
Scaling Beyond Early Adopters: A Systematic Review and Key Informant Perspectives

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PREFACE

The VA Evidence Synthesis Program (ESP) was established in 2007 to provide timely and accurate syntheses of targeted healthcare topics of importance to clinicians, managers, and policymakers as they work to improve the health and healthcare of Veterans. These reports help:

- Develop clinical policies informed by evidence;
- Implement effective services to improve patient outcomes and to support VA clinical practice guidelines and performance measures; and
- Set the direction for future research to address gaps in clinical knowledge.

The program is comprised of four ESP Centers across the US and a Coordinating Center located in Portland, Oregon. Center Directors are VA clinicians and recognized leaders in the field of evidence synthesis with close ties to the AHRQ Evidence-based Practice Center Program and Cochrane Collaboration. The Coordinating Center was created to manage program operations, ensure methodological consistency and quality of products, and interface with stakeholders. To ensure responsiveness to the needs of decision-makers, the program is governed by a Steering Committee comprised of health system leadership and researchers. The program solicits nominations for review topics several times a year via the [program website](#).

Comments on this evidence report are welcome and can be sent to Nicole Floyd, Deputy Director, ESP Coordinating Center at Nicole.Floyd@va.gov.

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EXECUTIVE SUMMARY

INTRODUCTION

The process of moving research insights into clinical practice can be slow and a gap often remains between best practices, frequently developed within single sites or small populations, and general practice delivered at a population scale. The field of implementation science seeks to mend this gap by promoting the adoption and appropriate use of effective interventions, practices, and programs, which includes the study of scale-up and spread of innovations. While hard-to-engage sites may have unique characteristics from sites that are engaged quickly or earlier, they are not typically differentiated in scale-up and spread processes. Thus, there is a lack of information about hard-to-engage sites and how to tailor approaches to these sites in scale-up and spread efforts. The objective of this project is to use systematic review and qualitative interview methods together to understand strategies available to scale up and spread clinical and administrative practices across large healthcare systems such as the VHA, with a focus on “hard-to-engage” sites.

METHODS

Systematic Literature Review

To identify relevant literature, we searched multiple databases using key terms related to scaling or spread of health interventions, improving low-performing organizations, and learning health system(s). In addition to searching publicly available databases, we searched abstracts within a database of all projects funded by the VA QUERI program from fiscal years (FY) 2008-2012. Studies were excluded at either the abstract or the full-text level if they were: not about healthcare delivery systems (*eg*, spread within schools or community-based non-profits), about low-income country settings, about learning healthcare systems but not spread (*eg* only discussed data infrastructure), discussed spread conceptually without a specific example or case study, or studies that did not have a large magnitude of spread (fewer than 10 sites included in the spread effort). We abstracted data on the following: the macro model the spread followed (collaborative/exchange to support spread of multiple initiatives within a specific topic area, initiative-specific spread, or embedded spread within a system), any specific micro strategies reported as part of the spread effort, the catalyst or rationale for starting the spread effort, focus/topic area of the practice or initiative, the country or countries where spread occurred, if and how the publication described working with hard-to-engage sites, and magnitude of spread.

Key Informant Interviews

We invited a total of 24 key stakeholders to participate in semi-structured interviews. The participants were drawn from 2 distinct samples: project leads and improvers on VA’s quality metrics. We identified 8 project leads based on their project’s spread magnitude and any specific references to spread activities being analyzed or implemented. These interviewees shared their perspectives on and experiences with strategies to scale up and spread clinical and administrative practices across healthcare systems, with a focus on “hard to reach” sites, which could also include low performers. The second group of interviewees were improvers in the VA’s performance metric system, that tracks a multitude of individual metrics, combines them to produce an overall global score for each VA facility, and then ranks sites into quintiles. We

identified 7 sites that had improved their quality ranking and invited 2 key informants from each site. These key informants represented one person in a leadership position and one person closely involved in improvement activities at the site. We interviewed a total of 16 key stakeholders from these sites, who shared perspectives on and experiences with strategies their sites used to improve their overall score, as well any specific metrics that may have been targeted for improvement.

