audits and to give feedback to staff team on incomplete assessments etc. rather than this coming from outside the team." (12 month review report)* The iterative development of the assessment form throughout the initiative implementation was also seen as a facilitator to building ownership of the initiative. *"We were constantly thinking about how to improve it in all sorts of ways including to make it easier to use." (I2, Clinical Lead)* This iterative process was at times seen to slow the pace of the initiative delivery, but it was crucial in understanding if the form met the needs of the staff and their system. This ensured the assessments continued to be used, but also empowered staff to tailor and improve the forms as needed. *"It's resulted in real buy-in from frontline staff, nurses, doctors, on the ward, nurses who said, this is our (Wellbeing) Project." (I1, Clinical Lead)*

To support fair distribution of the workload associated with the initiative, the team worked to integrate the assessment forms into the trust IT system. This step served to legitimise the assessment form as a standard procedure for patient care and ensured a structured way of documenting the health assessment criteria for staff. This enabled the work to be viewed as part of the everyday activities for the staff, making it a wider team responsibility. "*I think it's got a much better shot at being sustained. I think it's partly because we have found hopefully a way of embedding it in Trust practice and integrating it into our clinical system in a way that it's not at the moment and I think if we didn't have that I would fear for it." (I2, Clinical Lead)*

ii. Operating within a shifting Organisation

Risk: Participants in Wellbeing described the difficulties of operating within an organisation that had shifting priorities. *"In a big organisation like this there's every chance that someone else will decide there's some other way of doing things and then all of a sudden this all goes out the window…things change so much in the NHS that good things just get wiped out some times."(I1_Clinical lead)* Diminishing financial budgets and the pressure on the services to

make savings and demonstrate a quick impact were also discussed as a risk to this initiative's sustainability. *"Our service is just constantly being cut in spite of lots of bleating from the political sphere about parity and esteem, the push to do things within the diminishing economic envelope is certainly a reality."(I2, Clinical lead)*

Response and Learning: To gain and continue to maintain organisational support for the initiative, the team attempted to increase their visibility to highlight the value of the initiative. The team engaged in a number of activities to gain support through publishing in a number of journals with diverse audiences as well as planning strategic presentations. *"I thought we'd achieved something, but I didn't really know if it was going to go anywhere, whereas now… it feels like we've actually been able to work and that's through persuading people, showcasing it…doing publications that then we can show off." (I1, Clinical Lead)* This increased visibility allowed the initiative to be seen as vital to deliver improved patient outcomes. Gaining this profile was seen as key in maintaining momentum to deliver the work and for staff to recognise the organisational support for their efforts.

iii. Evidence to demonstrate value

Risk: The third risk identified was the initiative's ability to demonstrate impact on patient outcomes. Producing benefits from the initiative was a challenge as making a distinct link between initiative interventions and improvement in patient outcomes was difficult and seen as a longer-term aim. *"Can we stand some chance of improving people's health? Because just documenting peoples decline is not really going to help in the end….We got people access to services that might help them stop smoking, or lose weight, or eat differently…to actually take that around and show people that we have demonstrated something and we should actually do it, is a much longer process."(I1_ Clinical lead)*

Response and Learning: Although the initiative struggled to demonstrate evidence of benefits related to long term patient outcomes, they found that monitoring process measures such as the number of documented physical health checks enabled the project to show incremental changes to the service they were providing to patients. *"There has been subtle improvements each week. We do weekly physical checks…every time we do that we put it straight onto the (Wellbeing) document which we weren't doing before."(I4, Nurse)* The feedback from these measures empowered staff to understand how they were increasing the number of patients receiving

recommended care. This provided staff with encouragement and motivation to continue the work.

III. Initiative Achievements and Sustainability Goals

Over the duration of the initiative, Wellbeing was able to achieve tangible improvements to patient care processes. The team identified a number of existing parallel systems for collecting information about the physical health of patients (by doctors, nurses and pharmacists) which were recorded in different places. The team were able to improve processes within the setting by reducing duplication of recording and creating a single physical health assessment form. *"Previously there were doctors and nurses who were doing separate physical assessments, and they were kept in separate locations. So now it is one standard form…it's a real improvement in the physical assessment form."(I5, Service User)* The team was also able to increase completion of physical health assessments from their baseline. *"The most tangible improvements we've made within the project are just about the recording and undertaking of physical health assessments."(I6_QI Manager)* As well as improving patient assessment documentation, participants highlighted achievements related to raising awareness of the issues surrounding holistic needs of patients admitted with acute mental illness. The active involvement from service users was a unique and beneficial part of the work and was noted as a key achievement from this initiative. *"For me, perhaps the greatest success of the project of all is actually this very active involvement."(I2_Clinical Lead)* The service users played a significant role in designing and leading the creation of a patient-held health record. The team expressed a desire to continue to work with services users to inform next steps and maintain relationships in future initiatives.

Sustainability Goals

Sustainability was an important component for this work particularly because the outcomes associated with the initiative (improved quality of life, mortality and life expectancy etc.) were dependent on the long-term delivery of the interventions. Participants stated a number of diverse sustainability goals such as ensuring the initiative became the 'norm' on the ward and performing regular audits and review (Figure 31). The team also wanted to continue to build the initiative profile to aid in the sustainability and spread of the initiative throughout the organisation and into the community. The iterative development of the assessment form and

handbooks were also considered vital to sustainability to ensure the forms remained fit for purpose.

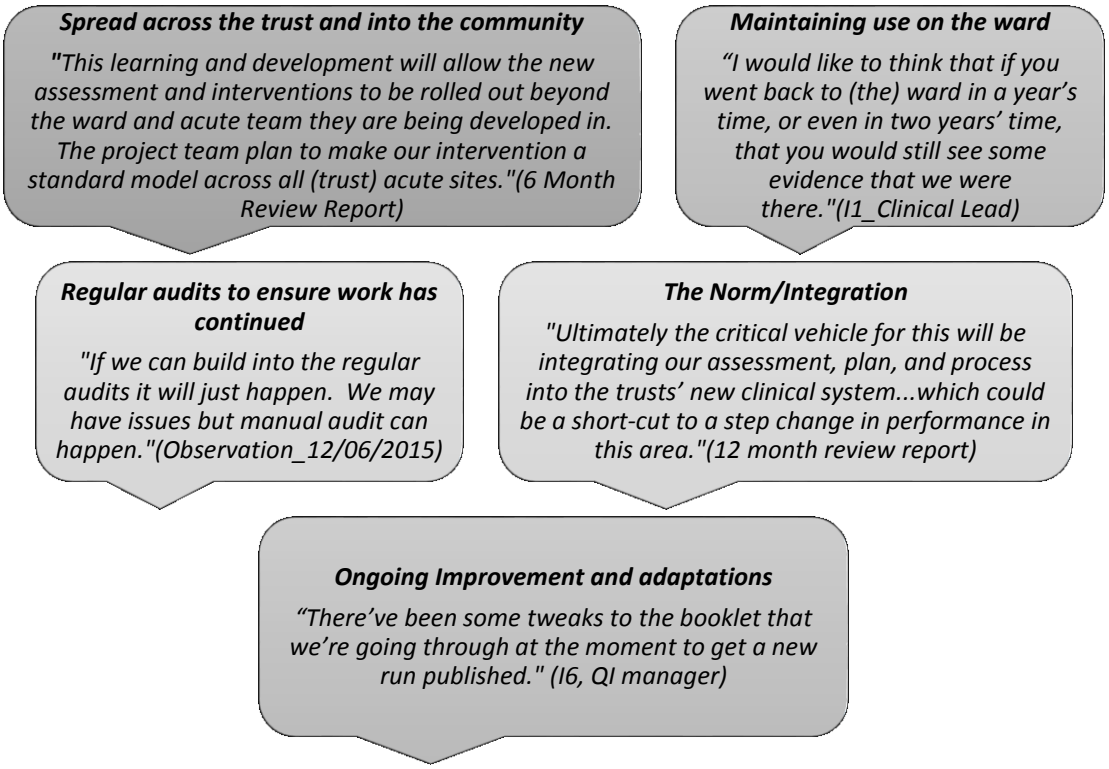


Figure 31: Wellbeing Sustainability goals

IV. Sustaining Wellbeing

Follow up interviews with team members were conducted approximately two years post initiative funding between April-August 2018. Table 32 summarises the sustainability outcomes for the initiative.

Table 32: Wellbeing sustainability summary

Sustainability Outcomes	Perceived Sustainability	Level Of Evidence	Rationale
Outcomes And Benefits	No	No Evidence	*Impact to patient outcomes unknown*
Activities	Yes	Strong Evidence	*Improvement measures documented, graphs and charts displaying progress*
Relationships, Partnerships And Networks	Yes	Some Evidence	*Patient partners involved in the follow-up project, charitable organisation less involved*
Procedures And Policies	Yes	Strong Evidence	*Assessment form on trust IT systems to be used across the acute wards*
Attention And Awareness	Yes	Strong Evidence	*Publications, reports, organisational newsletters and presentations*
Spread	Conflicting views	Some Evidence	*Initiative has been rolled out to 5 wards with plans to expand to the community*
Skills And Capabilities	Conflicting Views	Some Evidence	*Training courses not advanced. Anecdotal reports of team progression and use of skills*
Innovation And Adaptation	Conflicting Views	Some Evidence	*Iteration of the booklets, assessment form can be adapted but with some difficulty*
Garnering Funding	Yes	Strong Evidence	*Project extension and further clahrc nwl funding for roll-out*

The Wellbeing Initiative reported that a number of achievements had been successfully sustained. The team applied for and was awarded new funding from CLAHRC NWL for the continuation and rollout of the initiative in April 2016. The roll-out commenced in September 2016 and had a significant impact on the sustainability perceptions and outcomes in this team.

The team confidently described sustained adherence and delivery of improved documentation of physical health assessment for patients admitted with acute mental illness. Although measurement was briefly suspended during the time in between the funded work (between

March 2016-September 2016), the team began collecting the measures again with the roll-out of the new project (Figure 32).

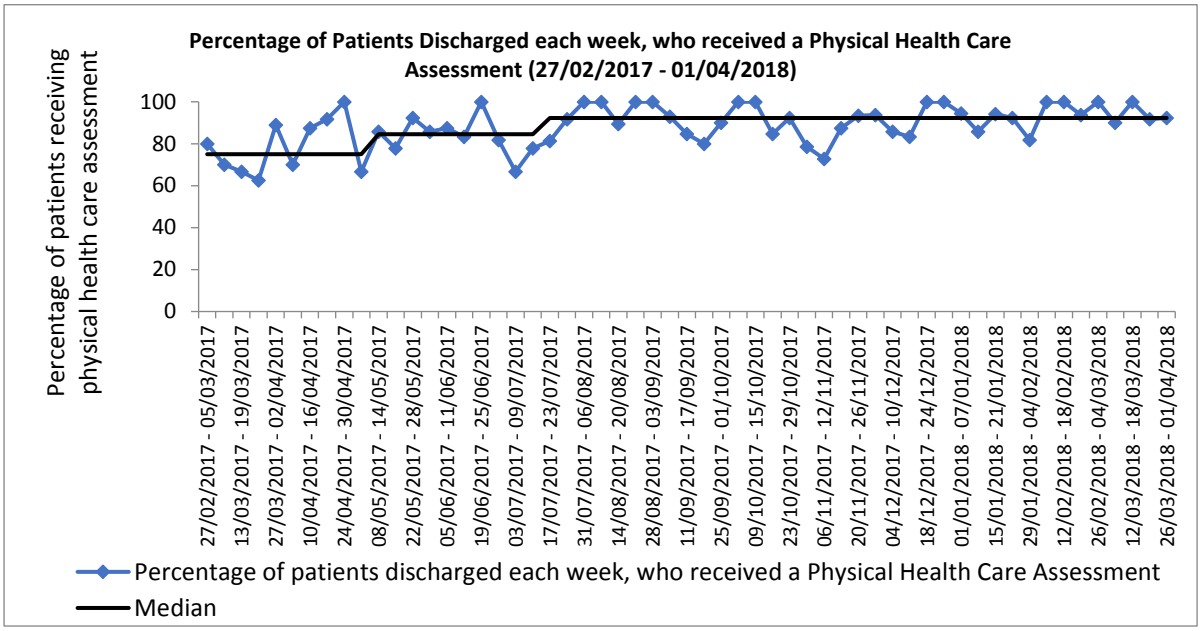


Figure 32: Wellbeing demonstration of continued delivery of the physical health assessment on form in the follow up period

The team achieved one of their sustainability goals which was to have the health assessment form integrated into the trust online IT system. *"We have got to a point where the physical health assessment form is in use across the trust as our standard physical health form."(Meeting Minutes_02/09/2018)* The team noted that although updating and improving the assessment forms was viewed as important, it was now more difficult to make changes as it had been integrated into the online system. *"Nothing was ever locked in so, even throughout the whole project there was always opportunity to feed into it. That obviously changed when the assessment had to go live onto (the trust IT system) because then it had to be locked into that…they can be changed but it's much harder to change once it's introduced". (I6, QI manager)*

During the course of the initiative, the team prided itself on the relationships and collaboration it had formed with service users. These partnerships were reported to have sustained and the team reflected when people left, they often still kept in touch to be updated about the initiative progress. *"I think it, it demonstrates some level of maturity of the group and of their interaction and relationships that have built over that time. So I think that inevitably has a level of resilience. I think it's interesting that some people have left and gone on, but still have some*

interest and involvement in the group, people haven't just disappeared off. (Meeting minutes_02/09/2018) While there is evidence of continuation of these relationships in the new initiative, findings indicated that this was not always easy as some members of the team felt lost and disconnected until the new funding began. *"Between the two (Wellbeing initiatives) where one ended and one began and all that sort of thing, well, I certainly felt a bit all at sea not knowing what was going on and all that." (I3_Service User)*

A number of team members described one area where they had not been successful. The connection between the initiative and improved patient health outcomes remained a challenge for the team. While the staff were confident that they had improved care of patients, there was no evidence available at the time of data collection of impact to health outcomes. *"It's something that would probably be an actual improvement in the physical health of these patient is probably something that will show in a few years' time I imagine, rather than straight away." (I38_Doctor)* The team viewed this as ongoing work to be tackled throughout the new initiative.

v. Summary and Next steps

Wellbeing was able to demonstrate sustained adherence and delivery of improved documentation of physical health assessment for patients admitted with acute mental illness. The initiative delivered a sustained improvement to these measures and was successfully spread to five further wards in the Trust. Although the team struggled to show improved patient health outcomes within the period of the initiative, the team used process measures such as the number of documented physical health measures to justify and support the continuation of the work. The team identified three areas for next steps: ensuring staff are adequately skilled and informed to use the form on the new wards, building the community initiative and continuing to develop the health assessment form and patient-held health record.

Case 2: Allergy

"People often invest a lot of their own time to get projects off the ground without necessarily being resourced for it."(I15_Project Manager)

I. Initiative Aims

Allergies are one of the most common chronic childhood conditions.[366] Despite the development of evidence-based guidelines for allergy care, diagnosis is low. [367–370] In response to these findings the Royal College of Paediatrics and Child Health (RCPCH) developed eight national allergy care pathways.[221] From 2011 to 2013, a child allergy improvement initiative was funded by CLAHRC NWL to implement four of the national care pathways. Preliminary results showed positive impact on patient experience, GP competence, hospital admissions and cost savings. These findings led to the roll-out of the Child Allergy Initiative across Northwest London in September 2014. The aim of the initiative was "*to improve delivery of specialist allergy services in a secondary care setting to demonstrate improvements in health outcomes and experience for children."*(Appendix L) The initiative ran across two sites and involved diagnosis and treatment training for clinicians, participation in an allergy network meeting as well as a number of interventions which varied across the sites (Table 33). The team used several improvement measures to assess their impact and progress (Table 34).

Table 33: Interventions across sites and example improvement measures

Interventions at each site	
Site A:	Site B:
• 3 nurse-led clinics • 1 Multi-Disciplinary Team (MDT) asthma clinics and 2 allergy clinics in secondary care • Updated A&E clinical pathway to identify asthma patients with a high risk of readmission • 2 nurse-led asthma clinics reviewing high-risk A&E referrals, one in a hospital setting and one in a community health centre.	• 2 nurse-led asthma clinics in general practice • A monthly school form to identify asthmatic children at risk and to create a simple process for referral

Table 34: Sample allergy Improvement Measures

Sample Allergy Improvement Measures
1. Number of Children seen at clinic 2. Number of times Asthma Assessed 3. Number of times Inhaler checked 4. Number of times Skin tests performed 5. Number of times Self-management plan agreed in clinic

II. Sustainability Risks, Responses and Learning

During the initiative, the Allergy team recognised and highlighted a number of challenges which impacted the potential sustainability of the initiative. Figure 33 shows Allergy's LTST results. The highest scoring factors were: Involvement A (Involvement of oneself in the initiative) (86.9%), and Leadership (81.1%). The lowest scoring factors are Involvement B (involvement of stakeholders, patients, carers and the public) (62.2%) and Resources in Place (65.4%). The initiative identified a number of risks to sustainability such as: l*ack of input from parents and children, demonstrating impact to patient care and pathways, appropriate staffing and skill utilisation*. They were also able to identify strengths and areas which supported the initiative's continuation. Below I outline these three risks and their related responses and learning.

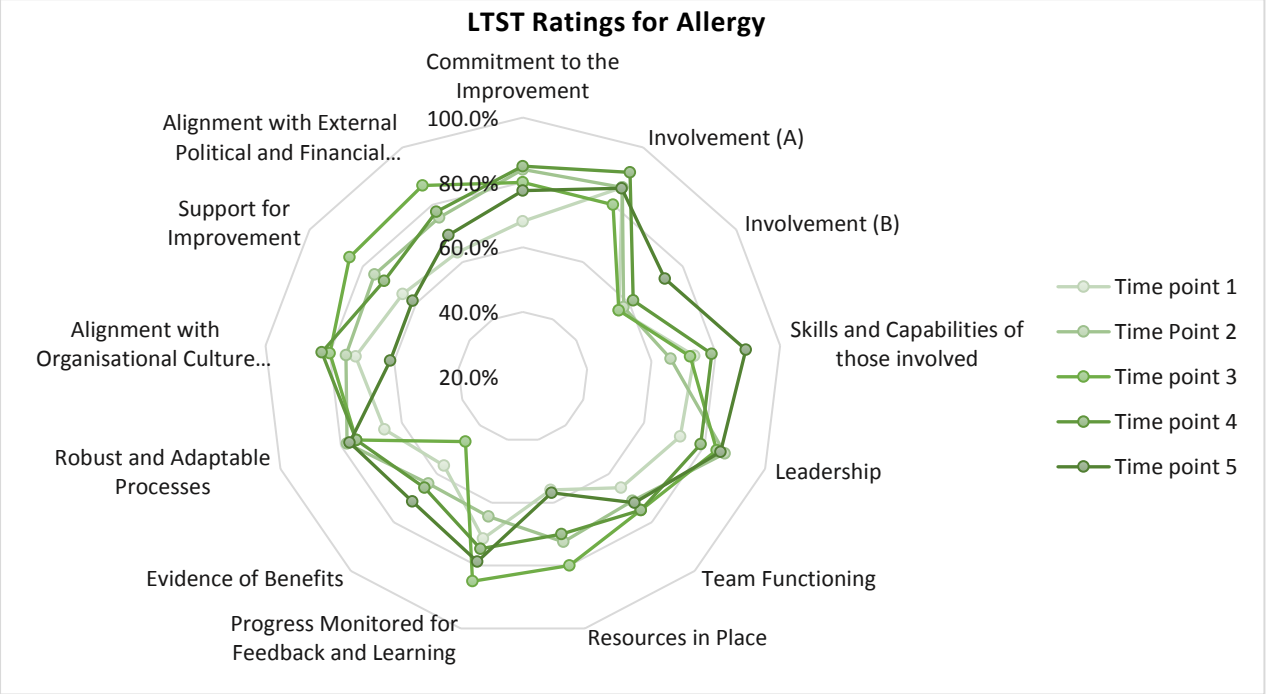


Figure 33: LTST Ratings for Allergy

i. Lack of input from parents and children

Risk: The involvement of patients and carers was highlighted as a weakness throughout multiple stages of this initiative. The team had a great deal of difficulty engaging with parents and children and involving them directly. This was seen as a risk to sustainability due to its connection with support and buy-in from local communities and services users. Participants felt that without the patients behind the work, supporting the initiative and providing 'real life' stories of impact, that the initiative would be seen as less valuable. *"We need to get more parent involvement…it's about trying to get some real energy behind us as a core group and to support*

this track. And I believe that we've missed this in our discussions. We've been so focused on the micro, I don't believe we've involved the community."(12 month review transcripts)

Response and Learning: During the initiative implementation, the teams set up and attended an 'allergy network meeting'. Team members believed that having this group would foster sustainability through the continuation of interest in allergy work and by engaging relevant stakeholders such as clinicians and parents. *"We set it up to engage really and get as much people as we could to come…we've had parents come which…has worked really well with the school nurses."(I19_Nurse)* Although the network meetings were a facilitator to improve involvement, involving patients and parents remained a persistent issue for the group. This was reflected in multiple comments and shown consistently throughout the LTST scores. "*So I think we were lacking on stakeholder engagement, particularly around patient involvement with the project and I think if I had the whole time again I would focus much more on getting that correct early on rather than trying to push through." (I16_Doctor)* Many participants felt that this risk was not resolved during the initiative and required more work.

ii. <u>Demonstrating impact to patient care and pathways</u>

Risk: The second issue identified by Allergy as a potential risk to sustainability was the team's ability to demonstrate clear benefits to their patient population. The initiative aimed to increase education and training and create improved care pathways for allergy but the connection to improved patient outcomes such as reduction in re-admissions was difficult to demonstrate in practice. This meant that the initiative struggled to demonstrate why they should be sustained and what should continue. *"We don't have the killer fact that says, by doing all this we have reduced the burden of asthma or prevented asthma admissions. I just don't have that information, and that's what, that's the one thing that I wish I had is a statistic."(I18, Clinical lead)* Without adequate evidence of effectiveness, the initiative struggled to gain support and further buy-in from the sector to support long term implementation.

Response and Learning: Although the team struggled initially to demonstrate the impact to patients, they found that having diverse measures such as number of teaching sessions conducted, and how many children had attended the allergy clinics, supported initiative continuation. Having a number of available measures on hand allowed the team to share their progress with others and demonstrate the changes to training and pathways they were making.

"I think the biggest thing that's made this project successful is the data collection because we were able to support what we were saying… so we've got data for every area basically, in the schools, GP practices, on our training that we provide."(I19, Nurse)

i. Appropriate staffing and skill utilisation

Risk: During implementation, the team identified staffing resource as a significant risk to sustainability. The proposed allergy clinics required new staff, and in particular required administrative support to book appointments and update patient files etc. This was a significant challenge for sustainability as it meant that nurses employed in the community would have to reduce their number of consultations to spend time on these administration tasks if the resource was not found. "*Need support ~ admin/ clerical - too much specialist nurse time spent on admin tasks -> not cost effective."(LTST_October 2015)*

Response and Learning: Through Clinical Commissioning Group (CCG) funding, a nursing post was created to cover the new allergy clinics and associated administration tasks (inviting GPs to attend workshops, collecting data etc.). A new nurse was recruited and assigned the agreed role. While this nurse was able to pick up a number of the initiative tasks, the workload was much greater than anticipated. Therefore in order to cope with the data collection and administrative tasks, many team members used personal time to complete initiative work. *"People here have given up their time for sort of free…and stayed late…because you've got the knowledge and the skills…it's not so hard to stay an extra hour or two hours or whatever it takes to get stuff set up."(18 month review transcripts)* Although this was recognised as not being a sustainable solution, the team recognised the importance of having the administrative data such as number of referrals to evidence their impact on care processes. As a team, they just 'got on with it' and continued to complete administration tasks as needed recognising that it could not be a long-term solution.

III. Initiative Achievements and Sustainability Goals

Participants from the two sites described similar achievements despite different approaches to the initiative. The first achievement was related to the training and capacity building for improved allergy services across Northwest London. Over 575 health professionals attended a range of formal education sessions on asthma, eczema, and food allergies. The initiative was also able to provide allergy clinics in secondary care and in the community which were seen as more convenient for patients and their families. A patient survey from site B demonstrated that 76% (65/85) of those surveyed said the service in the community clinics was better than in hospital (Figure 34_Team Presentation_03/04/2016). The initiative improved allergy pathways in A&E by enabling the London Asthma guidelines to be incorporated into care processes as well as in schools where a new referral form was developed. Finally, the initiative supported the sector to form an 'Allergy Network' which was viewed as a key achievement. This network promoted continued communication on improvement within the sector to share learning on best practices and impact for patients.

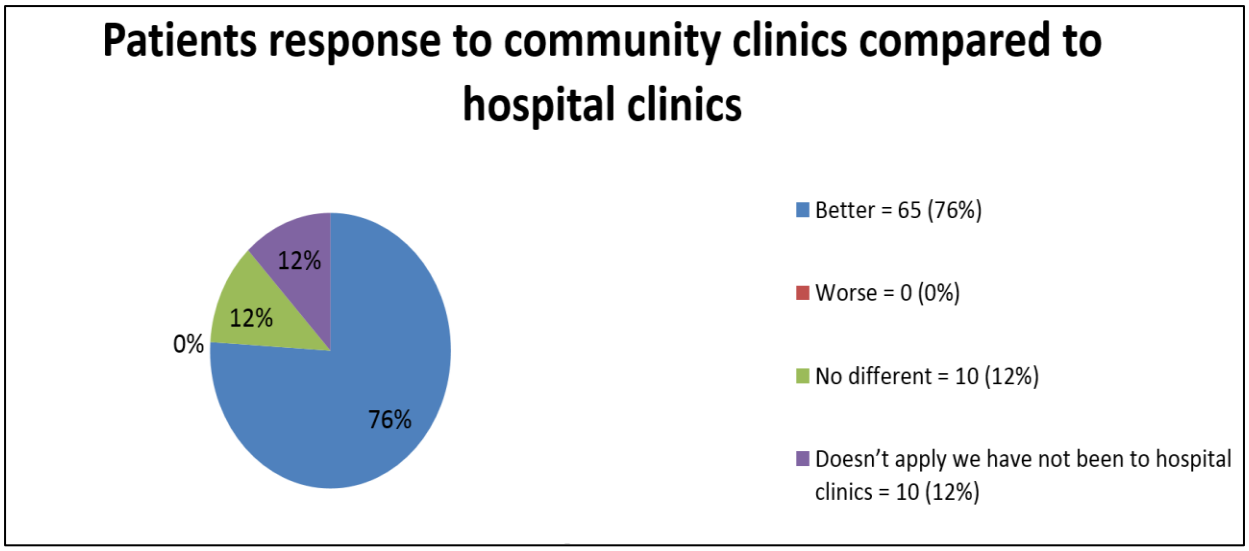


Figure 34: Allergy presentation demonstrating improved service provided by community clinics

Sustainability Goals

Reflecting on the achievements, team members described what they wished to sustain (Figure 35). These goals included the continuation and spread of secondary care and community based clinics to improve access to allergy care for patients. Team members also expressed the desire to obtain specific funding for specialist nurses to enable the clinics to be delivered consistently. The team planned to continue to build capacity for allergy care through the training sessions as

well as the allergy network meetings. Finally, the team described plans to reassess progress and look for where more improvements to the pathways could be found.

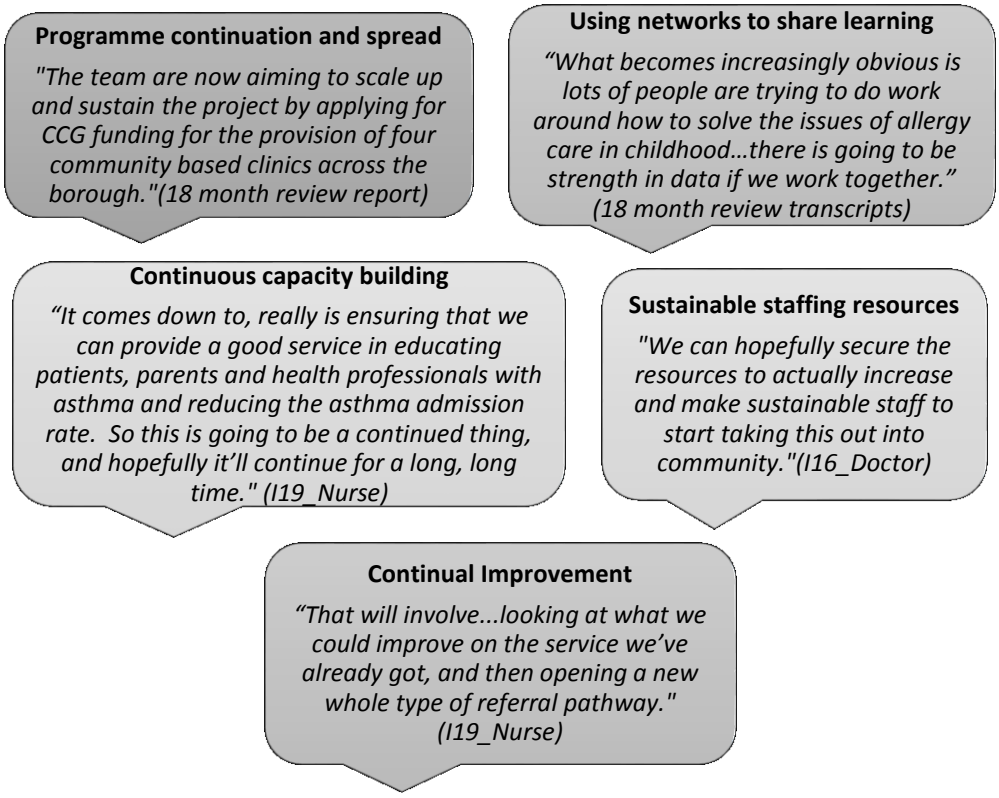


Figure 35: Allergy Sustainability Goals

IV. Sustaining Child Allergy

The initiative support from CLAHRC NWL formally ended in April 2016 and resource for the project manager of the initiative ended in August 2016. Follow-up interviews were conducted between July 2017 to February 2018 to investigate the current status of the initiative and its associated interventions. The sustainability of initiative work is summarised in Table 35.

Table 35: Allergy Sustainability Outcomes

Sustainability Outcome	Perceived Sustainability	Level of Evidence	Rationale
Outcomes and benefits	Conflicting views	Some Evidence	*Parent and patient feedback positive, unknown effects on patient outcomes including admissions or readmissions*
Activities	Conflicting views	Some evidence	*Discontinuation of 1 nurse and 1 MDT clinic but 2 clinics remaining (site A),Continuation of clinics in the community (Site B)*
Relationships, partnerships and networks	Yes	Strong Evidence	*Allergy Network Meetings, cross site working*
Procedures and Policies	Yes	Strong Evidence	*Proforma in place for A & E pathways, Patient booklet available, Referral pathway in schools*
Attention and Awareness	Yes	Some Evidence	*GP Forums, continued teaching in schools, Allergy network meetings*
Spread	Conflciting views	Some Evidence	*No spread at Site A. Site B reported scale up with additional nurse employed to run 2 further asthma clinics*
Skills and Capabilities	Yes	Some Evidence	*Ongoing education of school nurses, upgrading education for nurse specialists*
Innovation and Adaptation	Yes	Some Evidence	*Continued tailoring of proforma, expanding and adapting teaching sessions*
Garnering Funds	yes	Strong Evidence	*CQUIN funding (Site A) and CCG funding (Site B)*

Both Allergy sites obtained additional or continued funding for the initiative. Site A attained a CQUIN based on reducing asthma admissions and Site B was refunded by the CCG to continue the clinics and set up additional community clinics.

The teams described their continued relationships across sites through the Allergy Network meetings which were a mechanism for ongoing partnership and key in maintaining and establishing relationships between sites, clinicians, school nurses, parents and carers. *"They're not just maintained they've increased. We didn't have a partnership as such with the (site c) team, we absolutely do now, and quite a clear pathway between us about what's happening to those children, and a continued partnership."(I41_Nurse)*

The team in site A identified that they have been able to maintain specific allergy procedures with the use of a proforma as well as a child allergy booklet to provide relevant information

and case descriptions. These steps were key in ensuring best practice procedures would take place consistently. *"Before you know it you've got another set of doctors, so it's really hard to keep on track to get everyone to do it, so now there's a new proforma… there's a new paediatric booklet that's for every child that comes to A&E ….it's in there so they know that they don't have to go and find a sheet, so there's no real excuse now."(I19_Nurse)* Both sites also described how they were adapting interventions as needed. In site A, this was related to the updating and adaptation of the review proforma used in the hospital allergy pathway. Participants also described how the initiative work was continuing to develop particularly related to expansion of focus on food allergies and techniques to promote this component of the initiative. *"At the moment, we want to establish our food challenge service, we would like more direct input from the allergy nurse specialist, during the clinics, and see whether we could…have a supervised food challenge at the same time."(I40_Clinical Lead)*

As well as areas reported to be sustaining there were other sustainability outcomes which showed mixed success. Both sites struggled to demonstrate benefits to patient health outcomes but did find some success in documenting improvements to patient care processes. There were mixed reflections on the continuation of benefits with some participants noting that health outcomes were not adequately assessed so they were unsure if these had continued. On the other hand, some team members said that patient care had improved due to feedback from staff, patients and caregivers on the new pathways. *"All the feedback from users has been very positive, and from anyone who's been trained…we are providing a higher quality service, it is now nearer to patient's home, we're moving people out of hospital."(I18_Clinical Lead)*

Continuation of services and activities varied across sites. Site A participants reflected that they were still running a weekly MDT allergy meeting in secondary care along with two allergy clinics but one allergy MDT clinic and one nurse-led clinic had been discontinued. This was attributed to staff availability. For Site B, the education sessions continued in schools at the time of follow-up but the GP education sessions continued by request only. Site B participants stated that the nurse-led asthma clinics continued to be delivered and MDT meetings at the site had continued as well. No data collection for the follow-up period from either site could be obtained as the teams stopped formally recording improvement measures after initiative funding was terminated.

V. Summary and Next Steps

The Child Allergy Initiative was a complex set of interventions which aimed to improve child allergy care pathways. The project had a number of achievements with these interventions, training many clinicians and holding a number of allergy clinics. Sustainability was seen in the continued delivery of a number clinics and education sessions. Both sites had garnered continued funding in some form, and one site had used this funding to expand their services with an extra nurse specialist. The impact on patient health outcomes however was less clear. The team described a number of next steps for the work. Both sites described the intention to continue to deliver the clinics in either secondary or community care and the need to continue to collect feedback from patients to expand understanding of patient experience.

Case 3: Heart-Failure

"We just need to continue, continue, continue with it." (I24, Information Analyst)

I. Initiative Aims

The National Heart Failure Audit data identified a number of issues with care of acute heart failure patients at a trust in Northwest London.[371] Issues included the number of patients receiving specialist input to care and limited access to echocardiograms on weekends which were below the national recommendations.[222] The team at the trust identified a local solution to improve care for heart failure patients: a heart failure care bundle (a set of key clinical interventions that when enacted together has shown to give better patient outcomes).[222,372] NICE guidelines were used to develop the care bundle with the aim '*to improve the health, quality of life and experience of care for patients who are primarily diagnosed with acute heart failure'*. (Appendix M) The elements of the bundle included: Measurement of serum natriuretic peptides; performing a transthoracic Doppler 2D echocardiography; and referral to a heart failure specialist.[222] The initiative was set-up within one hospital ward and a number of improvement measures were established to track progress and assess impact of the work (Table 36).

Table 36: Heart-Failure Improvement Measures

Heart-Failure Improvement Measures
1. Number of admission bundles
2. Percentage of bundles with BNP level measured and documented
3. Percentage of bundles with Echo completed within 24h
4. Percentage of bundles with specialist referral
5. Overall compliance with admission bundle

II. Sustainability Risks, Responses and Learning

The Heart Failure team identified a number of ongoing challenges throughout the initiative which resulted in the team spending a significant amount of time in problem solving to address underlying issues in order to promote sustainability of the work. Figure 36 shows LTST results for Heart Failure. The highest scoring factors were: Commitment to the Improvement (91.6%), and Involvement A (Involvement of oneself in the initiative) (91.6%). The lowest scoring factors are Resources in Place (74.8%) and Involvement B (involvement of stakeholders, patients, carers and the public) (76.5%). Below, I explore three issues which were identified as

consistent risks throughout the initiative: *accountability and reliability of initiative delivery, measurement set up and accuracy,* and *understanding who and how to involve*

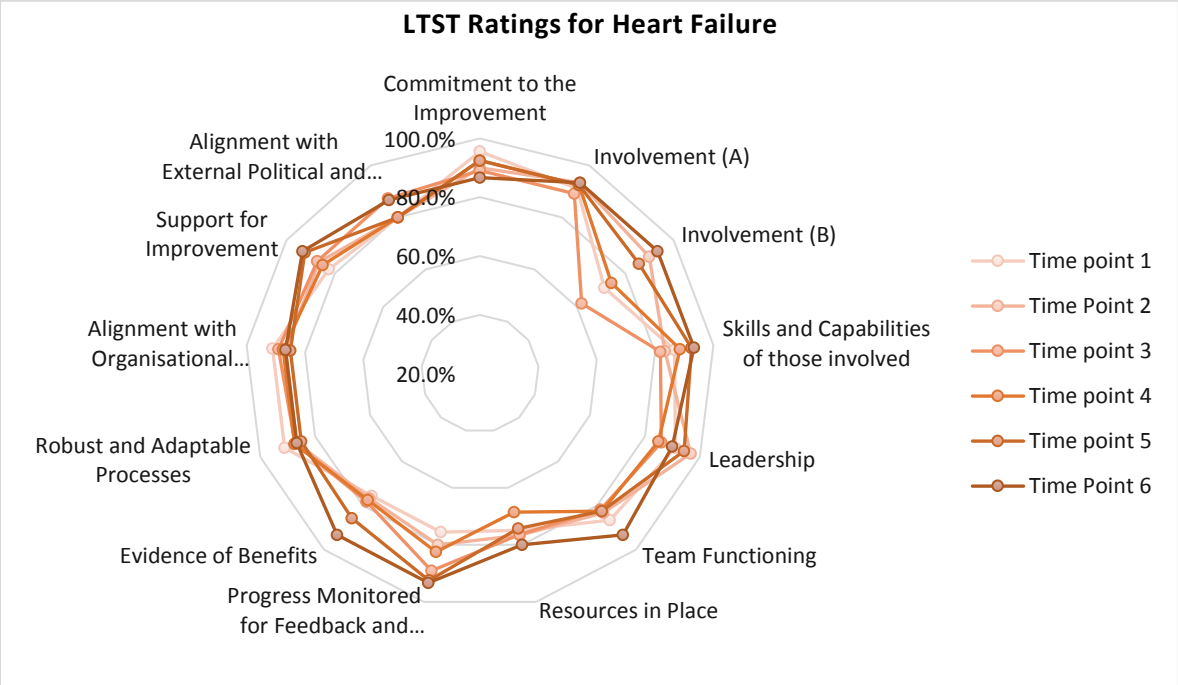


Figure 36: LTST Ratings for Heart Failure

i. Accountability and Reliability of initiative delivery

Risk: Heart failure encountered a number of challenges which resulted in lower scores in the 'resources in place' factor. The first was related to the time needed for staff to complete the care bundles. This included time to fill in the bundle as well as time needed to look for and find patients who may require the bundle. The second was related to the reliance on particular nurses to collect and document the bundle use. This required the team to consistently prompt other nurses and other staff to remember the bundle and fill it out. *"It does take consistent nagging so someone from the R&D team or the heart failure team go to the handover meeting in the morning…reminding people about it."(I21, QI Manager)* These issues were seen as important to sustainability as without individuals to complete the bundles as well as reminders to do so both completion and collection would not consistently happen.

Response and Learning: The team engaged in several activities to collect data from the initiative implementation to feedback to staff to help demonstrate progress. "*The team are now reporting progress back to the ward using the average monthly HF admission numbers as a target indicator of success rate."(12 month review report)* This feedback was viewed as aiding

sustainability as it promoted staff engagement and accountability to continue the work. The team also displayed initiative progress by posting graphs and charts on the ward notice boards to celebrate continuation of the collection of the bundles over time. This enabled staff to see initiative progress and understand the importance of continuing to collect bundle data. To address issues in accountability and reliability of bundle delivery, the team used meetings, conferences and forums to raise awareness and profile of the initiative. The team attended bi-weekly meetings for heart failure within their hospital to engage staff and ward managers in the bundle process. This was key in keeping everyone encouraged to continue to participate and was important to gain buy-in and awareness of the project. To safeguard continued delivery, the team also made an effort to build in mechanisms to train staff and new recruits on the bundle. Participants detailed how they ran education rounds with nurses and doctors to outline which types of patients may require a bundle and how the bundle completion would lead to better outcomes. This was a key step in ensuring the bundle continued to be delivered by staff.

ii. Measurement set up and accuracy

Risk: Issues with measurement impacted on the Heart-Failure team's ability to evidence the benefits of their work. The teams faced issued with the accuracy of coding of heart failure patients at the trust. *"People are often coded wrongly for heart failure so even when they're looking at what the absolute number of people are that should be on the bundle, it's always wrong." (I21, QI manager)* This meant that measurement set up took more time than expected and caused issues in understanding the correct delivery and impact of the work.

Response and Learning: To address the issues of coding accuracy, the team engaged with the coding team at the trust to increase understanding of the coding issues and look for ways to resolve the problems. *"(Project manager) met with the information director about coders looking for the bundle in the notes to make sure that this is happening. Hidden potential benefit from this work is potentially improving the fidelity of coding."(18 month review report)* While this was viewed as a facilitator to coding accuracy, the team still felt they had to closely monitor the data accuracy in all evaluations. Data accuracy was supported by the alignment of the initiative with a CQUIN and best practice tariff. The connection with the CQUIN programme gave the team a mechanism to integrate the initiative into existing funding streams to support its ongoing delivery. *"We've got a best practice tariff which means that for the next coming year we get £500 for each patient that comes in with primary care diagnosis, which gives about*

another £500,000 to the service."(I22, Service Manager) This allowed the initiative to highlight the importance of data accuracy to ensure reporting of specific targets for improved patient care were met.

iii. Understanding who and how to involve

Risk: Comments from the LTST on multiple occasions revealed that involvement of patients was viewed as lacking in the Heart Failure team. *"We have very good clinical involvement and now need to focus on patient input."(LTST_November 2015)* The team felt this was an issue for sustainability as patient experience and feedback on the bundle were critical in how it could be developed and used in the future.

Response and Learning: To address this risk, an effort was made to informally ask patients about their experience of the bundle. Unfortunately, this left the team unsure if they could actually make changes to the bundle or improvements related to patients' wishes. *"The heart failure nurse, did informal checking in with patients, asked them things and got feedback on what they want on discharge and stuff like that…One of the main things that she found that they did want was patient passports...but then, again, there was that disconnect with can we actually fund that?" (I21, QI manager)* The team had some success in engaging a patient representative who participated in various meetings but there was concern that they had no representation from actual service users. *"A patient has come back on board which is helpful but they have not directly used this hospital service."(LTST_February 2016)* Although the team made effort to mitigate this issue with multiple approaches, it was a consistent challenge for the team, and was not something that was resolved in the initiative duration. *"We didn't get many patients…within the meetings. Not through lack of trying!"(I24_Data Analyst)*

III. Initiative Achievements and Sustainability Goals

The Heart-Failure initiative ran for 18 months beginning in September 2014. During this period the initiative achieved some notable improvements to patient care and processes. Firstly, team members described the benefits that the project brought to patient care. The initiative enabled the delivery of best practice standards for the delivery of echocardiograms and referrals of patients to specialists. This was only made possible through the team changing service processes and infrastructure to deliver the care bundle. The team worked hard to identify issues with current service provision of the Echocardiograms and were able to solve issues and meet

national targets by creating a business plan and obtaining new echocardiogram machines to reduce delays. This was seen as a key success without which the initiative could not have been delivered. *"Since we've started with the project we have a 90% completion rate of all echos for inpatient patients within 24 hours. This is one of the major achievements."(I24_Data Analyst)* Figure 37 demonstrates the improved access to echocardiography throughout the initiative duration. The team also undertook extensive measurement review to see how the improved care impacted re-admissions and mortality. Although the direct link to the project work was still being ascertained at the end of the initiative funding, the site did see preliminary reduction in both readmissions of heart failure patients as well as mortality.

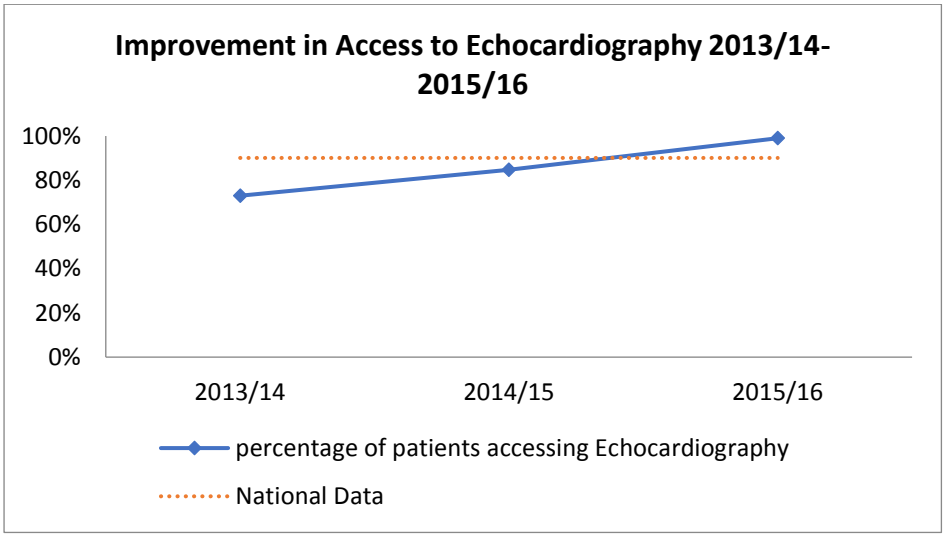


Figure 37: Access to echocardiography from 2013-2016

Improving the service also allowed the team to demonstrate how the initiative could meet best practice tariffs and CQUIN targets. Using this information the team was able to bring in additional funding for the trust. *"So although the CQUIN funding is funding that we should get anyway, it's a huge amount of money…when you go to the finance director and you say, this programme is worth £1 million…then that makes them sit up and think."(I25, Project manager)*

The project team also described how one of their main achievements was the recognition and profile the work had gained within the trust and elsewhere. The project was *"chosen as one of the ten projects to present at the London Northwest Healthcare Trust Annual Excellence Awards." (18 month review report)*

Sustainability Goals

Throughout the initiative the team expressed a desire for the bundle to become an embedded process at the trust to ensure patient benefits would be sustained (Figure 38). The team believed the CQUIN measures and best practice tariffs would aid in ensuring that the bundle would continue to be delivered and monitored in the future. The team also aimed to be responsive and adaptive in order to meet the needs of the system and the staff. This included the adaptation and improvement of the bundle as necessary. The success of the bundle at the initial site and its impact on patient care were viewed as evidence to suggest it should be the standard method of care for patients throughout the trust. This led a number of team members to describe sustainability aims related to the spread of the initiative to other hospitals.