Data Synthesis and Analysis

We drew from a combination of both key informant interviews and literature review findings to address the key questions. We first analyzed the literature and interviews separately, as described below, and then synthesized across these data sources by comparing and contrasting findings within key questions.

RESULTS

We identified 1,919 potentially relevant citations, of which 964 were included at the title screening and 307 abstracts were included and obtained as full-text publications. A total of 52 publications were identified at full-text review as meeting inclusion criteria and contributed to our final sample.

What Does Large Magnitude Scale-up and Spread Look Like?

Breaking down the national spread process

After working with innovators to test and pilot the initiative and then working with early adopters to test scale-up and spread strategies, activities described in our data split the final phase of full-scale spread into 2 parts with distinct strategies. The first part of the full-scale spread, which we are calling the “mass broadcast” phase, uses strategies intended to reach maximal audience. The second part of the full-scale spread phase, which we are calling the “re-personalize” phase, returns to using strategies more often employed in the first 2 phases of the spread process.

Macro models

We identified 3 distinct macro models to describe the organization or infrastructure of spread efforts in the 52 included publications. These included spread efforts that embedded scale-up or spread within a system of care (n=29), collaboratives or exchanges to support the spread of multiple initiatives within a specific topic area (n=14), and initiative-specific spread efforts (n=9).

Preconditions to consider in large-magnitude scale-up

Several factors repeatedly arose throughout the QUERI interviews, SAIL interviews, and literature as crucial information to gather prior to engaging in large magnitude scale-up. It is crucial that scale-up initiators gather information on who will need to be involved at each site and identify context-specific strategies that will be aligned with the goals of the scale-up.

VA preconditions and existing networks for spread

In addition to building networks de novo for a specific collaborative or exchange, spread efforts can also leverage existing networks in a similar model to collaboratives or exchanges. To better understand the existing conditions in VA that could facilitate spread efforts, we used data from the SAIL improver interviews. This information-seeking almost always occurred after working on homegrown solutions and analyzing local priorities and challenges. Once specific initiatives or issues had been identified, SAIL improvers sought information related to that particular area of interest. Existing sources of spread in the VA include peer to peer connections, existing VA hubs of information, central office expertise, and some non-VA entities.

Considerations and Strategies for Working with Hard-to-engage Sites

We drew from the QUERI spread project papers and interviews, as well as from the 18 publications we identified as either providing descriptions of hard-to-engage sites (n=11) or additionally providing descriptions of strategies used with these hard-to-engage sites after identifying/describing them (n=7). The proportion of hard-to-engage sites was small, and the phrase “N-of-1” was used repeatedly throughout the QUERI interviews to describe experiences working with hard-to-engage sites. While descriptions of hard-to-engage sites often portrayed challenges, a number of beneficial characteristics also warrant mention due to their repeated appearance. Hard-to-engage sites may have low bandwidth or limited resources, local innovations or homegrown solutions that present competition for an innovation, or competing priorities that do not overlap with the priorities of a spread initiative. While these were among the common challenges hard-to-engage-sites might face, a number of potential benefits were also highlighted: a healthy skepticism can lead to collaboration and potential innovation improvement, hard-won engagement that is slow to come may be more durable in the long-term, and low-performing sites can sometimes be easier to engage since their priorities are in alignment with a spread initiative’s goals.

Since hard-to-engage sites are highly variable in their needs, QUERI interviewees recommended “a flexible, tailored approach to one [site] at a time.” Useful strategies for hard-to-engage sites, as highlighted in the most salient themes from the literature and interviews, include facilitation, creating a web of support, establishing peer to peer communication, allowing sites to kick the tires of an innovation, tackling upstream issues, increasing visibility with multiple levels of leadership, utilizing a hard core with soft periphery model of innovation, maintaining engagement with non-adopter sites, and framing the message to initiate positive and helpful working relationships.

CONCLUSIONS

Low performers and hard-to-engage audiences are most in need of engagement when spreading innovations intended to standardize practice or improve quality of care, but they were understudied in the identified literature on large-magnitude scale-up and spread efforts. Variations in care delivery will require a better understanding of how to work with low performer and hard-to-engage groups. Hard-to-engage sites can be highly variable in terms of the challenges or barriers they face. For these myriad of individual factors, bundles of engagement strategies that are more personalized and intensive can help spread initiators reach these groups. More testing of strategies to use with these groups, as well as documentation of adaptations or

tailoring large-magnitude spread efforts make in engaging different groups of adopters, is needed.

ABBREVIATIONS

AHRQ	Agency for Healthcare Research and Quality
CIDER	Center for Information Dissemination and Education Resources
COREQ	Consolidated criteria for reporting qualitative research
HSR&D	Health Services Research and Development Service
IHI	Institute for Health Improvement
NIH	National Institutes of Health
OSVA	Office of the VA Secretary
QUERI	Quality Enhancement Research Initiative
SAIL	Strategic Analytics for Improvement and Learning
TEP	Technical Expert Panel
VHA	Veterans Health Administration
VISN	Veterans Integrated Services Networks

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This topic was developed in response to a nomination by Dr. Shereef Elnahal from the Office of Organizational Excellence (10E). The scope was further developed with input from the topic nominators (*ie*, Operational Partners, listed below), the ESP Coordinating Center, the review team, and the technical expert panel (TEP, listed below).

In designing the study questions and methodology at the outset of this report, the ESP consulted several technical and content experts. Broad expertise and perspectives were sought. Divergent and conflicting opinions are common and perceived as healthy scientific discourse that results in a thoughtful, relevant systematic review. Therefore, in the end, study questions, design, methodologic approaches, and/or conclusions do not necessarily represent the views of individual technical and content experts.

The authors gratefully acknowledge the following individuals for their contributions to this project:

Operational Partners

Operational partners are system-level stakeholders who have requested the report to inform decision-making. They can recommend Technical Expert Panel (TEP) participants; assure VA relevance; help develop and approve final project scope and timeframe for completion; provide feedback on draft report; and provide consultation on strategies for dissemination of the report to field and relevant groups.

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Technical Expert Panel (TEP)

To ensure robust, scientifically relevant work, the TEP guides topic refinement; provides input on key questions and eligibility criteria, advising on substantive issues or possibly overlooked areas of research; assures VA relevance; and provides feedback on work in progress. TEP members are listed below:

Nick Bowersox, PhD, ABPP
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Peer Reviewers

The Coordinating Center sought input from external peer reviewers to review the draft report and provide feedback on the objectives, scope, methods used, perception of bias, and omitted evidence. Peer reviewers must disclose any relevant financial or non-financial conflicts of interest. Because of their unique clinical or content expertise, individuals with potential conflicts may be retained. The Coordinating Center and the ESP Center work to balance, manage, or mitigate any potential nonfinancial conflicts of interest identified.

Collaborators

Dr. Miake-Lye, one of the principal investigators of this project, is the Implementation Core Lead of the Care Coordination QUERI Program. The work for this project was also supported with in-kind effort by other members of the Care Coordination QUERI Program:

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EVIDENCE REPORT

INTRODUCTION

The process of moving research insights into clinical practice can be slow and a gap often remains between best practices, frequently developed within single sites or small populations, and general practice delivered at a population scale.¹⁻¹⁷ The field of implementation science seeks to mend this gap by promoting the adoption and appropriate use of effective interventions, practices, and programs, which includes the study of scale-up and spread of innovations.¹⁸⁻²¹ The terms “scale-up” and “spread” are not well-differentiated and often used together or interchangeably,^{19,22} but the key definitional components repeatedly emphasized are the pre-established effectiveness of the innovation; the expansion across systems, sites, or settings; and the intentional process or active effort involved.^{1,19,20,22-28} An exemplar definition from the World Health Organization, used by the Conference to Advance the Science and Practice of Scale-up and Spread of Effective Health Programs in Healthcare and Public Health,¹⁹ contains all these elements:¹

SCALE-UP/SPREAD:

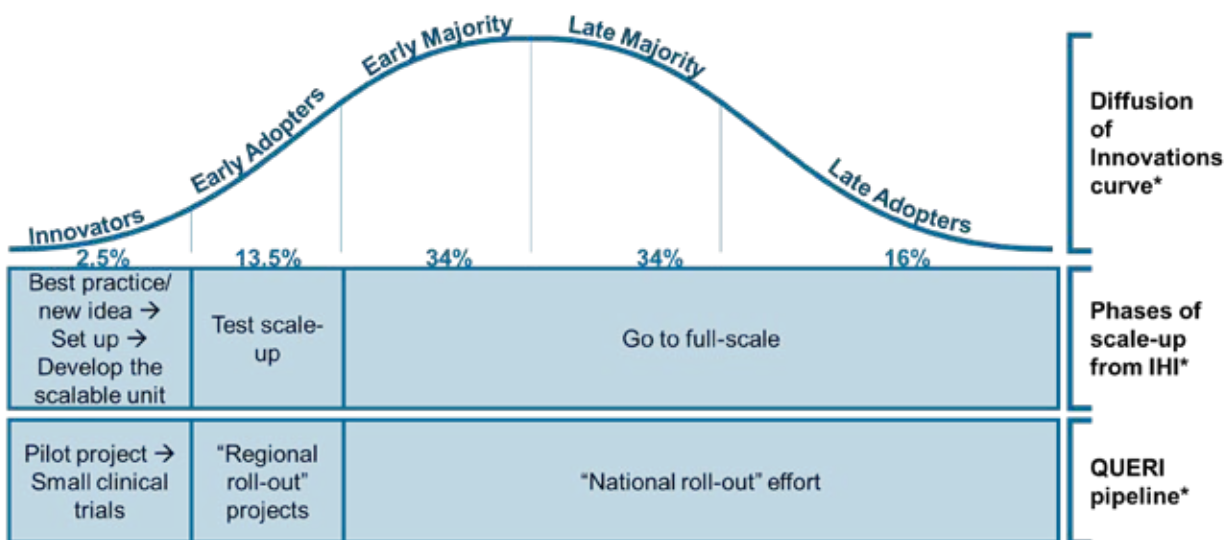
“Deliberate efforts to increase the impact of innovations successfully tested in pilot or experimental projects so as to benefit more people and to foster policy and program development on a lasting basis.”

Numerous frameworks and models have been developed for scale-up and spread,^{1-6,22,29-33} with a recent review identifying 24 concepts, theories, or models in the public health sector alone.²³ However, many of these are focused on particular settings or health areas (eg, low- and middle-income countries, maternal nutrition), and may not be directly applicable to more general spread efforts.^{19,22,23} In large healthcare systems such as the VA, organizations are multi-level and require models flexible enough to adapt to this setting, given that work across these systems “requires explicit attention to the interactions between and among multiple levels,” even for innovations targeting only one piece of the larger organization.³⁴ For this report, we focus on 2 widely-used frameworks that are general and describe the process of multi-site scale-up and spread: the Institute for Healthcare Improvement’s phases of scale-up¹ and the QUERI pipeline³⁵ (see **Figure 1** below). These 2 frameworks follow similar general steps in the spread process: piloting and initial testing of some idea or innovation, then testing scale-up before moving to full scale-up or spread. These frameworks are not without key distinctions. The QUERI framework is focused on moving research evidence to practice, characterizing the process as a “pipeline.”³⁵

This pipeline has a core premise that innovations must be “evidence-based,” and describes a top-down process that is then assumed to get that innovation broadly implemented. The IHI framework, on the other hand, is focused on grassroots process improvement, and the basis for cultivating an innovation to be spread or scaled up is not necessarily a strong evidence base.¹ Rather, local demonstration of improvement is necessary, through piloting and initial testing as the framework depicts, before scaling up and/or spreading more broadly. While there is a fundamental difference between the evidence-based approach and the grassroots process improvement approach, the similarities in the later stages of these frameworks is the key factor we wanted to emphasize in this report, so we chose to draw from both frameworks to highlight the ways in which they align.