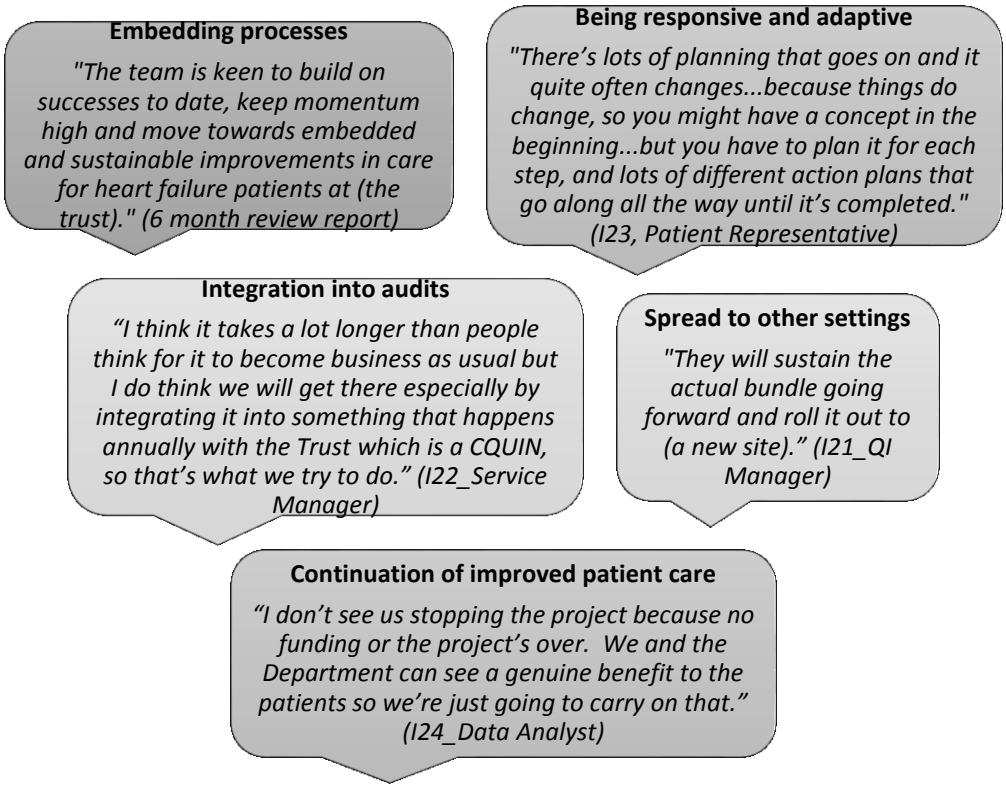


Figure 38: Heart-Failure Sustainability Goals

IV. Sustaining the Heart Failure Care Bundle

The initiative funding ended in April 2016. Follow-up interviews with the team were conducted between April-June 2017. The team described how they were sustaining eight of the nine sustainability outcomes. Table 37 summarises the sustainability outcomes for the initiative.

Table 37: Heart-failure sustainability outcomes

Sustainability Outcome	Perceived Sustainability	Level of Evidence	Rationale
Benefits or Outcomes	Yes	Strong Evidence	*Mortality, readmissions and length of stay data but link to bundle requires further exploration*
Activities	Yes	Strong Evidence	*Data avilable on bundle collection and documentation*
Relationships, partnerships and networks	Yes	Some Evidence	*Attend and present at the Heart Failure Forum and Patient Forum*
Procedures and Policies	Yes	Strong Evidence	*Ongoing use of the improved echo pathway, improved use of heart failure diagnostic codes*
Awareness and attention	Yes	Some Evidence	*Presentations at executive boards and forums. Trust open days, Education sessions with new starters*
Spread	No	No evidence	*Initiative attempted to spread to another site with limited success*
Skills and Capabilities	Yes	Some Evidence	*Training continued on wards, specific bi-weekly heart failure meetings*
Innovation and Adaptation	Yes	Strong Evidence	*Continual adaptation of the bundle to meet new standards, adaptations to improve and make fit for roll out.*
Garnering funds	Yes	Strong Evidence	*Integrated into the financial system through CQUIN programme and by becoming a best practice tariff*

Heart-Failure was able to describe and demonstrate continued data collection and progression of benefits for patients. The team were able to share data demonstrating progress and impact to mortality, readmissions and length of stay. Figure 39 displays Heart Failure Mortality Data April 2013-June 2017. Many team members felt strongly that they had demonstrated impact to patient outcomes. *"I think anything that can reduce length of stay, bring down mortality rates and means that the patients get a better outcome when they're in hospital…has to be a good thing."(I24_Data Analyst)* Although the majority of participants felt the initiative had performed strongly in this outcome, others felt the link between the bundle and these patient outcomes still required further exploration. *"In my mind it's not yet clear whether the project achieved outcome improvements for patients...we, as a collective group, have not yet answered*

the question of whether taking other factors into account that improvement occurred during the lifetime of the project."(I26_Data Analyst)

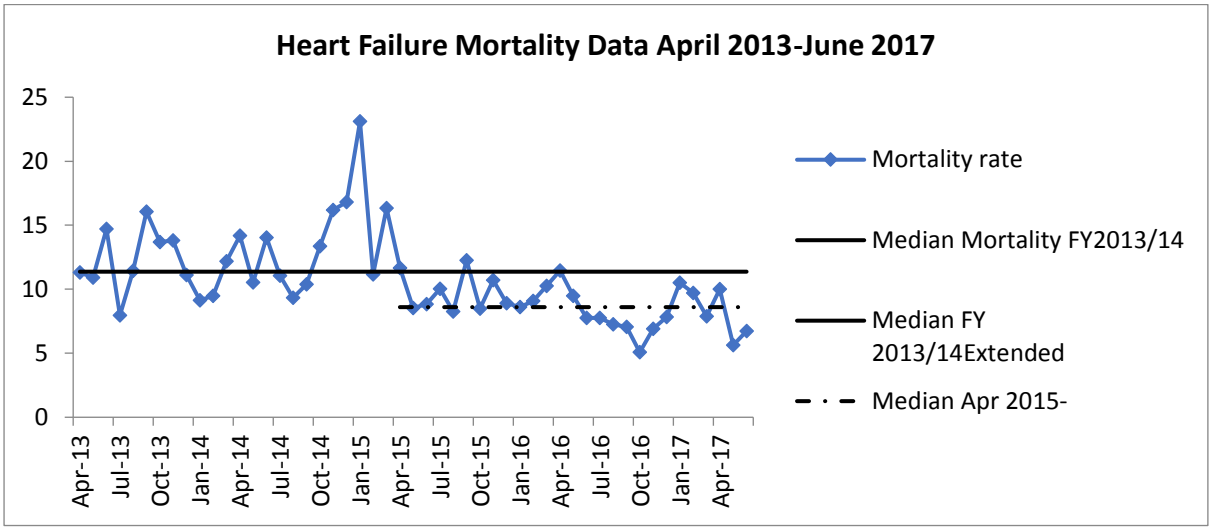


Figure 39: Heart Failure Mortality Data from Initiative Presentation_05/12/2017

The team were also able to clearly describe their processes for the continued delivery of the bundle. This included specific times for bundle collection and ongoing processes for bundle distribution and practices. *"We pick up the bundles every Wednesday. We check that the bundles drawers are filled... So, we have that process really embedded. It's always at the same time, same day, so it's always collected."(I22_Service Manager)* At the time of follow-up the team demonstrated consistent completion of the bundle with 2437 completed bundles documented (Figure 40). While this process was well established, specific team members felt that the reliance on individuals continued. *"Quite bluntly if I don't do it…it doesn't get done."(I24, Data Analyst)*

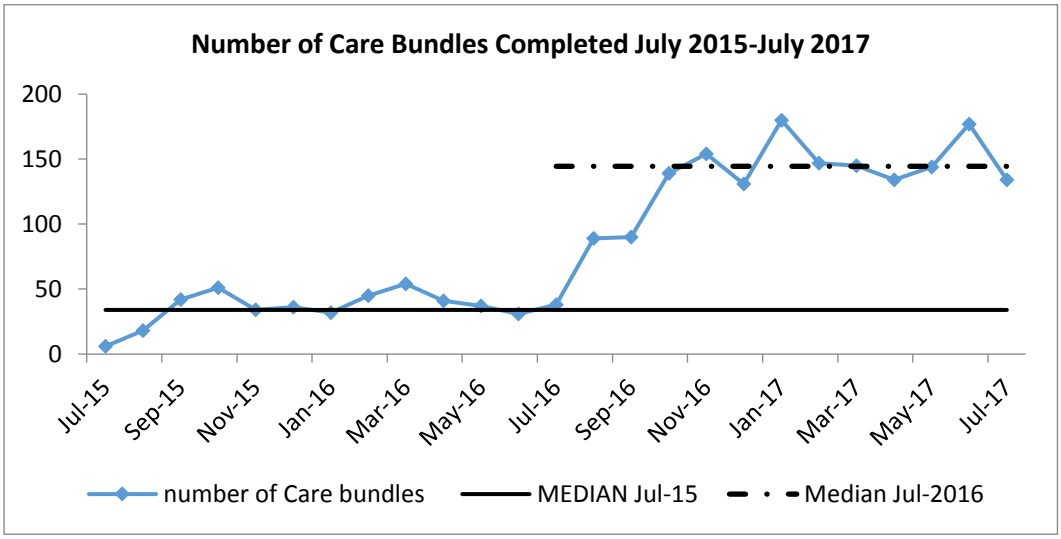


Figure 40: Graph documenting continued delivery of the care bundle (Initiative presentation_05/12/2017)

The team also provided examples of continued procedures and policies. The team described that the improved coding had continued to be used which was integral to understanding the bundle's impact on heart failure patient outcomes. *"We monitor against our coding, so we know our coding's got better because obviously we've implemented the bundle and we sat down with Coding and they know what to look for in coding now."(I22_Service Manager)*

The team described how they were working to create a responsive and adaptable bundle to ensure the bundle was fit for purpose. This included having the appropriate referral information as well as up to date guideline recommendations. The team had also updated later versions of the bundle to include tick boxes for specific requirements such as 'specialist input needed'. *"We have slightly changed the bundle…we've now got a tick box that says, has the specialist nurse spoken to and/or given leaflets on heart failure to the patients? So that is an added bonus that we've thought throughout the process of changing the versions." (I24_Data Analyst)*

The one area that the initiative reported less success was within *Program Diffusion or Spread.* The project had attempted to roll-out to another hospital within the trust during the follow-up period. Participants noted that roll-out was difficult within available resources and was seen as the next steps for the project work for which they would like to apply for further funding. *"We rolled it out across the Trust…It's a bit more difficult though, because the five elements of the bundle, one of the elements calls for a specialist nurse and (the new site) doesn't commission heart failure specialist nurses…they just need to call back to (the original site)…so, we have tried there, but it's not been as successful."(I22_Service Manager)*

V. Summary and Next Steps

The Heart Failure Initiative demonstrated the dynamic and complex process of sustaining an improved service in practice. Overall, the project activities and the procedures were sustaining at a 12 month follow-up. The team expressed that the initiative was no longer viewed as a 'project' and that the work would continue as regular practice going forward. Although the initiative showed sustainability in eight of the nine domains, they were not able to demonstrate successful spread or diffusion in the follow-up period. This was largely attributed to lack of resources and conflicting infrastructures across the hospital sites. As next steps the initiative identified that they would continue to monitor their progress and continue attempts to spread to other sites within the trust.

Case 4: MedRev

"It's possible to make change but making it effective and sustainable is much more difficult."(I14_Clinical Lead)

I. Initiative Aims

Adverse events from medicines and polypharmacy represent a considerable burden on the NHS and have a significant impact on patients.[223] This has resulted in the creation and implementation of a number of medicine optimisation and review initiatives.[223] The MedRev initiative aimed to undertake structured medication reviews with patients admitted to the hospital who were 70 or above who were on potentially inappropriate medicines which may cause adverse events. This initiative took place within five acute teaching hospitals. The project was first implemented at one hospital with four other sites joining and creating a 'breakthrough collaborative'.[373] All sites developed a shared aim and goals to improve patient outcomes. The project aimed to *"sustainably improve our delivery of consistent, high quality medicines optimisation to achieve better patient experience and outcomes in northwest London."(*Appendix N*)* This aim was delivered through a number of interlinked interventions including the use of a validated screening tool, a multidisciplinary meeting led by a pharmacist and through education of junior doctors and pharmacists on de-prescribing and medication reviews. A number of measures for the project were established (Table 38). The initiative began in September 2014 and was funded until April 2016.

Table 38: Sample MedRev Improvement Measures

MedRev Improvement Measures
1. Number of medications on admission to hospital
2. Number of medications on discharge
3. Were changes recorded as being made to medications?
4. Was the patient counselled of the changes to medications?
5. Number of Patient Review Notes (PRNs):
6. Number of medications de-prescribed:

II. Sustainability Risks, Responses and Learning

Through the prospective measurement of sustainability throughout the project, several risks and responses were seen to influence sustainability. Figure 41 displays MedRev's LTST results. The highest scoring factors were: Leadership (83.0%), and Commitment to the Improvement (81.5%). The lowest scoring factors are Resources in Place (64.9%) and

Evidence of benefits (69.5%). The team recognised and highlighted a number of challenges which impacted the delivery, measurement and continuation of the initiative such as: *measurement across diverse sites, staff turnover and loss of leadership and involving patients*. Participants also highlighted a number facilitators which were seen to aid sustainability and expected to support initiative delivery. Below I discuss these risks and facilitators and outline decision making and learning from each issue.

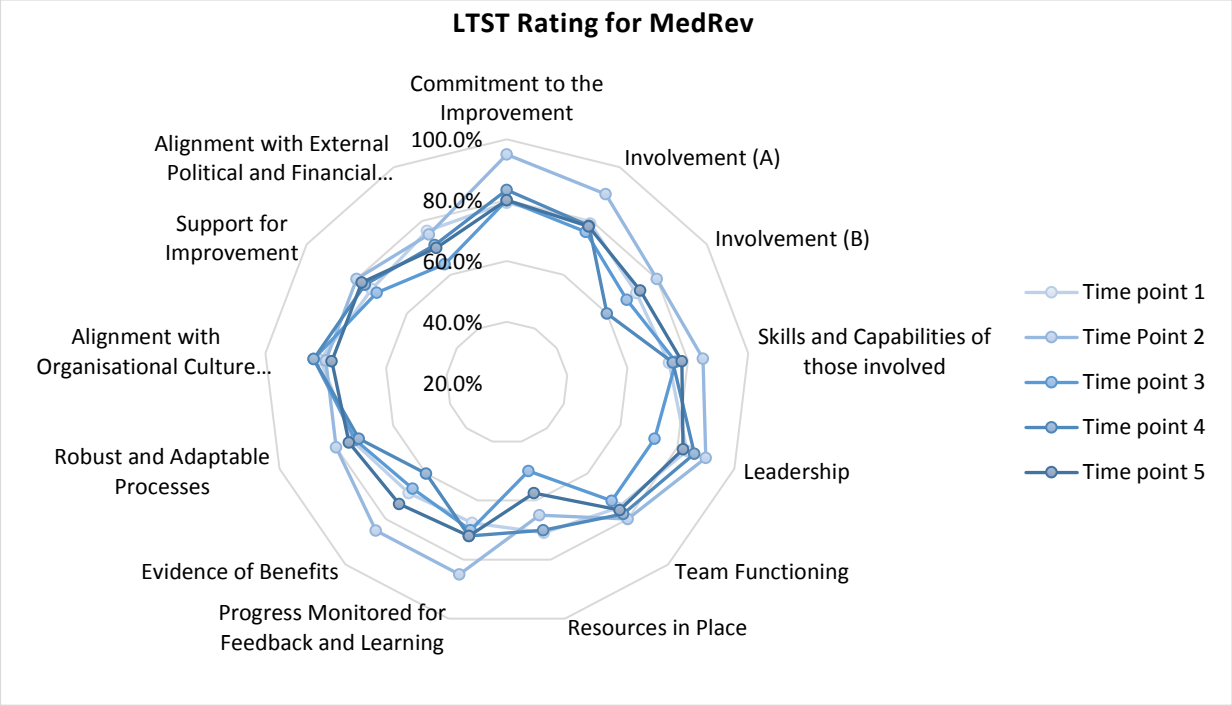


Figure 41: LTST Rating for MedRev

i. Measurement and delivery across diverse sites

Risk: MedRev encountered several difficulties in measuring success and demonstrating effectiveness of the intervention. This was specifically related to implementation of the intervention to sites where the staff, materials and infrastructure were different. Although the aims remained the same, initiative delivery varied across sites with adaptations to intervention processes, delivery methods and monitoring. *'We are all doing reviews, maybe differently'. (Observation_17/03/2016)* This posed a significant challenge in terms of being able to capture measurement and share cross-site learning to promote sustainability.

Response and Learning: To respond to this challenge the sites recognised the need to tailor data collection and delivery to suit the context and the people involved (e.g. the initial site ran

the initiative across the whole hospital and the roll out sites delivered the initiative on acute elderly care wards only). This allowed the sites to target patients viewed as most in need and deliver the initiative on a scale which was seen as realistic. *"It was felt that a new intervention would be introduced to better target patients most in need of medication review/optimisation/counselling. Both (site 2 and 3) agreed that a further narrowing down of the cohort to be targeted would be useful and potentially help them to achieve greater participation in the project by doctors/pharmacists."(12 month review report)*

ii. Staff turnover and loss of leadership

One of the lowest scoring factors within the team's LTST reports was Resources in Place (64.9%). This was largely due to issues relating to turnover of key staff members. This was seen as a significant risk to both delivery and measurement of the initiative as the project had to respond by delivering more training and establishing new relationships frequently. "*You can tell trainees to write things, you can say to your junior doctors, well I want you to do this. Two months later they've all changed, you have to do it again."(I13, Clinical Lead)* This initiative was also challenged by changes in leadership within organisations. The MedRev team conducted a great deal of engagement with senior executives to gain buy-in and support but due to leadership changes, the team found that they often needed to re-engage with new leaders and re-establish the case for their initiative. "*Many people reflected…that all the executive leaders at site 3 had left/changed...Optimistic that now people are in place...but reflected would need to start all over again in building relationships."(Observation_13/08/2015)*

Response and Learning: To mitigate issues in staff turnover, the team designed and delivered a training programme for junior pharmacists and doctors. The training provided information on how to use the relevant systems and outlined best practice for medication optimisation and de-prescribing. This was seen as important to embed the intervention into routine practice and was also seen to increase junior doctors' confidence in identifying inappropriate prescriptions during a medication review. To support future staff to deliver the initiative, the team also identified the need to integrate the initiative in current practice. *"The intention was that if they got it into the new electronic system it was going to be across the hospital and that would make it much easier in terms of embedding at least part of the change and making it more structured for people to report…so just streamlining it and making it easier for people to do."(I9_CLAHRC Theme lead)* Integration of the medicines review process into the electronic and paper systems at each site allowed the changes to become part of familiar systems and

allowed prompts to remind people to fill in the relevant documents. *"Getting (on) to (the) electronic prescribing system, getting the prompts put in and the drop down menus so people can just tick stuff and things like that and I think that... helps us."(I7_Project manager)*

iii. Involving patients

Risk: This case identified the involvement of patients as both a challenge and a facilitator. The team found difficulty in engaging with service users due to their acute illnesses and variable capacity to participate. They also found that the time to engage with patients was often not accounted for. *"The group of patients that we have, a lot of them are actually fairly elderly…So we've always been a bit limited in terms of how we can involve those patients, although there was talk about involving the patients' relatives, but with the time that we have…it's always been apparent that it's going to be a challenging thing for us to do."(I11, Pharmacist)*

Response and Learning: The team engaged with two patient representatives throughout the duration of the initiative. They identified that having patient representatives was a facilitator to sustainability and was attributed to multiple benefits. The first was the ability of patients to push the team and inspire action. *"Who's most frustrated about sustainability is the patient representative…she's worried that it's not going to be sustained…(the patient representative) could be a facilitator to help keep momentum and to really challenge people on how can this not be a priority?"(I9_CLAHRC Theme lead)* The second benefit was related to how patient representatives could act as advocates for the work going forward.

Although the team engaged consistently with these representatives, they felt that wider engagement of patients would have been beneficial. This issue continued throughout the duration of the initiative with no resolution. *"We've been so happy because we thought we'd got (two patient representatives) and then we were like oh, are they enough...The other sites were really hoping to get their own patient representatives and that didn't really happen, not for want of trying you know, it's hard".(I7, Project manager)*

III. Initiative Achievements and Sustainability Goals

Through the implementation of the interventions the project was able to achieve many of its initial aims. Four key achievements were highlighted by the team. First, the team were able to improve the review process and reduce inappropriate prescriptions. "*Assessment of (MedRev)*

demonstrates that 14% of medications on admission were stopped as inappropriate prescriptions."(CLAHRC NWL Annual report 2016-2017) Figure 42 demonstrates the increase in medication reviews included in Discharge Summaries (DSUM) for one of the sites. (Initiative Presentation_30/06/2016)

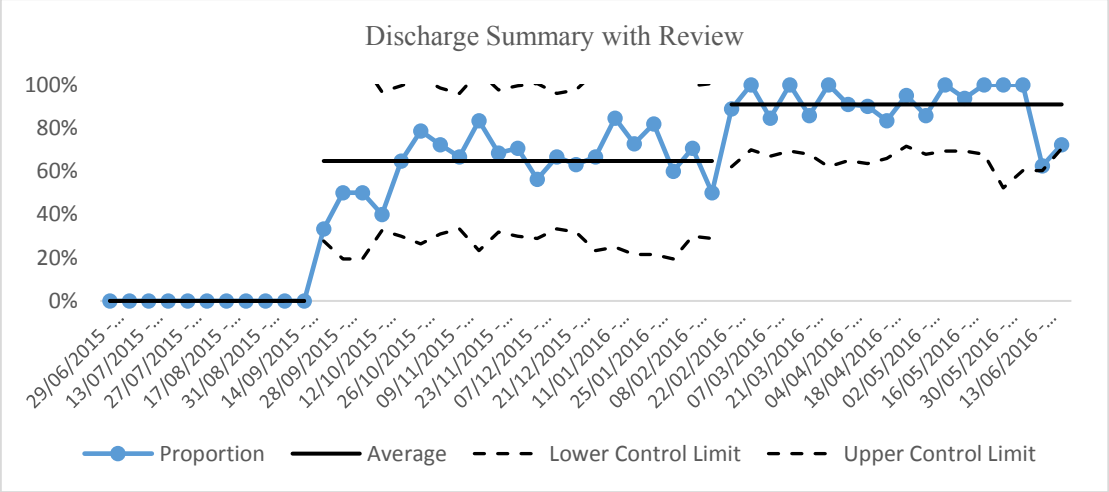


Figure 42: Percentage of Discharge summaries with a recorded medication review at site 2

The second achievement the team described was the improvement of junior doctor competency and confidence in de-prescribing through improved training. The third achievement was described as a 'culture change' across the five hospital sites which was demonstrated by more doctors carrying out reviews reliably and rigorously. The culture change was also attributed to pharmacists having more confidence to ask questions regarding inappropriate medicines and perform more rigorous reviews. *"I think that one of the key things about that culture change is that people have maybe learnt that it's OK to ask questions and to offer their knowledge, experience, advice into the mix and to not see it as a siloed, this is your responsibility, that's my responsibility." (I10_QI Manager)* This culture change was also related to another achievement, the improved working relationships between doctors and pharmacists at the sites. "*All reported a degree of confidence that good working relationships have been built, and working culture change achieved which they believe can be sustained (e.g., closer working between pharmacists and doctors, doctors asking pharmacists to accompany them on ward rounds)".(18 month review report)*

Sustainability Goals

These achievements were key to how the team conceptualised future sustainability of the initiative. A number of explicit sustainability goals were mentioned by team members throughout the initiative (Figure 43). At the final review meeting, the team expressed a desire and intention to continue to deliver the same interventions that were implemented during the funded period. Many of the team members expressed that the work should just become normal practice going forward for all pharmacist within the settings. The team also believed that the way of working between professional groups had been altered and would continue beyond the initiative. The initiative funding terminated in April 2016 but the team planned to continue to collect improvement measure for three months post funding to understand continued activities and progress.

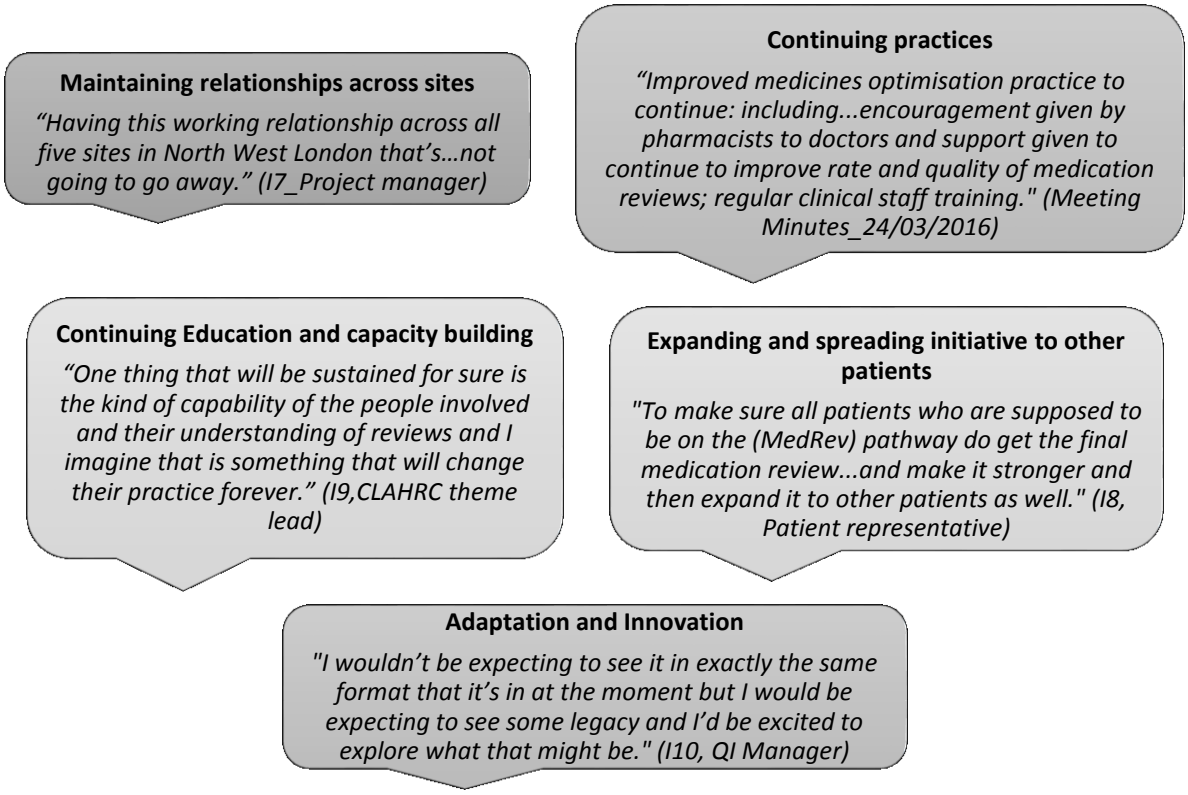


Figure 43: MedRev Sustainability Goals

IV. Sustaining MedRev

A follow-up focus group, in August 2017, brought team members from across sites to discuss initiative progress and status. During this focus group the team discussed the initiative journey since funding and described what had continued, changed or been discontinued (Table 39).

Table 39: MedRev Sustainability by outcomes

Sustainability Outcome	Perceived Sustainability	Level of Evidence	Rationale
Benefits or Outcomes	No	No Evidence	*Anecdotal accounts of improved process for patients but no empirical findings*
Activities	Yes	Some evidence	*Distribution of the medication review tools, medicines review continuing on wards*
Relationships, partnerships and networks	Yes	Strong Evidence	*Improved working relationships between pharmacy team and consultants, networking between 3 sites*
Procedures and Policies	Yes	Strong Evidence	*Discharge summary embedded, induction and training, inclusion of list of interventions in pharmacy manual*
Awareness and Attention	Yes	Strong Evidence	*Collaboration with other QI intiatives, Induction and training for undergraduate pharmacists*
Spread	No	No Evidence	*Tailored intervention to most appropriate areas, no resource to spread*
Skills and capabilities	Yes	Strong Evidence	*Ongoing education of undergraduate pharmacists and induction of new staff*
Innovation and adaptation	Yes	Some Evidence	*Developed frailty multidisciplinary team meeting and the change in focus to patient experience of the review*
Garnering funds	Conflicting views	Some evidence	*Roll-out application unsuccessful, Fellowship awarded to team pharmacist*

The team reported success in *sustaining initiative activities, procedures, and partnerships*. At follow-up the team were confident that activities for the initiative had continued, with reviews being carried out in multidisciplinary teams and the mediation review tool continuing to be used. *"We've got a really good set up…so we've now got in on that ward round and we're part of the furniture there on that ward round."(Focus group_ 03/08/2017)* The team could only demonstrate that data on activities at all sites continued to be collected in the three month period

after funding ended. Data collection on improvement measures did not extend beyond this point (Figure 44).

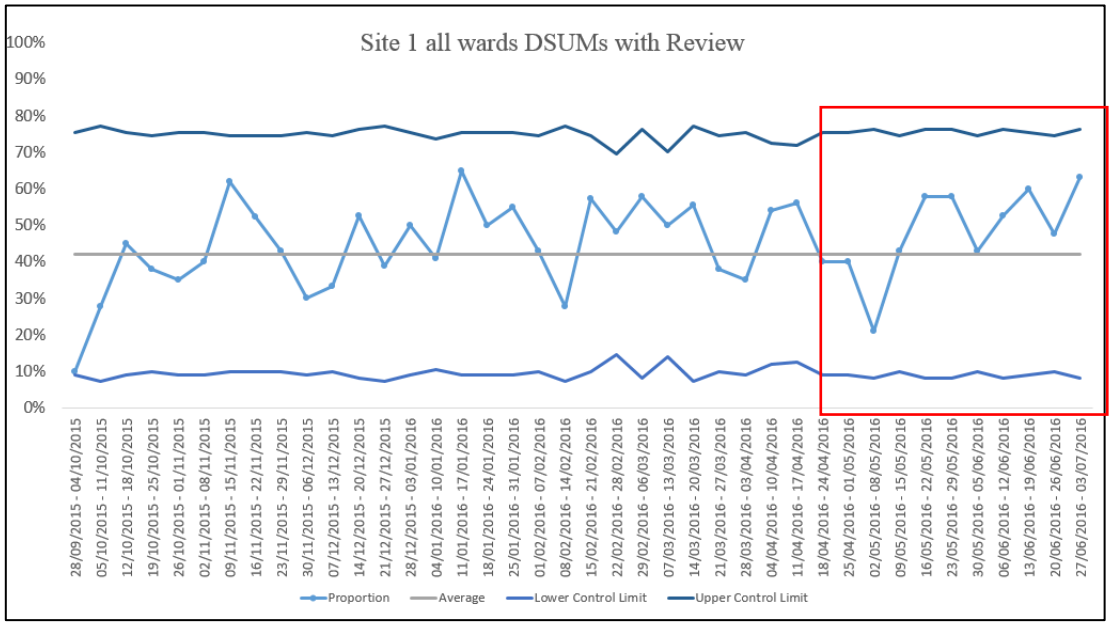


Figure 44: Data collection post funding-percentage of discharge summaries with a medication review (Initiative presentation_20/09/2016)

One of the desired sustainability goals anticipated by the MedRev team was the continuation of the improved relationships between doctors and pharmacists within sites. The participants in the focus group confirmed these relationships had maintained with cross-site meetings and continued work in medicines review improvement. These partnerships were described as key to maintaining the culture change felt by team members in terms of how medication reviews were conducted and how the interdisciplinary teams interacted. *"We've built really strong relationships with elderly consultants…If we're not on the ward round they come and find us…and even if the doctors rotate they'll tell them, the first thing you need to do is find your pharmacist and speak to them and they know when we're on the ward."(Focus Group_03/08/2017)*

As well as sustaining the initiative as planned, the team also described how the intervention was being improved and adapted. This included the need to incorporate new ways of working as a multidisciplinary team onwards and providing more focus on patient experience. While these were seen as changes to the process of delivering the project, this was not viewed as a departure from the original aims on the initiative. The team described how an improved system was now in place to involve patients in the medication review process. *"So it's more patient*

focused, it helps having the pharmacist there to keep it really patient focused so it's not a medical decision that's made when you're comprehensively reviewing patients' medicines." (Focus group_ 20170803) The team also described how multidisciplinary working had evolved to include weekly frailty team meetings which hadn't been accomplished during the initiative funding period. *"I'm now doing like a frailty multidisciplinary team meeting on a weekly basis and reviewing medicines there which we were trying to get into place while doing the project at work. So, I guess, it's rolled on."(Focus group_ 20170803)*

As well as areas which displayed clear continuation or progress, there were also a number of areas which had not moved forward. These included *demonstrating evidence of benefits* from the initiative, *gaining new funding* and *spreading the initiative*. At follow-up, the team offered some insight into the benefits which had continued. The de-prescribing of harmful medications was discussed as a benefit of the initiative to patients. While the team could describe that many adverse medication events were avoided, no formal evaluation of this was conducted. It was also noted by team members that the impact to patient outcomes would require a number of years as the intervention would impact quality of life and mortality, which were hard to capture in the short timeframe of the initiative. *"This very deep review of medication has all kinds of implications…but obviously this is not something you can measure in six months' time or one years' time. I mean it's at least a five year period."(I8_Patient representative)* During the follow-up period, the team had applied for further funding to expand their services into community settings. Unfortunately the application for further funding was not successful. *"My colleague has applied for funding, but that's rejected, because we hope that the natural continuation is actually get the community to get engaged with the project itself, but there's no funding for it."(I7_Project manager)* However, a pharmacist from the team also applied for, and was awarded, a fellowship to begin the preliminary work needed to understand the services commissioned in the community to perform medication reviews.

The spread of the initiative was identified as one of the sustainability aims, but in *the follow-up period,* this was not deemed possible or desirable. One site described how, in order to remain effective and sustainable given resource limitations, they had scaled back their work to specific wards deemed to be most in need. *"It kind of contracts rather than expands out, focussing on certain wards…but that's no big surprise. You haven't got continual resources to keep on branching out." (Focus group_03/08/2017)* The other sites also described that they had not expanded but remained on specific wards.

V. Summary and Next steps

The MedRev Initiative was able to establish improved medication reviews and documentation across all sites, and change training and inductions to support the delivery of high-quality medication reviews. The team felt that the initiative activities had continued and that the partnership between multidisciplinary staff members had been maintained. The team indicated that they would continue with the initiative interventions and planned to continue to work on patient participation in the reviews and tailor the intervention to patient preferences. Finally, the team planned to disseminate their learning through publications on the initiative journey as well as impact and outcomes.

6.4 Discussion

In this chapter, four improvement initiatives cases were used as exemplars to describe the process of sustaining in practice. I described their improvement aims, sustainability risks, achievements and outcomes. Although the cases provide only a brief look at each initiative, the results offer interesting insight into how sustainability is conceptualised and influenced within initiatives. Below the results are summarised specifically reflecting on the sustainability goals and outcomes across the cases. I then discuss key learning related to the process of sustaining and outline implications for practice and measurement.

Sustainability Goals and Outcomes

Although a large proportion of studies continue to define and measure sustainability solely as the continuation of activities, this was not seen within my cases.[304,335,338,340] Each case described a number of sustainability goals, while continued activities were mentioned, cases also expressed a desire to maintain diverse goals such as partnerships, cultural change and audit measurement. Two additional sustainability goals were noted in all cases: *spread of the initiative* and *continuing improvement and adaptability (*Table 40*).* These findings reflect the pressure improvement initiatives are under to roll-out in order to increase their potential impact. It also demonstrates that teams recognise the ongoing evolution of healthcare settings and the need to continuously examine and respond to emerging issues.[96,133,136]

Table 40: Summary of Sustainability Goals across Cases

	Sustainability Conceptualisation across Cases	MedRev	Wellbeing	Allergy	Heart-Failure
i.	***Continued Health Benefits***				X
ii.	***Integration of activities and practices, procedures, and policies***	X	X	X	X
iii.	***Sustained Capacity Building and Skills used***	X		X	
iv.	***Cost recovery or income generation***	X		X	X
v.	***Continued Partnerships***	X		X	
vi.	***Continuing Improvement and Adaptability***	X	X	X	X
vii.	***Spread to new settings***	X	X	X	X
iii.	***Continued Measurement***		X		X
ix.	***Becoming normal everyday practice***	X	X		X
x.	***Maintain a Cultural Change***	X			
xi.	***Ability to continually Achieve Targets***			X	X

The use of the sustainability outcome framework provided a nuanced look at the sustainability of each of the initiatives. Each case had diverse sustainability outcomes and all cases reported areas of strengths and weaknesses (Table 41).

Table 41: Sustainability Outcomes across cases

Sustainability Outcomes	Wellbeing	Allergy	Heart Failure	Medrev
Outcomes and benefits	No	Conflicting views	Yes	No
Activities	Yes	Conflicting views	Yes	Yes
Relationships, partnerships and networks	Yes	Yes	Yes	Yes
Procedures and policies	Yes	Yes	Yes	Yes
Attention and awareness	Yes	Yes	Yes	Yes
Spread	Conflicting views	Conflicting views	No	No
Skills and capabilities	Conflicting views	Yes	Yes	Yes
Innovation and adaptation	Conflicting views	Yes	Yes	Yes
Garnering funding	Yes	Yes	Yes	Conflicting views

Two areas emerged as shared challenges for cases, the *continuation of benefits and outcomes* and *spread of the initiative*. Although continuation of benefits is often argued to be the ultimate rationale for sustainability of initiatives, Heart-failure was the only case to identify the continuation of impact to patient health outcomes.[40] This was similar to findings in the literature which report many initiatives find it difficult to produce evidence of benefits and seek to sustain prior to demonstrating impact.[50,130,305] For example, Martin et al, studied the sustainability of four clinical genetics services and found that clear evidence of effectiveness was still lacking four years after implementation.[20] Though the teams lacked 'gold-standard evidence' of effectiveness, the teams had specific examples of the value of their work.[20] This finding was also reflected in my cases, where the teams used measures such as improved practices and feedback on progress to produce evidence of potential benefits. Spreading initiatives was also a recognised challenge for the cases which has been recognised in other studies.[59,129,374] Wellbeing was the only case to report full spread for the initiative to five other wards within their trust. Results demonstrated that spread was hindered by the team's ability to garner further resources and utilise current staffing resource, both of which have been reported as barriers to spread in past studies.[362,375]

Describing the process of sustaining

The case studies show that throughout their initiatives, teams reflected that there were challenges and risks impacting their ability to embed initiatives and maintain gains. Teams responded with various plans, actions and facilitators to mitigate these issues over time. This finding supports previous work which asserted that individuals and teams in complex systems will reorganise and adapt in response to challenges.[67–69,139] The process of sustaining was not linear in any case. Each team engaged in consistent 'firefighting' in their attempts to embed initiatives. This required them to regularly revisit and respond to ongoing and persistent issues with numerous solutions. Teams engaged in active problem solving, making changes and adjustments to systems, interventions and plans. This finding also supports previous work that found individuals in complex system can become creative decision makers proposing solutions to shape the progress of an initiative.[66,147] At times, the decisions made and actions taken within the cases were considered helpful but at other times the issues could not be 'fixed'. Persistent issues required teams to accept their inability to change specific circumstances and reconsider how to move forward despite ongoing challenges. For example, both Allergy and Heart failure experienced challenges in working with and engaging patients. Neither team felt that their actions had adequately addressed this issue and it remained a recognised issue for both teams.

The 'cycle of sustaining'

Implementation models are often represented as a linear process, where sustainability follows implementation (e.g. Figure 45*)*, however, this work supported previous assertions that sustainability is a concurrent process with implementation.[23,52]

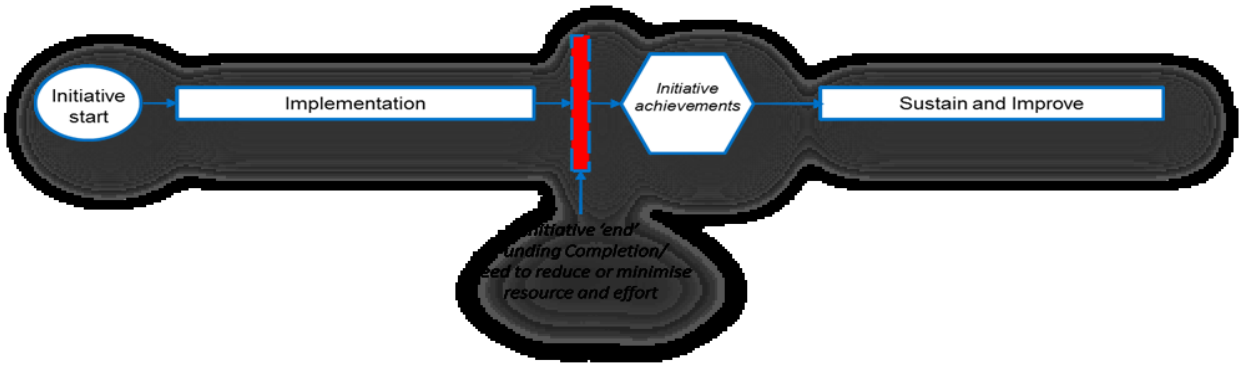


Figure 45: A linear view of implementation and sustainability

While initiatives will move forward through a linear timeline, developing and

implementing the initiative as expected, teams engage in continuous risk identification, decision making, actions and reflection to impact sustainability at all stages of the initiative. The process of sustaining can therefore be represented as an ongoing cycle involving (

Figure 46*)*:

1) *Recognitions of risks to su opportunities to enhance s*

2) *Considering potential resp mitigate risk or improve sustainability;*

3) *Decision making to take a not to (including recogniti action is not possible);*

4) *Reflecting on the success o of (in)actions;*

5) *Reassessing to move forwa risk*



Figure 46: The process of sustaining

This process is not a one off occurrence but instead is continuously at work throughout an initiative's implementation and beyond. Figure 47 overlays the process of sustaining on the traditional linear view of sustainability to highlight how this process takes place throughout all stages an initiative.

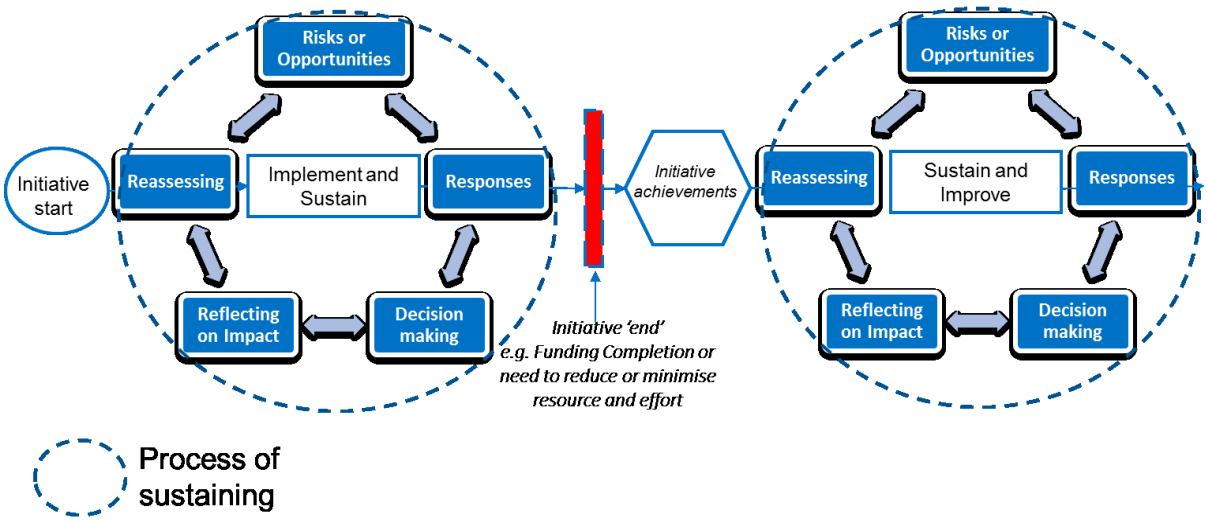


Figure 47: The process view of sustainability represented throughout an initiative's implementation and beyond

While this work supports previous perspectives, it also builds new learning by describing the process of sustaining, specifically, how teams attempt to address sustainability risks during implementation and the learning and consequences of these actions. This work provides much needed insight into the links between sustainability actions, processes and outcomes which are missing from the majority of published studies.[120] This work also responds to the call for health services research to identify and explain not only the causes of improvement, but also the influences and processes supporting these outcomes.[124,125]

Supporting the Process of Sustaining with the LTST

These findings further develop insight into how the LTST may be used to support the process of sustaining for improvement teams. As reported in chapter 5, the LTST allowed teams to consider collaboration and interconnectivity, engage in sensemaking to understand risks and priorities, share ideas to plan actions, and reflect on path-dependency. These benefits highlight the LTST's potential to support specific aspects of the process of sustaining which have been described here. The tool can also potentially enhance this process in two ways. The first is related to its capacity to foster collaboration and engage multiple stakeholders in sustainability discussions. The LTST provides provided a mechanism to collect team opinions and diverse stakeholder views which has been noted as resulting in more responsive and effective decision making.[8,18,151,276] The second way the LTST may enhance the process of sustaining is through its ability to create a platform for open discussion on sustainability issues to begin. While the process of sustaining may be implicit for many of the teams, the LTST provides teams with the ability to bring sustainability issues and discussion to the forefront to enable explicit

sustainability issues and planning to be acknowledged and conducted.

Implications for practice

The findings presented in this chapter have two implications for researchers and practitioners seeking to assess or report sustainability of improvement initiatives.

1. **Continuing effort:** Analysis of the cases has revealed that formal initiative 'ends' do not exist. The end of funding did not mean the end of the work or effort for any of the cases. Unfortunately, the concept of sustainability remains associated with an end-point or achievement. Stakeholders and staff often want to believe that at some point they will be able to leave the improvement and it will continue 'on its own'. This was not observed to be true, as the need for continued effort, implementation and measurement continued for all sites. This often slows progress as teams 'lift their foot off the pedal' and reduce effort and attention to the initiatives.[115] In order to achieve sustainability, the effort required needs to be understood and not underestimated if feasible workload and roles are to be established. This finding has been seen in a number of other studies which also identified that sustainability is process requiring ongoing effort.[119,315,341]
2. **Visibility of sustaining:** Using the multiple sustainability outcomes presented in this thesis may provide better insight into the unseen work that goes into sustaining an initiative. For example, the continuation of partnerships and networks and the ongoing training needed to sustain an initiative may be crucial to the continuation of an initiative.[341] If this work is not visible or explicitly described as a sustainability outcome, this effort will most likely be overlooked when measurement for sustainability takes place.[28] Making these outcomes explicit may allow for the multifaceted contributions of improvement initiatives to be recognised and accounted for.