Both frameworks differentiate between 3 phases. In both cases the third phase, “go to full-scale” or “national roll-out effort,” describes an effort that includes many organizations. This last phase is depicted as a homogenous process in these frameworks, but often captures a heterogeneous group of organizations and settings. One theory that would suggest that this is not a homogenous group is the Diffusion of Innovations theory, which proposes that adoption of any innovation fits a curved pattern when spreading across a large population, with different groups of adopting individuals or organizations fitting into 5 sequential groups with different adopting habits and characteristics.³⁶ Innovators and early adopters are seen as more risk-taking and engage more quickly with new innovations. The early and late majority groups tend to observe the actions of these earlier groups before making their adoption choices, and the late adopters are characterized as having the greatest skepticism for change and last to adopt. These descriptions fit with spread activities in the frameworks, where innovators would conduct initial piloting and testing and early adopters would then be the next group to engage with during initial spread efforts. However, while spread frameworks tend to group the rest of the spread process into one category, this is discordant with how Diffusion of Innovation describes the 3 remaining groups, which have unique characteristics. The IHI and QUERI frameworks are not unique in that late and non-adopters are typically not the focus of work published in this area.³⁷

As a note, Diffusion of Innovations theory is not perfect in its application to the scale-up and spread process, with observations of individuals rather than organizations as its basis and other issues related to characterizations of those individuals,^{36,38} but other work in this area does suggest that adopter characteristics do vary at an organizational level.³⁹ Given the specific characteristics Rogers ascribed to late adopters, or laggards as he called them,³⁷ we will be using the term hard-to-engage as a generic term to describe the group of organizations that scale-up and spread efforts have struggled to reach. There is a lack of information about how to tailor approaches to these hard-to-engage sites in scale-up and spread efforts.

Figure 1. Adopter Groups and Spread Process

*Diffusion of Innovations curve,³⁶ IHI Phases of scale-up,¹ and QUERI pipeline³⁵

Going to full scale or completing large magnitude spread requires more than ad hoc connections, and the coordinated effort can be thought of as a macro model driving the infrastructure or organization of a spread effort. Spread initiators may need to tailor their model or apply unique strategies to reach hard-to-engage sites, especially in large magnitude spread efforts where the initial model for going full scale may reach most sites, but not all. Additional, or different, approaches may be required to engage the hard-to-engage sites. For instance, collaboratives that rely on voluntary participation and activated users to engage with the effort may not have strategies or local champions in place to reach sites that do not reach out to join the network themselves.

The objective of this project is to understand strategies available to scale up and spread clinical and administrative practices across large healthcare systems such as the VHA, with a focus on “hard-to-engage” sites.

METHODS

To fully address our objective, we used both systematic review and semi-structured interview methods to collect relevant data, and synthesized these data through qualitative analysis. Below we describe our process, first developing our approach with our stakeholders, then conducting a systematic review and interviews, and finally integrating themes and findings into a cohesive narrative.

TOPIC DEVELOPMENT

After discussions with the Technical Expert Panel (TEP) and operational partners, the scope of work was expanded from performing a systematic review to include semi-structured interviews with key informants, given the likely paucity of literature directly addressing the objective of this project: to understand strategies available to scale up and spread clinical and administrative practices across large healthcare systems such as the VHA, with a focus on “hard-to-engage” sites, which could also include low performers. This objective has been refined to 2 key areas of inquiry, described below:

1. What does large magnitude spread look like?

As the QUERI pipeline³⁵ and IHI Phases of Scale-up suggest,¹ large magnitude spread is a planned and organized effort. As there are different forms that this organization or infrastructure can take, the planning process would involve a consideration of certain factors that may be site-specific. Here we sought to define the process of large magnitude scale-up and spread with consideration of hard-to-engage sites, what forms the large magnitude scale-up and spread can take, what should be considered prior to engaging in large magnitude scale-up, and what preconditions and existing networks for spread look like in the VA.

2. Considerations and strategies for working with hard-to-engage sites

We looked at the commonalities or characteristics of hard-to-engage sites. We defined these in relation to whether the characteristics might have potential benefits in the spread process, or if they cause challenges. We then explored the various strategies that have been used with hard-to-engage sites, since working with hard-to-engage sites as part of a larger spread effort may require tailored approaches.

The review was registered in PROSPERO: CRD42018093380

SEARCH STRATEGY

To identify relevant literature, we used 3 topical searches with key terms related to scaling or spread of health interventions, improving low-performing organizations, and learning health system(s). We also searched for similar articles for 5 key publications.^{20,34,40-42} Our searches included the following databases: PubMed, WorldCat, Web of Science, Business Source Complete, and ROCS. See Appendix A for complete search strategy.