Strengths and Limitations: Studying sustainability as a prospective process throughout implementation was critical to gaining insight into what initiatives achieved, what teams wished to sustain, as well as what was actually sustained in practice.[45,155] While this study has important findings for the field, there are also key limitations of the work which must be considered.

The first limitation is related to the case study approach taken. A key limitation of case study research is the extent to which generalisations can be drawn from a small number of cases.[217] The four cases studies enabled me to examine the initiative improvement teams and understand how sustainability was conceptualised and discussed in practice. As the sample was relatively small we cannot establish the probability that data is representative of other improvement initiatives.[376] However, given the time allotted for this thesis, and other pragmatic considerations, it was beyond the scope of this work to study more cases as each case required in-depth knowledge of the initiative, its settings, team members and practices. Equally, this study could have explored fewer cases in greater depth, which may have allowed for further information and nuances of the cases to be uncovered. This trade-off was a deliberate choice as this study aimed to demonstrate replicability across the cases to understand any potential generalisability and shared learning across cases.[215] Future work may wish to employ a more in-depth study of prospective sustainability within single initiatives to explore the sustainability outcome framework in particular settings.

The second limitation of this work is related to the timeframe of study. Although prospective investigation has been recommended, this approach also creates some difficulty for researchers in choosing an appropriate timeframe for follow-up.[10,13] This study was able to gather multiple snapshots of the process of sustaining and what was being 'sustained' but it was clear this process would continue beyond this study. Future assessment would likely reveal further changes to the initiative and demonstrate new challenges encountered.[10,45,183] Unfortunately, timeframes for sustainability studies will continue to be restricted within given budgets and other pragmatic considerations. Therefore, the potential time specific nature of any findings must be considered.[13,28]

Future work: Two key areas for future work have been identified: the need to assess multiple sustainability outcomes in future work as well as connect the results of the LTST with team actions.

- ***Assessing multiple sustainability outcomes:*** While the use of a multidimensional framework of sustainability outcomes had its benefits, it also demonstrated the difficulty of studying sustainability outcomes in practice. The strongest evidence for sustainably was demonstrated in the 'Continuation of activities' and 'Maintaining Procedures and Policies' domains. This was due to the ability of teams to describe concrete examples of how activities were sustained and systems which had been altered

throughout the initiative. The activities were also more likely to be captured through formal measurement over time. Other outcomes such as continued partnerships, skills and capabilities, and innovation and adaptation were harder to capture. Team minutes, reports and interviews provided some evidence for these outcomes but detail available varied across participants and teams. In order for these outcomes to be adequately assessed and reported, further understanding of operational definitions for each and potential sources for data capture are needed.

- ***Connecting the LTST with actions:*** This chapter reported the LTST findings for individual teams but I cannot say the extent to which these results led to team action, or if challenges would have been identified in the absence of the tool. Other studies have also identified this challenge in the study of sustainability approaches. For example, while Doyle et al. found their data indicated that teams who were more engaged with the NHS sustainability model took more action to promote sustainability, they could not say that the model itself had prompted these actions.[148] While I cannot provide a direct link to the tool, I can say that the tool enabled the risks of the initiative to be made explicit to myself and the teams. This information served as baseline for further inquiry. Future work may wish to explore if the tool is able to prompt better or more thorough reflection of issues to enhance sustainability.

Contribution to overall thesis: These findings provide insight into how sustainability is both conceptualised and supported throughout individual improvement initiatives. This work contributes new learning by describing the process of sustaining, specifically, how teams attempt to address sustainability risks during implementation and the learning and consequences of these actions. This work also describes the links between sustainability actions, processes and outcomes which are missing from the majority of published studies.[120] As this thesis aims to understand analytical generalisations, the following chapter will investigate the common experiences and shared strategies and actions used to support sustainability across the cases.[215]

6.5 Conclusion

This chapter described four improvement case studies and specifically outlined how the process of sustainability manifested in each case. Findings indicate that the cases conceptualised sustainability in similar ways, each acknowledging its dynamic and ongoing nature. Cases

demonstrated sustainability across a number of outcomes but many found difficulty in demonstrating continued benefits for patients. Through the description of risks, responses and learning in each case, this work provides better insight how improvement teams support sustainability of their initiatives. The process of sustaining is an ongoing cycle involving: *recognising sustainability risks or opportunities, considering potential responses, decision making to act or not, reflecting on impact, and reassessing to move forward or revisit the risk.* This study has important implications for the future study and measurement of sustainability for both practitioners and researchers. Future work is needed to build on these findings and establish rigorous measurement for the sustainability outcome framework.

Chapter 7: Identifying Strategies and Actions to Sustain_Cross Case Analysis

7.0 Chapter overview: This chapter presents the cross-case analysis of the four improvement case studies. It outlines the common challenges influencing sustainability across the cases and describes the strategies used to address these challenges and sustain improvements in practice. While multiple challenges across cases were seen, analysis identified five common challenges which represented ongoing issues in the case studies: *workforce stability, initiative impact, organisational priorities, workload distribution and patient and public support.* These challenges required teams to recognise, respond and adapt continuously and resulted in the execution of a number of shared strategies and actions. Twelve strategies for navigating sustainability in complex systems were identified. These strategies address four themes: *1)Recognising and utilising interdependencies, 2)Encouraging new interdependencies, 3)Promoting sensemaking, and 4)Allowing for and promoting emergence*. The impact of the strategies is discussed and the implications for future initiatives are presented.

Aims and Research Question: This chapter explores how key constructs impact sustainability across the case studies and presents consolidated findings of the strategies and actions used to address and influence sustainability in the case studies. The chapter will address the following research questions:

1. *Are common challenges to sustainability identified across the cases? If so, what are they?*
2. *What strategies and actions are used by improvement teams to sustain improvements and promote initiative continuation?*

7.1 Background

Both individual studies and systematic reviews have explored healthcare improvement and innovation sustainability.[10,12,14,45,69] While there is evidence that sustainability of improvements can be achieved, the rationale behind these findings and lessons for new programmes remains limited.[118–120] This has resulted in little understanding of how improvement teams plan and take action (or not) to sustain throughout their initiatives.[49] Understanding sustainability issues and

challenges, and how they are addressed across different settings and contexts remains an area requiring greater in-depth study.[10] Unpacking what the process of sustaining involves (the challenges and facilitators encountered) and how it can be supported (through actions and strategies) would provide much needed insight into how this process can potentially be influenced in the future.[28]

Common Sustainability Challenges

As outlined in the background and introduction to this thesis, we know very little about the process of sustaining, or what generalised learning can be found from investigating sustainability across multiple case studies.[155] Understanding whether there are common challenges associated with sustainability across different populations, settings, and interventions will provide valuable information to practitioners, funders, and researchers on the potential risks to expect while sustaining improvement initiatives.[155] Chapter 3 identified 40 constructs influencing sustainability (see Table 21: Consolidated Framework for Sustainability Constructs in Healthcare). There has been debate about the extent to which complex phenomena can be described and understood by lists of constructs or factors.[126,132,377] Some have argued that there is a need to understand both the dynamic nature within constructs as well as the interaction between them.[126,132,377] Some have also stated that *"the empirical literature suggests the existence of important categories of factors that influence sustainability across settings and are dynamically related".*[45] Therefore, clarifying the ways in which constructs interact to enhance or challenge sustainability will facilitate an understanding of sustainability from a complex systems perspective.[10,78]

In this chapter, I build on the learning from the individual case reports in Chapter 6 and investigate the challenges encountered across the cases in their attempts to sustain improvement. The role of sustainability constructs is explored to understand if common risks can be anticipated across diverse initiatives.

Self-organisation and Emergence of Strategies

There is a need to expand our understanding of what makes an initiative sustain and how to support this process in practice.[12] One of the least understood aspects of initiative management is how individuals and teams respond and reorganise following changes and challenges.[67] Complexity theory recognises that solutions to problems often cannot be imposed as internal

sensemaking and interdependencies are required to establish relevant actions and strategies.[20,21] Therefore, solutions to issues must evolve from the interactions within a complex system.[20,22] Self-organisation facilitates lasting change as people make decisions and act to meet the specific needs of their unique settings.[36,77,129,133] This process is often referred to as emergence.[133] Chapter 6 provided some insight into how teams were able to self-organise and evolve over time in response to internal and external risks and necessities.[66,136] Combining this information across cases to uncover 'patterns of self-organisation' would represent a significant contribution to the sustainability literature and enable potential shared actions and strategies to be identified.[133] This may aid others in both planning and designing future initiatives.[155] This chapter will compare and contrast the four cases presented in Chapter 6 to examine how self-organisation within the cases promoted emergence of strategies or actions to enhance and support sustainability.

7.2 Methods

A multiple case study approach was used to expand and generalise theories (analytic generalisations).[215] Full case reports were drafted and acted as the primary source of data for this chapter (see section 2.7.3 Case Study Analysis). Qualitative analysis of the collection of word tables and Nvivo matrices highlighted areas of interest and enabled cross-case conclusions to be drawn.[215] Study propositions guided data analysis and interpretation of findings (Table 42). A full description of methods can be found in Chapter 2 page 60.

Table 42: Study Propositions

Study Propositions:	
i.	*Sustainability is an ongoing dynamic process which changes over time, requiring responsiveness and action from teams to sustain improvements over time*
ii.	*Common challenges to sustaining improvements will be identified across different initiatives and settings*
iii.	*Common strategies are used across teams to influence and improve chances of sustaining*
Rival Propositions:	
i.	*Sustainability is a linear process following successful implementation*
ii.	*Team encounter unique challenges specific to their settings as organisations*
iii.	*Team actions and strategies to influence sustainability will be context and site specific*

7.3 Results

Results are presented in two sections. The first describes common challenges and associated constructs which influenced sustainability throughout the cases. The second identifies and explores shared strategies and actions taken by teams to support sustainability.

7.3.1 Common Challenges Impacting Sustainability

The case studies demonstrated that sustainability was a dynamic process which changed over time. During the initiatives, the teams recognised and highlighted several issues which impacted on the delivery, measurement and continuation of initiatives. Reviewing sustainability constructs (Table 21) across the cases allowed for the complex relationships within and between the constructs to be made visible. The influence of particular constructs was not straight forward as the vast majority (37/40) were considered to be both facilitators and challenges. Table 43 shows the coding matrix for coding references (number of items coded) as challenges or facilitators. Three constructs were seen as purely a facilitator (satisfaction) or a challenge (opposition and infrastructure).

Table 43: Coding matrix for Sustainability Constructs as challenges and facilitators

Sustainability Construct	Challenge	Facilitator	Sustainability Construct	Challenge	Facilitator
Awareness and Raising the profile	9	56	Evidence base for the initiative	10	13
Socioeconomic and political considerations	24	2	Expertise	3	5
Spread to other organisations	77	28	Improvement Methods	20	17
Urgency	3	1	Monitoring progress over time	88	55
Integration with existing programs and policies	35	28	Project duration	27	2
Intervention Adaptation and receptivity	71	36	Project type	0	0
Opposition	4	0	The Problem	0	0
Organisational Readiness and Capacity	19	4	Training and Capacity Building	43	47
Organisational Values and Culture	42	13	Accountability of roles and responsibilities	57	12
Support for Improvement	33	22	Belief in and commitment to the initiative	38	39
Leadership and Champions	41	35	Complexity and simplicity	6	3
Ownership	12	4	Defining Aims and Shared Vision	14	13
Power	8	11	Incentives	3	6
Relationships and collaboration and networks	54	64	Job requirements	7	5
Satisfaction	0	4	Workload	26	4
Stakeholder participation	142	70	Resources	300	74
Community participation	3	5	Funding	65	35
Patient involvement	69	34	Infrastructure	10	0
Staff involvement	55	28	Resource_Staff	163	34
Demonstrating effectiveness	57	36	Resource_Time	68	7

Each case experienced multifaceted issues throughout their initiatives, with the timing, frequency, and importance of issues varying for each case. While multiple challenges across cases were seen, analysis identified five common challenges which represented ongoing issues encountered throughout all cases: *workforce stability, initiative impact, organisational priorities, workload distribution and patient and public support.* Each of these issues are made up of multiple interacting constructs which were highlighted by team members. Below I explore why these issues were perceived to be challenges to sustainability, and how multiple constructs played a role in their manifestation.

I. Workforce stability

Associated constructs: *Resources, demonstrating effectiveness, support for improvement, workload, and leadership*

> *"We realised that actually you would have to protect the process against staff changes and against doctors rotating." (I2, Clinical lead)*

Each case study team acted to ensure their work was communicated and promoted to multiple groups of stakeholders, however, all teams faced the issue of workforce stability. This challenge manifested differently in each case with issues including: turnover, unavailable staff groups and loss of leaders. These presented significant challenges which resulted in the need to continuously re-engage and re-assess partnerships and working relationships.

- **Turnover:** All case studies experienced turnover of staff, particularly nurses and junior doctors. This created issues in handover and continuity as staff moved on and new staff were brought in. "*You have turnover of junior doctors every six weeks…so, again, just when you've got them comfortable and happy to use it then they change into another. So it's always going to be a challenge."(I21_QI manager)* This turnover impacted the ability of initiative rationale, learning and measures to be communicated adequately and consistently. These were core concerns that had to be continually re-addressed throughout the initiatives to promote continued delivery and sustainability. This required teams to consider the need for extra training and to continually establish relationships with new recruits. *"You need to think about new training awareness…that's a constant challenge actually because your staff group is always changing."(I2_Clinical lead)* Turnover in organisational leadership also occurred. Each team conducted a great deal of engagement with senior executives to gain buy-in and support throughout their initiatives. Unfortunately, due to senior executive changes, the teams often found that they needed to adapt to new leadership and re-establishing the case for their initiative. *"It's been kind of relentless, making sure we're engaging all the managers, making sure there's someone to attend these meetings."(Wellbeing_ Review Meeting transcripts)*

- **Vacancies:** The second issue faced was the need for specific or specialised staff groups. For example, in the Allergy initiative, the need for administrative staff was an ongoing issue. In Heart failure, specialist nurses were required to roll-out the bundle. *"Our biggest challenge at (the roll-out hospital) was the fact that the service was taken out of the trust, so there were, there are no specialist nurses within the trust."(I25, Project manager)* In both cases, the teams had to 'make do' with the available staffing and work within their available resources. "We definitely will need admin support…I can do that now…because I'm only covering two specific areas...I don't think they realised how much admin support would be needed."(I19_Nurse)

- **Loss of initiative memory:** Throughout the study period, all cases experienced the loss of team members who were viewed as highly influential. This was felt to impact sustainability as the initiative memory was compromised when team members with significant experience were no longer present to provide their expertise and insight. For example, in Wellbeing, the clinical leads and project manager were well liked and respected, therefore when they changed jobs the loss impacted the team's motivation and momentum. "*I can point to at least five people if not more within the original project team, that have got promoted during that time….you've taken away a lot of that 'know how' that was generated."(I6_QI manager)*

II. Initiative Impact

Associated Constructs: *Demonstrating effectiveness, Monitoring systems, Commitment to the improvement, Evidence base for the initiative*

We've had some good things happening with the project…but I think it's the frustration that things haven't come on as well or as fast maybe, as we would have thought."(I3_Service User)

Producing evidence of benefits and monitoring progress was a shared challenge across all case studies. Ongoing measurement was recognised as important to sustainability, but the teams found it difficult to demonstrate the effectiveness of their initiative with the available data or within the given timeframes. This was seen as a key risk to sustainability as the teams had little evidence to show the work was producing improved outcomes. Many cases found that they were receiving positive feedback from either staff or patients but they struggled to produce

measurable impact relating to patient outcomes. *'All the feedback both within the organisation and externally was really positive… that level of positive feedback gave the project a sense that it could continue and it could extend."(I6_QI manager).* This challenge was influenced by a number of issues for teams including: *measurement set up, establishing links to patient impact and initiative duration*.

- **Measurement set up:** Setting up appropriate measures to assess initiative progress was a challenge for teams as they encountered multifaceted issues such as difficulty in coding, incomplete data collection, and diverse documentation systems. *"The processes that they're trying to measure are real healthcare processes, they're messy, they're difficult to collect data from and so there were…problems…getting good data collection processes set up."(I26_Data analyst)* The Heart–Failure team described difficulty in data completeness as some bundle sections were left blank by staff. *"When they get the back sheet back, it may not be complete and if they're still only using that for audit then it's not going to be realistic."(I21, QI manager)* MedRev, encountered difficulties in measuring success as the materials and infrastructure for documentation were different across the sites and they had to tailor their measures to the available systems. "*Re-designed documentation and e-documentation process for medication reviews on all sites. The re-design was important as it prioritised "medication review"…This made it possible to use reliable evidence with confidence".(MedRev_18 month review report)*

- **Establishing link to patient impact:** Both Wellbeing and Allergy found it difficult to demonstrate clear benefits to their target population. Allergy aimed to increase education and training, and create improved care pathways for allergy patients but the connection to improved patient outcomes such as reduction in re-admissions was difficult to demonstrate in practice. Without evidence of effectiveness, the initiative struggled to gain support and further buy-in from the sector. *"Outcome measures (A&E attendances) look positive, but reliability and (project) attribution unclear. Process measures (management plan, skin prick testing etc.) look promising, but need to be looked at in more detail."(Allergy_LTST_February 2016)* In Wellbeing, the documentation of physical health metrics alone would not improve patient outcomes. Therefore making a distinct link between project action and improvement in patient outcomes was difficult.

- **Initiative duration:** Initiative planning and set up took much longer than anticipated, limiting the amount time to collect measures and perform meaningful evaluation of the improvement work. Initiative duration was a constant issue for the teams as they struggled to meet targets by specific dates and to demonstrate benefits within specified time periods. In Allergy, one participant noted how this issue frustrated the team *"A lot of people feel that even with them working quite hard there is still not the evidence they want to see. There's still not the patient impact that they want to see."(Allery_12 month review transcripts)* Setting realistic expectations of how long achievements would take and the need to keep going despite the project timeline finishing was communicated by a number of teams. *"There was a feeling that we were just starting to get somewhere and we're going to cut off in the middle...I guess we're all hoping just to keep going."(I7_Project Manager)*

III. Organisational Priorities

Associated Constructs: *Support for improvement, leadership, relationships and collaboration, opposition*

> *"It almost goes without saying that over the last year or so NHS budgets have been squeezed, the structure of the NHS has been revamped and is continuing to be revamped."(I10_QI Manager)*

Consistent and continuous support for improvement from organisations and leaders was a recognised challenge across the cases. Cases described consistent competing priorities for all improvement initiatives including cost saving demands, new innovations, as well as fluctuating trust strategies and priorities. The cases recognised that they often had little or no control over these situations *"In a big organisation like this there's every chance that someone else will decide there's some other way of doing things and then all of a sudden this all goes out the window…and things change so much in the NHS that good things just get wiped out sometimes."(I1_Clinical lead)*

- **Shifting Organisational priorities:** The organisations involved in this study were experiencing significant changes to infrastructure and systems which impacted the ongoing initiatives. In the case of Allergy, the team were operating in a newly merged

trust which complicated the process of gaining buy-in and support for the work. *"Newly merged organisation - no overall corporate objectives."(Allergy_LTST_July 2015)* Wellbeing, struggled to know how to frame their work and approach the 'right' people, as changes to management structures within their organisation made leadership roles unclear. Participants described the difficulty in remaining relevant to their organisational leaders and operating within reduced financial budgets. The teams described the pressure to not only make a quick impact but also to demonstrate cost savings. *"When it comes to management, when it comes to the chief exec, they really only want to know, how much has it saved?"(I14_Clinical lead)*

- **Lack of support:** Some initiatives encountered resistance and felt their work lacked organisational support. For example, in Allergy, the team felt strongly that they were delivering best practice, but described limited support from their organisation which at times hindered progress. *"There seems to be minimal organisational support within the project; sometimes I felt that we (core team) have been working against a whole organisation to improve children's health outcomes."(Allergy_LTST_February 2016)* This meant that the team had to adapt to organisational limitations when they were unable to get funding for administrative staff. *"Projects have clearly got over it by committed people within the organisation just going, hell, we're going to do it, and doing it….you've done it regardless of the fact that actually the funding and administration support has not been offered."(Allergy_18 month review transcript)*

- **Loss of interest:** Participants also highlighted that the personal interests of leaders influenced if the initiative was viewed as a priority or not. *"I think with so many challenges that we have within the Trust while we were doing the project, it has become apparent that it may not be at the top of the agenda for the Chief Exec really."(I11_Pharmacist)* Heart-Failure encountered this issue when the priority for completing the care bundle was superseded for a trust audit. *"They were behind on their audit data for the National Heart Failure Audit and so they're also doing that, and I think really they're just doing that and not pushing the bundle."(I21_QI manager)*

IV. Workload distribution

Associated Constructs: *Team functioning, relationships and collaboration, workload, accountability*

> *"The project seems to belong to somebody rather than to the organisation and I think that's been the biggest factor that I've seen in sustainability, is the lack of organisational ownership of projects, they think it belongs to an individual consultant or nurse or even a team of people, not the organisation." (I6_QI manager)*

Having a single individual seen as the core supporter or deliverer of the initiative was identified as a major risk to the sustainability of improvements across the case studies. Team functioning posed a number of challenges for initiative sustainability with issues such as *reliance on individuals* and *unfair workload* observed.

- **Reliance on individuals:** A number of team members identified a risk to sustainability related to the reliance on particular individuals to deliver the initiatives. In Heart-failure, the role of collecting and documenting the bundle relied heavily on a data analyst and a heart failure nurse. The team highlighted the need to engage staff through teaching sessions but my follow-up interviews found that data collection and entry was still completed mainly by one individual. In Wellbeing, a similar challenge was faced as one nurse was tasked with reminding ward nurses to fill out the assessment forms. *"How sustainable is it to have one allocated member of the nursing team to chase this...(the ward nurse) will be away over Christmas-it has been decided to not have anyone stand-in regarding this data collection as this is a good test." (Wellbeing_Meeting Minutes)*

- **Initiative workload:** Workload posed another challenge which impacted on team functioning and was seen as a challenge to initiative sustainability. For example, in Allergy, the project team consisted of a number of dedicated clinicians determined to improve allergy services. While this enabled much of the work to be accomplished, it also meant that the team struggled with allocation of workload. Roles and responsibilities associated with the initiative were often seen as unfair and requiring

staff to complete initiative tasks outside of their day job. *"Everything that was done, was done in people's spare time."(Allergy_18 month review transcripts)*

V. Patient and Public Support

Associated Constructs: *Patient and Public Involvement, demonstrating effectiveness, commitment to and belief in the initiative*

"If what we're doing is clunky and alienating and unmanageable for patients, then they won't go along with it either, so I think having them, gave us a bit of a check and a balance with that to make sure that we were doing something that was likely to be acceptable to patients and service users." (I2_Clinical lead)

The last challenge identified across the cases was garnering and maintaining patient and public support and engagement in the initiatives. Patient involvement was seen as a potential risk to the sustainability of the cases for a number of reasons including: *gaining momentum and support, and understanding patient preferences, feedback and needs.*

- **Gaining momentum and support:** A number of teams had difficulty in engaging with patients and carers on an ongoing basis. This was viewed as a risk to sustainability because without the support and buy-in from patients and local communities, the initiative would not have the necessary backing and real life stories to promote sustainability of the initiative. *"It's about trying to get some real energy behind us as a core group and to support this track."(Allergy_12 month review transcripts).* Participants also felt that without the patients supporting the initiative, it would be seen as less valuable and would struggle to garner interest and produce evidence of benefits. "*True involvement, engagement of patients, I would say that this is a weakness of the project and…it's very hard to know whether that would have created some pressure with the hospital management or the trust management, but it may have been a positive influence on the involvement of GPs."(I20_QI manager).*

- **Understanding patient preferences:** Teams believed that without patient and service user engagement it would be more difficult to drive and focus projects to produce relevant interventions. For example, in Heart-Failure the team made an effort to engage

with a patient representative within the initiative team but struggled to involve those who had used the bundle in practice. *"A patient has come back on board which is helpful but they have not directly used this hospital service."(Heart-failure_LTST_February 2016)* The team felt this reduced their ability to understand the experience of patients whose care was managed on the Heart Failure care bundle. Similarly MedRev, had active patient representatives but felt that they should involve patients who were receiving the medication reviews. *"Perhaps where it was much less successful was in gaining insight from patient experience in the moment of the project as they were going through it…People were just too ill in acute settings to give as much feedback as one would like."(I10_QI manager)*

7.3.2 Strategies and Actions to Sustain

To respond to the sustainability challenges presented above, the case study teams undertook a number of actions to influence sustainability and address ongoing issues. In this section, 12 strategies for navigating sustainability in complex systems are described. Table 44 summarises the 12 strategies and their use across the cases. The strategies have been organised into the following themes which outline how they impact specific properties of complex systems: *recognising and utilising interdependencies, encouraging new interdependencies, promoting sensemaking, and allowing for and promoting emergence.* Below each theme will be described, and the strategies used in each will be discussed.

Table 44: Strategies for Navigating Sustainability in Complex Systems

		Demonstrated use in an Initiative			
Theme	**Strategy**	**Wellbeing**	**Allergy**	**Heart Failure**	**MedRev**
Recognising and using interdependencies	1. *Engaging with senior leaders to gain support and buy-in*	Y	Y	Y	Y
	2. *Involving patients to act as a catalyst for change and a pull for the improvement*	Y	N	N	Y
Encouraging new interdependencies	3. *Building collaboration and networks to foster new relationships and future initiatives*	N	Y	Y	Y
	4. *Building in and planning for accountability and ownership to the initiative*	Y	N	N	Y
	5. *Maintaining momentum through ongoing promotion of the initiative*	Y	Y	Y	Y
Facilitating sensemaking among stakeholders	6. *Impacting organisational memory through integration in systems, processes, and funding mechanisms*	Y	Y	Y	Y
	7. *Consistent and continuous training and capacity building to ensure skills and capabilities for future delivery of the initiative*	N	Y	Y	Y
	8. *Embedding measurement and monitoring to enable feedback and encourage continuation*	Y	Y	Y	N
Allowing for emergence of needs	9. *Identifying and applying for further funding to support initiative staffing, infrastructure and spread*	Y	Y	Y	N
	10. *Expanding the Initiative to other sites and settings to meet patient needs and garner further impact and support*	Y	Y	Y	Y
	11. *Reducing complexity of the initiative to ensure feasible delivery and continuation*	N	Y	N	Y
	12. *Understanding and responding to receptivity and contextual needs through adaptation and iterations of the initiative process and products*	N	Y	Y	Y

Recognising and using interdependencies

Two strategies supported the recognition and utilisation of interdependencies within the initiatives. Specifically, these strategies were used to enhance ongoing relationships and partnerships with patients, staff, leaders, and other stakeholders. These strategies and actions were seen as supporting sustainability by enhancing stakeholder engagement, support and creating a 'pull' for the initiative.

1. Engaging with senior leaders to gain support and buy-in

All cases attempted to engage and gain buy-in from senior leaders within their settings. Engaging leaders was seen as key to sustainability due to their ability to champion and advocate for the initiative at higher managerial levels as well as their ability to inspire passion for the work. Teams strategically worked to identify and target clinical leadership across their organisations. A number of teams gained access to leaders at particular governance or trust meetings. They used these opportunities to prepare specific presentations to communicate the rationale and impact of the work and to foster belief in the importance of the initiative. *"Every clinical governance meeting we bring an update on what has happened and we use it to continually drive the bundle…I think the constant reinforcement of data is helpful. So, even by just saying how many bundles were filled out now compared to last month or the month before…We just need to give them something to help keep them motivated."(I22, Service manager)* These actions enabled the teams to maintain support and profile for the work and gain further commitment from staff members.

This strategy was used in all cases and it was seen to enable engagement and increase profile. It was noted by a number of cases that this strategy required ongoing effort. For example, in Allergy, the team attempted to engage with leaders of the organisation but found no real commitment which was seen to be an ongoing block for the work. *"Engagement of management/trust consultants required - this has been a major block in achieving goals."(Allergy_LTST_February 2016).* In MedRev, the team also struggled with movement and change of leaders and found that although they had initially found success with this strategy, they needed to re-engage and build relationships with each new leader who was appointed.

2. Involving patients to act as a catalyst for change and a pull for the improvement

Although patient and public involvement was noted as a challenge for many of the cases, involving patients was also highlighted as a facilitator to sustainability in 2 of the case studies. Forming relationships with, and involving, patients was perceived to aid sustainability in multiple ways. The first was the ability of patients to act as a catalyst for change and a pull for the improvement. Their capacity to push the team and inspire action was felt as a key stimulus to continuing the improvement work. The second was the role of patients in designing and informing key initiative outputs. Having patients involved allowed the team to ensure the

initiative interventions were relevant to patients to increase impact and receptivity. For example, in Wellbeing, one of the key aims of the initiative was to increase recording and communication of physical health metrics to patients. Service users on the team led the design of a coproduced patient-held health record which was deemed to facilitate its usability and effectiveness for patients. The third benefit of involving patients was related to their ability to maintain momentum for the work by spreading awareness and championing the initiative in other settings. *"Yes in fact there is something I can do and I will be doing is actually bang my fist on the table to explain (MedRev) and make sure that…the same way as I've been disseminating and doing campaign work for (another medicines project) I'll be doing exactly the same thing for (MedRev) in case there is someone at (the trust) who hasn't heard about it."(I8_Patient representative)*

This strategy was viewed as extremely helpful to the teams that used it. They felt that without the patient input, the project outputs would not have been as relevant and the work would not have been as successful.

Expanding and Encouraging new interdependencies

Three strategies were identified which expanded or encouraged new interdependencies within initiatives to be established. These strategies focused on building collaboration across disparate teams and settings, and fostering new relationships to garner further attention and support. These strategies aimed to enhance knowledge of initiatives within wider stakeholder groups, build accountability for the work and maintain momentum for the initiatives.

3. Building collaboration and networks to foster new relationships and future initiatives

Inter-professional collaboration between staff groups was an important facilitator in sustaining initiatives as it ensured that staff engaged in a multidisciplinary approach to deliver the interventions effectively. It also aided in building lasting relationship to maintain the work in the future. Fostering collaborations and networks throughout implementation was a strategy used within three of the four cases. Networks and collaborations were established in different ways within each case. Some teams set up network meetings, or attended forums to build relationships, while others organised collaborative funding applications or began multidisciplinary team meetings. These actions were associated with sustainability for a number of reasons. Collaborations were seen as a platform for continual engagement with

stakeholders as well as an opportunity to meet new stakeholders to gain further support for the work. Having these networks also facilitated cross-site learning and promoted future collaborative working. *"I think there are some really good things that have come out of it…just having this working relationship across all five sites in North West London that's…not going to go away and now there are other projects that we've bid for where we actually put in bids together and that seems like a really natural thing to do."(I7_Project Manager)* At the time of write up, network meetings and forums continued to be used by teams in Heart Failure, Allergy and Wellbeing. The use of multi-disciplinary team meetings has become a new way of working in MedRev.

4. Building in and planning for accountability and ownership to the initiative

In order to sustain, teams identified the importance of understanding initiative workload and responsibilities. Three of the cases identified the need to build in accountability and ownership of the work. This was important to ensuring continued buy-in and delivery of the initiative. It also allowed the staff to share responsibilities, so the workload of the initiative would not be reliant on individuals. This required teams to allocate tasks to ensure there were clear roles and responsibilities related to the initiative work. In MedRev, accountability for the work was built into their workforce planning through the inclusion of the initiative responsibilities in job roles. This ensured staff were aware of their role in medicines review and outlined the need for skilled staff to perform the reviews. *'We've built that into some of the job plans now that that's part of the role so one of the benefits of people leaving and…getting other people in when they start you go that's just what you do.' (I7_Project Manager)* The need to position the work as belonging to the staff and organisation was also recognised. In Wellbeing, this was achieved through recruiting a ward staff member to feedback results. *"The key risk we are aware of from the outset was the extent to which we could secure team buy-in. This was tackled through…recruiting a ward team member to do the audits and to give feedback to staff team on incomplete assessments etc. rather than this coming from outside the team."(Wellbeing_12 month review report).*

This strategy had mixed success within the cases. In MedRev and Wellbeing, the ward staff took ownership of the work and the initiative tasks became part of the core responsibilities of the staff. On the other hand, in Heart Failure team, the core initiative work remained reliant on select individuals at the time of follow-up. *"Quite bluntly if I don't do it, at the moment, it*

doesn't get done. So if I go on holiday, when I come back I have three weeks' worth of work to do, to catch up on."(I24_Data Analyst)

5. Maintaining momentum through ongoing promotion of the initiative

All teams attempted to keep the momentum of their work going through raising awareness and highlighting project progress and success. This was done through forums, publications, meetings, newsletters, award nominations, conferences, and email updates. These actions were associated with sustainability as they enabled the team to build awareness of the initiative, promote further interest and engagement, and heighten staff morale. Team members also noted that promoting the work also acted as a reminder to staff to continue initiative delivery. *"I did all the data collection weekly sending (it) out like hey, this is a really good example and encouraging people to get together and talk through examples of cases."(I7_Project manager)* Sharing the rationale and impact of the initiatives enabled staff to build team morale and belief in the initiative; the more it was publicised, the more opportunity the team had to be proud and share their success. *"We can show off because organisations like to be able to show off about good things. And if you provide them something to show off about then that's a win, the people then are ready to listen and that does really make a difference"(I1_Clinical lead)*

All sites found success with this strategy with MedRev and Wellbeing producing a number of peer-reviewed publications and Allergy and Heart Failure gaining commitment and support from leaders to share their stories at commissioning boards and executive meetings.

<u>Promoting sensemaking</u>

Four strategies were identified as promoting sensemaking for initiative sustainability. These strategies enabled individuals and teams to understand initiatives as they progressed, and provided insight into how the initiatives could be built into current systems and processes to foster continuation.

6. Consistent and continuous training and capacity building to ensure skills and capabilities for future delivery of the initiative

The importance of training and capacity building for sustainability was highlighted in three of the four cases. This was seen as important to embed the initiatives into routine practice and was also seen to increase staff motivation for delivering the initiatives. Teams engaged in a

number of actions to ensure staff had the necessary skills and capabilities to continue the delivery of the initiatives. These included: adding information on the initiative to induction presentations and packages, linking the initiative with undergraduate teaching and postgraduate diplomas, and having continued and consistent education sessions. Building in mechanisms for continuous training for all new staff was seen as a key sustainability strategy. *"Training one person or having a consultant doing outreach long term is not the answer. We have to build the education model in to it."(Allergy_6 month review transcripts)* This strategy ensured staff had the capacity to consistently deliver the work, and enabled a wider workforce to deliver the initiative. For example, in MedRev, the addition of de-prescribing material to undergraduate pharmacy programmes was seen as building a foundation of knowledge in early career pharmacists, so that the issue would be recognised by new graduates. "*We've made some headway into like the undergraduate university programmes for pharmacists they are now teaching a de-prescribing unit."(I7, Project manager)*

This strategy was employed in three of the four cases and was perceived to be a positive influence on sustainability. Training continued to be delivered and was a standard procedure for induction in MedRev at the time of follow-up. The impact of the strategy in the other two cases indicated that while they recognised the importance of training, the methods for training were more 'ad hoc'. *"That's part of the reason that (team members) are going to the GP forums, just to make everyone aware of what the service is… shouting it from the rooftops, what we're doing, and if you want training you just ask, we can come to you, we're quite flexible."(I19_Nurse)*

7. Embedding measurement and monitoring to enable feedback and encourage continuation

Although teams struggled to evidence the impact of their initiatives, the ability to have measures in place and monitor progress was identified as a facilitator to sustainability by three of the four cases. Having the ability to monitor, measure and update staff and stakeholders was seen to encourage continuation of the work. *"It's really good to keep looking at what we did…and keep measuring, because we're still seeing improvements and all the time you're still seeing improvements you want to keep on measuring, because it's good."(I14_Clinical lead)* The Heart Failure team displayed progress using graphs and charts on the ward to celebrate continuation of the collection of the bundle over time. This enabled staff to see their progress and understand the importance of continuing to collect bundle data. Measurement was also

seen as important as process measures provided information to funders and leaders to support continuation of the work. For example, Allergy explained how their ability to report specific measures allowed them to interest and engage commissioners. Having measures such as number of referrals and A & E attendances allowed the team to share their progress with others and demonstrate the changes to training and pathways they were making. In *Wellbeing,* monitoring the number of documented physical health checks enabled the project to show incremental changes to the service they were providing to patients.

This strategy was used by all four cases to varying degrees. It was seen to help both Allergy and Heart failure to gain further support and buy-in for spread. *"To establish that link with the commissioners the data that they collected during the project was really important, to convince them that this was worth refunding."(I17_Embedded Researcher)*

8. Impacting organisational memory through integration in systems, processes and funding mechanisms

All cases demonstrated attempts to integrate their changes into the existing systems. Integration was aimed at three levels across the cases. The first was integration of documentation processes into systems, which was done by all cases. For example, MedRev integrated their discharge summary for medication review into the online documentation system and Wellbeing integrated their physical health assessment form onto the online trust IT system. The second method of integration was linking the initiative with existing funding mechanisms. For example, the Heart Failure bundle was integrated into an existing funding stream for care of heart failure patients. This allowed the initiative to monitor and deliver a standard of care while receiving payment for meeting specific targets. The connection with the funding stream gave the team a mechanism to support its ongoing delivery. *"So we've got now a process by which…they've almost bought in forever, because we're saying, well if you take this away, you're not going to get your best practice tariff, and that's going to lose you £500,000. And in a cash strapped organisation, you can't afford for that to happen."(I25_Project manager)* The last method of integration, was the incorporation of the initiative into teaching or induction programmes. As highlighted above in the capacity building strategy, this was done in two of the cases, MedRev and Heart Failure.

This strategy was seen as successful across all sites as it ensured that some form of legacy of the project existed at follow-up. Although the majority of cases demonstrated that integration

was viewed as a facilitator to the sustainability of an initiative, there were some concerns over the lack of flexibility that remains for further improvement once integration has taken place. For example in Wellbeing, the health assessment form was integrated on the electronic record within the trust but team members noted that this complicated the process of making any further changes to the document.

Promoting and Allowing for emergence

Four strategies were identified which supported teams to understand emergent situations and initiative needs. These strategies highlight how teams were responsive and resourceful decision makers throughout initiatives to support sustainability. Each team recognised local needs and responded with solutions relevant to their given situations. This often resulted in renegotiating expectations and goals based on feasibility, time and resources.

9. Identifying and applying for further funding to support initiative staffing, infrastructure and spread

All cases engaged with this strategy to some degree. MedRev, Wellbeing and Heart Failure, all identified and applied for further funding during the study period. Allergy prepared a business case for their initiative to highlight to the need to continue and spread the service which was presented to commissioners for further funding. MedRev and Wellbeing also had individuals who applied for fellowship grants associated with the initiatives. Identifying relevant and available funding opportunities enabled the initiatives to have the ability to continue the work and maintain staffing structures. The process of applying for funds was also noted as providing a focus for the team to concentrate their efforts and target for people to accomplish. Receiving extra funding was also seen as a proxy measure of success demonstrating to staff the importance of the ongoing delivery of the work.

Although all cases used this strategy, it was an ongoing and unpredictable process. Wellbeing and Allergy both received funding which allowed them to build on initiative work and expand their services in further clinics and community settings. In Allergy, the awarded funds from the commissioning of the service led to the creation of permanent job posts for the continued delivery of the work. *"The first step was to get two nurses employed which actually was quite a big step. And we've had (the nurses) employed since June…Having two nurses is amazing, so it's how we best use those, the time of the two staff."(I18_Clinical lead)* MedRev described how an application to fund expansion of the work had been unsuccessful. *'My colleague has*

applied for funding, but that's rejected…the natural continuation is actually get the community to get engaged with the project itself, but there's no funding for it…So for now to sustain what it needs, and then see whether there's any future opportunity."(I11_Pharmacist) Heart Failure did not gain further funding but instead integrated the work into ongoing payment structures to continue to have investment of in the service.

10. Expanding the initiative to other sites and settings to meet patient needs and garner further impact and support

All cases identified spreading or expanding their initiative as a strategy to sustain improvements. To expand initiatives the teams began rolling out into other receptive wards and settings. Within the cases, participants described a number of reasons spread of their initiative was perceived to be valuable to their sustainability. These included: greater population coverage and better access for patients, improved uptake and increased impact as well as improved equity of services across sites. In Allergy, the team wanted to ensure accessibility of their service throughout their sector. In MedRev, the sites wanted to reach a greater population of patients. *'We recognise that some patients we identify who should have their medicines reviewed shouldn't have them reviewed in the acute situation…They should have a review in the community once they're over this acute illness and they're back into their activities of daily living."(I7_Project Manager)* Another reason for spread was that team members perceived that an initiative acting on a larger scale would be more likely to garner support from staff and organisational leaders. *"The idea of the funding is to roll out across the unit and into the community, and I think if this becomes the embedded way of working across the unit and the community, it's got a far better chance of success."(I6_QI manager)* The third reason for spread was related to equity of services. In Heart Failure, sites within the same hospital trust were not delivering the same service to heart failure patients. This was seen as an issues in equity of services for patients. *"Because we're one trust, we really should have standardisation across the three trusts, and again you're looking at political factors, geographical factors, different culture from the trust to trust. There's a lot of different elements when you start getting at, so it's a catch 22 because you should essentially go to three trusts."(I22_Service Manager)*

Wellbeing and Allergy found success in their attempts to expand their research, with both finding funds to do so. Wellbeing was able to roll out to five further wards and was working on expanding the programme to the community setting. During follow-up, Allergy was able to establish two further allergy clinics in the community. As MedRev's funding application for

spread was denied during the follow-up period, the team consequently determined that spread to all wards in the hospital may not be desirable. Given the resources available, the team decided to instead target specific wards for delivery. Heart Failure attempted to roll-out to a sister site within the trust but found that uptake and use of the bundle was very difficult given their small implementation team. In this case the team found that rolling out to another site risked the initial site implementation. "*If you don't have dedicated people to take on a task there is going to be a problem. And we've obviously found that because the uptake has been slow. And is it a case of move the staff around that you've got? In which case, would your original sites then suffer because you've got one or two people left looking after it there."(I24_Data Analyst)*

11. Reducing scope of the initiative to ensure feasible delivery and continuation

This strategy promoted emergence through pragmatic decision making by some teams to reduce the scope of the initiative to foster sustainability. The decision to reduce or change the scope of the work was often a difficult decision for teams to make but it was deemed to be important to sustainability in the long term. In Allergy, this involved one site choosing to reduce their project from a broad intervention targeting all allergy illnesses to asthma services only. In Wellbeing, the team decided to postpone spread of the initiative to community sites. *"The one aspect that we initially kind of pitched that we were going to do was to extend the pathway out into community services. Which we, in the end, just along the way had to give up on, because…just getting something to shift in in-patients…took so much more work frankly."(I1_Clinical lead)* The rationale for these actions was to foster lasting change which could realistically be delivered within the given time and available resources. This was seen as an important strategy to sustain as it allowed the initiatives to 'start small' to understand how best to deliver the initiative in practice. It also gave the teams an opportunity to build in mechanisms for continuation. One team member commented that this was important to sustainability because had they started too big they would have not been able to deliver anything given the restricted resources. Downsizing the intervention allowed them to show an impact, albeit a smaller one, which allowed them to gain buy-in and further funds to scale up. *"Taking our time and really looking into each aspect of the project has helped us sustain it…if we went into it, to a project the size it is now, I don't think we would've ever been able to sustain that, I think it would have been really difficult because you're always going to …have some hiccups on the way. And if you start small and you get that right then, and you know what*

works, what doesn't, you can then scale it up to a bigger project based on that one."(I19, Nurse)

While this strategy was seen as ensuring feasible delivery, it was also noted as a risk. Reducing scope often resulted in fewer people receiving the improvement, which meant that the potential impact of the initiative was diminished. For the teams employing this strategy, this trade-off was seen necessary to ensure that the initiatives could be set up and delivered within given resources.

12. Adaptation and iteration of the initiative processes and products to respond to contextual needs

A defining feature of many cases was the need to adapt the interventions to suit the context and the people involved. Adaptations to interventions took many forms. Wellbeing, Allergy and Heart Failure all described how they made iterative changes to documents such as the patient-held health records, care pathway proformas or care bundles. MedRev team members described how the documentation process for medication reviews on all sites was adapted to the systems available in each. These iterations were considered important to sustainability as they allowed each improvement to be tailored to the setting and responsive to existing limitations within systems and infrastructure. Adaptations were also made to respond to staff feedback on how forms or processes were working. '*The form has been iteratively developed through engagement with medical and nursing staff to assess the acceptability, suitability and feasibility of utilising the new assessment tool.'(Wellbeing_6 Month Review Report)* This enabled the initiative to be responsive to staff preferences and build ownership of the work. A team member from Wellbeing expressed why this was seen as influencing sustainability *"What's it going to be like for a frontline staff member to do this? Because if it takes longer, then they're not going to do it, that's basically the bottom line, so that was a big part of it."(I1_Clinical lead)* Adaptation was also key to ensure interventions could respond to new standards of care and emerging evidence. *"Every three, five, ten years the guidelines change slightly, so we constantly have a group of specialised people that look at it…and make sure that we're actually on the right page"(I22_Service manager).*

Changes and adaptation across the cases were noted as being necessary to the continued delivery of the improvements, contributing to the lasting implementation at each site as teams were able to find processes and products that best suited them. Although this strategy was

widely employed, a number of teams also questioned how adaptation may begin to impact fidelity of delivery or planned outcomes. This was viewed as a potential risk to future sustainability. *"I think the greatest challenge is having some way of ensuring quality…we did a whole piece of work in defining different kinds of medication reviews and articulating that and I don't know if because of the turnover of staff if that, when that investment goes I think people will still be ticking review but…I think the biggest thing is how do we know that even if that measure is sustained, do the people, do people really have that deep understanding of what it is that they're doing when they tick that box."(I7_Project Manager)*

7.4 Discussion

This chapter presented key learning from across the cases on challenges influencing sustainability and outlined 12 strategies which were employed to overcome or address issues and enhance prospects of sustainability. Results demonstrated that despite unique circumstances and events, initiatives were impacted by similar challenges which played a key role in the sustainability journeys of the teams: *workforce stability, initiative impact, organisational priorities, workload distribution, and patient and public support.* The evidence for the presented challenges builds on established literature which has identified specific constructs as important to the sustainability of initiatives.[8,14,36]

While the conceptualisation of sustainability as a number of constructs was a useful basis for analysis, my findings suggests that there can be value in moving beyond reporting the impact of individual constructs to describe complex experiences as seen by improvement teams.[10,28] Investigation of the challenges has demonstrated that they are made up of a number of interacting constructs. This conclusion supports previous work which found that complex phenomena require recognition of the dynamic nature within and between constricts and cannot be fully understood in isolation.[45,126,132,377] This highlights the need for future sustainability studies to provide more nuanced and realistic accounts of what to expect in sustaining improvement. Categorising complex issues as single constructs poses a risk, as it suggests that addressing that construct alone may fully resolve those issues. Unfortunately, results from this study have demonstrated that sustainability challenges require teams to navigate and address multiple interacting constructs using ongoing resourcefulness and problem solving.

Navigating Sustainability in Complex systems

Sustaining changes in complex environments poses a significant challenge.[10,22] Therefore, healthcare planners and staff need to thoughtfully consider how they can embed improvements in care.[98] The strategies presented in this study provide insight into the patterns of self-organisation taken by teams to address issues influencing sustainability and support sustainability in practice. They highlight the actions required to accomplish tasks and maintain gains from across the cases. These strategies addressed four themes aiding teams to navigate sustainability in complex systems: *recognising and utilising interdependencies, encouraging new interdependencies, promoting sensemaking, and allowing for and promoting emergence.* Below I discuss the role of the strategies in supporting sustainability in complex systems and highlight how these results fit within the current evidence base.

Interdependencies

Five strategies for sustainability promoted the recognition, use or development of independencies. Improvement teams built and maintained numerous relationships, connections, and partnerships across their systems. These actions have been seen as critical in understanding how a system behaves and what outcomes can be expected.[141,363] Fostering interdependencies is crucial to sustainability as it allows teams to share information, organise implementation and delivery, and make decisions to accomplish tasks.[363] The importance of facilitating relationships and partnerships among stakeholders to foster sustainability has been described elsewhere.[14,52,117,151,378,379] The role of program champions such as patients has been specifically highlighted as contributing to program sustainability. For example, Renedo et al., found that patient participants embraced sustainability as one of their core responsibilities and used their existing networks of associations with healthcare organisations such as CCGs to raise awareness of initiatives.[380]

Sensemaking

Ongoing sensemaking is crucial for effective initiative delivery and maintenace.[146] Analysis identified three strategies which enhanced sensemaking within the teams. Sensemaking helped the participants to understand initiative progress and aided teams in defining their contributions and impact to their systems.[14,365] These strategies also provided insight into how the initiatives could be built into current systems and processes to foster continuation. Previous studies have provided evidence to support the strategies related to sensemaking. For example, impacting

organisational memory through integration in systems has been supported by multiple studies.[7,20,381] Martin et al., found that integration influences stakeholder support and decreases the chance of users making further changes to interventions.[20] Consistent and continuous training and capacity building has also been supported by a number of studies.[7,43,178,382] Milne et al. found that *"ongoing workforce development for new health promotion staff and collaborative partners will strengthen project activities and support project continuity."*[178] The need for consistent capacity building has also been linked to the ability to maintain initiatives in standard operating procedures and make initiatives a permanent part of the organisation.[7]

Emergence

Although *"our learnt instinct…is to troubleshoot and fix things…it is often better to try multiple approaches and let direction arise by gradually shifting time and attention towards those things that seem to be working best".*[66] To support sustainability, all cases allowed for emergence in the system and learnt from the interactions among participants on how best to respond.[66,133] Four strategies were identified to support emergence. These findings demonstrate the importance of fostering learning, feedback and responsiveness in improvement teams.[66,178] Strict adherence to plans or solutions may hinder a team's ability to respond and problem solve, and result in actions which are not cognisant of the resources and needs of the local setting.[66,383] The need to understand and respond to contextual needs has been previously supported as a sustainability strategy elsewhere.[20,57,60,384] Research has indicated changes to interventions are often desirable to support initiative sustainability, *'especially if changes reflect additions to the intervention rather than subtractions from it'*.[384] The need to consider reducing complexity of interventions has also been discussed elsewhere. Yin et al., found that limiting scope of the initiatives is often necessary in order for the practices to be conducted on a daily basis and to promote continuation.[57]

While the evidence for many of the strategies has been established. Some of the strategies require further exploration. For example, a number of cases described that spreading their initiative was seen as a strategy for sustainability. The Kings Fund have stated that *"only by moving from pockets of innovation to system-wide improvement will the NHS deliver the changes that are needed to sustain and transform care at a time of unprecedented financial and service pressures."*[96] While this provides insight into the need for spread of innovations, few studies have established if and how spread can support or hinder sustainability.[21,122,385,386]

This work has demonstrated that spreading initiatives aided teams to broaden their population bases and increase potential impact and evidence of benefits. Spread was also seen to promote legitimacy of the initiative as it promoted further engagement and recognition. These findings may enhance future exploration of the links between sustainability and spread. This topic will be revisited in the following chapter in section 8.5 Future direction and research needs.

Implications for research and practice

Undertaking a longitudinal approach to studying sustainability is time consuming and complex. These results have demonstrated that while each case may have a unique sustainability journey, common challenges were encountered and shared strategies have been used to address obstacles. This work has two key implications for practice.

- **Demonstrating impact:** This work has shown that demonstrating benefits often requires more time than allotted through improvement initiatives. These findings demonstrate the need to manage expectations and set realistic targets for the delivery of outcomes. This also provides rationale for using process measures to demonstrate the contribution of an initiative to funders and stakeholders. For example, sharing the number of patients receiving a full medication review, and number of inappropriate medications stopped, provided a mechanism for MedRev to justify continuation and a proxy measure for impact to patient outcomes. Having diverse data collection mechanisms and measures can provide a more comprehensive and robust evidence-base to inform initiative planning and evaluation to enhance chances of sustainability.[13,178] Therefore, improvement teams should be aware of the need to plan for and collect process measures to indicate progress and impact to their funders and other stakeholders.
- **Need for resilience:** This work has demonstrated that in order to sustain, teams engaged in a wide range of action and strategies. Actions ranged from engaging partners and measuring progress, to applying for further funds and integrating initiatives into systems. This required teams to be flexible, creative and resilient when initial actions were unsuccessful. Team members had to learn how to persist through continuous challenges and learn to adapt to meet needs.[67,69] The need for teams to be responsive and resilient have been discussed but few improvement teams are explicitly taught these skills.[387] These skills have become increasingly important for future initiatives to

consider in order to promote sustainability in constantly changing and increasingly challenging environments.[388]

Strengths and Limitations: The opportunity to study sustainability as a prospective process throughout implementation was critical to gaining insight into how to improve sustainability of improvements and how to study this complex topic.[13] To my knowledge, this is the first longitudinal study to present sustainability strategies which have been utilised across different intervention types and settings. Although this study offers valuable insight into how sustainability is influenced in practice, there are key limitations which should be considered.

- ***Bias:*** In the previous chapter, I outlined some key limitations related to the case study approach. Another possible limitation related to the methodological approach, is the potential for bias in the data collection. Due to the qualitative nature of the majority of the methods, there is potential for both responder bias and recall bias. Prior relationships between myself and a number of participants were identified as a possible source of bias, specifically, social desirability bias, as participants may have responded in ways that were seen as more desirable to me.[52] I attempted to mitigate this challenge by allowing other researchers to conduct a number of the interviews (n=15/38). The use of multiple methods of data collection also served to triangulate findings and provide a chain of support for themes and findings that were not solely reliant on individual interviews.
- ***Generalisability:*** The second limitation is related to the generalisability of findings. All cases operated within the same QI context, therefore the results found may not be transferable to all improvement initiatives. It is recognised that other improvement initiatives may not experience constructs in the same way or use similar strategies. As outlined in the methods chapter, this work sought to examine the possible literal replication to understand potential learning from across the cases.[53] Using the cases from the same programme allowed for diverse initiatives to be observed but also served a pragmatic function. Being an in-house researcher allowed me unique access and opportunity to follow and observe the teams. The cost and time needed for this type of study was substantial and would not have been possible to carry out in multiple settings. Although the findings may not be directly transferable, they may provide valuable insight into the types of actions needed to sustain improvements which can be considered and tested by future research studies.

- ***Sustainability Outcomes:*** The final limitation is related to impact of the proposed strategies on sustainability outcomes. The strategies have been suggested and used across my cases but I cannot say if, or how, they will manifest or impact other teams or systems. I also cannot ascertain if these strategies will result in increased or augmented sustainability for improvement initiatives. This work reports only how the teams responded to sustainability challenges and what they believe influenced sustainability but direct links to sustainability outcomes cannot be made beyond the follow-up period reported. These inferences would require further exploration and examination.

Future Research: Three key areas for future work have been identified. The first is related to the transferability of the findings. Studying the application of these findings in further settings would provide valuable information on if, and how, these strategies are used and what alternative actions or strategies are identified. This learning would provide valuable information for future improvement work in terms of understanding pre-emptive actions to take to enhance sustainability and mitigate risks.

The second area for future research is the potential of the constructs identified as facilitators in some cases to serve as 'protective or compensatory' constructs in other cases where it was viewed as a challenge.[10] This study indicated that the vast majority of constructs were viewed as both challenges and facilitators to different teams at different times. Future work could explore if those struggling with particular constructs can learn from other settings where the construct is viewed as a facilitator.[1] For example, could the Allergy team have learnt how to actively involve patients from Wellbeing who viewed it as one of their key facilitators? This understanding could provide insight into how shared learning across diverse initiatives may enhance an initiative's ability to sustain.

The third area for future research is whether the LTST can support or enhance the strategies identified in this study. Future research is needed to explore if and how the strategies identified here can be supported by the LTST. For example, Chapter 5 established the LTST's role in establishing collaborative working within teams, therefore the use of the LTST may prompt teams to engage in strategies related to recognising and utilising interdependencies. Future work may wish to focus on building these connections to further understanding the potential value of the LTST in supporting or enhancing these sustainability strategies.

Contribution to overall Thesis: This chapter responded to calls for greater understanding of how sustainability challenges are addressed across different initiatives and settings.[10] Unpacking the challenges encountered and how they were supported through actions and strategies in practice provides much needed insight into how sustainability can be supported in future initiatives.[28] The following chapter summarises the key findings presented in this thesis and highlights the main empirical and theoretical contributions made. The key limitations are considered and the need for further research is described.

7. 5 Conclusion

This chapter presented the cross-case analysis of the improvement case studies. It provided learning on the constructs influencing sustainability across the cases and identified five common challenges encountered by each of the teams: *workforce stability, initiative impact, organisational priorities, workload distribution and patient and public support.* These challenges resulted in the execution of a number of shared strategies and actions. Twelve strategies for navigating sustainability in complex systems were identified within four themes: 1)Recognising and utilising interdependencies, 2)Encouraging new interdependencies, 3)Promoting sensemaking, and 4)Allowing for and promoting emergence. This work provides much needed insight into how constructs for sustainability are experienced in improvement initiatives and how teams address them in their attempts to sustain. Further work is needed to explore if and how these strategies are employed elsewhere and if they ultimately support sustainability outcomes.

Chapter 8: Discussion, Implications and Future work

8.0 Overview: In this chapter I outline the key findings presented in this thesis. I highlight the main empirical and theoretical contributions that this study makes to the wider literature and the field of Implementation Science. The impact of the chosen study design is discussed and key limitations to be considered when interpreting these findings are presented. The need for further research in particular areas is described including the relationship between sustainability, adaptation and spread. Drawing on findings from across the results chapters, I direct attention to implications for practitioners and policy makers to consider for future research, practice, evaluation and funding. Finally, I present my overall reflections and key messages for readers.

8.1 Revisiting the problem and addressing gaps in the literature

Sustainability has been identified as one of the 10 challenges to improving quality in healthcare.[98,112] Numerous studies have revealed difficulties in sustaining benefits within improvement initiatives and the challenges encountered in this process.[7,9,12,13,43,98,112,115] Equally, many have also demonstrated that sustaining improvements is possible, with continuation of improved processes, interventions and outcomes.[13,64,117–119] The rationale behind these diverse experiences and outcomes highlighted the need to explore the 'how and why' of sustaining to address multiple gaps in current knowledge. This PhD aimed to explore the process of sustaining within healthcare improvement teams. The overarching research question was:

How do healthcare teams influence the sustainability of improvement initiatives during the course of implementation and beyond?

In the introduction of this thesis, I identified a number of gaps in the current literature which required further investigation to address this question. Firstly, sustainability approaches, which propose to influence and support sustainability, were under-researched and little work had been done to understand what approaches exist and how they relate to one another.[20] There was also little understanding of how available approaches were being applied and what impact they were

having in healthcare settings. To address this gap I investigated the following sub-research questions:

What sustainability approaches (tools, models and frameworks etc.) have been proposed to assess, evaluate or influence sustainability of healthcare initiatives?

And

What impact have sustainability approaches had on sustainability processes and outcomes?

The second gap related to *how* sustainability approaches support or influence sustainability processes or outcomes.[10,153] Therefore, the need to investigate the application of a specific sustainability approach, the Long Term Success Tool (LTST), to explore its impact on improvement initiatives was identified. The following sub-question was investigated:

What impact does the LTST have on improvement initiatives and their attempts to sustain?

The third gap within the literature was related to the retrospective nature of previous sustainability research.[45] The 'process of sustaining' was widely discussed and accepted as a perspective of sustainability, but there is no common description of what the process involved, or description for how it manifested for improvement teams. Prospective research on the process of sustaining was considered crucial in understanding these gaps.[10,28,155] The following sub research questions sought to prospectively study and document the longitudinal sustainability journey of improvement teams to make the process of sustaining visible and explicit:

How does the process of sustaining manifest in practice?

The forth gap addressed in this thesis was related to the actions and strategies employed by teams to sustain beneficial or effective healthcare improvements.[22,49] While a number of studies provided information about the challenges encountered in attempts to sustain, very few identified or discussed strategies which support or enhance sustainability.[20,59,179] With few studies focusing on actions and strategies, there was little direction or practical advice for researchers and practitioners seeking to influence the phenomena over time.[49,59,142] To influence and support future initiatives, the field recognised a need to explore strategies to

sustain effective interventions.[2] To address this gap the following research question was addressed:

What strategies and actions are used by improvement teams to sustain improvements and promote initiative continuation?

While this topic was an ambitious endeavour, results represent real contributions to the literature and the field of Implementation Science. In the following section I discuss the main contributions, both empirical and theoretical, made from this thesis. Table 45 summarises the contributions made through each chapter.

8.2 Empirical Contributions

The specific findings responding to each of the research questions were outlined in Chapters 3 to 7. The study makes four main empirical contributions:

1. *Providing a consolidated knowledge base for sustainability approaches;*
2. *Describing the relationship between a sustainability approach and the process of sustaining;*
3. *Providing an explicit description of the process of sustaining, and;*
4. *Presenting strategies and actions to influence sustainability*

Table 45: Thesis Contributions

Summary Thesis Contribution by Chapter		
	Empirical	**Theoretical**
Chapter 3	• List of 62 sustainability approaches to support practitioners and researchers to understand the purpose, perspectives, and constructs in each to aid selection and use • The Consolidated framework of Sustainability Constructs in Healthcare	• Framework provides a mechanism for conceptualising sustainability in healthcare, can be used in coding and analysis of constructs
Chapter 4	• Summary of evidence on the use of sustainability approaches: benefits and challenges and impact on sustainability outcomes • Updated Framework for Sustainability Outcomes established	• Identified additional outcomes of interest to include in the updated framework: *Adaptation and responsiveness to change and Ability to Garner resources*.
Chapter 5	• Full description of application of a sustainability approach, the Long Term Success Tool (LTST) • Detail impact of a sustainability approach including key benefits and challenges of use	• LTST provided a standardised way to capture the perceptions of sustainability factors and plans in practice • Identified how a sustainability tool can support teams to navigate sustainability in complex systems
Chapter 6	• Detailed description of 4 improvement team sustainability journeys including description of success against the sustainability outcome framework • Sustainability demonstrated in a number of outcome measures but areas of strength and weaknesses were found demonstrating a spectrum of 'sustainability success'	• Demonstrated design and execution of prospective study and capture of sustainability process and outcomes can be done • Applying holistic measurement of sustainability outcomes provided understanding of what 'sustaining' may look like in practice describing what has continued/discontinued or changed • Provides insight into the unseen work that goes into sustaining an initiative
Chapter 7	• Five common challenges influencing sustainability across all cases • 12 strategies for navigating sustainability in complex systems identified • Tangible actions and strategies to be considered and tested by future initiatives to enhance and promote sustainability in other settings.	• Provides insight in the reality of delivering improvements in complex systems • Complexity lens highlighted links between strategies and attempts to navigate complex systems: *1) Recognising and utilising interdependencies, 2) Encouraging new interdependencies, 3) Promoting sensemaking, and 4) Allowing for and Promoting Emergence*

1. A consolidated knowledge base for sustainability approaches and their impact

Although numerous sustainability approaches exist, the evidence supporting their use in practice was limited (Chapters 3 and 4). Chapter 3 presented a systematic review that consolidated the available literature on sustainability models, tools, frameworks, and other approaches to unite the extensive work conducted across disparate healthcare areas. This represented the first review to consolidate available approaches for sustainability across diverse healthcare settings. This is a significant contribution to the field of Implementation Science as it organises and describes sustainability approaches which have been isolated across healthcare fields and specialities.[44] The review provides a list of available sustainability approaches to aid navigation of the topic by researchers and practitioners. Aggregating the findings on sustainability constructs across across the approaches supported calls for the development of a knowledge base that is useful beyond a single context or setting.[28,33] Proctor et al, specifically identified the need for a systematic review of sustainability tools and a 'repository of measures for sustainability determinants and outcomes'.[1] This work answers that call and will allow individual practitioners and researchers to determine the approaches best suited for their specific settings.[10,45,121]

The *Consolidated Framework for Sustainability Constructs in Healthcare* allows practitioners and researchers to understand the common constructs to consider, and provides a mechanism to conceptualise and analyse sustainability data. Although some researchers have speculated that *'sustainability research needs more measurement tools'*, my work has shown the need to produce new tools cautiously and to consider further development thoughtfully.[28] Continuous production contributes to further division and confusion in the literature and can result in fewer rigorous sustainability studies being conducted and published.[28] The use of the consolidated framework enabled the organisation and interpretation of my data. Throughout my analysis, I adapted and updated the framework as described in the methods chapter, section 2.7.2 Qualitative Analysis. While the framework was considered to be largely fit for purpose, there were adaptations needed to improve suitability in practice Table 46.

Table 46: Evolution of the Consolidated Framework

Evolution of the Consolidated framework for Sustainability Constructs in healthcare
The consolidated framework developed in chapter 3 (Table 21) was used analyse the data within chapters 5 to 7. This process aimed to iterate, validate and improve the framework to increase relevance and applicability to healthcare improvement initiatives. All constructs previously identified in the framework were also seen in my cases. Analysis highlighted the need for amendments to be made to constructs to: expand the definitions; increase specificity; and to introduce new constructs not previously included. Three factors were added to the framework: – **Robust and adaptable processes:** The need for adaptation, and recognition of changing landscapes. – **Project Scope:** The size and reach of projects. – **Feedback and communication:** The need for ongoing mechanisms to communicate progress and learning.

Chapter 4 described a systematic scoping review examining the application and impact of sustainability approaches in healthcare settings. Using the available literature on sustainability outcome variables, seven possible outcomes for sustainability were assessed. This review found only 27% (17/62) of approaches have demonstrated application in peer-review publications. The study found that although sustainability approaches are intended to support long term impact, few studies actually reported if improvements were sustained, with only 21% demonstrating an impact on a sustainability outcome. This study was key in highlighting issues with sustainability reporting and measurement such as lack of time or resource to study initiative sustainability, and lack of clear definitions or outcome measures to assess progress.[28,45,311,343,346] This work revealed two additional sustainability outcomes to be considered as future sustainability outcomes: *Adaptation and responsiveness to change* and *Ability to Garner resources* (see Table 27: Updated Sustainability Outcome Framework on page 143). This resulted in an updated *Sustainability Outcomes Framework* which was applied in Chapter 6.

2. Describing the relationship between a sustainability approach and the process of sustaining

Chapter 5 explored the prospective application of a sustainability approach, the LTST, across three improvement Programmes. Results demonstrate that using LTST throughout initiatives supported: *1) Collaborative working 2) Decision making, 3) Action planning and 4) Reflection on progress and development.* These findings support previous knowledge which had suggested that sustainability approaches could improve understanding of the barriers and risks to sustainability; improve involvement of stakeholders; and provide an overview of the

initiative.[148–150] These findings provide new insight into *how* a tool can support the process of sustaining within complex systems. Specifically, how the LTST provided initiatives with a mechanism for teams to consider collaboration and interconnectivity, engage in sensemaking to understand risks and priorities, share ideas to plan actions, and reflect on path-dependency. These actions have been previously associated with sustainability in a number of studies but this thesis has enhanced this knowledge to explicitly connect these activities with the benefits of the LTST in order to describe how a sustainability approach can impact the process of sustaining.[28,33,74,151,276,303]

Findings also demonstrated that while there were a number of benefits that were supported through the use of the LTST, there were also challenges. Challenges were associated with *isolation, ability to critically reflect, confusion and unfamiliarity, and inability to act*. While tools and models are designed to improve team knowledge and enhance action, it is recognised that tools can be detrimental to team working and take valuable time from the improvement efforts.[35,201,243,309–312,333,349–352] For example, other QI tools such as PDSA cycles have been associated with challenges for teams, related to the complexity of application and the need to adhere to fidelity of use.[201,349,351,352] Health Failure Modes and Effects Analysis (HFMEA) has also been challenging for teams to use in practice due its time consuming nature.[350] Therefore, the identification of benefits and challenges associated with the LTST is not surprising and highlights the need to thoughtfully consider the use and facilitation of this tool in practice. QI work requires substantial time and effort from healthcare practitioners, therefore any time taken to use a QI method should be assessed against its potential benefits and risks.[96,97] To aid teams to use the tool consistently and maximise value in its use, participants proposed a number of facilitators including: *tailored facilitation of the tool, designating a sustainability lead, viewing results over time, and adapting or tailoring the method*. These benefits, challenges, and facilitators outline the complex nature of using QI tools in practice and provide insight into the balanced approach to application needed in future use.

3. Making the sustainability process explicit

The process of sustaining is missed in research studies reporting only continuity or discontinuity of improvements.[22] To unpack the process of sustaining, I followed four improvement teams over a three year period. I employed a case study approach with structured measurement of sustainability factors (with the LTST) and outcomes (with the sustainability

outcomes framework) throughout initiatives. This work provided a structured look at each case's sustainability journey, specifically focusing on aims, challenges, achievements, and sustainability outcomes. Through the examination of case studies, I describe the process of sustaining including the ongoing effort, learning, and adaptations required in practice. The process of sustaining was not linear in the cases. In each initiative the process of sustaining involved an ongoing cycle of recognising risks, weighing potential options, taking actions (or not) and reflecting on the consequences of these actions. These cases demonstrated the dynamic nature of sustaining and reinforced previous learning that sustainability issues occur across multiple stages of initiative implementation and follow-up.[8] This work has also demonstrated that sustainability issues do not occur in isolation and actions to address issues in one area often resulted in knock-on effects for the initiative.[8]

This work also empirically tested an outcomes framework to see how it could be applied to improvement initiatives. The *Updated Sustainability Outcome Framework* was a helpful way to understand what continued, discontinued, or had changed in each case. The use of the framework allowed for the multifaceted contributions of improvement initiatives to be recognised, and provided better insight into the unseen work that goes into sustaining initiatives. While the use of the sustainability outcome framework had its benefits, it also demonstrated the difficulty of studying and understanding sustainability outcomes in practice. In particular it highlighted that evidence for 'Continuation of activities' was easier to collect and understand as teams were able to describe concrete examples of how activities were sustained and systems which had been altered throughout the initiative. These findings provide interesting perspectives on the previous reliance on this measure in past studies.[304] Researchers have questioned the robustness of measuring 'continuation of program activities' as a sole measure of sustainability, saying that it may risk other key sustainability variables being missed.[14,28,304] This study provides insight into why this measure may be used, as it was more readily recalled and understood by staff. These findings may aid future evaluators and practitioners to clearly define sustainability and outline how evidence for each sustainability outcome may be collected.

4. Strategies and actions to influence sustainability

Chapter 7 presented results of the cross-case analysis of the four case studies. This work provides direction and advice for researchers and practitioners on how to influence

sustainability through specific strategies and actions.[49,59,142] The research supported calls for better understanding of, and preparation, for the challenges associated with sustainability.[2,133] Reviewing the sustainability constructs across multiple cases allowed for the complex relationship between constructs to be seen and identified common challenges that each team encountered which impacted their ability to sustain: *workforce stability, effectiveness and impact, patient and public support, organisational priorities and workload distribution.* While previous work emphasised the importance of individual constructs influencing sustainability, this thesis indicated the need for initiatives to move beyond individual constructs to respond to multifaceted issues. This supports previous literature which stated that complex phenomena cannot be described or understood by a list of constructs or factors, but instead requires understanding of the dynamic nature within and between constructs.[45,126,132,377] The *Consolidated Framework for Sustainability Constructs in Healthcare* provided a useful basis for analysis but this work suggested that there was also a need to move beyond individual constructs to describe complex experiences as seen from frontline teams.[10,28] Providing detailed description of multifaceted challenges can provide more realistic accounts of what to expect in sustaining improvement and avoid over simplifying complex issues as single construct risks.

To mitigate issues and enhance prospects of sustainability, teams were required to recognise, respond, and adapt to ongoing issues. This ongoing resilience resulted in the execution of a number of shared strategies and actions. These strategies addressed four themes aiding teams to navigate sustainability in complex systems: *recognising and utilising interdependencies, encouraging new interdependencies, promoting sensemaking, and allowing for and promoting emergence.* Many strategies in this thesis provide further support for the actions and strategies identified in previous work. For example, impacting organisational memory, consistent and continuous training, involvement of program champions and responding to contextual needs, are supported by multiple studies.[7,14,20,43,52,60,117,151,178,378–382,384] This work provides further evidence for these strategies across multiple initiatives and settings. This work presented new strategies not seen in the previous literature. For example, expanding the initiative to other sites and settings was identified as a strategy for sustainability by the cases. While many studies recognise the importance and difficultly in spreading initiatives, few have established if, and how, spread may support sustainability.[21,96,122,385,386] This thesis provided insight into this connection by showing that spreading initiatives aided teams to broaden their population base and increase potential impact and evidence of benefits. It was also seen to promote further legitimacy of the initiative as it encouraged further engagement and recognition.

Undertaking a longitudinal approach to studying sustainability is time consuming and complex. These results have demonstrated that while each case may have a unique sustainability journey, there are shared issues encountered and strategies which have been used to address obstacles. These findings provide tangible actions to be considered and tested by future initiatives to enhance and promote sustainability in other settings.

8.3 Theoretical Contributions

As outlined in Chapter 3, complexity theory was an integral part of my approach from a critical realist perspective.[169] The relationship between sustainability and its conceptualisation in complex systems was a gap in the literature.[66,136] In the introductory chapters, I outlined the concepts of interdependencies, sensemaking, self-organisation and emergence (sections 1.6.1 Planning for and Managing Sustainability in Complex Systems). Applying these concepts to the study of sustainability provided a pathway to focus analysis and interpretation. Below I outline how the use of complexity theory aided this PhD in two distinct ways, and highlight how this thesis can contribute to wider complexity literature.

1. **Capturing 'dynamic' sustainability definitions**

Complexity theory allowed me to adequately define and capture the ongoing learning, adaptations and actions that shape an initiative's ability to sustain. Within my results, each team described both a focus on delivery but also on continued growth, development and spread. This made me reflect on the growing importance of multiple measures for assessing initiatives. If I had not picked a theoretical lens that recognised the role of change, adaptation and development in sustainability, thesis would not have made the insights that it did. For example, a focus on Diffusions of Innovations, would have prioritised the capture and study of continuation of activities by adopters but it would not have elucidated the nature of changes to interventions and delivery.[28,55–58,60] As I sought to understand the process of sustaining, this nuanced understanding of how teams interact, adapt, and respond in practice was critical to answering my research questions.

2. **Moving beyond isolated factors and constructs**

Although a large proportion of sustainability research proposes that the phenomena is made up of a number of constructs, there has been debate about the extent to which sustainability can

be described and understood by lists of constructs or factors.[126,132,377] Complexity theory allowed me to accept the previous research conducted on constructs and supported me to move beyond individual cause and effect relationships to investigate the interconnections and relationships between constructs.[126,132,377] This lens provided a way for me to look beyond isolated constructs to more accurately represent the process of sustaining and what happens in practice. It allowed me to describe how constructs interacted to challenge sustainability from a complex systems perspective.[10,78] This provided valuable insight into the potential challenges to anticipate and strategies to enhance prospects of sustainability which were outlined in chapter 7.

3. Evolving theory on how to navigate sustainability in complex systems

While complexity theory provided a helpful theoretical basis for this work, this study can also contribute new insight to complexity theory in relation to its application in sustainability research. Although complexity theory emphasises the interactions, interconnections, and activities that influence behaviours and outcomes continuously in health systems, very few studies have taken a prospective approach to studying this process in practice.[66,76] In addition, while it is acknowledged that complex systems evolve in response to emerging needs and events, the impact of this evolution on sustainability has not been examined.[66,136] Through this thesis, I build on current understanding of decision making and planning in complex systems to offer new insight into how improvement teams navigate components of complex systems to sustain improvements in healthcare. I have expanded knowledge on how the characteristics of a complex system (interdependencies, sensemaking and self-organisation and emergence) manifest in practice and how they can influence a team's ability to sustain. Through examination of the cases, I describe how teams interact within and across groups, sharing information to improve organisation and delivery of initiatives. These results describe what is required to sustain tasks in practice and provide insight into the patterns of self-organisation that are employed to sustain improvements. This work has expanded knowledge on how interactions within systems result in the emergence of strategies and actions to support sustainability planning and outcomes which has been suggested in previous complex systems research.[66,133]

8.4 Summary of Impact

In the introduction of this thesis, I outlined why sustainability was an important topic to research further, due to its implications for resources, patient care, staff satisfaction, and public opinion (section 1.5 Importance of Sustainability in Healthcare). Research Councils UK defines impact as the demonstrable contribution that research makes to *society*, the *economy* and *academic advances (‘including significant advances in understanding, methods, theory and application’)*.[389] Below I summarise the potential impact of this thesis on these three areas (Figure 48).

- **Academic:** This work provides future researchers and evaluators with a consolidated framework to guide and inform sustainability research and data analysis. It has studied and expanded knowledge on the outcome variables to consider when studying sustainability in practice. This work has evolved complexity theory in relation to its application in sustainability research by describing the interactions, interconnections and activities involved in sustaining improvements.
- **Economic:** Initiatives that fail to sustain are extremely wasteful of human and monetary investments.[8,18] Given the need to maximise impact from resources, it is imperative that mechanisms to promote and enhance the possibility of long-term impact, and cost-effective benefits, be produced.[7] This work provided insight into how sustainability can be supported and influenced in health care organisations to maximise investments made into improvement efforts.[21,122] It provided insight into how sustainability can be assessed and measured to understand the impact of initiatives and described how sustainability should include multifaceted outcomes not previously explored. This work may provide funding organisations with greater insight into the impact of their investments.
- **Societal:** If effective programs are not sustained within practice, potential benefits for patient care are lost.[18,41] Prior to this work, there was limited knowledge of how to influence sustainability and how structured approaches and tools may be used to support improvement efforts.[22] These results can support organisations, teams and individuals to not only understand the process of sustaining, but also provide insight into how sustainability approaches can play a role in supporting sustainability in practice. As failure to sustain can be detrimental to staff morale and public opinion, it is hoped these findings will provide future initiatives with insight into the practical

challenges of sustaining, and support them to navigate these issues in pratice.[19,20,114] The tangible strategies and actions suggested in this thesis can be considered and employed as necessary by future initiatives to enhance and promote sustainability.

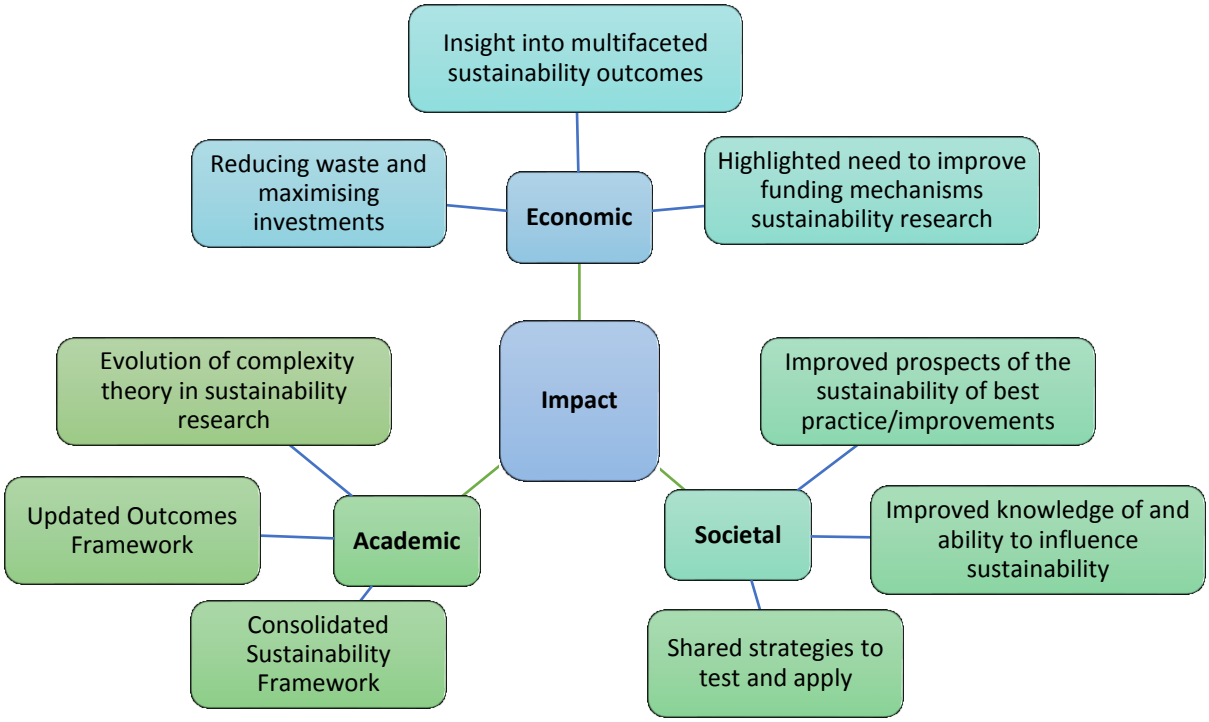


Figure 48: Summary of Impact

8.5 Future direction and research needs

This study has outlined a number of key findings for the field of sustainability research. While a number of important contributions have been made, this work has also recognised areas requiring further inquiry and study. Several future research endeavours have been outlined in the individual chapter discussions such as:

- Rigorous study and reporting of other available sustainability approaches to assess the impact of their use. This investigation would aid in understanding if they can support similar benefits or result in similar challenges.[28]
- Examination of operational definitions and methods of data collection to allow for future research on sustainability to be more rigorous and comprehensive. Future application and testing of the *Updated Sustainability Outcomes Framework* would also allow its potential value in standardising sustainability reporting in future research to be explored.

- Transferability of findings of actions and strategies to other settings and programmes. The exploration of the sustainability strategies within new and diverse settings would provide valuable information on if and how the strategies are used and what alternative actions or strategies are identified in diverse settings.

While there are a number of future directions for this work, two key topics emerged as areas of interest for future work. The need to explore the links between *adaptation and sustainability* as well as *spread and sustainability*.[1,28,45] Below I discuss the need for further investigation into these areas and present possible perspectives that may facilitate examination in the future.

Exploring the relationship between adaptation and sustainability

A fundamental challenge in studying sustainability is the tension that exists between the continuation of interventions as originally designed, and the need to adapt them for use across different settings.[28,40,60] The relationship between sustainability and adaptation has been debated in the literature. Research has indicated that modifications to interventions are often desirable to foster both implementation and sustainability.[22,28,64,383,390] Scheirer (2005), supported this finding within her systematic review suggesting that programs that were modifiable at local levels were more likely to be sustained.[14] On the other hand, some have suggested that without clear fidelity to interventions protocols, there is limited ability to directly link improvements to particular interventions.[156] This inability to demonstrate cause and effect links has been noted as a common shortcoming of QI research.[156]

As seen in this study, adaptation and modifications are often the result of resource availability, changes in priorities, or the emergence of more compatible or effective practices being identified.[10,28,60,391] All cases studied within this thesis revealed that they had continued to evolve and adapt during the follow-up period. These developments and adaptations took many forms (e.g. updating materials with new guidelines or tailoring education sessions to meet the needs of staff groups). Interestingly, none of the cases viewed these modifications as fundamental changes to the intervention and all stated they were carrying out the same initiative. As 'partial sustainability' is more common than continuation of the entire program or intervention, sustained initiatives are likely to look different from what was initially implemented.[10] Few studies explore what changes are made to interventions, why such changes are necessary, and how decisions to change intervention components are made.[28,392] While this

study contributed to exploring the changes made to the studied initiatives through the Sustainability Outcome Framework variable '*adaptation and development'*, more research is needed to address the tension between the long-term sustainability and adaptation.[45]

***A potential way forward*:** My results have shown teams respond to and overcome issues, through modification, adaptation, and resilience but what does this mean for fidelity and planned outcomes? There is a need to understand the trade-offs that are made between fidelity and sustainability and how stakeholders make such decisions.[10] The nature of adaptations and modifications made within initiatives are often not documented or described.[59,393,394] It is recommended that even if the main research interest is a specific intervention, that researchers should still study periods of adaptation and describe the nature of modifications made to interventions.[10,395,396] To investigate such modifications, a framework and coding system for modifications and adaptations of evidence-based interventions has been developed by Stirman et al.[395] This framework identifies 12 different types of content modifications and five types of contextual modifications.[395] The prospective application and investigation of adaptation throughout initiatives could provide much needed insight into the relationship between adaptation and sustainability. My results have reinforced the finding that adaptations will be made within initiatives, therefore future research should prioritise studying this process to unpack why this happens and the potential impact this has on outcomes and sustained services.

Exploring the relationship between Spread and Sustainability

The debate about adaptation and sustainability is also closely linked to the topic of spread and roll-out of successful initiatives. Spread is of particular importance to sustainability, as it has been argued that sustained effects can only be achieved through the reliable spread and replication of an innovation.[40] As noted in Chapter 6, all cases identified spread of their initiatives as a component of their sustainability goals and identified spreading or expanding their initiative as a strategy to sustain improvements. Participants described how spread allowed them to improve population coverage, uptake, and impact as well as improve equity of services across sites. In the literature, spreading initiatives is a recognised challenge for improvement initiatives and this finding was supported in this work.[59,129,374] It is assumed that rolling out to new settings should be easier than initial implementation efforts but results have demonstrated that this is not always the case.[129] For example, Heart Failure found that uptake and use of the bundle at a sister site was difficult given their small implementation team and

differing infrastructures. Spread initiatives often focus on replicating interventions with complete fidelity, neglecting the need for local adaptation and attention to local contextual requirements.[129] In practice, it is recognised that some initiative components may be implemented and maintained with fidelity but it is likely that others will be altered.[13,28] While there are a variety of models and frameworks used to help conceptualise the diffusion or spread of innovations, most frameworks cannot describe what actually happens when an innovation is spread across different organisations.[59,393,394] As a result, the mechanisms and knowledge needed to support successful spread are limited. This work has outlined the attempts and success of spreading initiatives across the four cases and highlighted the challenges encountered. Future research should explore how spread can be examined further and how it can be supported to both expand benefits to patients and support sustainability of initiatives.

A potential way forward: Denis et al. developed a framework to understand the complexity of innovation adoption and adaptation.[393] This work proposes that there is an interaction between an innovation and the adopting system to produce a "pattern of diffusion" over time.[393] This framework suggests that each innovation contains a theoretical 'hard core' that is "well defined and fixed" and a 'soft periphery' that is "less clear and more flexible to manipulation by the adopting system".[393,397] Complex interventions are increasingly being described as consisting of a 'hard core' and 'soft periphery'.[59,393,394,398–400] Defining the core and adaptable components of an intervention has been suggested to guide both implementation and sustainability.[392] Understanding how to operationalise these concepts may aid in progressing sustainability research as well as contribute to supporting the spread of interventions.[28] Unfortunately, isolating elements of interventions is a recognised challenge and not always possible.[14,28,156] Future research should explore how this perspective may support assessment and evaluation of sustainability as well as its potential to facilitate pragmatic implementation efforts that focus on the spread of the most effective aspects of an intervention.[14,28]

8.6 Reflections on Study Design: Strengths and Limitations

It was at times difficult and overwhelming to navigate this complex phenomena but the approach used to triangulate and bound the topic allowed for conclusions to be drawn. This study was underpinned by a critical realist approach, which informed the study design, data collection, and reporting.[167,168] This section reflects on the study design chosen and discusses

possible limitations requiring further consideration. Three specific areas are discussed and potential limitations examined: case study approach, the LTST, and researcher reflexivity.

Case Study Approach

This study used a longitudinal case study design to explore the phenomena of sustainability across multiple cases and settings. The use of in-depth case studies was advised as a mechanism to uncover the process underlying sustained initiatives.[52,176,177] Case study design enabled me to observe and revisit the teams on multiple occasions to understand their development and their attempts to embed initiatives in systems and organisations. This approach also allowed for analysis using multiple sources of data which was advocated from the critical realist perspective.[157,173] Although this approach provided key mechanisms to explore the research topic, some limitations should be considered. Generalisability and depth of cases were both discussed as limitations within chapter 6.[217] Here I highlight particular challenges relating to conducting case study research and the implications of these limitations on this study.

Managing and organising the amount and depth of material collected in case study research is also a common limitation.[215,250] It became apparent in the data analysis phase of this thesis that each case had a rich and multifaceted sustainability journey and I quickly realised it would be difficult to report all cases in great depth given thesis word limit. Word tables were used to initially display data from the individual cases according to uniform categories (aims, challenges, facilitators, sustainability outcomes, strategies used etc.).[215] A qualitative analysis of the collection of case reports and word tables enabled the study to highlight areas of interest and draw cross-case conclusions.[215] While cross case analysis allowed for the relevant research questions to be addressed, the rich description of narratives may have been diluted, and interesting nuances for each case were potentially diminished.[241] I attempted to reduce the impact of this limitation through the presentation of the case reports and specific case examples where possible. This trade-off was a deliberate choice as this study aimed to demonstrate replicability across the cases to understand any potential generalisability and shared learning across cases.[215] Future work may wish to employ a more in-depth study of prospective sustainability within single initiatives to explore each sustainability journey and outcomes in greater detail.

Applying and studying the use of the LTST

Sustainability approaches have been proposed as a way to identify initiative needs, understand sustainability risks, and plan actions to mitigate challenges.[8,16,18,35,151] While other studies have employed sustainability tools, few have outlined the application and engagement processes in detail.[148–150] This thesis examined the application and impact of one tool, the LTST. The choice to apply this tool as opposed to other available approaches was mainly pragmatic based on the CLAHRC NWL evaluation needs which were discussed in the Methods chapter on page 75. The use of a structured tool provided this thesis with a structured way to capture the perceptions and plans of diverse improvement teams across multiple settings and programmes. This tool provided one lens to focus and provide scope to the work and its use throughout this study was invaluable in directing and standardising data capture of this complex phenomena. Results demonstrated that the tool served many positive benefits to teams by encouraging collaboration, risk identification and planning. The use of the tool also highlighted weaknesses within teams associated with isolation and disengagement.

While the tool appeared to benefit teams, there are also methodological limitations relating to its use throughout this study. A key limitation is that the tool has not been validated. Therefore its validity across settings and teams cannot be ascertained. However, this thesis forms part of the initial acceptability and feasibility testing needed to understand if the tool is fit for purpose, through determining whether it could be applied consistently by improvement teams in practice. As noted in the methods chapter, CLAHRC NWL had previously applied the NHS III SM from 2008-2013 and found that securing engagement with the SM across teams was challenging, with teams finding it difficult to understand and apply the model consistently (see section 2.3.4 CLAHRC NWL Sustainability Research).[16,148,200] This experience highlighted the importance of establishing user acceptability and feasibility prior to validation to adapt the tool as needed.[209] It was observed early on in this study that participants interpreted the factors within the tool in diverse ways. The main risks associated with this findings were related to face validity, construct validity, and internal consistency of responses.[364] Observation and interviews demonstrated that participants did not see interpretation of the factors as reducing the value of the tool nor did it hinder the identification of risks or discussions across teams (Chapter 5 section 5.3.2 LTST Impact on the process of sustaining).

However, validation of the tool may hold academic and evaluation interest to support the LTST's use elsewhere. Therefore, the findings and data presented by this thesis require further analysis and wider consideration of the feasibility and necessity of validation. Future work could examine if validation is possible and explore validation tests which may be appropriate to ascertaining tool validity and reliability.

Although validity of the tool was a methodological concern, I mitigated this in a number of ways. First, I attempted to develop construct validity through presentations, teaching and handing out the LTST framework prior to tool use to provide users with a common definition for each factor. This served to provide all teams with a baseline understanding of what each factor was, while allowing for individual interpretation and specificity. Second, as noted in the methods section, a number of steps were taken to validate the findings from each data source. The LTST data was triangulated with the other sources to ensure the results reported within this thesis had sound evidence and support for any conclusions which were drawn.

Reflexivity and Impact

A critical realist perspective requires extensive validation of assumptions throughout the research process.[157,158,173] I described my validation processes in detail in Chapter 2 (section 2.8 Thesis Validation and Reflexivity) and I revisit and reflect on my role and perspective again here. A key concern throughout this work was ensuring consistent reflexivity on my role as an 'in house' researcher and the tensions my insider status brought to the research process.[225,401] As outlined in the methods chapter, my role may have added to bias in the interpretation and presentation of findings.[173,239,255] For example, when I began this research, I had established practical and theoretical assumptions (informed from my experience with past QI initiatives and developing the LTST) which may have resulted in me ignoring or missing other possible opportunities or perspective in the field. I attempted to mitigate this risk by undertaking both a deductive and inductive process of data analysis, where I consciously looked for emerging themes and topics not previously explored or identified. This ongoing process identified multiple new areas for exploration, including the role of project scope, ongoing feedback within teams, as well as the relationships between sustainability constructs. While my status as an 'insider' within CLAHRC NWL may have allowed me to access participants and data more readily, within programmes 2 and 3, I was an 'outsider'.[225,401] This provided me with diverse experience in interacting and engaging with multiple teams where my role was solely as a

researcher and educator. This required constant reflection of my own epistemological assumptions as well as awareness of role being held and how I was perceived by teams.[257]

Across all programmes, my role as an 'impartial observer' and researcher was at times challenging due to my internal assumptions and biases. The use of ongoing communication with my supervisor and colleagues, as well as notes taken in my reflective diary, allowed for consistent examination of how these biases were potentially impacting my data collection and interpretation. The use of critical multiplism and pluralism, allowed me to have reassurance that my interpretations of the data were supported by multiple sources, individuals, and documents.[158] Taking a critical realist approach was key in recognising and accepting my internal experiences and biases. It allowed me to accept that my findings may be biased but they represent my interpretation of the truth and the reality which I observed, which was supported by triangulation of data sources and validation from participants.

8.7 Implications and Recommendations

This thesis has a number of implications for practice and policy. These are outlined in the following section.