In addition to searching these databases, we searched abstracts within a database of all projects funded by the VA QUERI program from fiscal years (FY) 2008-2012. All potentially relevant

projects were then collated, and the project leads were identified as potential key informants (described below). In addition, our team then accessed the VA Assessment and Research Reporting Tool, a national database program that supports administrative processes and reporting capabilities for a variety of VA research data, to find any publications affiliated with these projects. These publications were included in all screening and abstraction procedures.

STUDY SELECTION

Three team members independently screened the titles of retrieved citations (IML, DD, PMS). For citations deemed relevant by at least one person, abstracts were then screened independently in duplicate by the same 3 team members. All disagreements were reconciled through group discussion. Full-text review was conducted in duplicate by 2 independent team members (IML, SM), with any disagreements resolved through discussion. Studies were excluded at either the abstract or the full text level if they were: not about a healthcare delivery system (*eg*, spread within schools or community-based non-profits), about low-income country settings, about learning healthcare systems but not spread (*eg* only discussed data infrastructure), discussed spread conceptually without data or a specific example or case study, or studies that did not have a large magnitude of spread (fewer than 10 sites included in the spread effort). Studies in low-income countries were viewed as having infrastructure differences too distinct to draw parallels to a VA setting, since these studies often described efforts by international groups coming from foreign countries or working in systems with very different resource or system constraints. Studies with fewer than 10 spread sites were not describing the stage of large magnitude scale-up or spread that this report is focused on, and were typically much more indicative of testing scale-up or regional roll-out projects, as described by the IHI and QUERI frameworks.

DATA ABSTRACTION

For each included publication we abstracted data on the following: the macro model the spread followed (collaborative/exchange to support spread of multiple initiatives within a specific topic area, initiative-specific spread, or embedded spread within a system), any specific micro strategies reported as part of the spread effort, the catalyst or rationale for starting the spread effort, focus/topic area of the practice or initiative, the country or countries where spread occurred, if and how the publication described working with hard-to-engage sites, and magnitude of spread. Each publication was subject to dual data abstraction, with any discrepancies resolved through team discussion.

QUALITY ASSESSMENT

The focus of this review, which is describing scale-up and spread, is not one for which there are existing instruments to assess the quality of studies. With no established criteria for deciding on quality, and because it was beyond the scope of this work to develop such criteria, we did not perform any quality assessment.

KEY INFORMANT INTERVIEW SAMPLING AND DATA COLLECTION

We used the consolidated criteria for reporting qualitative research (COREQ) to guide our reporting of the qualitative component of this work.⁴³ We invited a total of 24 key stakeholders to participate in semi-structured interviews. An email invitation to participate in an interview was

sent to each identified individual, and a phone interview was scheduled with those who agreed to participate. The semi-structured interviews were recorded and transcribed. Sample interview guide questions are shown in Appendix B. The average interview duration was 36 minutes and 30 seconds. The interviews were conducted by the MD- or PhD-educated members of the trained qualitative team (IML, ALK, CL), with additional team members in attendance as possible. All 3 interviewers are female researchers who are familiar with implementation science and quality improvement topics. In most cases participants and interviewers were not familiar with one another, the exception being during the pilot interview. The participants were drawn from 2 distinct samples, described below.

QUERI Project Leads

We identified 39 projects in the database of QUERI proposals that described scale or spread activities in their abstracts. Of these, 11 projects described conducting national, multi-regional, or multi-site spread as part of the scope of the project. An additional 14 projects described evaluations of national policy or program spread efforts, with the final 10 projects describing analyses or work with low performing sites. We selected the 2 national spread projects, 2 additional multi-site/multi-region projects, 3 evaluation projects, and one analysis of low performing sites. We chose the projects based on their size and any specific references to spread activities being analyzed or implemented. Contacts from all 8 of the projects agreed to be interviewed, and they shared their perspectives on and experiences with strategies to scale up and spread clinical and administrative practices across healthcare systems, with a focus on “hard to reach” sites, which could also include low performers. In one case a QUERI project lead did not respond to our contact, so we interviewed a different co-investigator from the same project instead.