Implications and Recommendations for Practice

In complex systems, it is recognised that people respond to their environment by using internalised rules that drive action.[66] While the behaviour of a complex system is unpredictable, it is possible to make *'generally true and practically useful statements'* about how complex systems will behave as there are overall patterns which can be observed.[66,402] For example, while no one directs how to interact in business meetings, behaviours naturally emerge from relatively simple rules which dictate actions in such situations, everyone behaves adaptively and decisions and actions are taken as necessary.[66] This learning can be applied to the findings presented in this thesis. While I was unable to predict the sustainability or actions of the cases, emergent lessons and patterns were observed. From these patterns, a number of 'rules' can be suggested.[66] Here I combine learning across the programmes, cases, and sources to summarise nine rules for navigating sustainability in complex systems. Each rule offers learning for future improvement work and recommendations for practice that can be considered in future initiatives.

i. Share workload and designate tasks to ensure ongoing and consistent delivery of the initiative

While the importance of key leaders and champions has been promoted in many publications[14,52,117,151,378,379], having a single individual seen as the core supporter of the initiative was a risk to sustainability in the cases studied. This issue was highlighted by Wellbeing in particular, where the team worked to ensure team ownership and discourage the initiative being seen as belonging to an individual. This was also an issue facing Heart-Failure but was not addressed adequately. The team highlighted that they wanted to engage staff through teaching sessions but follow-up showed that data collection and entry was still completed by one individual. This posed a risk to the work continuing in the long term. To promote sustainability, effort must be made to share workload, and designate tasks to the implementation team to ensure ongoing and consistent delivery of the initiative.

ii. Collect diverse process measures to act as proxy measures of success before the true impact can be ascertained

The literature has shown that many initiatives struggle with producing evidence of benefits in improvement initiative timescales.[10,20,50,130,305] All cases identified producing and communicating evidence in the duration of study as a challenge. Improvement teams should be prepared to collect appropriate process measures which can act as proxy measures of success before the true impact can be ascertained. This will allow the team to have communicable data to garner support from leaders and support continued delivery of the work by staff members.

iii. Build ongoing mechanisms to allow new stakeholders to understand the initiative delivery and rationale for its continuation

Consistent and continuous training and ongoing workforce development are known to help strengthen initiative activities and support initiative continuity.[7,43,178,382] All teams faced the issue of staff and stakeholder turnover, resulting in the need to re-engage and reassess partnerships and working relationships. From these challenges, it became evident that teams need to have broad engagement from multiple stakeholders with disseminated and multifaceted interest in the work to ensure continuous support and promotion. Teams must build ongoing mechanisms to engage with leaders and staff to allow new staff and stakeholders to be informed about the work (specifically how it is delivered and the rationale for the importance of continuation).

iv. Understand the effort required to deliver continuous improvement in care

The end of funding did not mean the end of the work or effort for any of the cases. Stakeholders and staff often want to believe that at some point they will be able to leave the improvement and it will continue 'on its own'. This was not observed to be true, as the need for continued effort, implementation, and measurement continued for all sites. The challenge of continuing effort poses an issue for both the momentum and interest the work is able to garner. This has also been seen to slow progress as teams may 'lift their foot off the pedal' and reduce effort and attention to the initiatives.[115] Delivering improvements in care will always require some effort, this effort can be minimised and strategically planned for with the use of suggested strategies. For example, integration into systems and measurement structures allowed staff to build in reminders and prompts for the work, as well as update on progress to support continued delivery.[20] In order to achieve sustainability, the effort required needs to be understood and not underestimated if feasible workload and roles are to be established.

v. Build interest and maintain support by communicating how the initiative can support organisational priorities

This work has demonstrated that there will inevitably be competing priorities for all improvement initiatives. For initiatives to sustain, they must find ways to build interest and support from their organisation.[112,113] This can be done through highlighting how initiatives align with organisational priorities and through ongoing 'sales pitches' to ensure the initiative is understood and the impact it can bring is valued. Teams used presentations, publications, meetings, and sharing 'good news' stories within their organisation and in the wider environments to promote the initiatives.

vi. Respond to emerging evidence and needs to remain relevant and maintain momentum

There is evidence that interventions that are not adapted to the local context will not sustain.[22,60,64] All cases demonstrated the need to be responsive and adapt their behaviour, interventions, systems or processes at one time or another. There were key areas relating to sustainability which were addressed through adaptation: responding to changing landscapes and responding to changes to the evidence base or guidelines. There was a consistent acceptance across the cases that initiatives had to respond to continually changing landscapes to stay relevant. The teams recognised that they often had little or no control over these situations. This proved challenging, as they had to either fight to maintain their status or to

adapt their approach to ensure they were meeting demands. Although teams may be confident in the mechanisms and techniques for initiative delivery they must be prepared to be responsive and resilient. The ability to respond to ongoing issues will ensure that the initiative does not lose momentum or become unsuitable for a given setting.

vii. Explore both the positive and negative impact associated with making adaptations to initiatives

Related to the above rule is knowing when adaptation is not appropriate. For example, if it fundamentally impacts the ability of the initiative to produce benefits. As discussed in section 8.5, there is a well-recognised tension between the continuation of interventions as originally designed, and the need for adaptation for optimal application.[28,40,60] While the studied cases recognised the need to be flexible in initiative delivery, a number of participants were concerned with fidelity to interventions. For example, in Wellbeing, participants feared that their rationale for the chosen intervention would not be translated to new staff and therefore ineffective or wasteful changes could be made to the assessment form. Thoughtful and well-planned adaptations are needed to ensure initiatives are able to continue to deliver intended benefits to patients.[40,112]

viii. Refine aims and iteratively define objectives to ensure targets are realistic

The time needed to set up, address underlying issues and demonstrate effectiveness of interventions was a key challenge for the cases. Traditional initiative timelines often produce unrealistic targets for teams and can be detrimental to the continued work as stakeholders begin to disengage from seemingly unproductive efforts.[112] Teams should be aware that they may not complete all the initiative work within set timeframes and they should be prepared to continue to dedicate time to delivering the initiative. This will aid in sustainability by supporting teams to understand the need to refine aims and objectives iteratively to respond to the natural life cycle of their initiative.

ix. Approach spread cautiously as it may negatively impact the initial intervention and undermine progress

While spread can aid teams to garner more impact and support to enhance sustainability, there will be issues as initiatives attempt to expand.[59,129,374] Teams should not underestimate the effort and time required to scale-up and spread their initiatives. There is a need to use caution

when spreading as this can potentially have a negative impact on the initial intervention site and undermine any progress which has been made. Before a team can spread, they should first be aware of the potential impact it will have on the original site, and plan for the additional workload.

Implications and Recommendations for Policy

Researchers, practitioners and policy makers can no longer accept the 'implement and forget' mentality, as failure to sustain has practical, financial, and ethical consequences.[5,8,18,28,96,97] There is a need to stop improvement waste and maximise any investment made to improve health services.[7,10,11] Organisational leaders, funders and policy makers must encourage and support initiatives to build capacity for improvement and understand the need for robustness in implementation and sustainability research. This study has identified several implications for policy makers and practitioners concerned with sustainability of improvement initiatives and sustainability research more generally.

i. Consider continuous improvement instead of improvement initiatives

There is a need to present realistic improvement journeys and diminish the perception of isolated and time bound improvement initiatives. Findings from this work have demonstrated that the initiative duration was a consistent issue for the teams as they struggled to meet targets by specific dates and demonstrate findings by the end of their funded period. The time needed make an improvement in care and demonstrate impact should be more realistically presented and accounted for. This will require funders to recognise the limitations of having defined timelines for an initiative. Strict timelines may pressure initiative teams to demonstrate findings by any means necessary, perhaps employing more people and using more resources initially. These steps can produce quick demonstrable benefits but as they are set up in unrealistic conditions, the potential for sustainability is limited.[111] Policy makers should work with practitioners to understand how we can accurately capture a 'full' and 'realistic' initiative journey as well as support implementation in true conditions to enhance ability to embed and sustain changes.

ii. Create funding mechanisms for sustainability research

Related to the implication above is the need for funding mechanisms that recognise the complexity and value of sustainability research. As mentioned in the introduction to this thesis,

there is still very little research which focuses on what happens to projects after funding ends.[59] Current funding mechanisms prioritise 'new' and innovative changes but this has significant consequences for healthcare teams and improvement initiatives. Teams are encouraged to continually implement 'new' interventions with little attention to what has happened to the previous work. Funding streams should make room for opportunities to evaluate, study and follow the sustainability of initiatives. This recommendation echoes previous calls which suggested that funding agencies supplement implementation research grants to learn more about how initiatives are sustained, and provide multi-year funding for data capture of sustainability trends.[1,45]

iii. Recognise the effort of Improving

Related to rule four above, organisations, managers and funders should also be aware of the time and effort being dedicated to sustaining and embedding practices. While it is recognised that initiatives require a substantial and continual commitment of time and resources, this effort and time is not always planned for, or recognised as demonstrated in this thesis.[96–98] This work found that many initiatives relied on the hard work of a few individuals, who took their own time to dedicate to the improvement initiative. The sustainability of initiatives should not rely on the extraordinary effort of individual champions but should be an organisational culture and commitment which is supported and recognised.[126] This work provides organisations with a more realistic representation of what sustaining in practice requires, and emphasises that it must be thoughtfully considered and resourced.

iv. Progress Evaluation for Sustainability

Viewing sustainability as both a process and outcome posed many challenges in terms of conceptualising and navigating this topic. This comprehensive perspective allowed me to describe a full picture recognising both the process of sustaining as well as the sustained outcomes. This work demonstrated the need to move beyond binary (yes/no) research studies on sustainability.[28] As shown in Chapter 4, most studies rely only on measurement of continued practices but the true nature of sustaining is multifaceted. This study has shown the depth and complexity of sustaining and outlined nine potential measures to provide a broad overview of what sustainability may look like. Future funding mechanisms and research should be dedicated to exploring sustainability processes and outcomes to fully understand initiative impact. Future evaluation should also capture why outcomes were not sustained. The

description of how, and why, an initiative has changed would offer more nuanced learning for future improvement teams, and provide further insight into what sustainability 'looks like' in practice.

8.8 Conclusion

Sustainability of improvement initiatives is recognised as one of the 10 challenges to improving quality in healthcare.[112] This work explored this complex issue to provide better understanding of how sustainability is conceptualised and navigated in practice. This thesis aimed to investigate the processes by which improvement teams influence the sustainability of their initiatives. I have prospectively studied how individuals and teams manage and respond to sustainability challenges and how sustainability is supported throughout improvement initiatives. I have investigated how a structured tool, the LTST, was used within improvement teams to prompt action and identify risks to sustainability. This work has contributed to the field of sustainability research and Implementation Science by providing valuable insight into the process of sustaining as well as the actions and strategies that are employed to enhance and influence the prospects of sustainability over time. The study of sustainability poses a significant challenge to researchers due to its complex theoretical underpinnings and numerous factors, interactions and relationships.[8] The use of a critical realist paradigm, along with complexity theory, provided the framing necessary to carry out this study with as much rigour and reflection as possible. This lens also allowed me to provide new insight into how sustainability can be studied and navigated in complex systems.

The findings put forth in this thesis demonstrated that sustainability can be, and is, influenced throughout improvement initiatives. There are shared lessons to be gained from looking across initiatives, including the use of common strategies and actions. The 'rules' presented above provide guidance for both those participating in and managing improvement initiatives. While the rules appear simple in nature, adhering to them will be a major challenge for many initiatives. Some may not even be possible, but understanding the risks and shortcomings of initiatives may prepare improvement teams for the challenge of sustaining in practice. Although many empirical and theoretical contributions have been made, many areas for future research are needed. Specifically, work to unpack the relationship between sustainability and adaptation as well as spread is suggested.

The field of sustainability research is growing, with thoughtful and interesting sustainability research projects being commissioned at a large scale. For example, a newly funded Canadian study (October 2018), led by researchers the University of Toronto and the University of Alberta, will examine the sustainability of a quality improvement intervention implemented in Canadian care homes across three provinces.[403] Exciting grants and centres are also being established. For example, the Health Foundation in the UK is establishing a new specialist unit 'The Health and Social Care Sustainability Research Centre' which will work with a number of sustainability research units across the UK to help ensure the long-term sustainability of health and social care. This signifies that the importance and significance of sustainability research to healthcare and the population is increasingly being recognised.

Given the economic climate, aging population and increasing demand and specificity of healthcare needs, health care organisations cannot afford to waste limited resources.[7,10,11,21] Therefore, in order to maximise investments and realise longer term benefits for patients, we need to prioritise sustainability research, as well as support ongoing improvement initiatives to enhance chances of sustainability where possible. This emphasises the importance of the contributions made within this thesis which provide a platform for future research in these areas.

9.0 References

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10.0 Appendices

Appendix A: LTST Development Paper_BMJ Open

BMJ Open

What makes a sustainability tool valuable, practical and useful in real-world healthcare practice? A mixed-methods study on the development of the Long Term Success Tool in Northwest London

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Abstract

Objectives Although improvement initiatives show benefits to patient care, they often fail to sustain. Models and frameworks exist to address this challenge, but issues with design, clarity and usability have been barriers to use in healthcare settings. This work aimed to collaborate with stakeholders to develop a sustainability tool relevant to people in healthcare settings and practical for use in improvement initiatives.

Design Tool development was conducted in six stages. A scoping literature review, group discussions and a stakeholder engagement event explored literature findings and their resonance with stakeholders in healthcare settings. Interviews, small-scale trialling and piloting explored the design and tested the practicality of the tool in improvement initiatives.

Setting National Institute for Health Research Collaboration for Leadership in Applied Health Research and Care for Northwest London (CLAHRC NWL).

Participants CLAHRC NWL improvement initiative teams and staff.

Results The iterative design process and engagement of stakeholders informed the articulation of the sustainability factors identified from the literature and guided tool design for practical application. Key iterations of factors and tool design are discussed. From the development process, the Long Term Success Tool (LTST) has been designed. The Tool supports those implementing improvements to reflect on 12 sustainability factors to identify risks to increase chances of achieving sustainability over time. The Tool is designed to provide a platform for improvement teams to share their own views on sustainability as well as learn about the different views held within their team to prompt discussion and actions.

Conclusion The development of the LTST has reinforced the importance of working with stakeholders to design strategies which respond to their needs and preferences and can practically be implemented in real-world settings. Further research is required to study the use and effectiveness of the tool in practice and assess engagement with the method over time.

Strengths and limitations of this study

- ► Feedback received from potential users of the Long Term Success Tool (LTST) throughout its development allowed us to design an approach that has responded to user preferences and addressed issues with language, length and practicality.
- ► The LTST builds on established literature and aligns well with other sustainability models but is distinguished from other approaches by its practical design and ability to draw on team suggestions for action planning.
- ► A systematic review of the literature may have strengthened our approach and uncovered further articles, but due to the practical time constraints of our programme, this was not possible.
- ► A limitation of this work is the potential for responder bias throughout development stages.
- ► Prior relationships between researchers and participants was identified as a possible source of bias, as participants may have responded in ways that were seen as more desirable to the researchers.

Introduction and Objectives

Significant financial and human resources are invested in initiatives to improve the quality of healthcare and deliver better patient outcomes. While many initiatives show patient benefits or improvements in care processes or clinical outcomes initially (eg, in the period when resource is available to introduce new practice), these often fail to sustain in the longer term.[1–5] As a result, there is growing research interest in this area, with studies showing wide variation in the sustainability of initiatives. Self-reported measures have shown that up to 60% of programme sustain (at least in part), while studies using more objective measures of sustainability

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(such as independent observation) report lower rates of sustainability from 6.7% to 45%.[3 6]

This area of research is further complicated by several definitions of sustainability in the literature and little consensus on what constitutes 'achieving sustainability'.[17] Despite these issues, three domains of sustainability have been consistently used within the literature; continuation of initiative activities (maintenance of the intervention or practices that were introduced), continuation of the health benefits which resulted from the initiative (health outcomes remain stable or get better) and capacity built in the workforce (the skills gained by being involved in the initiative that can support ongoing high-quality care or the attainment of skills which enable the workforce to continually improve).[1] Given the complexity and dynamic nature of healthcare and healthcare delivery, we believe that all three domains are necessary to define and assess sustainability. For these reasons, we have chosen to define sustainability as: a dynamic process where staff and others involved have the capacity and capability to monitor and modify activities and interventions in relation to the health benefits they wish to achieve and in response to threats and opportunities that emerge over time. As sustainability is being seen as a process and not an end point, this definition does not include a specific time frame for sustainability. Time frames should be defined by initiative teams and stakeholders and be based on the goals of the improvement initiative with respect to the intervention, desired outcomes, disease area and setting.

Navigating the relationship between achieving initial 'successful' implementation and achieving long-term sustainability is a challenge.[1 8–10] It has been noted that over 60% of implementation frameworks include sustainability stages.[11] Factors contributing to sustainability of improvement initiatives often relate to how the improvement initiative is planned and conducted from the outset, suggesting an interdependent relationship between factors that influence initial success and those that influence long-term success.[1 8 9] Although the evidence shows an overlap in factors influencing both implementation success and sustainability, there is lack of clarity on what conditions may result in initial success but may or may not result in the sustainability of improvements. For example, an initiative may achieve initial success by providing extra resource or putting pressure on the workforce, but once the resource or pressure are removed the benefits achieved are not sustained.

Addressing sustainability in practice

In the current healthcare climate of increasing demands and competing priorities for resources, healthcare planners and stakeholders are increasingly concerned with the long-term impact of their investments.[3 10] This has highlighted a need to understand how sustainability of improvement initiatives can be influenced and how specific approaches may help support sustainability.[3 10]

Defined procedures for addressing sustainability in improvement initiatives do not exist but many have suggested that sustainability indicators or factors can be used to monitor and influence sustainability over time.[1 4 12–14] Multiple strategies and approaches such as models and frameworks have been created to highlight such factors, but issues with tool design and content have been identified as barriers to their use in healthcare settings.[10 15–18] Specifically, poorly designed constructs, inadequate coverage of items and lack of clear definitions have impacted application and outcomes in past use.[15–18] Using methods well in practice is a recognised challenge for improvement teams, highlighting the need for all methods to be designed to be practical for use in real-world healthcare settings.[19–22]

The application of one sustainability method, the National Health Service Institute for Innovation and Improvement Sustainability Model (SM), has been previously described.[8 23] The SM is a self-assessment tool that details key factors that increase the likelihood of sustainability and continuous improvement.[24] The model is used to raise awareness of 10 factors for sustainability and prompt teams to consider actions to increase the likelihood of sustainability.[24] Application of this model demonstrated that while the SM raised awareness of determinants of sustainability and was perceived as valuable, teams found it difficult to understand and to apply the model routinely.[8 23] In particular, concerns were raised about the clarity the language used within the model, the user friendliness of design, the length of time taken to complete the questions and suitability for continuous use in healthcare settings.[8]

The purpose of this study was to collaborate with stakeholders to develop a sustainability tool relevant to people in healthcare settings and practical for use in improvement initiatives. To inform the tool development, we explored the following research questions:

1. How do sustainability factors identified in the literature resonate with the experience of those in improvement projects in healthcare?
2. What features or characteristics make a sustainability tool valuable, practical and useful in real-world healthcare practice?

Design

setting

Research was conducted within the National Institute for Health Research (NIHR) Collaboration for Leadership in Applied Health Research and Care for Northwest London (CLAHRC NWL).[25] CLAHRC NWL improvement projects cover a range of health problems and disease areas that include primary care, secondary care and community settings that are delivered over 18–24 months with the aim of sustaining improvements beyond this period. To support multidisciplinary teams to implement changes CLAHRC NWL systematically applies Quality Improvement (QI) methods such as the Model for Improvement and Action Effect Method.[19 23] The approach previously included use of the SM (2008–2013) but following internal

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evaluation and published research, it was acknowledged that a new more user-friendly method for sustainability was required to meet the needs of improvement teams.[8 23]

Participant information

Participants in this study included members of CLAHRC NWL improvement initiative teams and staff. These members come from various backgrounds: multidisciplinary healthcare practitioners (doctors, nurses, allied healthcare professionals), patients, carers, healthcare managers, directors, analysts and researchers (many participants hold overlapping roles, ie, nurse who is also a project manager). Other participants were also included at the engagement event and piloting. Although the majority of attendance is from improvement teams, these events were open to the public so additional participants included students, fellows, community members and industry partners. Specific participation from these groups is outlined within each development stage and summarised in the results.

Methods

Tool development was conducted in six stages. The first three stages: scoping review, group discussions and the stakeholder engagement event focused on reviewing the literature findings and their resonance with stakeholders in this setting. The last three stages: interviews, small scale trialling and piloting contributed to designing and testing usability of the tool. The researchers within this study had participant observer roles.[26] They provided teaching, facilitation and explanation throughout the development stages.

Scoping literature review

A scoping literature review was undertaken to examine the extent, range and nature of research activity related to sustainability approaches.[27] The *r*esearch question guiding this review was: 'what approaches have been proposed to assess sustainability in healthcare and what sustainability factors are examined in each method'? *Identifying relevant studies:* A number of reviews had previously been published to identify factors for sustainability.[3 6 28] These reviews were used as a starting point to identify relevant authors and publications including snowballing of relevant journal articles, reference lists and the PubMed options of 'similar article' and 'cited by-' articles. *Selecting studies:* We sought approaches (published models, tools, strategies and frameworks) that identified sustainability factors and themes. Papers that introduced or described a sustainability approach were included. Papers only defining or constructing concepts of sustainability outside of a structured approach were excluded. Commentary, posters, protocols, conference proceedings, editorials and perspectives were excluded. *Charting the data:* A data extraction form was developed for identified articles. Data extraction included: approach name, approach purpose, year published, type (model, scale, tool, checklist, framework), sustainability themes identified and scoring mechanism. One author (LL) screened the retrieved papers for inclusion and extracted the data from the articles. Data extraction was independently checked against the full-text articles by a second author (CD). Any discrepancies were discussed between authors and were resolved by consensus. Inclusion and exclusion criteria were refined to reflect these discussions Agreement was reached for accuracy of all studies. *Summarising the results:* All sustainability constructs (factors, questions, criteria, etc) identified in the approaches were extracted for thematic analysis. Aggregate themes were developed by combining similar or overlapping concepts and removing duplicate or redundant labels. Overarching sustainability themes were created using a mapping software.[29]

Group discussions

Three facilitated group discussions were held with CLAHRC NWL team members to understand the perceived relevance of the literature review results against CLAHRC NWL team expertise and experience. Discussions were held during a weekly CLAHRC NWL meeting between core staff. The themes from the scoping review were provided on paper hand-outs to the attendees and an open discussion took place to determine the resonance and clarity of the themes presented. Observation notes were taken during group discussions. Notes were transcribed and findings were discussed among the research team to inform iterations of language and representation of themes which were iteratively adapted and presented at consecutive discussions.

Stakeholder engagement event

Consolidated sustainability themes were presented to stakeholders at a CLAHRC NWL Collaborative Learning event in April 2014 to check the relevance and language against stakeholder views. In facilitated group discussions, participants provided their views on the resonance of these themes as well as identified any missing themes not seen in the literature. Designated note takers captured key learning and suggestions from the discussions. Field notes were collected and transcribed by one researcher. Findings were summarised and fed back to the research team to inform next steps and tool iteration.

Interviews

Interviews aimed to collect in-depth information on value and practicality of tool design. A purposive sampling strategy was used to recruit interviewees. Participants were selected based on their role within diverse CLAHRC NWL improvement projects, their level of knowledge of their project and their experience with the SM (we sought both those with and without experience in using the SM to ensure we had a balanced sample of those with prior opinions of the SM). This approach aimed to maximise the diversity of perspectives gained from the interviews.[30] All interviews were carried out face-to-face in a workplace setting by one author (LL). A semistructured interview

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guide was used for all interviews. The interview guide used open ended questions on tool value and features that would be most or least desirable to identify interviewee priorities. Interview questions explored the design of questions and statements used to draw attention to factors for sustainability as well as views on collating and presenting data to facilitate discussion and action. No specific questions on the sustainability themes were asked as the themes and factors had undergone two iterations with participant comments so further in-depth study was deemed unnecessary. The final interview question showed participants an early mock-up of the tool design on which they commented freely. Interviews were audio recorded and uploaded onto qualitative software Nvivo V.9. Audio recordings were coded directly on Nvivo using thematic content analysis.[31] A preliminary coding structure was developed using the interview questions as coding nodes, with themes inductively derived to summarise responses and record patterns in the data. The coding structure was iteratively developed, integrated and refined as further interviews were added to the dataset.[32] Results have been summarised using descriptive summaries and example quotes with explicit links to source text.

small-scale trialling

A group of individuals involved leading QI projects as part of a CLAHRC NWL fellowship programme were asked to trial a draft version of the tool. Trialling with this group aimed to understand the practical application of the tool including the approximate amount of time to complete by a wide range of people with diverse experience and expertise in improvement initiatives. Each participant filled out the tool for their own QI project. After completion, the group discussed the experience and posed questions on use. Critical feedback and suggestions for tool development were recorded as observation notes and summarised by the research team to inform tool iterations and piloting.

Piloting

The resulting tool was piloted in July 2014. Piloting aimed to provide an opportunity for further comments and suggestions on practicality of the tool in healthcare settings, and to measure if the tool could be completed within an acceptable time frame. A brief presentation given to participants to outline tool design and instructions for use. Participants were asked to fill out the tool for their individual QI projects. Individuals without a formal project were asked to fill out the tool with a hypothetical project in mind. Participants were given 15 min to complete the tool and a 20 min facilitated group discussion followed. Designated note takers recorded key observations and feedback to inform tool iteration.

Results

Each development stage allowed for iterative adaptation and refinement of concepts, content and design of the tool. Key iterations from each stage are summarised in figure 1. The number and roles of participants is outlined in table 1. The following section discusses results from each development stage and concludes with an introduction to the resultant tool.

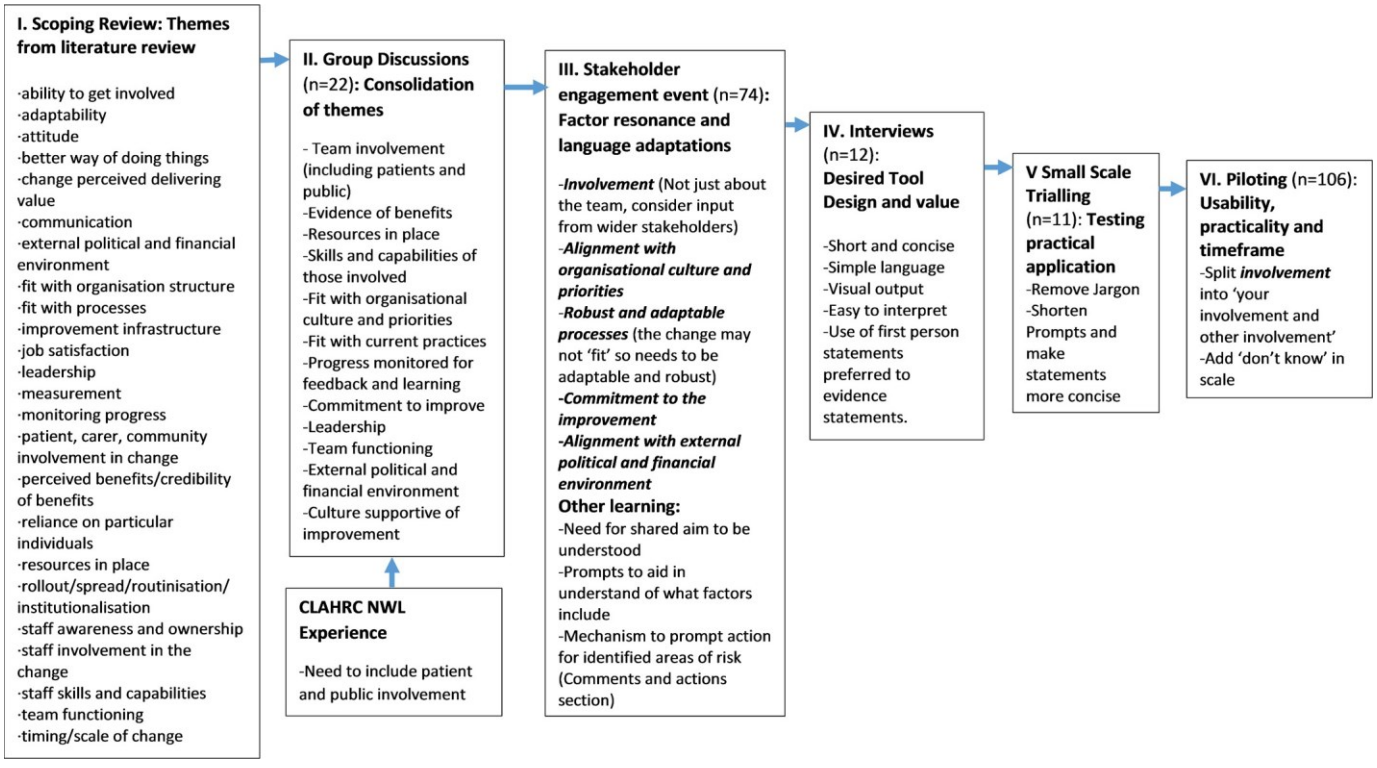


Figure 1 Tool development stages and iterations

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Table 1 Number of participants by roles

	Number of participants by role							
	Multidisciplinary healthcare	Healthcare or project	patient or	Researcher	Student/	Data		
I. Scoping review	—	—	—	—	—	—	—	0
II. Group discussions	5	9	0	3	—	3	2	22
III. Stakeholder engagement event	22	12	10	8	7	1	7	74
IV. Interviews	6	3	1	—	—	—	2	12
V. Small-scale testing	6	1	3	1	11	—	—	11
VI. Piloting	30	16	17	6	8	—	20	106

scoping review

The scoping review identified 81 publications for potential inclusion. Titles and abstracts were examined and 35 articles were retrieved in full text for full documentary analysis. Of these, 19 were excluded (16=nosustainability approach identified, 3=protocol, commentary or conference poster). In total, 16 publications which identified sustainability approaches were included in this review. The sustainability approaches consisted of six models, five frameworks, four tools and one scale. The approaches aimed to evaluate sustainability, plan for sustainability or provided guidance to study or influence sustainability of initiatives. Thematic analysis identified 25 overarching themes impacting sustainability (figure 1). Online supplementary appendix A summarises the approaches found and the sustainability constructs extracted. Results demonstrated reasonable consensus in the literature on factors influencing sustainability. The review uncovered themes not explicitly covered in the SM such as considering resources for the improvement, and the impact of the wider environment on initiatives. No strategy explicitly included the importance of involving patients or carers as an aspect of sustainability which was a key finding from previous CLAHRC NWL work.[8]

group discussions

In total, 22 individuals participated in the internal CLAHRC NWL group discussions. Discussions lead to combining themes that had different labels but were seen as having related or overlapping definitions. Discussions also identified where themes may be confusing and need to be expanded to underlying concepts to be relevant to improvement setting. For example, the literature theme of 'staff skills and capabilities' was expanded to include skills and capabilities of all those involved which may include as patients, carers or other stakeholders who participate in QI projects. Academic jargon and terms were also removed such as 'routinisation' which were seen as unhelpful or potentially confusing. These discussions resulted in changes to the language used and theme consolidation to form a list of 12 factors impacting sustainability (figure 1).

stakeholder engagement event

These factors were presented to stakeholders (n=74) in April 2014. The majority of the factors resonated well with stakeholders and were recognised as relevant to healthcare settings but in some cases the factor language needed to be adapted to align with stakeholder expertise and understanding. For example, the factor, 'Fit with Current Practice' was found to be problematic for participants. Although this factor was meant to convey the importance of interventions being aligned with current practice, many stakeholders mentioned that often improvements must be different from the current ways of working so trying to fit in with 'current practices' would not be desirable or possible. The factor was changed to 'robust and adaptable processes', highlighting the need for interventions with the ability to adapt to local settings.

Stakeholders also identified missing concepts and concepts they felt were not clearly represented in the current factors. For example, establishing a shared aim for a project was suggested as an explicit prompt underlying the factor 'commitment to the improvement'. Desirable design elements were also highlighted. Participants stated that team members entering scores should have the opportunity to comment and suggest actions to improve the prospects for sustainability. They suggested that comments could be brought together for each factor to provide a starting point for action planning based on team member ideas. Suggested changes were used to adapt language and definitions as well as inform design of the scoring mechanism of the tool.

Interviews

Interviews (n=12) allowed detailed views from diverse stakeholders to be identified. Interviewees represented perspectives from multiple QI projects. Projects included frailty assessment in acute care, patient experience measurement for sickle cell disease, clinical pathway development for allergic conditions in children, medication review in the elderly, bundle development for chronic obstructive pulmonary disease and diabetes education in community settings.

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Interviewees discussed sustainability measurement, tool value and functionality. Stakeholders unanimously expressed a desire for a tool that is simple to use and quick to complete:

> Brevity I think is the theme. It is very hard to have yet another form to fill or another algorithm to think about, for people who are already over worked and over stretched.(I3)

Interviewees desired a flexible tool with the option of quick review of the factors with any guidance or supportive text being brief and concise. Participants felt that using reflective statements to illicit an overall rating was a good way to get people thinking and provide an engaging format for the tool:

> I think overall impressions are powerful. You get a general feel and I think that is all you can hope for because otherwise…it will not be possible to make it user friendly. (I4)

The data and outputs used to stimulate discussions needed to be simple to access, interpret and present back to team members:

> I think most clinicians are familiar with a RAG (Red, Amber, Green) rating system so that would be easy for people to understand quickly. (I7)

From this feedback a draft tool was developed.

small-scale trailing

CLAHRC NWL fellows (n=11) trialled a draft version of the tool in June 2014. Each fellow was undertaking a QI project across diverse topic areas and settings (for example, service redesign, app development, patient experience measurement and staff training package development). Trialling the tool resulted in refinement the tool's prompt text to reduce the overall length. Stakeholders commented that the tool was a good reminder what to consider for sustainability but suggested changes to some of the language within the tool to remove terms perceived as 'jargon'. For example, in the factor 'Resources in place' original prompt text read: 'I am given sufficient headspace and time to dedicate to the improvement', after discussion the term 'headspace' was removed as it was seen as confusing to some participants. All participants completed the tool within 15 min. This time frame was discussed and seen as acceptable, with the fellows commenting that no more than 15 min should be allotted for routine tool use in practice.

Piloting

The tool was piloted with 106 participants (83 of which returned a completed tool to the research team). Fifty-two participants indicated that were involved in active QI projects. This included 9 CLAHRC NWL QI projects across diverse topics (such as sickle cell disease, allergic conditions in children, polypharmacy in the elderly, chronic obstructive pulmonary disease and congestive heart failure) as well as 19 projects outside of the CLAHRC NWL programme. Piloting with stakeholders demonstrated that majority of participants completed the tool in the projected 10–15 min time period. Stakeholders engaged well with the prompts within the tool, commenting that they provided a simple format to begin consideration on how each factor may impact their initiatives. Participants commented that the tool was easy to use and that the statements and questions enabled good discussion and 'promoted deeper thinking' allowing them to think about things they had not previously considered.

Regular scoring and review of factors was discussed and participants agreed in the necessity of consistently reviewing the changes to sustainability throughout their initiatives. Use every 3 months was recommended by stakeholders, as they felt this time frame would be feasible given the ease and design of the tool and the potential for changes and turnover of staff in settings. Participants suggested the addition of a 'don't know' and 'no opinion' option to the tool as they did not want to make a forced choice and rate a factor that they did not have enough information to make an accurate rating. During piloting, stakeholders questioned the appropriateness of the term 'sustainability'. Many stakeholders felt that 'sustainability' did not accurately capture the need for potential adaptation of initiatives or the desire to continually improve practice. Stakeholders wanted a term that would include both sustained improvements as well as the long-term commitment to improvement. These discussions resulted in the term 'long-term success' being used in place of sustainability to represent the aim that stakeholders desired. Feedback was used to iteratively develop the tool, which was then rolled out for wider use by CLAHRC NWL teams in January 2015. The final design of the tool and description for use is discussed below.

The Long Term Success Tool (LTST) Purpose

The LTST aims to support those implementing improvements reflect on 12 key factors to identify risks and prompt actions to increase chances of sustainability over time.

The factors

The factors included in the tool are: commitment to the improvement, involvement, skills and capabilities, leadership, team functioning, resources in place, evidence of benefits, progress monitored for feedback and learning, robust and adaptable processes, alignment with organisational culture and priorities, support for improvement and alignment with external political and financial environment. The factors and their effects have been well documented in the literature.[13 33] The presentation and language used to articulate the factors has been carefully developed and adapted with stakeholders to improve ease of understanding and user friendliness. The 12 factors have been organised within 3 emergent areas; people, practice and setting. Table 2 describes the factors and

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Table 2 Long-term success factors: purpose, statement for rating and questions to consider

Factor	Purpose	Statement	Additional questions to support reflection
People			
1. Commitment to the Improvement	To reflect on both own personal commitment to the initiative and impression of commitment across the team as a whole to the initiative	My team understands what the project is trying to achieve and believe this work will lead to improved processes and outcomes.	Do you feel committed to the project? Do you understand what the project is trying to achieve? Do you believe that this work will improve processes and outcomes? Do you believe there is reliable evidence (eg, from literature, guidelines, etc) that the project will produce the desired benefits? Do you think there is commitment across the team as a whole? Has a shared aim been established for your project? If you think commitment is lacking, what do you think is the reason for this? What do you think should be done to address this?
2. Involvement	Reflect on who has been involved and who may need to be engaged further for the initiative to achieve long-term success. Asks about personal involvement and contribution and explores the involvement of patients, and members of the public who from stakeholders are impacted by the changes being	I have the opportunity to input into the project and I feel a sense of ownership towards the work. I am able to express my ideas freely which are openly considered by the team. There is wide breadth of involvement including patients and members of the public who regularly feed into the project. t	Do you personally feel involved in the project? Are you given the opportunity to express your ideas and recommend changes to the project when necessary? Do you think the project has involved the right people? Does your project involve patients affected by the improvement? Is there involvement from staff who will be delivering the improvement as part of their day-to day carers practice? Are the views of these groups taken on board? Does the project have a good spread of views, skills and expertise? Do made you believe involvement can be improved? Are there groups of people you still need to involve?
3. Skills and capabilities	Explores whether the staff and other people delivering the change have the skills to do so successfully and whether training of new members of the team has been planned for	Staff have the necessary skills to deliver the improvement. Training and development opportunities are available to all staff, volunteers and other people involved.	Do you feel able to fulfil your role within the project? Do you require further training or education? Do staff who will be delivering the improvement (eg, front-line or support staff) have the skills to do so consistently and effectively? Are new staff informed about the project and their role in it? Do you think there are training needs associated with the improvement that should be addressed? What should be done to address to these needs?
4. Leadership	Asks if there is strong leadership in place and if the leaders are approachable, available and able to garner support for the initiative	My project has supportive and respected leaders and/or champions who advocate for the improvement, communicate the vision and effectively manage the process.	Do you believe your project has strong leadership? Are your project leaders actively involved in the project? Are they able to garner support and enthusiasm for the work? Are they available and approachable to members of the team if necessary? Do the project leads effectively communicate the need for the change? How do you think leadership could be strengthened?

Continued

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Table 2 Continued

Factor	Purpose	Statement	Additional questions to support reflection
5. Team functioning	Explores the accountability and responsibilities for the workload involved in the initiative and ask if the team is working well together	My project team is working well together. There are clear responsibilities for individuals and the work is shared across the team and does not rely on particular individuals.	How well do you feel your project team is working together? Does the project team meet and communicate on a regular basis? Have clear roles and responsibilities for project team members been established? In your opinion, are team members fulfilling these roles and responsibilities? Are skills and expertise of team members considered and put to use? What do you think can be done to improve team functioning?
Practice			
6. Resources in place	Explores if the necessary resources such as staff time, equipment and facilities have been dedicated to the initiative	My project has financial support that will allow the improvement to achieve long-term success. We have the necessary staff, material and equipment and I am given sufficient time to dedicate to the improvement.	In your opinion, have enough resources been dedicated to support the project? Do you believe the financial support provided will allow the improvement the project is trying to achieve to become part of normal working practice in the long term? Does the project have enough staff to achieve the project aims? Do staff have enough time to spend on the improvement? Are the materials needed (eg, physical facilities, sites, equipment, etc) available to staff when they need them? Are resources needed discussed by the team on a regular basis? What resources do you think are lacking?
7. Progress monitored for feedback and learning	Encourages teams to consider what systems are in place to monitor the initiative over time and how this information will be used to inform staff of further changes needed	There is a monitoring system in place that allows the team to collect, manage and regularly review data. Feedback from the project is shared with me and other stakeholders on a regular basis.	Have measures to enable continuous monitoring for your project been defined by the team? Do you think these measures are able to assess the impact of the improvement? Can you suggest any changes to improve this? Are these measures regularly assessed? Is this information used to make changes and improve project progress? If the measures show lack of progress are the causes for this investigated? Are project members and staff regularly informed about what is working well
8. Evidence of benefits	Asks if and how the benefits of the initiative are communicated to both staff and patients over time	There is evidence of benefits emerging from the project and this evidence is regularly communicated and visible to staff and patients.	Does the evidence for your project include both the impact on physical and mental well-being of patients? Is there evidence (process and outcome measures) that the project is producing the desired impact on patients? Is evidence of the projects' impact regularly shared with staff, patients and other stakeholders? If evidence shows lack of progress, does the team investigate reasons for this?

Continued

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Table 2 Continued

Factor	Purpose	Statement	Additional questions to support reflection
9. Robust and adaptable processes	Reflects on the need for initiatives to be adapted to local processes and emerging needs. It also asks about the process for recording successes and failures of changes made	There is the opportunity to adapt the project to reflect local needs, setting and emerging evidence. Adaptations are documented and the successes and failures of changes are reported.	Is there regular review of how the project is working? How well does the project fit within current practices? Do staff and team members need to adapt how they implement the improvement in response to challenges or changing care needs? Does your team use Plan Do Study Act cycles, Statistical Process Control and other quality improvement methods to test and document the changes made to the improvement?
Setting			
10. Alignment with organisational culture and priorities	Encourages teams to consider the need to align improvement initiatives to organisational strategies to gain executive buy-in and support as well as have the initiative become part of organisational policies and procedures	The improvement my project is trying to achieve is aligned with the strategic aims and priorities of the organisation(s) we work within and our work contributes to these aims. Our work is supported by the policies and procedures within the organisation.	Is the improvement your project trying to achieve aligned with the organisational priorities? Has this been promoted as something to help further the organisation's aims and priorities? From your perspective, how well is the work of the project being integrated into the everyday operations of the organisation? Does the project conflict with any other changes taking place within the organisation?
11. Support for improvement	Explores the values and beliefs held within organisations related to continuous improvement and looks at the support given to staff and patients to be involved	There are values and beliefs in my organisation(s) that emphasise the need to improve. Staff and management are supportive of improvement initiatives and continuous improvement is a priority for the organisation, staff and patients.	Do you feel continuous improvement is a priority within your organisation? Are staff and senior management receptive to improvement initiatives? Are you supported by your leaders to participate in the improvement initiatives? Do senior leaders actively participate in improvement projects?
12. Alignment with external political and financial environment	Looks at the need for teams to be aware of the potential political and financial changes that may impact the initiative	My project exists in a supportive economic and political environment. My team is aware of external pressures and incentives that may influence the project.	Has your team considered the impact of the external environment on the project? For example, are there economic pressures or political developments that may impact the project? Is there political support for the implementation of your project? Does your project help address external political or economic concerns? Does it contribute to the achievement of political objectives? Are there plans to mitigate risks due to the external environment?

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provides the statements for rating and supporting questions included within the tool.

how it works

The LTST is designed to create a platform for people to share their own views on sustainability as well as learn about the different views held within their team and to prompt discussion on any difference in opinion. To ensure teams are aware of how systems are evolving over time, teams are encouraged to use the tool approximately every 3 months to assess progress and identify emerging risks continuously. Team members are asked to provide their overall impression of how their team is performing in each factor. Responses are collected on a paper questionnaire form or on the CLAHRC NWL Web Improvement System for Healthcare.[34] The full paper questionnaire can be found in online supplementary appendix B .

For each factor, team members are provided with a statement intended to prompt reflection. Supporting questions are available for each factor if team members would like more detail on what to potentially consider (table 2). Team members score each factor individually and anonymously using a simple five-point Likert scale (as well as no opinion and do not know options). Team members provide comments to suggest actions, explanations of their rating or concerns about progress against each factor.

Team scores are then brought together to produce aggregated outputs demonstrating how the initiative is performing against the given factors. Figure 2 shows an example a visual chart produced highlighting risks and differences in opinions. Table 3 shows an example of aggregated comments and actions highlighted within the tool.

Visual charts and comments are intended to facilitate discussion, bring differences of opinion or concerns into the open and encourage actions to increase the chances of improvements being sustained. For CLAHRC NWL teams, time is allocated at progress meetings to review scores and plan actions.

Discussion

The aim of this work was to develop a relevant and practical tool for sustainability that meets the needs of people in improvement initiatives. We explored how sustainability factors identified in the literature resonated with those in improvement projects and the features or characteristics which make a sustainability tool most valuable in real-world healthcare practice. This work has shown that the majority of factors from the literature resonated well with stakeholders and were recognised as relevant to healthcare settings. In some cases, the literature findings needed to be adapted through changes to the language used to align with stakeholder preferences and understanding. Engaging stakeholder in the design process demonstrated that stakeholders valued clarity, conciseness and simplicity for tool design with simple data interpretation and visual graphs. Receiving ongoing feedback during the development period from those who will use the tool has allowed us to design an approach that has responded to user needs and has addressed issues with language, length and practicality along the way.

The LTST provides a mechanism for improvement teams to identify risks to sustainability and importantly can create an environment for team members to highlight specific actions to be taken and comment on ways to influence sustainability over time. The LTST builds on established literature and aligns well with other sustainability models and frameworks with all LTST factors reflected in one or more of the other approaches.[1 2 4 9 24 35–44] LTST is distinguished from other approaches by its practical design and ability to draw on team suggestions for action planning. Using participant ideas as a platform for action is a unique feature of the tool that is not present in other tools currently used in this area. Also unique to the LTST

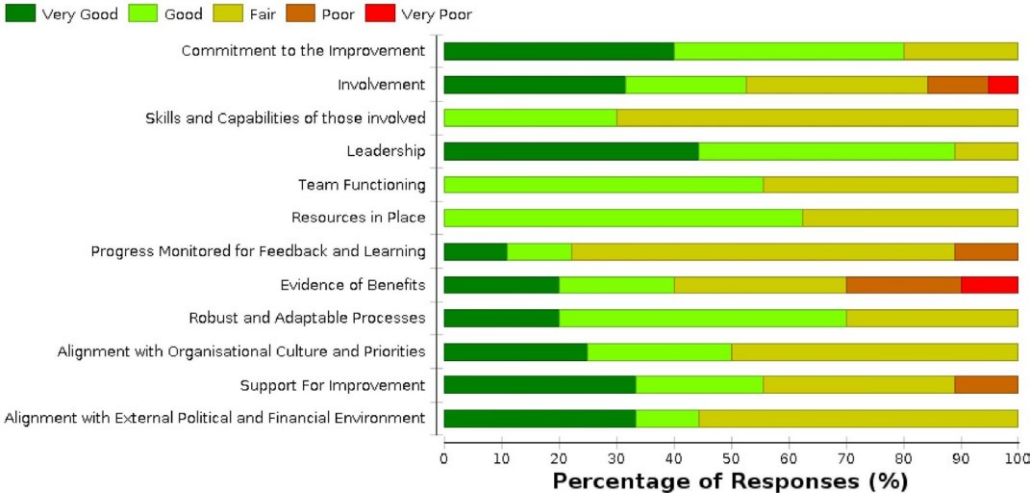


Figure 2 Team level graph highlighting areas where the team is doing well, where more work is needed and differences of opinion.

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Table 3 Comments and actions provided by team members during scoring which can be a starting point for discussion

Factor	Comments and actions
Commitment to the improvement	► Clear summary of project components and effects now in place from last time ► Make sure all stakeholders attend meeting ► As a commissioner I did not understand expectations and my role in the group—others seem very committed. ► Need to look at those engaging with the project
Involvement	
(a)	► Difficulties moving forward as until all stakeholders are engaged—unable to move forward ► Need to consider who is not involved and who would bring influence and value to the project
(b)	► More patient/parent engagement at local level helpful ► More needed ► Patient and public involvement needs to be broadened ► No public/patient—do not feel it would be appropriate
Skills and capabilities of those involved	► Of current clinical staff that I am aware of ► Capacity issues potentially can limit progress ► More nurse input ► Not enough nursing staff employed to deliver project currently ► Needs consultant/generalpractitioner and nurse shadowing and specific training

is that the allotted time for use, an identified barrier and challenge to other method use, has been explicitly tested and informed by end users.[8 45] While many other methods involve either unknown or substantial time commitments, the LTST can be completed in approximately 10–15 min.[42 45]

There is also potential to supplement the use of other models or frameworks to complement the LTST. For example, if a project receives a low rating for the factor 'robust and adaptable processes', the Model for Highly Adoptable Improvement tool kit may be used to aid the team in further understanding of where the intervention can be adapted.[46]

Limitations

A limitation of this work is the use of a snowballing scoping review opposed to a systematic review. Conducting a full systematic review may have uncovered further articles and/or approaches, but due to the practical time constraints of our programme, this was not possible. The results of our review have fed into a protocol for a full systematic review on available sustainability approaches which is now under way.[47] The results of this review will inform future adaptation of the LTST.

Another limitation of this work is the potential for responder bias throughout development stages. Prior relationships between researchers and participants was identified as a possible source of bias, namely, social desirability bias, as participants may have responded in ways that were seen as more desirable to the researchers.[48] Another source of possible responder bias stems from the sustainability themes and factors being presented to participants during development stages which may have directed participant responses and reaction. Although participants were given the opportunity to provide their views on the resonance of these themes as well as identify alternative themes, participants may have been more likely to agree with presented findings which may have impacted our findings. As the development of the tool was centred on user preferences, attempts were made to communicate and reiterate there were no 'right' answer to questions. We also attempted to mitigate this effect by having multiple stages for feedback, with diverse facilitators and a wide variety of participants. We also had a researcher unknown to the majority of the interviewees conduct the interviews.

Another possible limitation is related to the generalisability of the tool to teams with little or no QI experience. Although the tool was developed by people with significant QI experience, the tool is intended to be used by those with all levels of QI knowledge. The process of involving those would use the tool in the design and piloting of the tool sought to ensure the tool could be used by all people involved in an improvement project. Tailoring of the tool language and the instructions were done to ensure people with little QI experience or knowledge would be able to use the tool. Further observation and study of the application of the tool is needed to assess if application is impacted by this design.

Future research

While attempts have been made to respond to user preferences and create a practical tool, further research is required to assess tool effectiveness and engagement

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box 1 Information on using the long term success tool

Using the long term success tool in your setting

- The Long Term Success Tool (LTST) has been designed on the Collaboration for Leadership in Applied Health Research and Care for Northwest London Web Improvement System for Healthcare system. For those who do not have access to this system, the LTST questionnaire form and Excel spreadsheet can be downloaded with this paper. The tool can be used along with table 2 which provides supporting questions to describe the potential items to consider within each factor. The tool can be used by individuals and teams. Responses can be input into the Excel spreadsheet which enables users to produce similar graphs and outputs to ones shown in this paper (supplementary appendix C). The spreadsheet enables eight possible entry points for a team (up to 20 team members) and will aggregate team data over time for review and action planning (see online supplementary appendices B and C).

over time. A 3-year programme of research with teams at CLAHRC NWL and other groups internationally is currently under way to investigate tool impact on initiative processes and practices and examine actions taken by improvement teams to sustain improvements across diverse settings and environments. This longitudinal study will also investigate tool links to sustainability outcomes to assess what impact tool use may have on sustained QI projects. To facilitate and study the use of the tool by those outside of Northwest London, the tool is freely available along with a structured excel spreadsheet for data entry to produce automated graphs and charts (box 1).

Conclusion

The development of the LTST has reinforced the importance of working with stakeholders to design strategies which respond to their needs and preferences and can practicality be implemented in real-world settings. This study provides valuable information on the process of developing a new approach to sustainability that is both conceptually rigorous and practical for use with healthcare improvement teams.

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contributors All authors were involved in conceiving the study. LL conducted the interviews. All authors contributed to data collection in the group discussions and piloting. CD, LL and JR conducted the analysis. LL drafted the initial manuscript. All authors contributing to revisions and the final draft of the manuscript.

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Data sharing statement No further data are available.

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Appendix B: Long Term Success Tool Framework

Long Term Success Framework		
People		
Factor	**Prompt**	**Follow-up questions**
Commitment to the Improvement	*My team understands what the project is trying to achieve and believe this work will lead to improved processes and outcomes.*	• Do you feel committed to the project? Do you understand what the project is trying to achieve? • Do you believe that this work will improve processes and outcomes? Do you believe there is reliable evidence (e.g. from literature, guidelines etc.) that the project will produce the desired benefits? Do you think there is commitment across the team as a whole? • Has a shared aim been established for your project? • If you think commitment is lacking, what do you think is the reason for this? What do you think should be done to address this?
Involvement	*a) I have the opportunity to input into the project and I feel a sense of ownership towards the work. I am able to express my ideas freely which are openly considered by the team.* *b) There is wide breadth of involvement from stakeholders including patients and members of the public who regularly feed into the project.*	a) Do you personally feel involved in the project? Are you given the opportunity to express your ideas and recommend changes to the project when necessary? b) Do you think the project has involved the right people? Does your project involve patients affected by the improvement? Is there involvement from staff who will be delivering the improvement as part of their day-to day practice? Are the views of these groups taken on board? • Does the project have a good spread of views, skills and expertise? Are people with knowledge of mental as well as physical health involved? Do you believe involvement can be improved? • Are there groups of people you still need to involve?
Skills and capabilities	*Staff have the necessary skills to deliver the improvement. Training and development opportunities are available to all staff, volunteers and other people involved.*	• Do you feel able to fulfil your role within the project? Do you require further training or education? Do staff who will be delivering the improvement (e.g. frontline or support staff) have the skills to do so consistently and effectively? • Are new staff informed about the project and their role in it? • Do you think there are training needs associated with the improvement that should be addressed? What should be done to address to these needs?

Leadership	*My project has supportive and respected leaders and/or champions who advocate for the improvement, communicate the vision, and effectively manage the process.*	• Do you believe your project has strong leadership? • Are your project leaders actively involved in the project? • Are they able to garner support and enthusiasm for the work? • Are they available and approachable to members of the team if necessary? • Do the project leads effectively communicate the need for the change? • How do you think leadership could be strengthened?
Team functioning:	*My project team is working well together. There are clear responsibilities for individuals and the work is shared across the team and does not rely on particular individuals.*	• How well do you feel your project team is working together? Does the project team meet and communicate on a regular basis? • Have clear roles and responsibilities for project team members been established? In your opinion, are team members fulfilling these roles and responsibilities? • Are skills and expertise of team members considered and put to use? What do you think can be done to improve team functioning?
Practice		
Factor	**Prompt**	**Follow-up questions**
Resources in place	*My project has financial support that will allow the improvement to achieve long term success. We have the necessary staff, material and equipment and I am given sufficient time to dedicate to the improvement.*	• In your opinion, have enough resources been dedicated to support the project? • Do you believe the financial support provided will allow the improvement the project is trying to achieve to become part of normal working practice in the long term? • Does the project have enough staff to achieve the project aims? Do staff have enough time to spend on the improvement? • Are the materials needed (e.g. physical facilities, sites, equipment etc.) available to staff when they need them? • Are resources needed discussed by the team on a regular basis? • What resources do you think are lacking?

Progress monitored for feedback and learning	*There is a monitoring system in place that allows the team to collect, manage and regularly review data. Feedback from the project is shared with me and other stakeholders on a regular basis.*	• Have measures to enable continuous monitoring for your project been defined by the team? • Do you think these measures are able to assess the impact of the improvement? Can you suggest any changes to improve this? • Are these measures regularly assessed? Is this information used to make changes and improve project progress? • If the measures show lack of progress are the causes for this investigated? • Are project members and staff regularly informed about what is working well and what could be better?
Evidence of benefits	*There is evidence of benefits emerging from the project and this evidence is regularly communicated and visible to staff and patients.*	• Does the evidence for your project include both the impact on physical and mental well-being of patients? • Is there evidence (process and outcome measures) that the project is producing the desired impact on patients? • Is evidence of the projects' impact regularly shared with staff, patients and other stakeholders? • If evidence shows lack of progress, does the team investigate reasons for this?
Robust and adaptable processes	*There is the opportunity to adapt the project to reflect local needs, setting and emerging evidence. Adaptations are documented and the successes and failures of changes are reported.*	• Is there regular review of how the project is working? • How well does the project fit within current practices? • Do staff and team members need to adapt how they implement the improvement in response to challenges or changing care needs? • Does your team use PDSA cycles, Statistical Process Control and other quality improvement methods to test and document the changes made to the improvement?
Setting		
Factor	**Prompt**	**Follow-up questions**
Alignment with organisational culture and priorities	*The improvement my project is trying to achieve is aligned with the strategic aims and priorities of the organisation(s) we work within and our work contributes to these aims. Our work is supported by the policies and procedures within the organisation.*	• Is the improvement your project is trying to achieve aligned with the organisational priorities? Has this been promoted as something to help further the organisation's aims and priorities? • From your perspective, how well is the work of the project being integrated into the everyday operations of the organisation? • Does the project conflict with any other changes taking place within the organisation? What could be done to better align your improvement to these priorities?

Support for Improvement	*There are values and beliefs in my organisation(s) that emphasise the need to improve. Staff and management are supportive of improvement initiatives and continuous improvement is a priority for the organisation, staff and patients.*	• Do you feel continuous improvement is a priority within your organisation? • Are staff and senior management receptive to improvement initiatives? • Are you supported by your leaders to participate in the improvement initiatives? Do senior leaders actively participate in improvement projects?
Alignment with external political and financial environment	*My project exists in a supportive economic and political environment. My team is aware of external pressures and incentives that may influence the project.*	• Has your team considered the impact of the external environment on the project? For example are there economic pressures or political developments (e.g. national reorganisation of services or initiatives to change how care in your clinical area is delivered) that may impact the project? • Is there political support for the implementation of your project? • Does your project help address external political or economic concerns? Does it contribute to the achievement of political objectives? • Are there plans to mitigate risks due to the external environment?

Appendix C: Long Term Success Tool Questionnaire

Long Term Success Tool

This tool aims to aid you in planning for long term success of your work. You will be asked to rate 12 factors that have been identified to impact long term success from current literature and evidence.

Each rating should represent an overall impression of how you believe your project is doing. Please use the boxes to highlight any comments or actions needed to address the factors.

A. Please specify which project you are completing the form for:

B. Please rate the project in the following factors:

1. Commitment to the improvement

My team understands what the project is trying to achieve and believe this work will lead to improved processes and outcomes.

O Very Good O Good O Fair O Poor O Very Poor O No Opinion O Don't Know

Comments and actions:

2. Involvement

a) I have the opportunity to input into the project and I feel a sense of ownership towards the work. I am able to express my ideas freely which are openly considered by the team.

O Very Good O Good O Fair O Poor O Very Poor O No Opinion O Don't Know

Comments and actions:

b) There is wide breadth of involvement from stakeholders including patients and members of the public who regularly feed into the project.

O Very Good O Good O Fair O Poor O Very Poor O No Opinion O Don't Know

Comments and actions:

3. Skills and capabilities

Staff have the necessary skills to deliver the improvement. Training and development opportunities are available to all staff, volunteers and other people involved.

O Very Good O Good O Fair O Poor O Very Poor O No Opinion O Don't Know

Comments and actions:

4. Leadership

My project has supportive and respected leaders and/or champions who advocate for the improvement, communicate the vision, and effectively manage the process.

O Very Good O Good O Fair O Poor O Very Poor O No Opinion O Don't Know

Comments and actions:

5. Team functioning

My project team is working well together. There are clear responsibilities for individuals and the work is shared across the team and does not rely on particular individuals.

O Very Good O Good O Fair O Poor O Very Poor O No Opinion O Don't Know

Comments and actions:

Please turn over

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Long Term Success Tool

6. Resources in place

My project has financial support that will allow the improvement to achieve long term success. We have the necessary staff, material and equipment. I am given sufficient time to dedicate to the improvement.

☐Very good ☐ Good ☐ Fair ☐ Poor ☐ Very Poor ☐ No Opinion ☐ Don't Know

Comments and actions:

7. Progress monitored for feedback and learning

There is a monitoring system in place that allows the team to collect, manage and regularly review data. Feedback from the project is shared with me and other stakeholders on a regular basis.

☐Very good ☐ Good ☐ Fair ☐ Poor ☐ Very Poor ☐ No Opinion ☐ Don't Know

Comments and actions:

8. Evidence of benefits

There is evidence of benefits emerging from the project and this evidence is regularly communicated and visible to staff and patients.

☐Very good ☐ Good ☐ Fair ☐ Poor ☐ Very Poor ☐ No Opinion ☐ Don't Know

Comments and actions:

9. Robust and adaptable processes

There is the opportunity to adapt the project to reflect local needs, setting and emerging evidence. Adaptations are documented and the successes and failures of changes are reported.

☐Very good ☐ Good ☐ Fair ☐ Poor ☐ Very Poor ☐ No Opinion ☐ Don't Know

Comments and actions:

10. Alignment with organisational culture and priorities

The improvement my project is trying to achieve is aligned with the strategic aims and priorities of the organisation(s) we work within and our work contributes to these aims. Our work is supported by the policies and procedures within the organisation.

☐Very good ☐ Good ☐ Fair ☐ Poor ☐ Very Poor ☐ No Opinion ☐ Don't Know

Comments and actions:

11. Support for improvement

There are values and beliefs in my organisation(s) that emphasise the need to improve. Staff and management are supportive of improvement initiatives and continuous improvement is a priority for the organisation, staff and patients.

☐Very good ☐ Good ☐ Fair ☐ Poor ☐ Very Poor ☐ No Opinion ☐ Don't Know

Comments and actions:

12. Alignment with the political and financial environment

My project exists in a supportive economic and political environment. My team is aware of external pressures and incentives that may influence the project.

☐Very good ☐ Good ☐ Fair ☐ Poor ☐ Very Poor ☐ No Opinion ☐ Don't Know

Comments and actions:

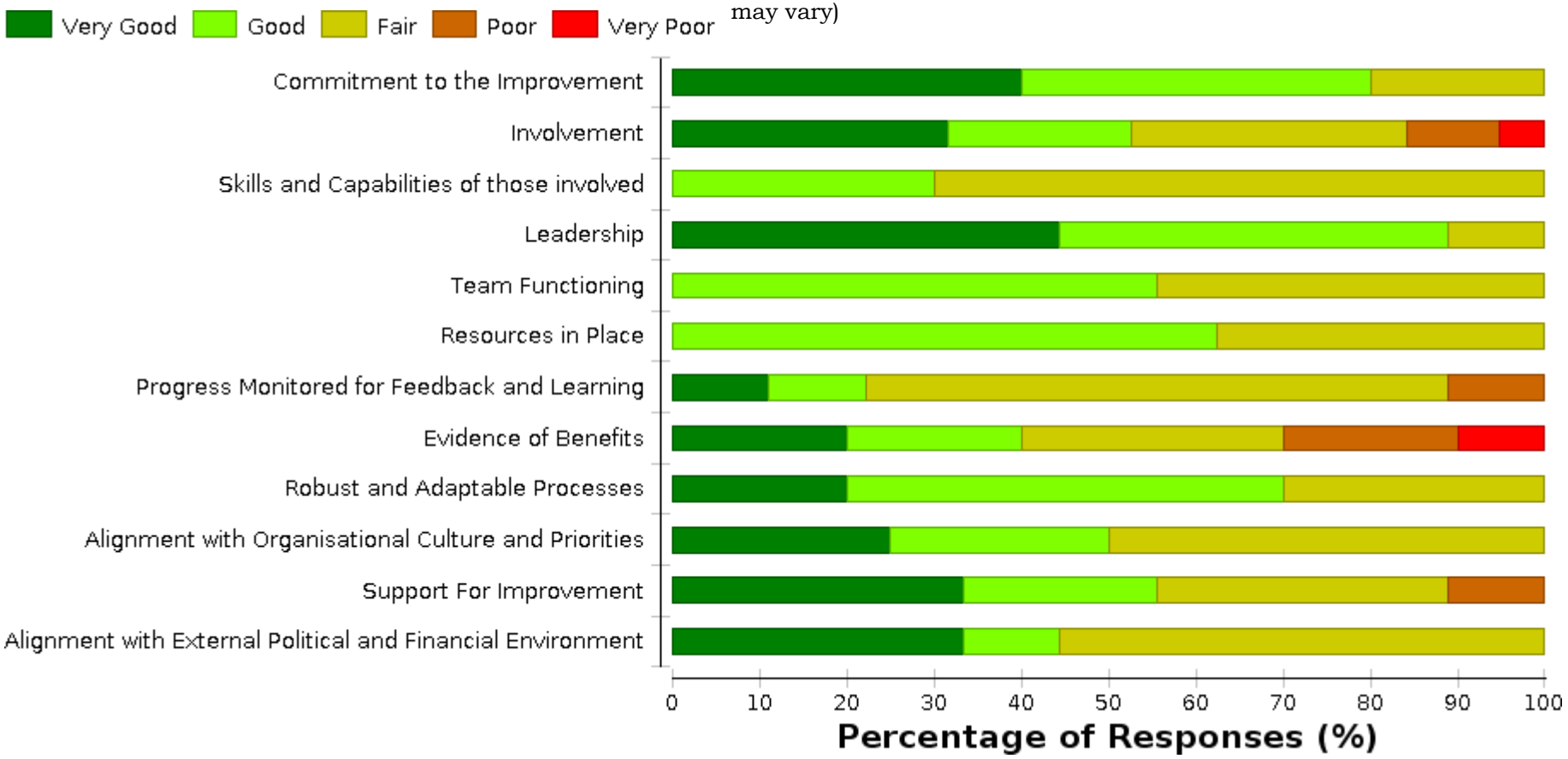
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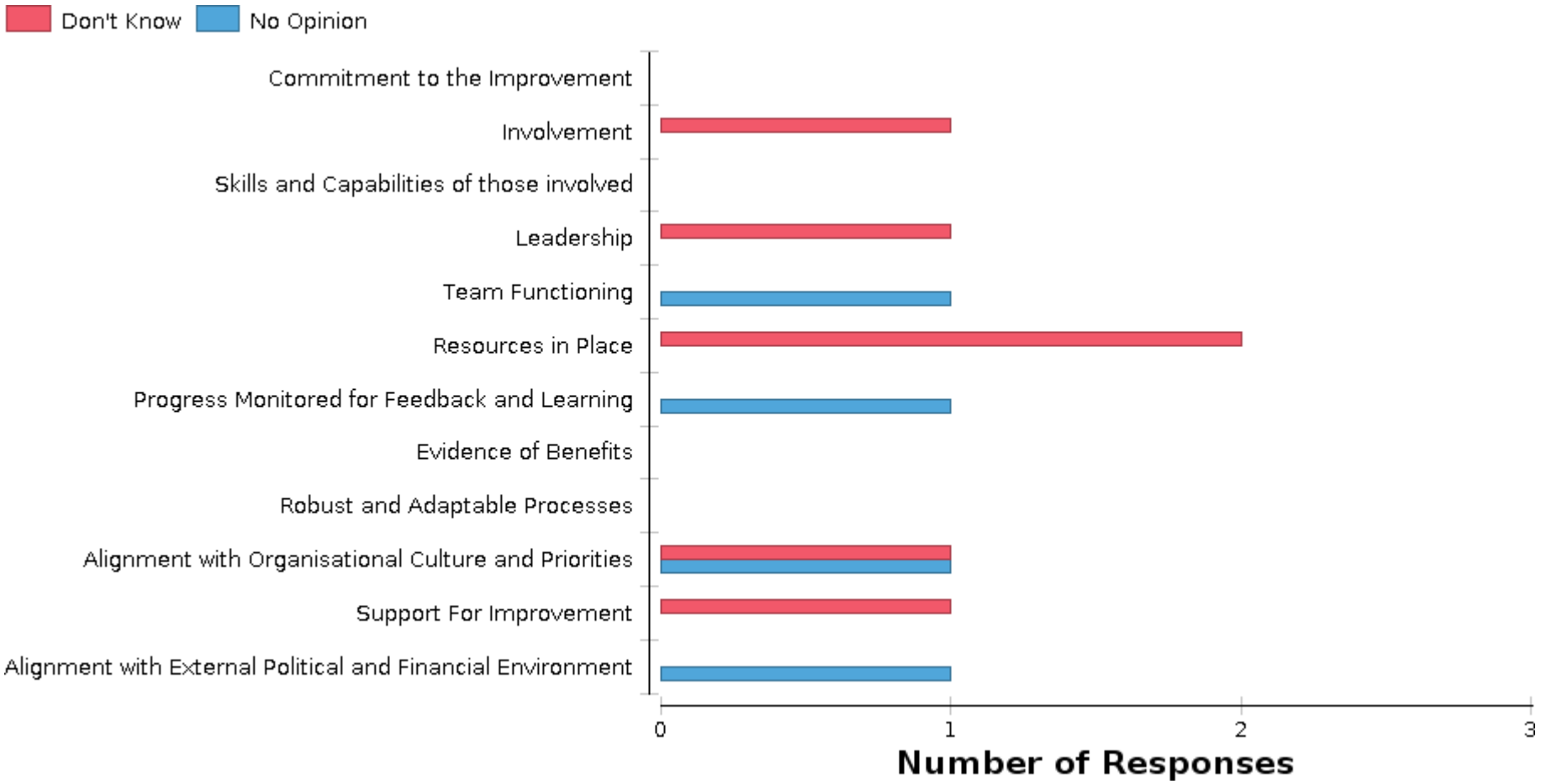
Appendix D: Long Term Success Tool Report Example

Long Term Success Rating

(excluding No Opinion and Don't Know answers, denominator may vary)



Number of No Opinion and Don't Know Answers



Ratings

#	Question	Very Good	Good	Fair	Poor	Very Poor	Num. Responses	No Opinion	Don't Know	Total
1	Commitment to the Improvement	4	4	2	0	0		0	0	10
2(a)	Involvement (A)	5	3	2	0	0	10	0	0	10
2(b)	Involvement (B)	1	1	4	2	1	9	0	1	10
3	Skills and Capabilities of those involved	0	3	7	0	0	10	0	0	10
4	Leadership	4	4	1	0	0	9	0	1	10
5	Team Functioning	0	5	4	0	0	9	1	0	10
6	Resources in Place	0	5	3	0	0	8	0	2	10
7	Progress Monitored for Feedback and	1	1	6	1	0	9	1	0	10
8	Learning Evidence of	2	2	3	2	1	10	0	0	10
9	Benefits Robust and Adaptable	2	5	3	0	0	10	0	0	10
10	Processes Alignment with Organisation	2	2	4	0	0	8	1	1	10
11	al Culture and Priorities	3	2	3	1	0	9	0	1	10
12	Support for Improvement Alignment with	3	1	5	0	0	9	1	0	10

Rating Statistics

(excluding No Opinion and Don't Know

#	Question	Lowest Rating	Highest Rating	Median Rating
1	Commitment to the	Fai	Very Good Very	Good Good/Very
2(a)	Improvement Involvement (A)	r	Good Very Good	Good Fair
2(b)	Involvement (B)	Fai	Good	Fair
3	Skills and Capabilities of those	r	Very	Good
4	involved Leadership	Very	Good	Good
5	Team Functioning	Poor	Good	Good
6	Resources in Place	Fair	Good	Fair
7	Progress Monitored for Feedback and	Fair		
8	Learning	Very	Very	Fair
9	Evidence of Benefits	Poor	Good Very	Good
10	Robust and Adaptable Processes	Fair	Good Very	Fair/Goo
11	Alignment with Organisational Culture and Priorities	Poor	Very	Good
12	Support for Improvement	Fair	Good	Fair/Goo
	Alignment with External Political and			

Summary of free text actions for each question

#	Question	Comments and Actions
1	Commitment to the Improvement	* Clear summary of project components and effects now in place from last time * make sure all stakeholders attend meeting * As a commissioner I didn't understand expectations and my role in the group - others seem very committed. * Need to look at those engaging with the project
2	Involvement a)	* Difficulties moving forward as until all stakeholders are engaged - unable to move forward
	b)	* more patient/parent engagement at local level helpful * more needed * PPI needs to be broadened * No public / patient - don't feel it would be appropriate * Patients/ Patient group and primary care practices poorly
3	Skills and Capabilities of those	* of current clinical staff that I'm aware of * capacity issues potentially can limit progress * more nurse input * not enough nursing staff employed to deliver project currently * needs consultant/ GP and nurse shadowing and specific
4	Leadership	* Need clarification of roles * can't answer as I am one of the leaders * Leaders are good at advocacy for improvement, but not yet "managing" the process of
5	Team Functioning	* Responsibilities not necessarily very clear * Timeline shared and now specific actions' meetings and roll out to be mapped and project group lead named.
6	Resources in	* for my particular clinical team I am unsure at present re: funding * More commissioners * Not enough nursing staff to deliver * nursing resource low across boroughs

7	Progress Monitored for Feedback and	* no system to monitor and record barriers to progress * Early days re: metrics * get going -data harvesting in place * Not all feedback / info sharing going through CLAHRC therefore not all get to see all
8	Evidence of Benefits	* No communication to wider stakeholder group who attended getting started event * More needed to get bottom line managers to staff/ patients perhaps via website * Early Days
9	Robust and Adaptable	* Commissioners, clinicians, project lead, data information personnel
10	Alignment with Organisational Culture and	* CQUIN, QIPP good mechanisms * Some but not all * multi orgs, multi cultures - I think that's one of the
11	Support for Improvement	* need to engage with senior
12	Alignment with External Political and Financial Environment	* Diversity of stake-holders with different agendas

Appendix E: Published Systematic Review_Implementation Science

Lennox *et al. Implementation Science* (2018) 13:27
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Implementation Science

SYSTEMATIC REVIEW Open Access

Navigating the sustainability landscape: a systematic review of sustainability approaches in healthcare

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Abstract

Background: Improvement initiatives offer a valuable mechanism for delivering and testing innovations in healthcare settings. Many of these initiatives deliver meaningful and necessary changes to patient care and outcomes. However, many improvement initiatives fail to sustain to a point where their full benefits can be realised. This has led many researchers and healthcare practitioners to develop frameworks, models and tools to support and monitor sustainability. This work aimed to identify what approaches are available to assess and influence sustainability in healthcare and to describe the different perspectives, applications and constructs within these approaches to guide their future use.

Methods: A systematic review was carried out following PRISMA guidelines to identify publications that reported approaches to support or influence sustainability in healthcare. Eligibility criteria were defined through an iterative process in which two reviewers independently assessed 20% of articles to test the objectivity of the selection criteria. Data were extracted from the identified articles, and a template analysis was undertaken to identify and assess the sustainability constructs within each reported approach.

Results: The search strategy identified 1748 publications with 227 articles retrieved in full text for full documentary analysis. In total, 62 publications identifying a sustainability approach were included in this review (32 frameworks, 16 models, 8 tools, 4 strategies, 1 checklist and 1 process). Constructs across approaches were compared and 40 individual constructs for sustainability were found. Comparison across approaches demonstrated consistent constructs were seen regardless of proposed interventions, setting or level of application with 6 constructs included in 75% of the approaches. Although similarities were found, no approaches contained the same combination of the constructs nor did any single approach capture all identified constructs. From these results, a consolidated framework for sustainability constructs in healthcare was developed.

Conclusions: Choosing a sustainability method can pose a challenge because of the diverse approaches reported in the literature. This review provides a valuable resource to researchers, healthcare professionals and improvement practitioners by providing a summary of available sustainability approaches and their characteristics.

Trial registration: This review was registered on the PROSPERO database: CRD42016040081 in June 2016.

Keywords: Sustainability, Method, Tool, Model, Framework, Assessment, Quality improvement

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Background

Internationally, there is a need to improve health and care services. To support this, many healthcare organisations are engaged in a wide range of improvement initiatives. Despite the significant investment of staff time and other resources, many promising initiatives fail to sustain and do not produce long term benefits [1–6]. Sus- taining worthwhile changes poses a challenge to those undertaking an improvement initiative. A systematic re- view of 125 studies of improvements made in healthcare found that the projects do not maintain all aspects origin- ally implemented with fewer than half continuing inter- ventions at high levels of fidelity [1]. Similar results were found in a review on the continuation of programme ac- tivities where only 60% of sites reported sustaining at least one programme component [5].

Initiatives that fail to sustain are extremely wasteful of human and monetary investments [7, 8]. Large variation in the practices and care can be seen across similar services when initiatives which initially demonstrate im- proved patient outcomes fail to maintain their gains [7, 8]. This has also been shown to be detrimental to improve- ment efforts in general as staff, patient and public opinion of improvement initiatives declines and enthusiasm for engaging in future programmes is lost [9, 10]. In the current climate of rising demands, shifting priorities and competition for resources, there is a need to understand how sustainability of implemented initiatives can be influ- enced as health planners and other stakeholders want to ensure the long-term impact of their investments [1, 11]. Despite recognition of this challenge and considerable re- search conducted in this area, relatively little is known about how to translate this evidence into action to support the long-term impact of improvement efforts [12].

Further complicating this research area is the lack of consensus on how to define sustainability. This has led to contradictory recommendations for influencing sustain- ability and debate on what qualifies as a sustained im- provement [10, 13]. Sustainability is often viewed as an 'outcome' where health benefits, activities or workforce capacity are maintained [8]. Some have cautioned against this linear perspective on sustainability as it 'does not take account of the recursive or reflexive character of sustain- ability and learning or of the continuous adjustments that shape the sustainability process' [13]. More recently, the ability to adapt and continuously improve has also been recognised as a potential definition of sustainability [14]. This concept of sustainability as a 'process' rather than an 'outcome', incorporates concepts of adaptation, learning and continuous development [15]. This lens allows sustainability to be viewed as a change process that can be influenced by 'sustainability' will refer to the general continuation and maintenance of a desirable feature of an initiative and its associated outcomes as well as the process taken to adapt and develop in response to emerging needs of the system. This definition as well as any additional domains found will be explored in the review.

With no clear consensus on how to define or influence sustainability, many researchers and healthcare practi- tioners have developed frameworks, models and tools to support and monitor sustainability in healthcare settings [12, 18]. With little overarching direction for this area of research, new definitions, factors and methods for asses- sing sustainability have been produced by individual studies [18]. Some work has been undertaken to review frameworks for sustainability in specific settings and programmes, but little has been done to comprehen- sively review available approaches for sustainability across healthcare settings [15, 18, 19]. It is recognised that diverse healthcare settings 'use similar processes to achieve adoption, implementation, and sustainability' which indicates general learning and lessons can be gathered from across settings to inform sustainability re- search [18]. This provides an opportunity to draw from the current literature to investigate available sustainabil- ity approaches and develop a sustainability knowledge base that is useful beyond specific settings or interven- tions [18, 20]. This paper offers a review of sustainability approaches to support healthcare teams and researchers to understand the different perspectives, applications, and constructs within approaches to guide their use in healthcare improvement initiatives.

This review addressed the following research questions:

1. What approaches have been proposed to influence or assess sustainability in healthcare?
2. Where have they come from and how have they been developed?
3. What are their key characteristics?
4. What sustainability constructs are examined in each approach?

Methods

Search and information sources

A systematic review was undertaken guided by the Pre- ferred Reporting Items for Systematic Reviews and Meta- Analysis (PRISMA) reporting standards [21]. The selection of databases, search terms and search strategy was sup- ported by a medical librarian to ensure an overall quality and coverage of the systematic review. The search was car- ried out on Embase, HMIC Health Management Informa- tion Consortium, and Ovid MEDLINE in January 2017, and a follow-up search was conducted prior to submission in September 2017. Key words included a combination of

sustainability terms (sustain*, institutionali#ation, routi- ni#ation, maintenance, integration, normali#ation, embed*) and method terms (model, framework, tool, plan, checklist, scale, strategy, theory, conceptuali#ation) along with health or healthcare. A snowballing approach was also taken; ref- erences from included papers were analysed and retrieved if deemed relevant.

Data collection process and study selection

We sought approaches (for the purposes of this work, the term approaches refers to published models, checklists, tools, processes, strategies, conceptualisations and frame- works) that aim to influence and/or assess sustainability within healthcare settings. The level or type of influence was not specified but could include assessment, planning, evaluation, monitoring, prediction or testing. Papers pub- lished in peer-reviewed journals introducing a tangible and clear approach for sustainability were included. Papers published in languages other than English were excluded. Approaches used within a larger system process or staged process (for example an implementation model including sustainability as the final stage) were excluded. Commen- tary, posters, protocols, conference proceedings, editorials and perspectives were excluded. Papers only defining or constructing concepts of sustainability were excluded. Two authors independently screened the first 20% of the full-text articles for inclusion. Any differences in selected articles were discussed, and inclusion and exclusion cri- teria were refined to reflect these discussions. One author (LL) then screened the remaining papers for inclusion.

Quality assessment and data extraction strategy

A quality assessment and data extraction form was devel- oped for identified articles. Existing quality assessments were explored, but it has been noted that available quality assessment approaches often fail to consider the rationale and context of studies [22, 23]. Their use to determine the inclusion of qualitative studies is often not recommended as many existing tools do not capture the multiple mean- ings of "good quality" and "rightness"; therefore, studies should often not be excluded based on this quality assess- ment [22, 24]. The available assessments were not sensi- tive to the aim of our study which was exploratory in nature. We sought to provide an overview of available approaches for sustainability and designed our data ex- traction form to identify and describe the included articles. The aim of the data extraction was to report descriptions and study information not to ascertain validity of the ap- proaches or their constructs. To ensure the studies met the baseline quality expected, each article was assessed with the structured data extraction form. Data extraction included strategy name, purpose of use, healthcare setting, level of healthcare use, description of use, sustainability constructs, scoring sustainability, theoretical underpinning, sustainability per- spective and method development details. One author (LL) extracted the data from the articles. This information was then independently checked against the full-text arti- cles by the second author (LM). Any missing data or discrepancies were discussed between authors and were resolved by consensus. Agreement was reached for accur- acy of all studies.

Data synthesis and presentation

To examine the sustainability constructs within each method, articles were uploaded to Nvivo 10 software for analysis. Template analysis was conducted using prede- fined codes to guide the analysis process [25]. Constructs within one method (Shediac-Rizkallah and Bone's concep- tual sustainability framework) served as the baseline template for coding sustainability constructs [8]. This technique allowed each approach's constructs to be com- pared and contrasted and additional constructs to be iden- tified. The preliminary coding structure was iteratively developed with new constructs integrated and refined as further sustainability approaches were added to the data- set. One author conducted the initial coding with input from other authors on coding structure and construct la- bels. To assess coding clarity and reliability, a second coder independently coded 25% of the articles and an inter-rater reliability score (kappa coefficient) was calcu- lated. Discrepancies between coders were used to refine codes and revise the definitions and inclusion criteria for each of the constructs. Results have been summarised using ratios and narrative summaries.

Risk of bias in individual studies and across studies

This review aimed to explore the creation and introduc- tion of sustainability approaches; therefore, results other than the description of the sustainability method in indi- vidual studies were not analysed. As this review focused on published sustainability approaches, publication bias may have affected the results of this study. Approaches available in the grey literature were identified but not included in this review.

Registration

This systematic review was registered on the PROS- PERO database under the registration number: CRD 42016040081 in June 2016 [26].

Results

The search strategy resulted in 2889 publications from the databases. Snowballing and electronic citation tracking identified 121 further papers for potential inclusion. Titles and abstracts were examined, and 229 articles were re- trieved in full text for full documentary analysis. In total,

62 papers which identified sustainability approaches were identified for inclusion in this review Fig. 1.

Sustainability approaches

The 62 papers identifying sustainability approaches are outlined in Table 1. Full data extraction details for each approach are available in Additional file 1. Sustainability approaches have been consistently developed and adapted since the late 1980s with an average of two created every year Fig. 2.

Theoretical perspectives, definitions and development details

Theoretical perspectives

Exploring the theoretical underpinnings of the approaches revealed diverse theoretical grounding. Although 37% (23/62) did not have an explicit link to theory, 15 different theories were identified within the other approaches. While numerous theories were found, 4 theories were common across multiple sustainability approaches covering 45% of papers: *diffusion of innovations theory*, *complexity theory*, *ecological theory* and *open systems theory*. Theoretical perspectives guided how sustainability was defined within approaches and how it was viewed within healthcare systems. A brief de- scription of the most common perspectives and their links to the sustainability approaches are outlined in Table 2.

Definitions of sustainability

Definitions for sustainability were explicitly stated in 76% (47/62) of approaches and implicitly deduced from the remaining 24%. Multiple definitions were found across ap- proaches, but 5 distinct definitions for sustainability were identified:

1. *Continued programme activities* (included in 86% (53/62) of the approaches)

e.g. 'The ability of activities to continue appropriate to the local context after withdrawal of external funding' [27].

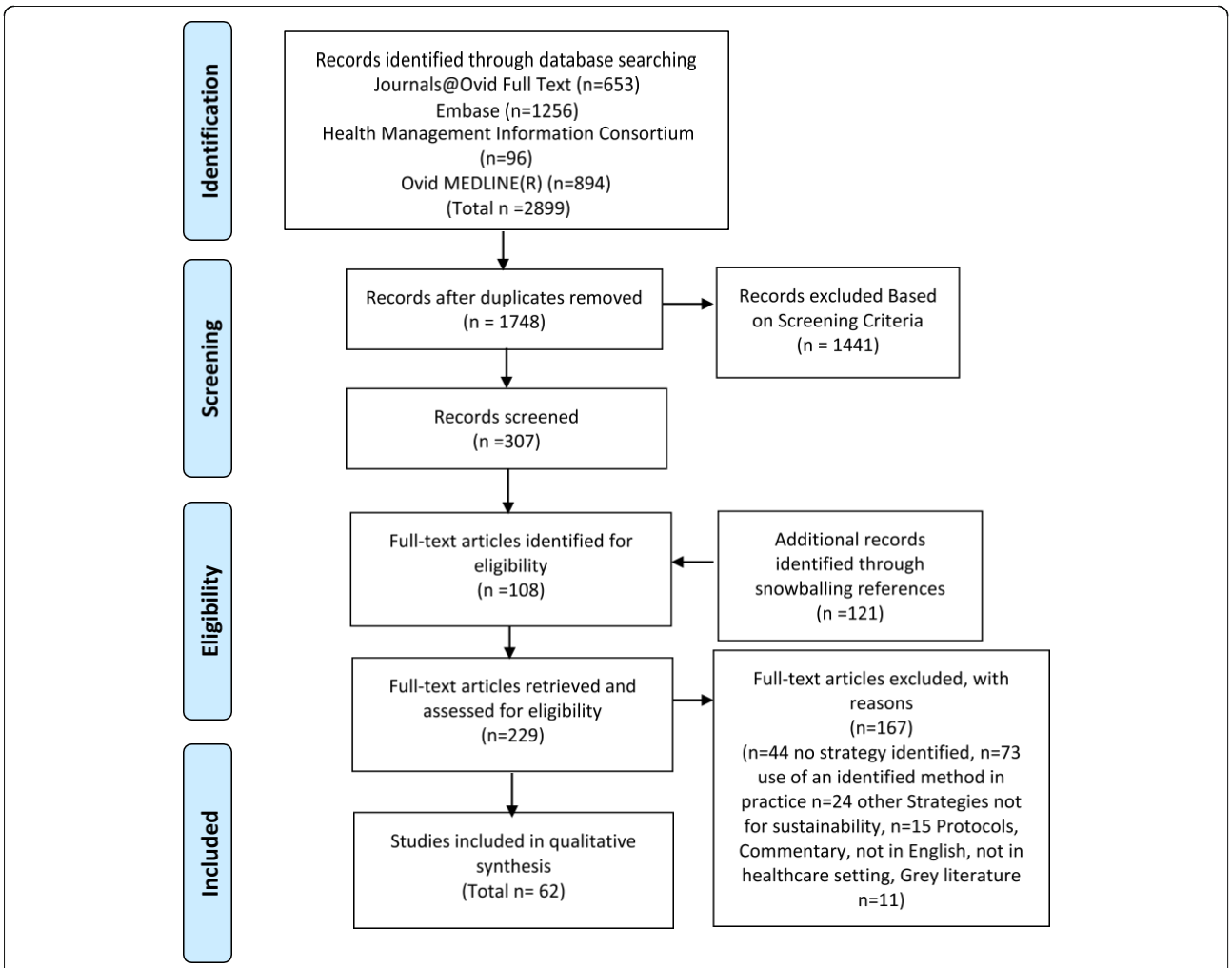


Fig. 1 PRISMA diagram. Description of search strategy and article retrieval

Table 1 Papers included in review

Author	Year	Name	Purpose
1. Alexander, J.A. et al. [62]	2003	The model for community health partnership sustainability	To provide practical guidelines for partnership sustainability
2. Amaya, A. et al. [65]	2014	Conceptual framework for sustainability	To identify themes and relationships emerging from data to identify recommendations to inform decision-makers on priorities
3. Ament, S. et al. [80]	2014	Strategies to sustain improvements in hospital practice	To suggest post-implementation strategies which are valuable in sustaining implementation successes
4. Atun, R. et al. [53]	2010	A conceptual framework for analysing integration of health interventions into health systems	To analyse and map the nature and extent of integration in different settings, along with the factors that influence the integration process
5. Azeredo, B.T. et al. [45]	2017	Framework for investigating the sustainability of ARV provision	To structure data collection and analysis
6. Blackford, J. and Street, A [69]	2012	The Advance Care Planning-Service Evaluation Tool (ACP-SET)	To assist community-based palliative care services to establish a sustainable system-wide model relevant to their local context
7. Blanchet, K. and Girois, S [57]	2013	The Sustainability Analysis Process (SAP)	To conceptualise and measure sustainability of health systems in low-income countries and fragile states
8. Bray, P. et al. [81]	2009	Sustainability Pyramid Model	To propose a series of practice characteristics that constitute critical elements for QI sustainability activities
9. Brinkerhoff, D. and Goldsmith, A. [20]	1992	The analytical framework for Institutional sustainability	To analyse the generic conditions for sustaining institutions in general and provide suggested strategies
10. Chambers, D. et al. [11]	2013	The Dynamic Sustainability Framework	To maximise the fit between interventions, practice settings and the broader ecological system over time
11. Dauphinee, W. and Reznick, R [63]	2011	Framework for guiding change and managing and monitoring a successful multicentered network.	To identify success factors that can facilitate the adoption of a national simulation network
12. Dominick, G.M. et al. [82]	2016	ENRICH Sustainability Survey	To identify residential children's homes (RCHs) that sustained PA-promoting environments.
13. Dorsey, S. et al. [46]	2014	NINR Logic Model for Center Sustainability	To provide guidance for those who wish to develop and sustain a centre or plan for sustainability
14. Edwards, J. C. et al. [42]	2007	Catholic Healthcare partners HF-GAP Sustainability Assessment (AHRQ)	To trigger planning for sustainability early in a project's design
15. Feldstein, A.C. and Glasgow, R.E [83]	2008	Practical, Robust Implementation and Sustainability Model (PRISM)	To enhance implementation and sustainability and to help conceptualise, implement and evaluate health care improvement programmes
16. Finch, T.L. et al. [84]	2012	Technology Adoption Readiness Scale (TARS)	To contribute to the successful normalisation of e-health, either as a 'diagnostic' tool or for evaluation purposes
17. Fleiszer et al. [58]	2015	Framework for the sustainability of healthcare innovations	To guide data collection and content analysis
18. Ford, J.H. et al. [47]	2015	Strategies to Sustain Use of A-CHESS	To suggest strategies to be used to sustain the use a mobile app
19. Fox, A. et al. [79]	2015	The sustainability of innovation theoretical framework	To guide research, determine variables, influence data analysis
20. Goodman et al. [85]	1993	Level of Institutionalisation (LoIn) Scale	To measure the extent of programme integration into an organisation
21. Goodman, R. and Steckler, A [86]	1989	Model for Program Institutionalisation	To demonstrate how health promotion programmes may become institutionalised to guide programme design and evaluation
22. Gruen, R.L. et al. [7]	2008	Model of health-programme sustainability	To provide a model of health-programme sustainability based on context and resource availability
23. Hanson, D. et al. [43]	2005	A systematic ecological framework to design sustainable interventions	To design sustainable, community-based, safety promotion interventions
24. Hodge L.M. and Turn, K [54]	2016	A Conceptual Framework of Supporting Factors	To guide and evaluate capacity building in EBP implementation and sustainment in low-resource community settings
	2013	Framework for e-medicine sustainability	

Table 1 Papers included in review *(Continued)*

Author	Year	Name	Purpose
25. Isabalija, S.R. et al. [87]			To facilitate the development, implementation, and sustainability of e-medicine by providing professionals with information on which to build their sustainability efforts
26. Iwelunmor, J. et al. [68]	2016	A conceptual framework	To bring attention to sustainability as a core component embedded within the overall life cycle of an intervention that evolves through time
27. Johnson et al. [19]	2004	A Sustainability Planning Model	To address two sets of sustainability factors known to be associated with success in sustaining an innovation
28. Knight, T. et al. [59]	2001	A framework for evaluating the sustainability of collaborative working	To provide formative evaluation of future collaborative initiatives and analysis of collaborative working
29. Leffers, J. and Mitchell, E [88]	2011	Conceptual Framework for Partnership and Sustainability in Global Health Nursing.	To offer guidance and a framework for partnership and sustainability for nurses who participate in global efforts
30. Lennox et al. [56]	2017	The Long Term Success Tool (LTST)	To support those implementing improvements reflect on 12 key factors to identify risks and prompt actions to increase chances of sustainability over time
31. Luke, D.A. [36]	2014	Program Sustainability Assessment Tool (PSAT)	To assess and plan for sustainability risks and develop an action plans
32. Maher, L. et al. [61]	2010	NHS III Sustainability Model	To predict the likelihood of sustainability and guide teams to things they could do to increase the chances that changes will be sustained
33. Mancini, J.A. and Marek, L.I [37]	2004	Model of community-based program sustainability/ Program Sustainability Index (PSI)	To evaluate community-based programme sustainability
34. May, C. and Finch, T [89]	2009	Normalisation Process Theory	To explore the social organisation of the work (implementation), of making practices routine elements of everyday life (embedding), and of sustaining embedded practices in their social contexts (integration)
35. May, C. et al. [51]	2006	Normalisation Process Model	To assist in explaining the processes by which complex interventions become routinely embedded in health care practice
36. Melnyk, B. and Fineout-Overholt, E [90]	2011	The ARCC (Advancing Research and Clinical practice through close Collaboration) model	To provide health care systems with a conceptual framework to guide system-wide implementation and sustainability of EBP for the purpose of improving quality of care and patient outcomes
37. Nelson, D.E. et at [39]	2007	The five basic elements of program sustainability	To suggest five basic elements of programme sustainability for tobacco control programmes, to understand the factors associated with success
38. Nystrom, M.E. et al. [91]	2014	Strategies to facilitate implementation and sustainability of large system transformations	To provide an approach to implement and sustain a large national change programme
39. Okeibunor, J. et al. [60]	2012	A model for evaluating the sustainability of community-directed treatment	To provide critical indicators of project performance to evaluate sustainability
40. Olsen, I. T [92]	1998	Sustainability of health care: A framework for analysis	To study the sustainability of health services in developing countries
41. Parand, A [38]	2012	Strategies to sustain Safer Patient Initiative (SPI)	To recommend strategies to facilitate the sustainability of a quality and safety improvement collaborative
42. Persaud, D [52]	2014	The ELIAS (Enhancing Learning, Innovation, Adaptation, and Sustainability) Performance Management Framework	To improve the sustainability of healthcare organisations
43. Rasschaert, F. et al. [93]	2014	Conceptual framework on sustainability of community-based programmes	To explore the data retrieved and to identify factors influencing the sustainability
44. Racine, D.P [66]	2006	Model of sustaining innovations in their effectiveness	To suggest a comprehensive conceptual framework of programmatic, organisational and environmental factors that may shape the circumstances for sustaining and replicating effectiveness
45. Roy, M. et al. [48]	2016	Framework for Sustained Retention	To understand sustained retention, highlight barriers specific to sustained retention and review interventions addressing long-term, sustained retention

Table 1 Papers included in review *(Continued)*

Author	Year	Name	Purpose
46. Rudd, R. E. et al. [94]	1999	A five-stage model for sustaining a community campaign	The five-stage model offers a mechanism for expanding the life of a campaign
47. Sarriot, E.G. et al. [31]	2004	Child Survival Sustainability Assessment (CSSA) framework and process	To provide a process for a participatory sustainability assessment with communities and local partners
48. Sarriot, E.G. et al. [28]	2008	The Sustainability Framework	To organise thinking about sustainability as well as inform planning, management, and evaluation of activities in order to improve and maintain health outcomes at a population level
49. Saunders, R.P [64]	2012	LEAP Sustainability Assessment	To assess sustainability of the Lifestyle Education for Activity Program (LEAP)
50. Savaya, R [49]	2009	Projected Likelihood of Project's Continuation	To examine projected sustainability and its predictors along a continuum of forms
51. Schalock, R. et al. [30]	2016	Sustainability model	To consider what factors drive the organisation's ability to both adapt successfully to change
52. Scheirer, M. and Dearing, J.W [18]	2011	A Generic Conceptual Framework for Sustainability	To guide the sustainability research agenda
53. Schell, S.F. et al. [44]	2013	Capacity for sustainability framework	To provide a framework on sustainability capacity, identifying organisational and contextual characteristics necessary for successfully sustaining programmes over time
54. Shediac-Rizkallah, M.C. & Bone, L.R [8]	1998	Conceptual framework for planning for sustainability of community based health programs	To conceptualise and measure sustainability and provide guidelines to facilitate sustainability in community programmes
55. Shigayeva, A. and Coker, R [15]	2015	Conceptual framework to support analyses of sustainability	To support analyses of sustainability of communicable disease programmes
56. Sivaram, S. and Celentano, D.D [27]	2003	Conceptual framework to develop a strategy that will facilitate sustainability	To develop a strategy that will facilitate sustainability of outreach worker efforts in AIDS prevention
57. Slaghuis, S.S. et al. [32]	2011	A framework and a measurement instrument for sustainability of work practices in long-term care	To analyse sustainability of actual changed work practices and evaluate improvement projects
58. Song, B. et al. [50]	2016	The framework for sustainability evaluation of Community based LTC programmes	To evaluating community-based LTC programmes from the sustainability perspective
59. Sridharan, S. et al. [29]	2007	Analysis of strategic plans to assess planning for sustainability of comprehensive community initiatives	To assess planning for sustainability
60. Stefanini, A. and Ruck, N [41]	1992	Conceptual framework to monitor the performance of externally-assisted health projects	To monitor a project's efforts towards sustainability
61. Story et al. [67]	2017	Conceptual framework for institutionalization of community-focused maternal, newborn & child health strategies	To encourage collaboration and contribute to programme planning and policy making for the institutionalisation of community-focused health strategies
62. Tuyet Hanh, T.T. et al. [40]	2009	Framework for Evaluating the Sustainability of Community-based Dengue Control Projects	To provide a framework and tool for assessing sustainability

2. *Continued health benefits* (included in 44% (27/62))

e.g. 'Sustainability is the ability to sustain population health outcomes.' [28]

3. *Capacity built* (included in 19% (12/62))

e.g. 'our conceptualization of sustainability was on the inter-organizational relationships that might serve as a basis of the collaborative problem-solving

4. *Further development* (*adaptation*) (included in 16% (10/62))

e.g. 'Adapting successfully to change and providing a range of valued service delivery opportunities and practices in an effective and efficient manner' [30].