SAIL Improvers

The VA uses a performance metric system called Strategic Analytics for Improvement and Learning (SAIL),⁴⁴ an adapted version of the *Thomson Reuters Top Health Systems Study*, that tracks a multitude of individual metrics and combines them to produce an overall global score for each VA facility which is adjusted for facility complexity. Facilities are sorted into quintiles using this overall score. The perspectives of these sites may reflect how and when sites may engage in spread efforts, and what types of resources these sites used to improve.

We sorted the 146 VA sites with data from all quarters in FY2012 through FY2017. These were categorized into 3 groups: sites whose rank remained in the lower quintiles (quintiles 3 through 5 throughout the reporting period, n=34), sites whose rank remained in the higher quintiles (quintiles 1-3 throughout the reporting period, n=38), and sites that changed ranks (n=75). From this last group, we placed sites in the improver group that had begun with scores in the lower quintiles in the first 3 quarters reported (FY2011 and FY2012) and had made improvements to move up to the top quintiles and had maintained high quintile ranking in the latest fiscal year (n=16). See Appendix C for example data representing these categories. One example for an improver site is site E in the Appendix, which was ranked in the fifth quintile in FY2011, then in the fourth quintile for all 4 quarters in FY2012. In FY2013 site E ranked in the third quintile in quarter one, second quintile in quarters 2 and 3, and first quintile in quarter 4. This first quintile ranking persisted through the rest of the reported fiscal years (FY2017 quarter 4).

We then sampled 7 representative sites from the improver group, based on facility complexity and diversity of location, and invited 2 key informants from each site. Two additional sites were contacted but the original contact did not respond. These key informants represented one person in a leadership position and one person closely involved in SAIL improvement activities at the site, and were identified by TEP members or team members who were familiar with the sites. Once we had contact with a site, our first contact could suggest additional or replacement interviewees if they thought there were other, more appropriate individuals. We invited a total of 20 key stakeholders from these sites with SAIL improvements, of whom 16 shared perspectives on and experiences with strategies their sites used to improve their overall SAIL score, as well as any specific metrics that may have been targeted for improvement. Of the 4 invited stakeholders who did not respond, 2 stakeholders were the initial contacts at the nonresponding sites, one stakeholder was unable to participate due to scheduling conflicts, and one individual referred our team to another colleague at the same site, who we interviewed instead.

DATA SYNTHESIS AND ANALYSIS

We drew from a combination of both key informant interviews and literature review findings to address the key questions. We first analyzed the literature and interviews separately, as described below, and then synthesized across these data sources by comparing and contrasting findings within sections. Within each results section we describe the sources we drew from for that section.

Literature Review

Our review is a narrative analysis. We synthesized descriptions of spread efforts from included publications.

Key Informant Interviews

Drawing primarily on matrix analysis,^{45,46} an inductive and deductive team-based analytical approach was performed. A matrix analysis is a tabular format that collects and arranges data for easy viewing in one place, permits detailed analysis, and sets the stage for later cross-case analysis with other comparable sites.^{45,46} Based on our interview guides, we developed separate templates for QUERI and SAIL interviews to rapidly organize qualitative data by key themes or questions.⁴⁷ Each interview was analyzed by 3 members of the team (IML, DD, SM), and consistency of interpretation was regularly checked through team discussion. See Appendix D for QUERI and SAIL templates used in analysis.