5. *Recovering costs* (included in 3% (2/62))

e.g. 'It is the ability of an organization to produce outputs of sufficient value so that it acquires enough inputs to continue production at a steady or growing rate' [20].

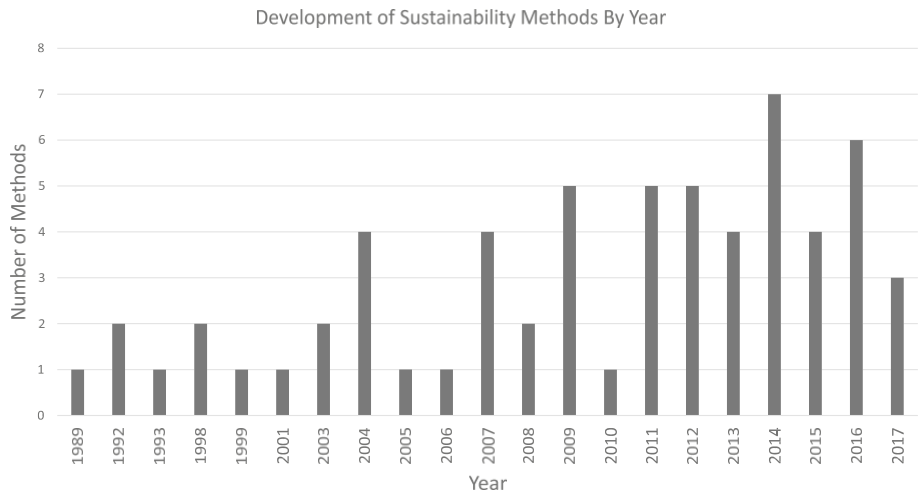


Fig. 2 Development of sustainability approaches by year. Graph displays sustainability approach development by year

Sustainability approach development

The sustainability approaches were developed through several techniques often using a mixed-method ap- proach (e.g. literature review and interviews) (Fig. 3).

Sixty-one percent (38/62) of the development processes included a literature review or systematic review. This was followed by 26% (16/62) using 'professional expert- ise' such as an advisory panel and 24% (15/62) using interviews.

Table 2 Theoretical perspectives

	Diffusion of innovations [70, 95]	Complexity theory/complex systems theory [71]	Ecological theory [72, 96]	General systems theory or open systems theory [73]
No. of approaches drawing on theory	10	9	5	4
Sustainability process	Sustainability is viewed as the final stage of initiative life cycle [18, 86]	Sustainability is a nonlinear process where change, adaptation and uncertainty are expected [15, 31, 53, 68]	Views sustainability as an ongoing and dynamic process that occurs throughout implementation [11, 72]	Sustainability is a process where things can return to the norm ('homeostasis') or adapt to the environment to survive. [85, 92]
Theory application in approaches	This perspective explores how programme benefits and burden will support or be a barrier to sustainability [54, 66]. Within approaches using this perspective, the role of adopters of the initiatives were seen as key to success, specifically to achieve wider reach during initiatives and maintain activities after the initiatives come to an end [27].	This perspective highlights how the interactions that occur between an initiative, the setting, the broader organisation and the sociocultural context impact sustained change. Initiatives were viewed as components being introduced to complex adaptive systems that change and adapt in response to interactions with the environments, individuals and wider context [53].	This perspective focuses on behaviour and how it is influenced by and influences individuals and environments [72] Approaches adopting this perspective focused on the need to find the right fit between initiatives, contexts and expectations to inform the ongoing adaptation of initiatives to achieve sustainability [11]	This perspective views an organisation as an organism open to the influence of its environment with the need to adapt to survive in order to achieve lasting change [73] Approaches using this perspective explored perceived benefits and burden of an initiatives, availability of support for initiatives and leadership within organisations [54]

Sustainability method characteristics

Type

The sustainability approaches come in a variety of forms: frameworks/conceptual frameworks (32), models (16), tools (8), guidance strategies (4), checklists (1) and pro- cesses (1). The highest proportion identified themselves as frameworks. Our exploration indicates there is very little consensus between approaches on what constitutes a 'framework', 'model' or 'tool'.

Aim

The highest proportion of approaches, 39% (24/62), aimed to *evaluate* sustainability, followed by 23% (14/62) of the approaches which aimed to support *planning* for sustainability. The remaining approaches aimed to pro- vide *guidance* and *strategies* to influence sustainability or a combination of *evaluation*, *planning and guidance*.

When to assess

Two distinct perspectives on when approaches should be used emerged from this review. The highest propor- tion, 66% (41/62) of approaches, viewed the sustainabil- ity as a prospective process to be explored throughout implementation. Nine approaches viewed sustainability as a linear process with sustainability being studied retrospectively after implementation has been 'com- pleted'. The remaining 12 approaches specified they could be used both prospectively and retrospectively, during implementation or following implementation.

Level of use

The majority, 82% (51/62), of approaches have been de- signed to examine or influence sustainability at a specific *intervention or programme level* (e.g. a single improve- ment project) [31]. Eleven approaches aimed to examine sustainability at an *organisational or systems level (e.g. a long-term care organisation)* [32].

Settings

Thirty-seven percent (23/62) of the approaches were de- signed for use in general healthcare settings and did not specify a specific healthcare setting for use. Public health settings were specified in 31% (19/62) of the approaches, followed by community healthcare in 26% of the ap- proaches (16/62). A smaller number of approaches were designed for use in acute, 3% (2/62), and e-health settings, 3% (2/62).

Suggested users

Suggested users were specified in 55% (34/62) of the ap- proaches (Fig. 4). The majority of these approaches have been designed for use by multiple groups of professionals or practitioners (e.g. researchers as well as nurses).

Sustainability constructs

Constructs across approaches were compared and con- trasted, and 40 individual items for sustainability were found. The number of constructs examined in each method ranged from 8 to 31 with an average of 17 con- structs per method. Additional file 2 provides a descrip- tion of inclusion, a definition and an example for each of the 40 constructs. To assess coding clarity and reliability, an inter-rater reliability score (kappa coefficient) was cal- culated between two coders using the NVivoPro coding comparison function [33]. The test showed a high level of agreement between scorers with an inter-rater reliability score of 0.94 [34, 35].

A consolidated framework for sustainability constructs in healthcare is presented in Table 3 and summarises the frequency of sustainability constructs across the approaches. The constructs have been organised under the following six emergent themes: *the initiative design and delivery*, *negotiating initiative processes*, *the people involved, resources, the external environment, and the organisational setting.*

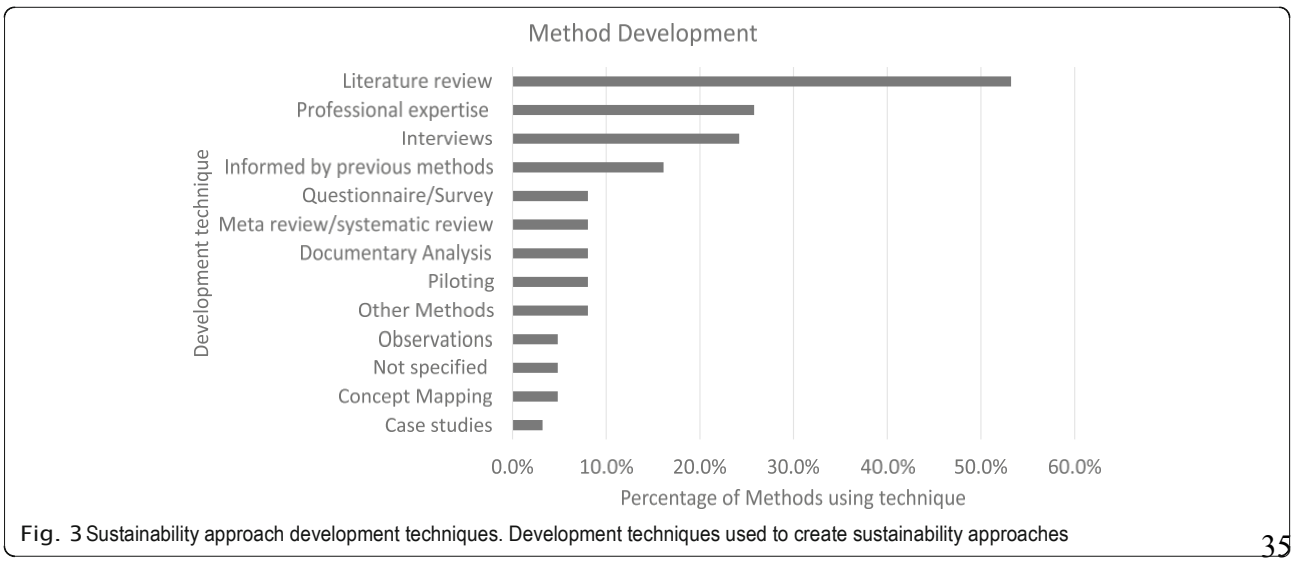


Fig. 3 Sustainability approach development techniques. Development techniques used to create sustainability approaches

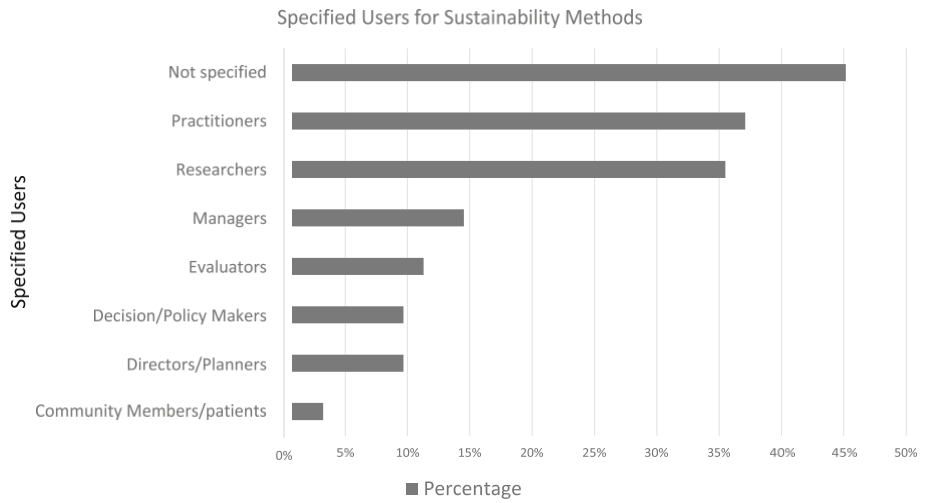


Fig. 4 Suggested users for approaches

Comparison across approaches demonstrated that no two approaches contained the same combination of the constructs nor did any single approach capture all 40 constructs. Although variation was seen, results show that there are consistent con- structs across approaches regardless of proposed inter- ventions, settings or application types. Six constructs were included in over 75% of the approaches: 'General resources' (90%), 'Demonstrating effectiveness' (89%), 'Monitoring progress over time' (84%), 'Stakeholder par- ticipation' (79%), 'Integration with existing programs and policies' (79%) and 'Training and capacity building' (76%).

Diversity in assessment

Although common constructs were found across ap- proaches, each approach reported diverse means to in- vestigating and defining individual constructs. As an exemplar, the top 3 most common constructs are pre- sented in more detail to highlight how similar constructs are assessed across different approaches. Inclusion infor- mation and definitions for all constructs are available in Additional file 2.

Table 3 Consolidated framework for sustainability constructs in healthcare

The initiative design and delivery	Negotiating initiative processes	The people involved	Resources	The organisational setting	The external environment
· Demonstrating effectiveness 89%	· Belief in the initiative 63%	· Stakeholder participation 79%	· General resources 90%	· Integration with existing programs and policies 79%	· Socioeconomic and political considerations 63%
· Monitoring progress overtime 84%	· Accountability of roles and responsibilities 56%	· Leadership and champions 73%	· Funding 68%	· Intervention adaptation and receptivity 73%	· Awareness and raising the profile 45%
· Training and capacity building 76%	· Defining aims and shared vision 53%	· Relationships and collaboration and networks 65%	· Infrastructure 26%	· Organisational values and culture 71%	· Urgency 5%
· Evidence base for the initiative 52%	· Incentives 31%	· Community participation 56%	· Resource_Staff 26%	· Organisational readiness and capacity 56%	· Spread to other organisations 5%
· Expertise 23%	· Workload 27%	· Staff involvement 42%	· Resource_Time 6%	· Support available 40%	
· The problem 15%	· Complexity 24%	· Ownership 26%		· Opposition 5%	
· Project duration 8%	· Job requirements 19%	· Power 18%			
· Improvement methods 6%		· Patient involvement 16%			
· Project type 2%		· Satisfaction 11%			

- *Resources*. This construct included a complex combination of potential resources to consider. Four key resource types were found: *funding*, *infrastructure*, *staff* and *Time*. The majority of the approaches explicitly stated the need to assess resources but not all indicated the type of resource. Many approaches highlighted the importance of the ability of an initiative *to garner and maintain* resources [15, 27, 36–41] through *stable sources* [19, 36, 39, 42–45]. The ability of an initiative to *share resources* with partners and other organisations [41, 46], seek out *alternative and supplemental resources* [18, 47–49] and/or uncover *multiple funding sources* [8, 36, 49, 50] were also highlighted across some approaches as important to overall sustainability.

- *Demonstrating effectiveness* (assessing or measuring project outcomes and impact). A number of potential perspectives were taken to assess this construct. While some approaches chose to look at overall initiative evaluation or performance [32, 36, 44, 51, 52], others chose to specifically assess either the ability of the initiative to *function* as intended [15, 36, 39] or the ability of the initiative to *produce* intended benefits [7, 11, 31, 47, 53–60]. A selection of approaches took a wider perspective and looked at whether the initiative benefits were perceived by staff and other stakeholders as *valuable* [8, 30, 42, 51, 61-63].

- *Monitoring progress over-time* (the ability to monitor the initiative using standardised systems or mechanisms over-time) appeared in 84% of the approaches. Approaches to monitoring included diverse areas to assess including *having appropriate data to document progress* [64, 65], having *a management or monitoring system in place* [15, 53, 61, 66, 67], *and* having *regular reporting and feedback mechanisms* [46, 47, 52, 54, 68, 69].

Top ten comparisons across approaches

Comparison across level of use

The top ten constructs for examining an *organisation or system's* sustainability versus an *intervention or programme's* sustainability are presented in Table 4. Regardless of level of use, 5 of the top 10 constructs are found across both types of approaches. Differences be- tween these types of approaches demonstrate how the 'level of use' of an approach changes the potential con- structs to be explored (shown in italics). In studying an *organisation or system's sustainability*, there is a greater focus assessing the *readiness and capacity* for the initia- tives and *involving stakeholders* and *community members*. Approaches assessing organisational sustainability were also much more likely to prioritise *defining overall aims* for the programme and garnering *belief in initiatives* from stakeholders. Approaches assessing an *intervention's sus- tainability* emphasised the need to consider how an initia- tive becomes *integrated into current programmes and policies* specifically looking what *intervention adaption* may be needed. These approaches were also more likely to assess how *training and capacity building* were conducted to ensure staff were able to undertake the initiative tasks.

Comparison of prospective versus retrospective approaches

The top ten constructs for examining sustainability throughout an initiative (prospective assessment) versus after implementation (retrospective assessment) are presented in Table 5. Several key differences are observed. Prospective approaches are used for a combination of plan- ning, guidance and evaluation. Prospective approaches show a greater emphasis on *building relationships* and get- ting *stakeholder buy-in* throughout an initiative. These ap- proaches also highlighted the role of *initiative adaptation* to ensure initiatives align with stakeholder and setting needs. Retrospective approaches were more often designed for evaluation purposes emphasising the need for *a shared vision* and *accountability* to deliver the initiative. These ap- proaches were more likely to specifically examine *funding* for the initiative and highlight the need to have a *defined aim* to show evidence for sustainability of an initiative once it has been 'completed'. These differences highlight how retrospective approaches tend to focus on delivery and evidence for continuation of initiatives while prospective ap- proaches focus on building an initiative into an organisa- tion, getting people on board and garnering networks that may help along the way.

Discussion

This review aimed to identify available approaches which assess or influence sustainability in healthcare and ex- plore what sustainability constructs were examined in each to inform their future use in practice. This review found that a substantial number of approaches exist with 62 approaches identified and included in this review. Approach characteristics were wide-ranging with diverse settings, interventions and designs. Each provided a unique perspective on sustainability with no two being exactly alike.

The reviewed sustainability approaches made connec- tions to many different theoretical perspectives which highlighted the complexity of measuring and planning for sustainable initiatives. Four theoretical perspectives (diffusion of innovations theory, complexity theory, eco- logical theories and open systems theory) were most common and revealed two distinct positions guiding the use of sustainability approaches. The first views sustain- ability as a linear process following implementation. In this approach, sustainability is an end goal, a state to be

Table 4 Comparison across level of use (difference shown in italics)

Organisational focus (11 approaches)	Percent	Intervention focus (51 approaches)	Percent
1. Demonstrating effectiveness	100	1. Resources_General	90
2. Resources_General	91	2. Demonstrating effectiveness	86
3. Monitoring progress over time	91	3. Monitoring progress over time	82
4. Organisational readiness and capacity	82	*4. Integration with existing programs and policies*	82
5. Belief in the initiative	73	*5. Training and capacity building*	76
6. Organisational values and culture	73	6. Stakeholder participation	76
7. Community participation	73	*7. Intervention adaptation and receptivity*	75
8. Leadership and champions	73	8. Leadership and champions	73
9. Stakeholder participation	73	*9. Organisational values and culture*	71
10. Defining aims and shared vision	64	*10. Funding*	69

reached or level of achievement [70]. The second views sustainability concurrent process alongside implementa- tion, where sustainability is a process to be influenced and adapted to impact initiative longevity [71-73]. Value is seen in both views, but depending on what theoretical perspective is taken, planning, measurement and moni- toring is significantly different [8, 13, 61, 74, 75]. Despite previous work finding that 'most frameworks proposed tend to be deterministic in nature where sustainability is viewed as an end goal', we found that 66% of approaches we reviewed saw sustainability as a process rather than an end state [15]. The choice to evaluate, monitor or plan for sustainability overtime rather than after imple- mentation may indicate a shift in perspectives from sus- tainability as an outcome to sustainability as an ongoing process. As this perspective gains popularity, some have cautioned that while it may be valuable to assess sustain- ability throughout initiatives, data collection past the im- plementation stage is still required to assess the continuation of initiative activities or outcomes and de- termine whether sustainability is actually achieved [18]. This highlights the need for the purpose of use to be clear before an approach is applied. While some ap- proaches explicitly aim to sustain outcomes, others meant to influence and promote action overtime. There- fore, the aims and potential results from approaches should be understood to ensure people are able to realis- tically assess the outcomes they desire.

Results have demonstrated that sustainability is most often defined and assessed as the *maintenance of programme activities*. Although multiple definitions were found (continuation of the health benefits from an initia- tive, capacity built in the workforce or community, fur- ther development or adaptation and the ability to recover costs), there was a clear dependence on this one measure which has been previously observed in the lit- erature [76]. It is important to note that while measuring continuation of programme activities is important to assessing sustainability, relying solely on this measure may risk other key sustainability variables being missed [18, 76]. For example, it may result in the continuation of ineffective or undesirable practices if health benefits are not taken into account. This was observed in the Drug Assistance Resistance Education programme in America which continued to be implemented in schools despite studies showing that it had little effect on pre- vention or reduction of drug use by students continuation of programme activities as the sole

Table 5 Comparison of when to assess (differences shown in italics)

Retrospective assessment (9 approaches)	Percent	Prospective assessment (41 approaches)	Percent
1. Demonstrating effectiveness	100	1. Resources_general	93
2. Resources_general	89	2. Demonstrating effectiveness	85
3. Leadership and champions	89	3. Monitoring progress over time	83
4. Accountability of roles and responsibilities	78	*4. Stakeholder participation*	83
5. Belief in the initiative	67	5. Integration with existing programs and policies	81
6. Defining aims and shared vision	67	6. Training and capacity building	78
7. Funding	67	*7. Intervention adaptation and receptivity*	73
8. Monitoring progress over time	67	8. Leadership and champions	73
9. Training and capacity building	67	9. Belief in the initiative	68
10. Integration with existing programs and policies	67	*10. Relationships and collaboration and networks*	68

measure of sustainability also risks initiative being un- fairly judged as failing to sustain if activities are adapted. If the definition is broadened, adaptation could also sig- nify sustained improvement, especially if the adaptations contributed further to health benefits or cost recovery. These examples highlight the need for careful consider- ation of what will be sustained and what evidence there is for sustainability to occur [66]. All definitions identi- fied in the review represent interrelated facets of what sustainability means in practice; therefore, those working in this field should explore the breadth of available sus- tainability domains in order to accurately represent the sustainability process and account for its full complexity and possible outcomes [7].

Our comparison across approaches demonstrated con- sistent constructs were seen regardless of proposed inter- ventions, setting or level of application. Within the six constructs included in the majority of approaches, diverse views and different assessment mechanisms were taken, highlighting the complexity within each construct. This demonstrates the need for careful planning and consider- ation of how each construct is articulated and assessed given the specific outcomes of interest desired. Interest- ingly, no approaches contained the same combination of the constructs nor did any single method capture all iden- tified constructs. Given homogeneity of the individual constructs found, we believe there is value in having an overarching resource and summary, indicating the breadth of possible sustainability constructs to consider for sus- tainability in healthcare settings. The consolidated frame- work for sustainability constructs in healthcare (Table 3) provides a knowledge base for those who may wish to re- view proposed sustainability constructs and draw on the substantial work and research already conducted in this area.

The framework can also help those considering creating a sustainability method in their own setting. While there are benefits of approaches created for specific settings, there is also a risk in continually creating 'new' approaches with similar constructs divided by semantics and personal interpretations of the literature [18, 20]. Those consider- ing creating a sustainability approach should consider the information presented here and the available approaches for use before 'recreating the wheel' as continuous produc- tion may lead to further division and confusion in the lit- erature and ultimately result in fewer robust studies on the use of available sustainability approaches being pub- lished [18]. The number of sustainability approaches may grow with necessary alterations to design and further development, but there is a need for future authors to describe how new approaches fit within the findings presented here. Authors should previous approaches which have informed the development) and highlight if they are transferable to other settings and if there are any specific benefits or bar- riers to their use.

Strengths and limitations

This is the first review to consolidate available ap- proaches for sustainability across diverse healthcare set- tings. We believe this work represents a significant contribution to the field in organising and describing sustainability approaches which have until now remained isolated across healthcare fields and disciplines [18]. This review provides not only a resource for identifying avail- able sustainability approaches but also outlines the aims, applications and constructs in each approach so readers can determine if one may be fit for their setting. This work has demonstrated that although many approaches were developed within specific interventions and set- tings, similar constructs for sustainability were found in- dicating general learning can be gathered from across settings to inform sustainability processes and research. Additionally, this paper provides a consolidated sum- mary of all constructs deemed to be important across approaches to serve as a sustainability knowledge base that is useful beyond specific settings or interventions. To aid readers in navigating the data extracted from each approach, we propose a list of questions to guide their decision- making process (Table 6). Readers can re- spond to these questions and use their responses along with full method details in Additional file 1 to establish if an available method will suit their purposes.

The use of one author to conduct of the majority of screening, data extraction and coding is also a limitation of this work. Although double data extraction is recom- mended in most systematic reviews, it is also recognised that this is often not possible in many cases due to time and resources constraints [78]. This may have resulted in bias in inclusion or exclusion or resulted in missing or erroneous information being collected. To address this limitation, we involved multiple authors where pos- sible in selection of the studies (20% screened by a sec- ond author) and coding of constructs (25% of studies).

Table 6 Questions for consideration

Navigating available sustainability approaches—questions for consideration
1. How do you wish to view sustainability? (a process or an end goal)
2. What is your aim? (evaluation, planning, guidance)
2. What does sustainability mean to you? (continuation of the health benefits, continuation of activities, capacity built, further development and/or cost recovery)
3. Where do you wish to use the sustainability approach? (specific intervention or organisation)
4. Who will use the approach? (researcher, practitioner, managers etc.)
5. Does an existing approach meet your needs?
6. If not, what needs to change or be adapted and why?

Data extraction was also checked against full-text arti- cles for all included papers.

Another limitation of this work is the disproportionate number of frameworks from the community health and public health settings. These areas tend to dominate this area of research so further work may be needed to ex- plore sustainability in other acute and chronic care settings [79].

Another key limitation of this work is that we did not use an existing quality assessment tool and cannot attribute value or accuracy of constructs from each approach. While the quality criteria set out in our data extraction form allowed us to ensure each paper had a minimum level of data to adequately describe the approach, it did not assess quality of the approaches themselves. We extracted infor- mation on each of the approaches which others may wish to use to attribute validity to findings. Details, particularly those around sustainability approach development, may be used by readers to assess whether they believe the approach has enough merit to be used in their site. It is important to note that many approaches (24%) were informed by profes- sional expertise, a technique that may be difficult to assess for quality but appears to be very significant in the creation of sustainability approaches.

We reported which constructs were deemed to be important to assess, but this does not indicate that these are the 'right' constructs or that they will lead to sustainability. Although our assessment of frequency indicated some con- sensus across approaches, with six constructs included in over 75% of approaches, this does not tell us that assessing these constructs will achieve sustainability in practice or that they are correct or comprehensive. In order to under- stand the validity of these findings, the approaches must be applied and assessed in practice. Future work will explore if and how these approaches have been applied to ascertain if their constructs accurately represent sustainability in spe- cific settings and if they fulfil their stated aims.

Future work

Many approaches presented in this review recommend that they be used and evaluated further within other healthcare initiatives and settings to explore applicability and further development needed [11, 36, 56, 79]. Future work in this field should now focus on applying the avail- able approaches in practice to understand the application processes and assess the overall impact of their use [18].

Conclusion

Sustainability of improvements has been recognised as a challenge for some time, and while there is diversity in the literature on how it is defined and how it can be influ- enced, there is one clear and compelling message: sustain- ability of initiatives requires thoughtful planning and attention. If we do not address it appropriately, we continue to risk wasting valuable resources and losing sig- nificant progress and patient outcome improvements. Choosing a sustainability approach to support this process can pose a challenge to those looking to influence sustain- ability because of the diverse approaches reported in the literature. Understanding the purpose, perspectives and constructs within each will aid potential users to make the most of approach choice and application.

Additional files

Additional file 1: Data extraction form. Full data extraction details for each method. (XLSX 30 kb)

Additional file 2: Definition and description of sustainability constructs. Table provides definitions, descriptions and examples for each of the 40 sustainability constructs found constructs. (PDF 446 kb)

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Authors' contributions
LL conceived of the study and was responsible for the design and search strategy. LL conducted the search. LL and LM conducted the data analysis and produced the tables and graphs. JR provided input into the data analysis and interpretation. The initial draft of the manuscript was prepared by LL then circulated among all authors for comments and revision. All authors read and approved the final manuscript.

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Appendix F: Interview Guide and Questions

Interview Guide and Questions

Introduction: The aim of this work is to understand the process by which improvement team members influence the sustainability of their projects and to understand participant views on sustainability and long term success. Interviews with team members will be conducted at two time points to gain in-depth understanding of sustainability processes and actions. A purposive sampling strategy will be used to recruit interviewees from improvement teams. We would like to ask you a few questions to aid in our understanding of how improvements are sustained in practice.

Semi-structured interviews will explore perceptions, experiences and actions associated with sustainability. We will not be using your name or any identifiable titles to attribute statements you have made. All data will be anonymised.

Ethics: This research protocol and interview questions have been approved by Imperial College HRA IRAS number: 188851.

Sampling Strategy and Participant Selection: A purposive sample strategy will be used to select participant. Participants will be selected based on their level of knowledge of the project or intervention and their role in the project. This aims to maximize the diversity of perspectives gained from the interviews. All participants will be CLAHRC NWL stakeholders who 1) *Have been involved in a past project 2) Will be involved in a future project 3) Have been involved in using the NHS III model* and/or the Long Term Success Tool.

Settings: CLAHRC NWL Office, Project NHS trust sites, telephone, Skype

Time: Approximately 30-45 minutes

Time frame: Interviews will be conducted in April-August 2016 and April 2017 to February 2018.

Method: The interview will be semi-structured, using an interview protocol to guide the interviews. An exploratory approach will be taken to examine any emerging themes and issues therefore revision of the protocol will take place as the research progresses. Based on

participant responses and initial analysis the initial research questions and interview questions will be adapted.

As data are collected and analysed initial coding and interpretations will be discussed with supervisors and select participants. This process will enable interpretations of the data to be shared with the participants, and give the participants the opportunity to discuss and clarify the findings, and contribute further perspectives on the issue under study.

Analysis: The analysis will involve the following stages: familiarization, identifying thematic framework, coding, and mapping and interpretation. Transcribed interview notes and recordings will be analysed using Nvivo, a qualitative research software, to identify common challenges and themes across projects and settings.

Themes covered:

I. Perceptions of added value of models, tools and frameworks for sustainability
II. Longevity and lasting impacts of initiative improvements
III. Inputs, factors and actions needed to achieve long term success
IV. Risks to Sustainability
V. Use, engagement with and impact of the Long Term Success Tool

Long Term Success Interview Questions

First round April-August 2016

1) Can you please describe you **past experience** with improvement projects?
   I. What did this project aim to achieve and was this accomplished? Why or why not?
   II. Was this project sustained?
   III. Can you briefly describe any ***strategies*** you may have used to try to influence sustainability? (actions taken, models, methods or tools such as the NHS III sustainability model)?
   IV. What did you learn from this experience?

2) Can you please describe your **current improvement project** and its aims?
   I. What is your role in the project?

3) Can you describe any **key improvements/achievements** your project has accomplished to date?
   I. Throughout the project have there been any steps taken to ensure long term success is achieved? If so what were they?

4) A) In your opinion, what has been/will be the **greatest challenge** to the sustainability of your project? Why?

I. Are there any actions that were taken/could be taken to improve this?

B) In your opinion what has been or will be the **greatest facilitator** to the sustainability of your project? Why?

5) Can you describe **your experience** in **using the LTS** approach?
   I. How has it felt compared to previous sustainability strategies you have used?
   II. In what way, if any, has it influenced your project's journey or trajectory?

6) These are the **LTS Tool results** from the project **(show project Spider Diagram and Bar chart**). What are your thoughts on this?
   I. How reflective are the results compared to your experience of being involved in the project?
   II. Has anything been missed?

7) Your reports indicated these challenges /action (**show project challenges/actions list**). Did you or your team follow up on these?
   I. If so, what actions has your team undertaken to address this?
   II. If not, are there any actions that could have been beneficial?

8) Do you believe the improvements your project is making ***will be sustained***?
   I. For how long?
   II. What could improve this?

9) What are the ***next steps*** for this project?

10) Any other comments?

Follow-up Interview Questions

April 2017- February 2018

1. Can you describe what has happened with the heart failure project in the past year?

2. In your opinion has the initiative been sustained?

3. As sustainability can be measured in a number of ways, can you describe based on the descriptions if any of the following have been achieved?

Sustainability outcomes	**y/n, describe**
I. Benefits or outcomes for patients are continued	
II. Continuing the program activities or components of the original intervention	
III. Maintaining community-level partnerships or coalitions developed during the funded program	
IV. Maintaining new organizational practices, procedures, and policies that were started during program implementation	
V. Sustaining attention to the issue or problem	
VI. Program diffusion and replication in other sites	

4. For the previous interview, the aim of your work was to: X. It included x,y,z. Has the intervention changed at all from what was initially implemented?

- If so how has it changed and why were these changes necessary?

3. For looking at your previous interviews, many of you identified X, Y, Z as an issue for sustainability. Can you tell me if and how these influenced the project journey in the last year?

- Were there any other challenges the project encountered?

4. Many of your colleagues also identified X, Y, Z and facilitators for sustainability. Can you tell me if and how these influenced the project journey in the last year?

- Where there any other things that helped the project along the way?

6. Some strategies for sustaining were also highlighted in the previous interviews such as X,Y,Z.

- Have these actions taken place?
- Have other actions been taken to aid in the project's sustainability?
- How have they helped?

7. What are the next steps for this project?

8. Any other comments?

Appendix G: Sustainability Constructs and Descriptions

Theme	Construct	Description
The External Environment	Awareness and Raising the profile	Ensuring that stakeholders are aware of the initiative and its benefits and strategic steps are taken to raise the profile of the project to garner further support though media, marketing and publications.
	Socioeconomic and political considerations	Awareness of the potential impact of outside forces in the environment, government or society that may impact initiative funding, processes or priorities.
	Spread to other organisations	Ability of an innovation to show benefits which are either spread within an organisation or to other organisations.
	Urgency	The urgency or motivation to maintain an initiative based on its potential to support an important and relevant healthcare need.
Negotiating Initiative processes	Accountability of roles and responsibilities	Roles and responsibilities involved in the initiative are clearly defined and outlined with necessary distribution across teams so there is no reliance on specific individuals.
	Belief in the initiative	The belief that, the initiative will be of value, it will produce the benefits intended and deliver the stated improvements to care.
	Complexity	The difficulty and complexity of understanding, delivering and maintaining the initiative.
	Defining Aims and Shared Vision	Taking the time to define and understand what people want to achieve and why. Working with stakeholders to establish a shared aim and vision.
	Incentives	Motivation gained from rewards or benefits that drive individuals and organisations to engage with an initiative and continue to deliver it overtime.
	Job requirements	Specific job requirements have been established and are included in job descriptions and roles. Tasks are able to be accomplished with the given skill set of workers.
	Workload	The added effort and change to workload when a new initiative in implemented. Staff have the necessary time to complete tasks and the initiative has fair division of labour and does not require special or extra effort.
Resources	Resources_ General	Any resources needed to manage and maintain an initiative.
	Funding	Having adequate money for the initiative to be implemented, embedded and sustained.
	Infrastructure	The physical resources required to support the initiative to be delivered such as buildings, office space, materials and supplies.
	Resource_Staff	Having a sufficient number of staff to meet the requirements of the initiative.

	Resource_Time	Energy and time to dedicate to the initiative.
The Initiative Design and Delivery	Demonstrating effectiveness	Assessing or measuring project outcomes and impact.
	Evidence base for the initiative	The evidence that the initiative will provide stated benefits and can credibly achieve them through the initiative plan.
	Expertise	Having adequate expert knowledge and experience to carry out an initiative.
	Improvement Methods	The use of improvement methods to support initiative success and sustainability e.g. PDSA cycles, Measurement for Improvement and Action Effect Method.
	Monitoring progress over time	The ability to monitor the initiative using standardised systems or mechanisms over time.
	Project duration	How long the project is expected to last and how long resources are available.
	Project type	The type and design of the initiative.
	The Problem	The recognition, concern and acceptance of a problem that supports an initiative to address it.
	Training and Capacity Building	Orienting and training staff to be able to deliver the initiative successfully, as well as ongoing educational and skill building support for new workers.
The Organisational Setting	Integration with Existing Programs and Policies	The need to ensure an initiative was embedded into organisational structures, programmes and policies.
	Intervention Adaptation and Receptivity	The ability of an initiative to respond to change and adapt to fit with local contexts and requirements.
	Opposition	Resistance from stakeholders to the initiative due to other priorities or competing interests.
	Organisational Readiness and Capacity	Capacity and readiness of the organisation to undertake the initiative.
	Organisational Values and Culture	Organisational beliefs and values that support a culture for the initiative and its sustainability.
	Support Available	Support in the form of technical, educational, managerial support available to enhance delivery and maintenance of the initiative.
The People Involved	Leadership and Champions	A person, or group of people who have the ability and skills to advocate, communicate and support an initiative to achieve lasting change.
	Ownership	Organisations, communities and stakeholders taking ownership and responsibility to support, embed and sustain an initiative.
	Power	The ability of individuals to use their resources and skills to advocate or support the initiative.

	Relationships and collaboration and networks	Ability to build collaborations, partnerships and networks to support sustainability of the initiative.
	Satisfaction	The level of enjoyment and reward stakeholders and staff get from participating in the initiative.
	Stakeholder participation	The need for involvement and participation from stakeholders who are affected by the initiative.
	Community participation	Participation of community members to direct, and shape initiatives to reflect their values, expectations and needs.
	Patient involvement	Involving patients in initiative processes to understand potential impact, values and preferences.
	Staff involvement	Including staff responsible for implementing an initiative across multiple stages of planning, design, delivery and maintenance, valuing their input and taking feedback on board.

Appendix H: CLAHRC NWL Study Protocol

Evaluation of the NIHR CLAHRC NWL Systematic Approach to translating evidence-based research into practice in healthcare

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Research Protocol Version6.0 8th February 2017

This protocol describes the study 'Evaluation of the NIHR CLAHRC NWL Systematic Approach' and provides information about procedures for entering participants. Every care was taken in its drafting, but corrections or amendments may be necessary. These will be circulated to investigators in the study. Problems relating to this study should be referred, in the first instance, to the Chief Investigator.

This study will adhere to the principles outlined in the NHS Research Governance Framework for Health and Social Care (2nd edition). It will be conducted in compliance with the protocol, the Data Protection Act and other regulatory requirements as appropriate.

Study Management Group

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Sponsor
Imperial College London is the main research Sponsor for this study. For further information regarding the sponsorship conditions, please contact the Head of Regulatory Compliance at:

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Indemnity
Imperial College London holds negligent harm and non-negligent harm insurance policies which apply to this study

Audits
The study may be subject to inspection and audit by Imperial College London under their remit as sponsor and other regulatory bodies to ensure adherence to GCP and the NHS Research Governance Framework for Health and Social Care (2nd edition).

Related Documentation

This Protocol links to the following documents:

Information Sheet version 4.0

Group 4 Information Sheet version 1.0

General Consent Form version 1.0

Project Lead Consent Form version 2.0

Ethics IRAS 188851

Background
While peer-reviewed clinical evidence (such as journal articles, guidelines, toolkits) describe activities that healthcare providers can undertake to improve healthcare, they rarely come with a blueprint for how it can be embedded in routine practice.(Bate & Robert, 2002; Hoffmann et al., 2014; Kitson, Harvey, & McCormack, 1998; Shojania & Grimshaw, 2005)

The NIHR CLAHRC NWL programme has developed a systematic approach consisting of additional tools and methods to help with this process of embedding research into routine practice in healthcare. NIHR CLAHRC NWL funds and supports Quality Improvement Teams consisting of multidisciplinary staff (such as managers, doctors, nurses, pharmacists, and physiotherapists) and patients to use the systematic approach in projects lasting a fixed term e.g. 12 or 18 months.

The systematic approach includes activities which are proposed to provide benefits in the evidence translation process and are based on recommendations from existing research in this field.(Bate & Robert, 2002; Langley et al., 2009; Shojania & Grimshaw, 2005) The approach includes strategies to support the planning, conduct and evaluation of evidence-translation efforts, and provides guiding principles for teams to work towards including the strategic principles to act scientifically and pragmatically, embrace complexity, and to engage and empower those responsible for and effected by translation efforts including frontline healthcare staff and patients. In addition the approach specifies a number of tools and methods to guide team progress. For example, one activity is known as process mapping, whereby Quality Improvement Teams collaborate to produce a diagram depicting standard procedures of care delivery. This is hypothesized to help the team to better understand their system and opportunities for intervention, as well as providing an opportunity for patients and multi-disciplinary staff to interact in different ways and empathize with each other's perspectives.(Langley et al., 2009)

The purpose of this research study is to thoroughly assess the strengths and weaknesses of the systematic approach and its component parts, and to better understand "what actually happens" during the process of evidence translation and improvement.

The research will be conducted through a series of 1:1 interviews and observations of group meetings and workshops with a diverse group of people involved in delivering and improving healthcare. This will include NHS doctors, managers, nurses, allied health professionals, data analysts, and commissioners, as well as academic researchers and members of the public. Documents produced in preparation for and as a result of these meetings will also be analysed. These methods will help to determine the strengths and weaknesses of the CLAHRC NWL approach to translate research into routine healthcare improvements.

The results of this research will be used to iteratively develop the approach and scale up improvements nationally and internationally.
While new clinical research is always necessary, much more needs to be done to apply existing research evidence more effectively in everyday practice. Therefore, this research project chooses to investigate the process of translating of research into healthcare practice.

CLAHRC NWL has worked with partners to identify priority areas for improving care in Northwest London. The Delivery themes are targeted at areas of high morbidity with high health and care related costs that are recognised areas for improvement within Northwest London. These include Breathlessness, Early Years and Frailty as areas where local data suggest there is scope to significantly improve quality and value of care.

The Cross-cutting themes draw on existing literature and build on the CLAHRC NWL experience enriching understanding of the complexity of translation. To support successful and sustainable outcomes it is necessary to:

- Embed: Maximise knowledge of staff and patients to understand processes of care to help 'fit' research evidence. Test changes using an iterative approach to allow teams to react to obstacles and opportunities.
- Engage: Establish meaningful dialogue between patients and healthcare providers to ensure that changes to practice are aligned with patient needs and priorities.
- Consider the whole person: Focus on both mental and physical wellbeing to ensure patient centred care and high value service design.
- Utilise information: Identify key priorities to target research and resources. Provide regular feedback on implementation progress and impact on patient health.
- Collaborate: Engage staff, academics and patients to develop shared consensus on how to approach implementation, measure outcomes and build collective ownership and commitment to deliver improvements.

The research priority is to thoroughly assess the strengths and weaknesses of the overall systematic approach and its component parts and use our findings to scale up and spread successful aspects of the work.

This research will be undertaken at project, theme and programme level using our academic partners' expertise in clinical sciences, improvement science, epidemiology and social sciences. This work will be both formative, with frequent feedback of research to aid the development of programme activities, and summative, leading to dissemination through peer-reviewed publications and conferences.

Research Questions

Primary Research Question

What are the strengths and weaknesses of the systematic approach in enabling and empowering Quality Improvement projects to deliver sustainable healthcare improvements in collaboration with multi-professional stakeholders including patients and the public?

Secondary Research Questions

Factors influencing fidelity of use and outcomes of using the systematic approach:

- How effectively are Quality Improvement methods and the systematic approach applied in Quality Improvement Projects, what contextual factors affect this and how can practice be improved?
- How does the use of the CLAHRC NWL systematic approach including quality improvement methods influence Quality Improvement project development and success?
- What are the strengths and weaknesses of the long-term success tool (part of the systematic approach) in supporting Quality Improvement projects to plan for sustainable, long term success beyond the end of project funding?
- How can the value of participating in Quality Improvement projects be measured for patients, staff, and organisations, both in terms of intended and unintended benefits?
- What are the strengths and weaknesses in the 4PI tool (part of the systematic approach) in supporting Quality Improvement projects to effectively engage patients and the public in the evidence translation process and healthcare improvements? This will include the following PhD projects:

- Ms. Laura Lennox: use of the Long Term Success Tool, one component of the Systematic Approach. Supervisors: Prof. Derek Bell, Dr. Julie Reed
- Mr. David Sunkersing: use of the systematic approach and outcomes in care planning for the elderly. Supervisors: Prof. Derek Bell, Dr. Julie Reed
- Mr. Tomasz Szymanski: health economic outcomes of using the systematic approach in a case study aimed to improve pharmacy record-keeping. Supervisors: Prof. Derek Bell, Dr. Julie Reed
- Ms. Sophie Spitters: use of the systematic approach and outcomes in a case study aimed to improve paediatric allergy services. Supervisor: Dr. Julie Reed, Professor John Warner
- Ms. Federica Amati: use of the systematic approach and outcomes in a case study aimed to improve mental health services. Supervisor: Prof. Derek Bell

Engagement, facilitation, and training in methods and tools in the systematic approach:

- How effective is CLAHRC NWL at engaging people in the use of the systematic approach and in facilitating and teaching Quality Improvement teams to use it effectively?
- This research will be undertaken by Dr. Laurel Issen, Dr Catherine French, and Mr. Vimal Sriram.

Exploration of contextual factors and perspectives of groups and individuals in the evidence translation process:

- How can individuals, organisations, professional groups, and other communities contribute to the process of improving care and translating evidence into practice? What
  are the strengths and weaknesses in the systematic approach for enabling this to happen?
- What are the barriers and facilitators to support transfer of knowledge and acceleration of implementation as projects scale up and roll out to new settings?
- What are the strengths and weaknesses in the systematic approach in enabling cooperation and collaboration among diverse stakeholders including patients and the public?
- What does 'value' in healthcare mean for patients and healthcare practitioners?

This will include the following PhD projects:

- Ms. Meerat Kaur: Exploration of contextual factors and perspectives of groups and individuals in the evidence translation process, from the perspective of patient and public engagement and involvement. Supervisors: Prof. Derek Bell, Dr. Julie Reed
- Ms. Izaba Younis: Exploration of contextual factors and perspectives of groups and individuals in the evidence translation process, from the perspective of exploring the value systems of different professional groups and the benefits they emphasize about involvement in Quality Improvement work. Supervisor: Prof. Derek Bell

Values

The research in this study utilizes an 'action research' methodology which is designed as an iterative process of action, reflection, and improvement, with the ultimate purpose of developing a systematic way to enable improvement. This means researchers will support Quality Improvement projects by communicating their findings with projects at short intervals and may be involved in close working relationships with these teams. For example, a researcher investigating the use of the Long-Term Success tool in one team may then use those findings to feed back to the team under investigation and to deliver training to other teams.

Participant Entry

There are four groups under investigation, which will have different methods of recruitment: Group
1 will be Quality Improvement Project Teams funded by NIHR CLAHRC NWL, Group 2 will be Individual Quality Improvement Fellows funded by NIHR CLAHRC NWL. Group 3 will be individuals who are already in professional contact with NIHR CLAHRC NWL through previous participation in Quality Improvement Project Teams or the Fellowship, or through steering group meetings. This will include members of the NIHR CLAHRC NWL core team. Group 4 will be individuals who are undertaking Quality Improvement work not supported or funded by NIHR CLAHRC NWL, but who are independently using some aspects of the CLAHRC NWL systematic approach or rolling out a project first developed with NIHR CLAHRC NWL.

All four groups will include NHS staff, Non-NHS Staff such as academic researchers and care home staff, and patients and members of the public. No patients will be recruited through their use of care services; rather, they will be recruited through their participation in the Quality Improvement networks under investigation (described as Group 1, Group 2, Group 3, and Group 4). These networks already include patients and members of the public; therefore these

individuals will not be excluded from participation. Only the medical details which participants choose to self-disclose will be part of the study, and researchers will not have access to any patient-identifiable medical records or clinical notes.

Group 1, Quality Improvement Project Teams: CLAHRC NWL works alongside project teams consisting of a clinical lead and a multidisciplinary group of individuals who will be responsible for and/or affected by an attempt to translate evidence into practice for healthcare improvement including patients and members of the public. One of the researchers named in this application will invite individuals to participate in interviews and/or focus groups through e-mail or work meetings, and if interested in participating, they will be sent an information sheet and consent form. We anticipate recruiting about 60 individuals from Group 1 to participate in interviews and/or focus groups. The leads of the project teams will also receive an information sheet regarding methods of documentary analysis and meeting observations, and will be invited to consent on behalf of their teams to these methods as described (see Documentary Analysis/ Meeting Observation Information Sheet and Documentary Analysis / Meeting Observation Consent Form).

Group 2, Individual Quality Improvement Fellowships: CLAHRC NWL provides training and mentoring for fellows who are each independently responsible for a Quality Improvement project. One of the researchers named in this application will invite individuals to participate in interviews and/or focus groups through e-mail or work meetings, and if interested in participating, they will be sent an information sheet and consent form. We anticipate recruiting 45 fellows to participate in interviews and/or focus groups. Fellows will also receive an information sheet regarding methods of documentary analysis and meeting observations, and will be given an opportunity to consent to analysis of documents they produce through their involvement in the fellowship.

Group 3, NIHR CLAHRC NWL Network: In addition to people who are actively engaged in CLAHRC NWL-supported Improvement Projects, we will also seek perspectives from the wider CLAHRC NWL network. This will include people who have previously been involved in projects funded and/or supported by CLAHRC NWL, members of CLAHRC NWL steering groups, and the CLAHRC NWL exchange network which is a multidisciplinary network enabling patients, carers, healthcare professionals and researchers to collaborate in Quality Improvement projects in Healthcare. One of the researchers named in this application will invite individuals to participate in interviews and/or focus groups through e-mail and/or work meetings, and if interested in participating, they will be sent an information sheet and consent form. We anticipate recruiting about 60 individuals to participate in interviews and/or focus groups.

Group 4, Quality Improvement Network: The NHS patients, members of the public, NHS Staff, and Non-NHS Staff who are involved in Quality Improvement independent from NIHR CLAHRC NWL will be recruited through a self-selected sample of those who are, or have been, involved in quality improvement initiatives. They will be initially targeted through advertising the involvement opportunity on Twitter, through specific groups known to have carried out or been involved in quality improvement initiatives, such as the Kidney Alliance, organisations known to support improvement initiatives such as the Health Foundation, Healthcare Quality Improvement Partnership and posting an advert on the People in Research website. In addition, healthcare professionals and patients/public who have presented on their experiences in a quality improvement initiative at conferences, or written about their work in other arenas and whom have provided contact details on their slides, abstracts, papers, or relevant material, will be contacted by a researcher named in this application to gage their

interest, send them the information sheet and asked to suggest others who may be interested in sharing their experiences. Active discussions take place on Twitter about quality improvement in the NHS and these will be monitored, and the opportunity will be highlighted to relevant individuals who will be asked to pass on the information to those who they feel are relevant. Potential participants will be contacted using a method that they prefer (e.g. this could be via Twitter, e mail, phone or letter). Expenses such as backfill for carers, childcare and/or travel costs will be provided to ensure we are less likely to discriminate against those who may not have the means to get involved. Formal interviews with these participants will be carried out after the receipt of a signed consent form. These interviews will be audiotaped, transcribed, anonymised and held in accordance with data protection. We anticipate recruiting approximately 140 individuals from this group to participate in interviews.

All participants (Groups 1-4): Potential participants will be approached by a researcher named in this application through the methods described above. This researcher will provide information about the study, why we want to talk to them, how we would keep and use the data, and that they are free to withdraw at any time. Informal conversations, led by researchers named in this application, will take place to give a brief introduction to the research and explain what their involvement could look like, as well as answer queries that may immediately arise. The information sheet will then be left with the potential participants, along with a consent form. The researcher will then follow up with potential participants a maximum of 3 times, no more often than once every 3 weeks. If the potential participant states that they do not want to be involved in the research at any time, communication will cease and any contact details held will be amended to state that the person should no longer be contacted to be involved. Participants may be asked to take part in up to 4 interviews, and/or up to 4 focus groups, due to the varied topics under investigation and the interest in longitudinal studies. Participants will be free to participate only in those interviews and/or focus groups which are of interest to them, and participants who have already declined participation will not be contacted again about interviews and/or focus groups. Interviews and/or focus groups will be conducted only after both the research and participant sign a copy of the consent form which will be kept on file in accordance with data protection. Participants will also be offered the opportunity for a consent form to be signed by both parties which can be kept for their own records.

All participants will also be invited to quarterly Collaborative Learning Events, bespoke training events, and access to online training tools supporting the use of the systematic approach. These training methods also provide forums for peer-to-peer support. Participants in these training methods will receive an anonymous survey to provide feedback on the training. The survey will specify that the results may be used for research purposes, and will give instructions on how to seek more information or to receive a participant information sheet.

Inclusion Criteria

- Play a role in a project team supported by NIHR CLAHRC NWL and/or participate in training, collaborative learning events, and/or steering groups, and/or involvement in a
  Quality Improvement project using some or all of the elements of the CLAHRC NWL systematic approach
- Speak English
- over 18 years old

Exclusion Criteria

- Not involved with CLAHRC NWL
- Not English-speaking
- Under 18 years old

Methodology

Data collection

Quality Improvement projects will be followed longitudinally over the course of project funding and for a follow up period of up to five years after the project ends, in order to assess long-term sustainment of improvement and value.

Each project consists of check points for more formal assessments – e.g. project reviews at 6, 12, and 18 months post-funding and monthly to quarterly use of the long term success tool.

These check points will consist of structured quantitative and qualitative information gathering and analysis. Teams will be assessed at the end of the project as to how effective teams were – this will involve analysis of data collected by teams, questionnaires, interviews and focus groups.

This longitudinal analysis will develop a narrative of the Quality Improvement journey and how the systematic approach influenced this both positively and negatively. We will perform quantitative and qualitative analysis of the extent to which use of systematic approach support success of project team.

Research will be conducted using the following methods:

Documentary analysis: In order to investigate engagement in Quality Improvement methodology and the systematic approach, as well as fidelity of use, researchers will analyse materials produced through routine business of applying the systematic approach to translate evidence into practice, for example minutes of team meetings, leaflets describing the improvement project, or diagrams depicting internal processes, procedures, and operations. These materials may also be used to investigate perspectives and contextual factors influencing the use of the systematic approach.

Observation of meetings: Researchers will observe facilitated workshops, working sessions, or routine meetings where Project Teams engage in training, peer-to-peer learning, or use the systematic approach to translate evidence into healthcare practice. This will enable investigation of engagement, facilitation and training in the systematic approach; fidelity of use of the systematic approach; individual perspectives and contextual factors.

Interviews: Interviews will be conducted using semi-structured interview method with open questions to allow participants to share their narratives about the process of applying the systematic approach to translating research into routine practice. This will enable investigation of engagement, facilitation and training in the systematic approach; outcomes of using the systematic approach; individual perspectives and contextual factors. Interviews will be recorded and transcribed and kept securely with access permitted only to approved researchers.

Questionnaires and surveys: Both anonymous and non-anonymous surveys will be conducted following workshops, training and collaborative learning events, and activities relating to elements of the systematic approach in order to gain a range of perspectives on the experience of using the systematic approach. This will enable investigation of engagement, facilitation and

training in the systematic approach; individual perspectives and contextual factors. There will be two types of surveys which will be used and have been previously validated by this research group: One is a training experience survey, and the other is a survey about the use of elements of the systematic approach.

Storage of data: Each set of observations, interviews, and/or questionnaires must be part of a subproject which will go through an internal review of research protocol to ensure the standards set out in this ethics application are met. For any given sub-project, consent forms will be kept in a locked cabinet and any other participant-identifiable data will be stored on a secure password-protected drive, with access restricted to a limited number of researchers who either are identified in advance of data collection, or who do not have close working relationships (defined as direct line management, sharing work responsibilities, belonging to the same project team, and/or having weekly work interactions) with any of the participants. Personal data and research data will be retained for 10 years after completion of the study, after which point these will be destroyed, in line with the College Data Detention Policy. Consent: Informed consent will be obtained from fellows and clinical leads of project teams, who will sign a consent form containing information about the research project. Consent will include interview consent, and consent on behalf of the project team to use documents and observe meetings for research purposes.

Participants who receive surveys and questionnaires will be made aware that the information provided may be used for research.

All individuals who will be interviewed will sign a consent form containing information about the research project and who will have access to the data.

Data analysis
Factors influencing fidelity of use and outcomes of using the systematic approach:

Fidelity of use will be answered in part through analysis of documents. In instances where quality criteria exist for the assessment of Quality Improvement tool use fidelity (Taylor, McNicholas, Nicolay, Darzi, & Bell J., 2013), this will be used to evaluate the degree to which the Quality Improvement tool or aspect of the systematic approach was used as intended. Where no quality criteria exist, researchers will develop criteria from peer-reviewed literature providing guidance on the use of the methods and the theoretical benefits of their use.

Researchers will conduct semi-structured interviews with people who have used some or all components of the systematic approach or who have received care in the systems in which the Quality Improvement projects intervened. Participants will be encouraged to share their perspectives on the use of the systematic approach, outcomes of the project, and the factors which influenced these aspects. Interview transcripts will be interpreted using both deductive thematic analysis and theory-driven inductive thematic analysis.

Engagement, facilitation, and training in methods and tools in the systematic approach:

Effectiveness of training will be measured at different levels using the Kirkpatrick Model and Bloom's Taxonomy as a theoretical basis.(Bloom, 1956; Kirkpatrick, 1979) In the Kirkpatrick model, there are several levels at which training can be considered successful. Level 1: reaction (to what extent did participants react favourably to the training), Level 2: learning (to what extent did participants learn the concepts presented in training), and intentions for Level 3:

behavior (to what extent did participants change their behavior as a result of training) will be measured through post-training questionnaires and surveys.

Kirkpatrick Model Level 3: Behaviour and Level 4: Outcomes (to what extent were healthcare improvement outcomes achieved as a result of the training) will be investigated through focus groups and interviews, particularly in the follow-up stage after projects have completed.

Engagement in training will be analysed according to quantitative analysis of proportions of project team members who attend training events and/or use training materials. Reasons for engagement or disengagement will be investigated through meeting observations, interviews, and focus groups.

Data will also be analysed according to Bloom's Taxonomy, which proposes several levels in which learning can be obtained: remembering, understanding, applying, analyzing, evaluating, and creating.

Exploration of contextual factors and perspectives of groups and individuals in the evidence translation process:

Data about the context of quality improvement and perspectives of groups and individuals will be collected through participant and non-participant observation of meetings and workshops, interviews, and focus groups.

From these interviews, focus groups, and observations, three forms of analysis will be utilised.
1. Telling their stories

At a simple level the narratives will be utilised to create narratives highlighting the value and limitations of how different contributions can support improvement in healthcare.

2. Mapping contributions

As well as 'telling their stories' the data will be analysed and mapped against the theoretical framework – with the aim of demonstrating the breadth of different contributions which need to be considered in improving health and to start considering how they fit together, the overlaps, the gaps, the contradictions that affect collaborative experimental learning to improve healthcare.

3. Thematic analysis

In addition to descriptive analysis thematic analysis will be used to explore how individuals construct the value and limitations of their contributions within the context and structures they work within. The aim of this analysis will be to identify success factors and frustrations experienced and to identify and where possible explore underlying assumptions which influence or are influenced by collaborative working. The longitudinal nature of data collection will enable individuals perceptions and experiences to be tracked over a limited period of time and to better understand the 'shifting perceptions' of how value is constructed and reconstructed over time.

Regulatory Issues

Ethics Approval

The study has been approved by Imperial College (as study sponsor), Imperial College NHS Trust, Chelsea and Westminster NHS Trust, and the HRA (ref SL-AR3). The study will be

conducted in accordance with the recommendations for physicians involved in research on human subjects adopted by the 18th World Medical Assembly, Helsinki 1964 and later revisions.

Ethical considerations

Situation: involvement of researchers as participants

Summary: NIHR CLAHRC NWL funds and supports Quality Improvement Teams consisting of multidisciplinary staff (such as managers, doctors, nurses, pharmacists, and physiotherapists) and patients to use the systematic approach in projects lasting a fixed term e.g. 12 or 18 months. The research in this study utilizes an 'action research' methodology which is designed as an iterative process of action, reflection, and improvement, with the ultimate purpose of developing a systematic way to enable improvement. This means researchers will support Quality Improvement projects by communicating their findings with projects at short intervals and may be involved in close working relationships with these teams. For example, a researcher investigating the use of the Long-Term Success tool in one team may then use those findings to deliver training to other teams. The way that training is delivered to project teams is another line of investigation in this research; thus the researcher for one project may be a research participant for another project.

Ethical consideration: Multiple researchers would be able to utilise the data collected from observations, interviews, and documentary analysis, to explore the research questions posed in this study from different perspectives and through different examples; however, because some of these researchers may also be participants, or may have close working relationships with some of the research participants, it would not be appropriate for every researcher to have access to the entire dataset.

How this will be addressed: We will establish internal governance procedures by which researchers involved in this project will specify how their sub-project will comply with the programme-level ethics to ensure confidentiality of records. The data being collected in the interviews, focus groups, and observations of meetings and workshops will be stored securely on Imperial College servers (password protected access and backed up daily), with access provided only to researchers who have been approved to access that sub-project's data, to protect the identity of the individuals involved and to encourage them to share honestly their experiences, reflections and feelings. A log of researchers engaged with the study and with permission to access files will be kept by the research portfolio coordinator and PI and academic lead.

Situation: Involvement of patients and members of the public as research participants

Summary: This study will explore their engagement of both healthcare professionals and patients and public members in the conduct of quality improvement and evidence translation efforts. For example, if a Quality Improvement project is using the systematic approach to improve the provision of water to care home residents, the family member of one of the residents may act as a professional lay member of the Quality Improvement Team that uses the systematic approach to improve care. Thus, this team member may be recruited for observations of workshops and meetings of the Quality Improvement Team or interviewed about aspects of the systematic approach. There may also be patients who have received care

previously, or may be recipients of care in the future, that directly relates to the area of care being improved. For example a patient who has previously had cancer surgery, or is scheduled to have cancer surgery, may be recruited to a Quality Improvement Team or involved in focus groups to understand their experiences and gain their input to future improvement efforts.

Ethical considerations: When patients are involved in research, it is important to clarify whether there are any clinical interventions or deviations from the standard care that patients would typically receive if they were not participating in research. The research study in question will not involve any clinical interventions, and patients can expect to receive the same care regardless of whether they choose to participate in the research study or the Quality Improvement project. It is important that patients and members of the public are made fully aware of this distinction, and clearly understand the purpose of the research and that participation is fully voluntary.

How this will be addressed: Members of the public will only be involved so much as they play a role within the existing networks of the organizations under study. Participants will be recruited via existing voluntary contact with the research investigators, clinical leads, or fellows leading each Quality Improvement project, or by having presented their involvement in a Quality Improvement project in a public forum. Like all participants in this research, those patients and members of the public who are recruited to interviews and/or focus groups will receive an information sheet about the study in lay-friendly language, which clearly states that participation is optional and that they can expect to receive the same standard care regardless of their decision to participate or not participate in research. All interviewees and focus group participants being recorded will be asked to complete an informed consent form and will be able to withdraw from the study at any point.

Situation: Confidentiality of information and informed consent.

Summary: Interviews, focus groups, and meeting observations may uncover issues which participants would not want to be shared widely, particularly with people with whom they have close working relationships.

Ethical considerations: The interviews and workshops are not anticipated to be highly sensitive but issues discussed could link to emotions relating to frustration, feelings of failure or low self value. Research participants must also be aware that the documents produced by project teams and views expressed in meetings, interviews, surveys, and focus groups may be used for research purposes.
How this will be addressed: Participants in interviews and focus groups will receive information sheets about the study and sign consent forms. Clinical leads and fellowship leads for each project will be informed that documents produced by the team and meetings may be observed and analysed for research purposes. Project leads will sign acknowledgement of their responsibility for communicating this to their team members. Identifiable information will be accessible only by researchers approved for the subproject. Names and identifying features will be removed from transcripts and observation notes for the purposes of publication and dissemination. Researchers will take care to deal with any emergent issues of feelings of failure or low self-value sensitively and if necessary would direct participants to relevant support services.

Confidentiality
The Chief Investigator will preserve the confidentiality of participants taking part in the study and is registered under the Data Protection Act. All recorded and transcribed information will be stored securely on Imperial College servers (password protected access and backed up daily). Access will only be permitted to this information by the study PI and approved researchers. A log of researchers engaged with the study and with permission to access files will be kept by the PI.

Data reported for dissemination will remove all identifiable factors (e.g. names, organisations) and replace them with pseudo-identifiable names e.g. Interviewee A; Organisation 1. In the case of any serious misconduct/malpractice being revealed during the study issues will be discussed with an individual's line manager and if necessary escalated through appropriate Trust or University procedures.

Adverse Events
It is not expected that any adverse events will occur during the study, but any problems will be discussed with the head of department and the Joint Research Compliance Office.

Outputs and dissemination
We expect this work will lead to the refinement of the CLAHRC NWL systematic approach for translating evidence into practice, which will be transferrable across the NHS and provide generalised learning for healthcare organisations internationally. This will include theoretical outputs articulating the approach based on previous peer-reviewed literature, and will also include pragmatic outputs designed to help individuals to understand not just *what* needs to happen for evidence translation, but *how* to overcome the common pitfalls to translate evidence into lasting improvements in healthcare.

CLAHRC NWL will promote dissemination through traditional academic channels including peerreviewed journals and conferences, as well as continuing to publish in more widely accessed magazines such as HSJ, Nursing Times and Junior Doctors. Dissemination will also be achieved through joint working initiatives with other CLAHRC programmes who are similarly funded to accelerate the uptake of research into practice (e.g. knowledge exchange model with South Yorkshire CLAHRC), as well as through annual reports to our funding agencies (NIHR and Health Foundation).

CLAHRC NWL also recognises the role that patients and members of the public play as change agents, as exemplified 'My Medication Passport' and the development of apps for self-management of asthma and sickle cell disease. Building on our experience we will use social media forums including Twitter and virtual worlds to access a broader group of stakeholders including accessing feedback on the CLAHRC NWL programme.

In addition, members of the CLAHRC NWL External Advisory Group have a role as "CLAHRC NWL Champions" and we anticipate that this group of national and international leaders in healthcare, research, industry and other fields will further facilitate dissemination and help to build our standing as a national resource to support such work.

Publication Policy
Investigators will endeavour to publish all results in peer-reviewed academic journals. Wherever possible investigators will publish open-access papers.

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Appendix I: CLAHRC NWL Participant Information Sheet

Evaluation of the NIHR CLAHRC NWL Systematic Approach to translating evidence-based research into practice in healthcare

Information sheet for participants

The research is being conducted by a team at Imperial College London, based at NIHR CLAHRC for Northwest London at Chelsea and Westminster Hospital. Before you decide whether you wish to participate in this research study please take your time to read the information so that you understand why this study is taking place and what it will involve. We will be very pleased to answer any further questions.

What is the purpose of this study?

While peer-reviewed clinical evidence (such as journal articles, guidelines, toolkits) describe activities that healthcare providers can undertake to improve healthcare, they rarely come with a blueprint for how it can be embedded in routine practice.

The NIHR CLAHRC NWL programme has developed a systematic approach consisting of additional tools and methods to help with this process of embedding research into routine practice in healthcare.

The purpose of this research study is to thoroughly assess the strengths and weaknesses of the systematic approach and its component parts, and to better understand "what actually happens" during the process of evidence translation and improvement.

The results of this research will be used to iteratively develop the approach and scale up improvements nationally and internationally.

Why have I been chosen, and do I have to take part?

You have been identified to take part due to the role you play in healthcare delivery, improvement or research. This could be as an academic, NHS staff member or member of the public. In addition you or your organisation is involved in a collaborative programme of healthcare improvement and research.

Participation is entirely voluntary. If you decide to contribute to a part or the whole of this study, you will keep this information sheet and sign an informed consent form before any

interaction with the research team takes place. You can choose to withdraw from the study at any point without giving any justification and all data relating to you will be permanently destroyed.

What will the study involve?

There are two ways to be involved in this research study, either as a part of a CLAHRC NWL Quality Improvement team, or as an individual involved in Quality Improvement in healthcare. For either of these ways, you may be invited to participate in some of the following activities:

Interviews: Interviews will take place between one participant and a researcher and will explore a set of semistructured interview questions and will take 30 – 90 minutes to complete. Participants may be asked to undertake more than 1 interview (up to 4) and participation in any additional interviews is entirely voluntary.

Focus groups: Focus groups will take place between one to three researchers and a small group of research participants (up to 30) and will explore a set of semi-structured questions posed to the group. Participants may be asked to undertake more than 1 focus group (up to 4) and participation in any additional focus groups is entirely voluntary.

Due to the longitudinal nature of quality improvement work and the many topics involved, you may be invited to participate in up to 4 interviews, and/or up to 4 focus groups. The number of interviews or focus groups will not be directly related to your level of involvement with NIHR CLAHRC NWL. You are welcome to participate only in those interviews and/or focus groups which are of interest to you. You are free to decline contact for additional opportunities; this will be noted and researchers in this study will not contact you for further interviews or focus groups.

Observation of CLAHRC NWL meetings and training events: If you attend CLAHRC NWL meetings or training events, for CLAHRC NWL project teams, steering groups, fellowships, and/or the Exchange Network, a researcher may take notes about these events to enable investigation of engagement, facilitation and training in the systematic approach; fidelity of use of the systematic approach; individual perspectives and contextual factors. These observations will be general and will not include any patient-identifiable information, and access to the notes will be available only to approved researchers.

Questionnaires: If you attend CLAHRC NWL training events or facilitated workshops, you may be asked to fill out a brief anonymous survey about the event. These questionnaires will be used for both operational purposes to improve support for your Quality Improvement projects, and for research purposes to explore effective methods of

training and facilitation, individual perspectives, and contextual factors. The number of questionnaires you are asked to fill out will be related to the level of your involvement with NIHR CLAHRC NWL and the number of training events and materials you access. You are free to access these materials and training events without answering the questionnaires or participating in this study.

Documentary analysis of CLAHRC NWL Quality Improvement Projects: Documents produced through the routine delivery of CLAHRC NWL Quality Improvement project are owned by the CLAHRC NWL programme and may be used for research purposes. For example, Process Mapping is an exercise which Quality Improvement Projects will undertake as part of the systematic approach. Outputs of Process Mapping exercises may be analysed to determine the usefulness of the exercise in delivering healthcare improvements. Researchers are also interested in observing meetings that take place between different individuals regarding planning, delivery or evaluation of improvements in healthcare. This means that at some meetings which are scheduled to take place as part of existing programmes of work, researchers will ask permission to audio or video record meetings. This will only take place if all involved in the meeting consent to this happening. In other meetings, researchers may take observations either as participants in the meeting or as non-participant observers. These notes may be used for research purposes to determine the strengths and weaknesses of the systematic approach, as well as to explore different perspectives in healthcare improvement. For each Quality Improvement project, the clinical lead or CLAHRC NWL Fellow leading the project will be responsible for communicating that documents produced by the team and observations at meetings may be used for research purposes.

What will happen to the results?

A report from this work will be provided to funders (Health Foundation and NIHR CLAHRC for Northwest London) and may be published. Results from this research will be published in peer-review scientific journals and conferences. Findings will also be fed back to those involved in healthcare improvement and research programmes to inform their future work.

Confidentiality

Data produced from this research will be stored securely according to the Data Protection Act. All information including audio recordings and transcripts will be kept confidential and access will be granted to authorised members of the research team only. If any quotes

are used in reports or publications these will be anonymised and at no time will information be identifiable to specific individuals. Ten years after completion of the study all personal and research data will be destroyed.

In the case of serious misconduct/malpractice being revealed during an interview or focus group, issues will be discussed with an individual's line manager and if necessary escalated through appropriate Trust or University procedures.

What if there is a problem?

Given the nature of this study, it is highly unlikely that you will suffer harm by taking part. If you are harmed by taking part in this research project, there are no special compensation arrangements. If you are harmed due to someone's negligence, then you may have grounds for a legal action. Regardless of this, if you wish to complain, or have any concerns about any aspect of the way you have been treated during the course of this study then you should immediately inform the Investigator (Prof Derek Bell). The normal National Health Service complaint complaints mechanisms are also available to you. If you are still not satisfied with the response, you may contact the Imperial AHSC Joint Research Compliance Office.

Who has reviewed this study?

The research for this study was externally reviewed in order to receive funding for the NIHR CLAHRC NWL programme 2014-2018 and/or the competitive Health Foundation Improvement Science fellowship. The full study was reviewed and approved by the Imperial College London Joint Research Compliance Office and the NHS Health Research Authority.

Who is organising the study?

This study is organised by the NIHR CLAHRC NWL programme which operates in Imperial College London, Chelsea & Westminster NHS Foundation Trust, and Imperial College NHS Healthcare Trust. Contact details for the Research Portfolio Coordinator for the NIHR CLAHRC NWL programme can be found below.

What are the benefits of joining this study?

Participation in this research will provide an opportunity for reflection and engagement in dialogue about the process of evidence translation and how this can lead to improved patient care.

Contact Details

If you would like to know more about the research, please contact:

Dr Catherin French

E-mail: catherine.french@imperial.ac.uk

Phone: 020 3315 8848

Address: NIHR CLAHRC for Northwest London, 4th Floor, Lift Bank D, Imperial College London
Chelsea & Westminster Hospital NHS Foundation Trust

369 Fulham Road, London SW10 9NH

Appendix J: CLAHRC NWL Consent Form

Consent Form

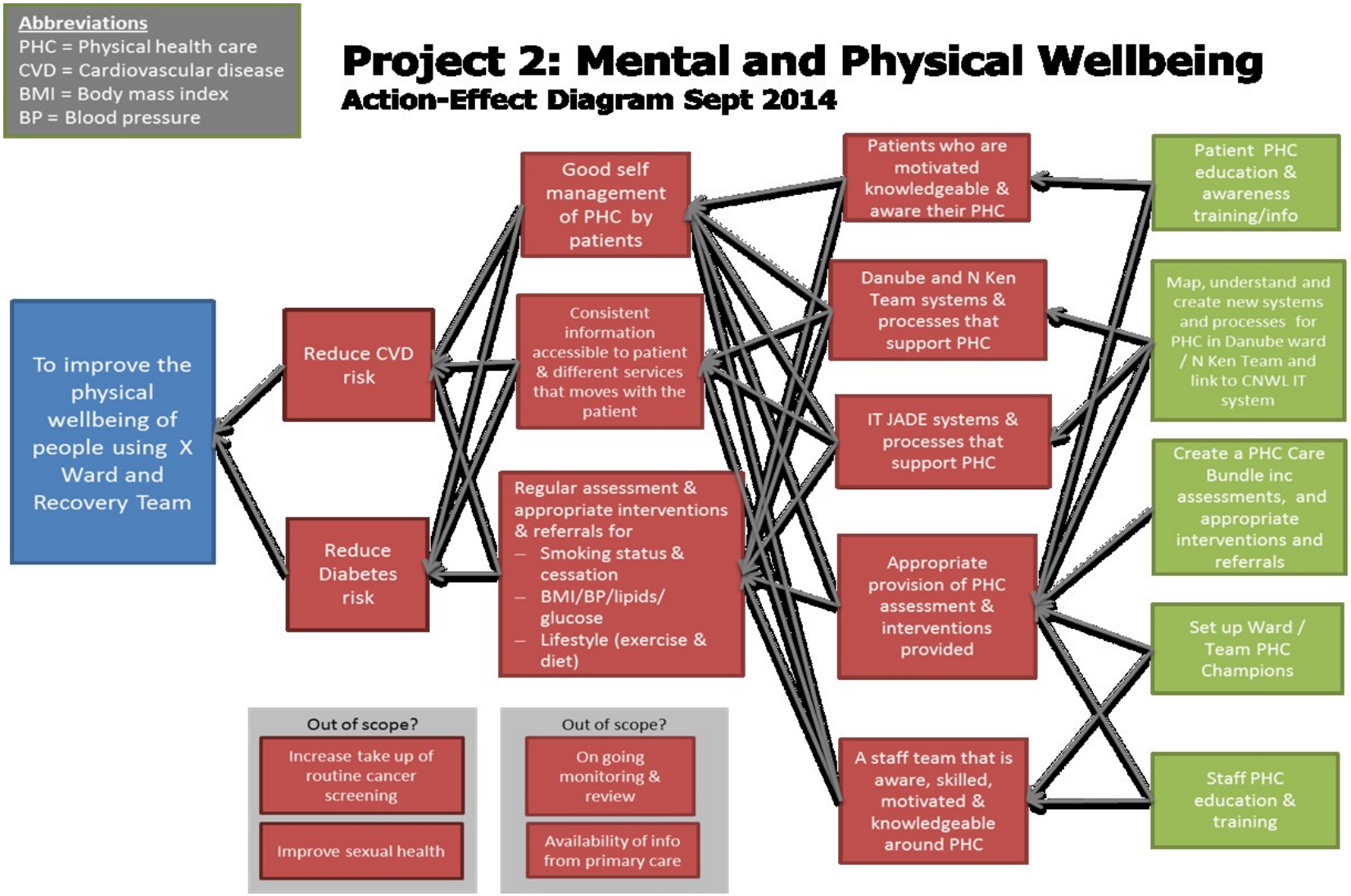
Evaluation of the NIHR CLAHRC NWL Systematic Approach to translating evidence-based research into practice in healthcare

Please read and confirm your consent to participate in this study by initialing the appropriate

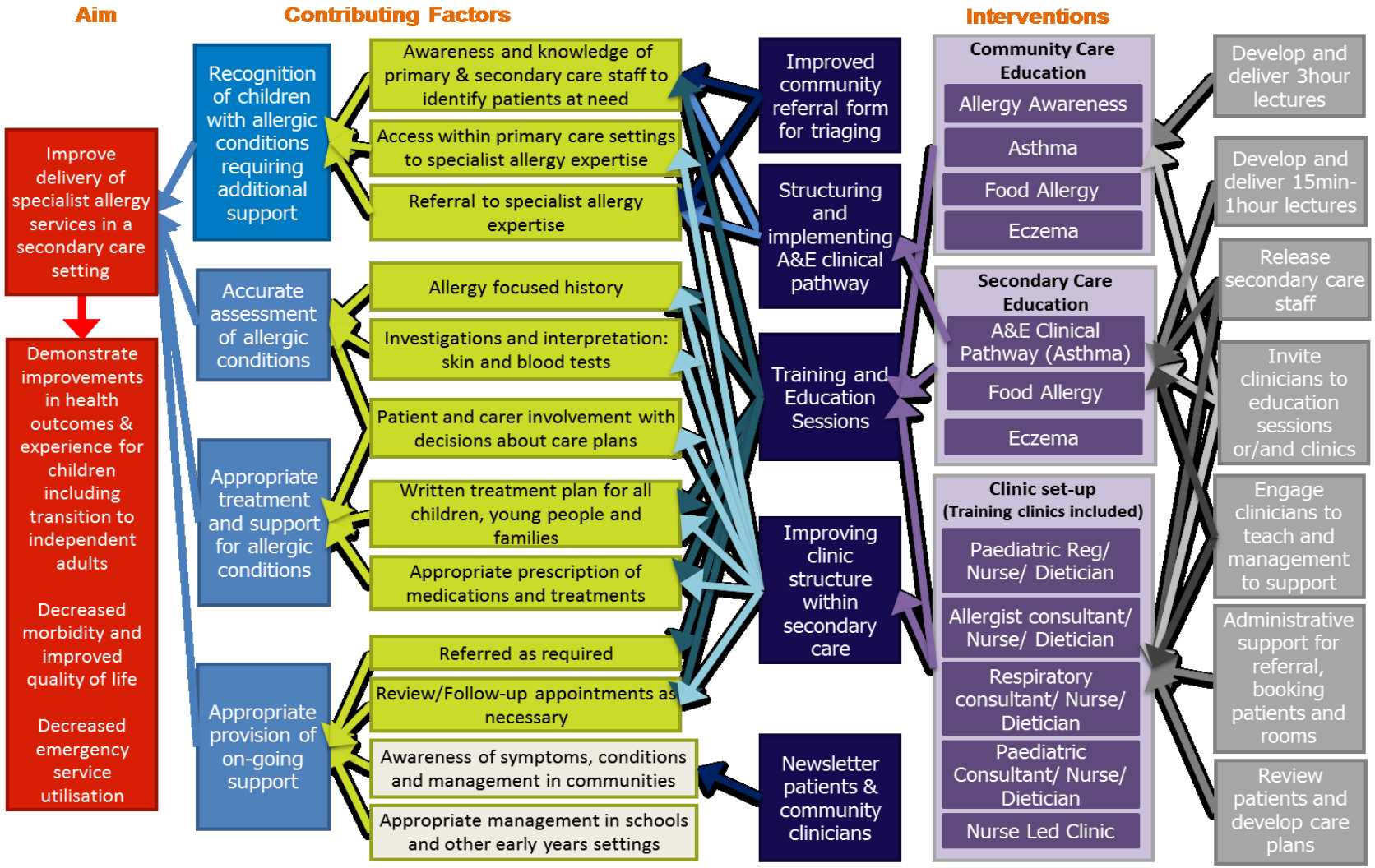
1. I confirm that the purpose of the study has been explained to me, that I have been given information about it in writing and read it, and that I have had the opportunity to ask questions about the research and have had these answered satisfactorily. ☐
2. I understand that my participation is voluntary, and that I am free to withdraw at any time without giving any reason and without any implications for my legal rights. ☐
3. I give permission for the interview to be audio-recorded by the researcher, on the understanding that the recordings will be kept in a secure locked cabinet and/or secure password protected computer server and destroyed one year following the end of the study. ☐
4. I understand that anonymised quotes may be used in publications stemming from the research but not in any way that might allow for identification of individual participants. ☐
5. I understand that all personal and interview data will be kept confidential at all times and accessed only by approved researchers ☐
6. I agree that my details, including personally identifiable details, may be kept on Imperial College London computer systems/premises ☐
7. I agree that my research notes/data may be accessed by responsible persons from the Sponsor, NHS Trust, or regulatory authorities, in order to check that the research has been conducted correctly ☐
8. I agree to take part in this study. ☐

_____	_____	_____
Name of respondent	Date	Signature
_____	_____	_____
Name of researcher taking consent	Date	Signature

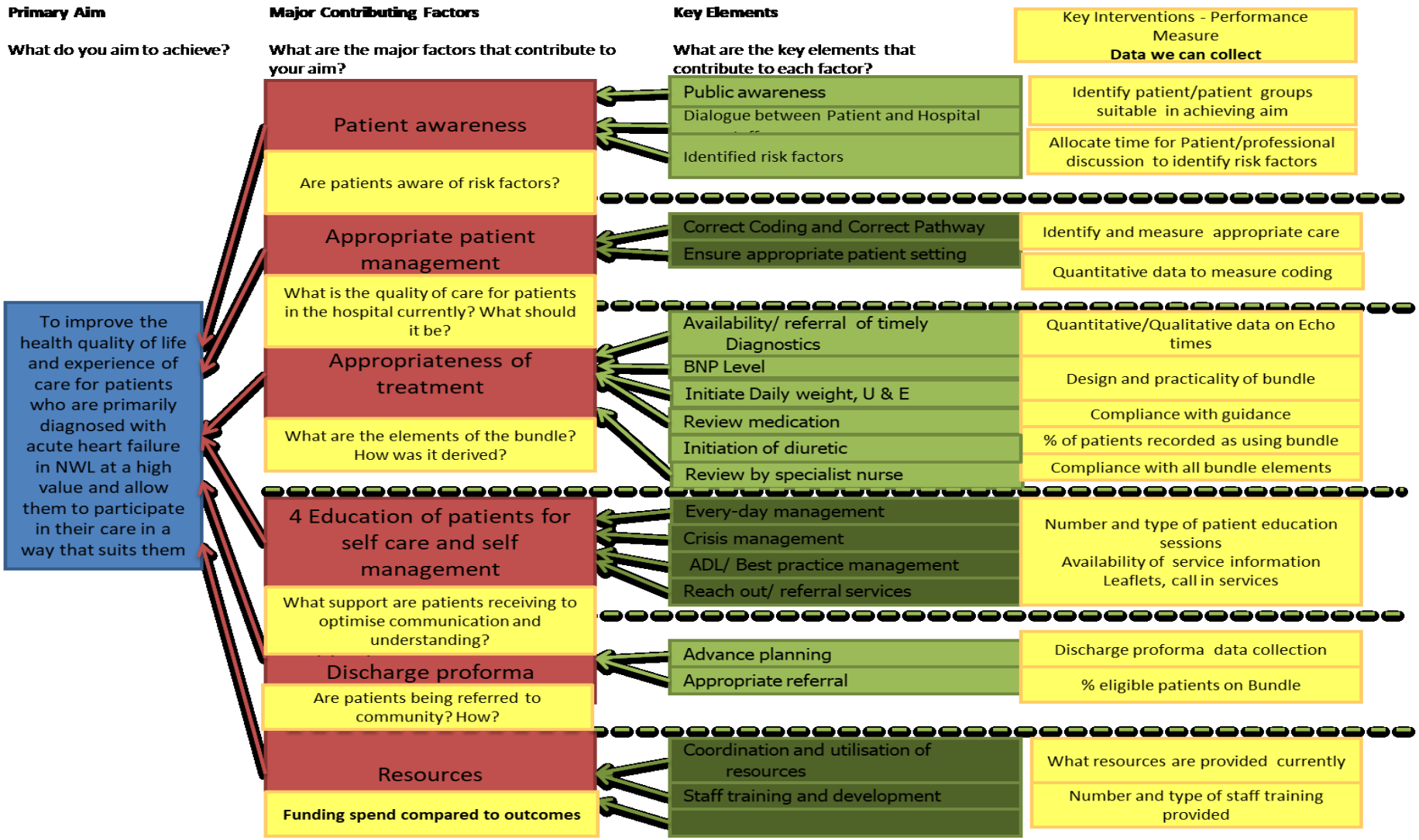
Appendix K: Wellbeing_Action Effect Diagram



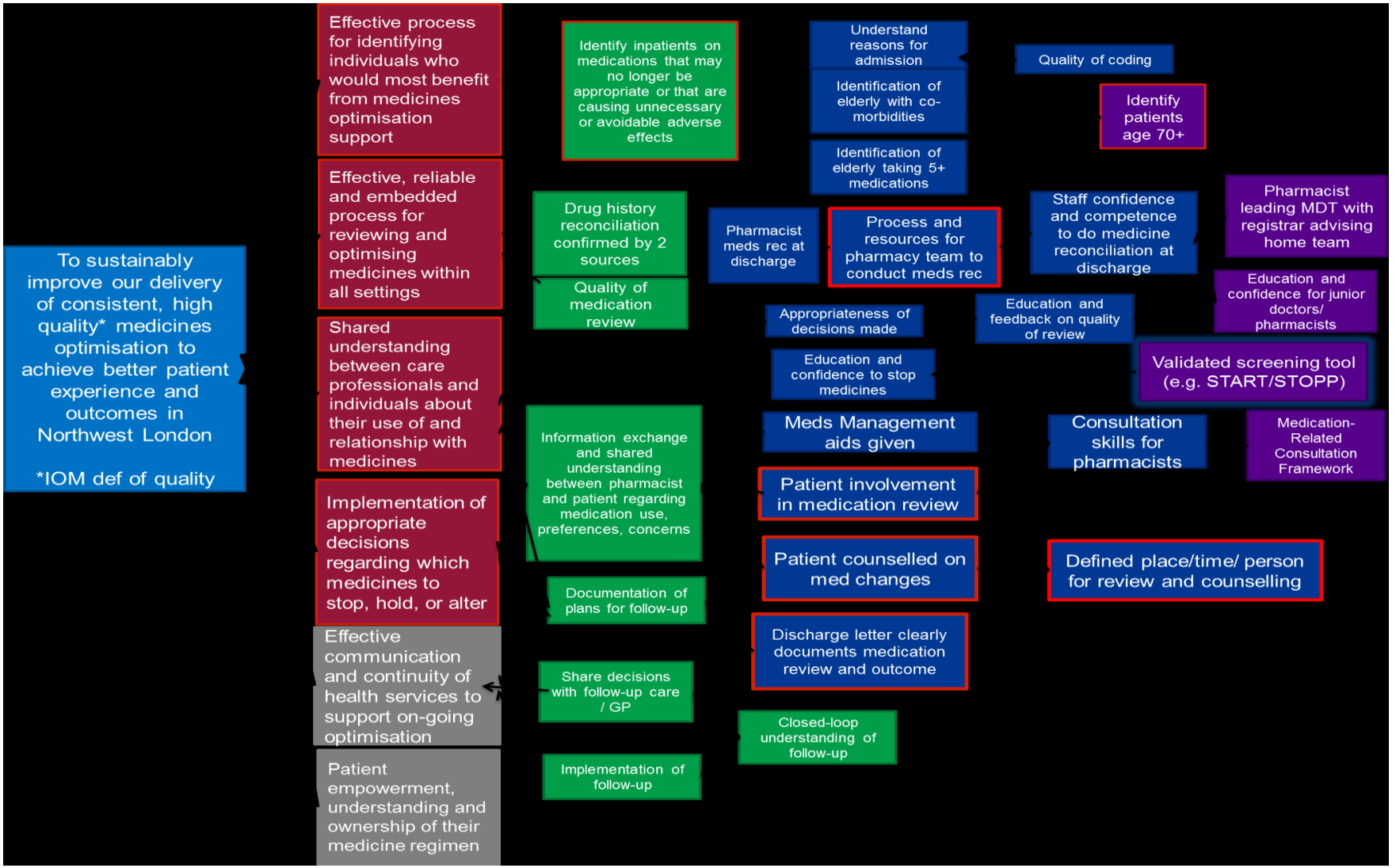
Appendix L: Allergy_Action Effect Diagram



Appendix M: Heart failure_ Action Effect Diagram



Appendix N: MedRev_Action Effect Diagram



Appendix O: Article Permissions

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