PEER REVIEW

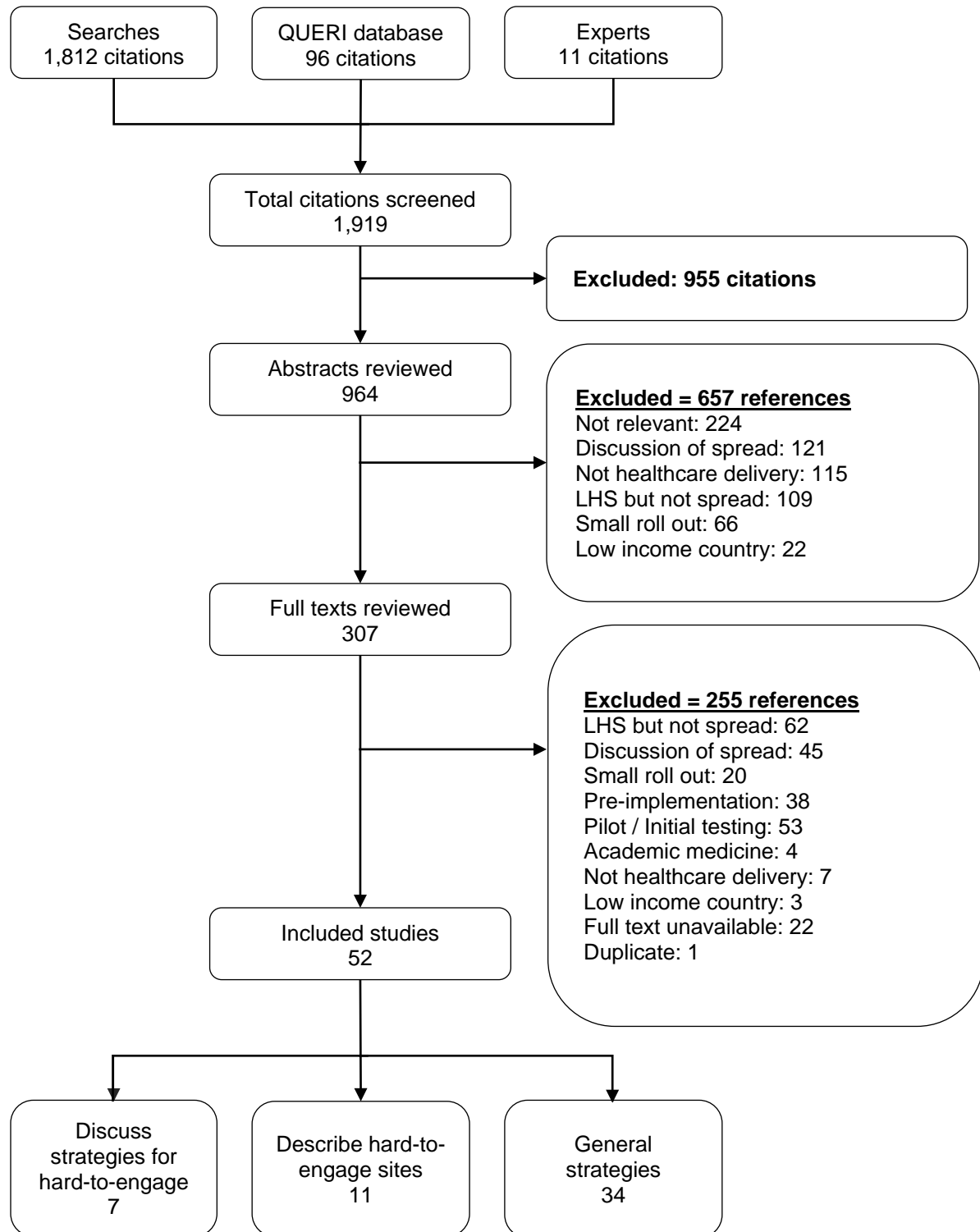
A draft version of the report was reviewed by technical experts and clinical leadership. Reviewer comments and our response are documented in Appendix E.

RESULTS

LITERATURE FLOW

We identified 1,919 potentially relevant citations, of which 964 were included at title screening. From these, a total of 657 abstracts were excluded. Excluded abstracts were categorized as not healthcare delivery (n=115), low income country (n=22), learning health system but not spread (n=109), discussion of spread (n=121), small roll-out (n=66), or otherwise not relevant to the topic of spread (n=224). The other 307 abstracts were included and obtained as full text publications. The 255 publications that were excluded at full-text review were categorized as exclusions for the following reasons: learning health system but not spread (n=62), discussion of spread (n=45), small rollout (n=20), full text unavailable (n=22), not healthcare delivery (n=7), low income country (n=3), duplicate (n=1), or otherwise not relevant to the topic of spread (n=95). This final group included studies of piloting or initial testing of interventions (n=53), pre-implementation analyses with no implementation component (n=38), and other topics not relevant to spread (*eg*, medical education programming, n=4). A full list of excluded studies from the full-text review is included in Appendix F. A total of 52 publications were identified at full-text review as meeting inclusion criteria and contributed to our final sample (See **Figure 2** for literature flow). The included studies discussed spread strategies for hard-to-engage sites (n=7), described hard-to-engage sites but did not discuss specific strategies (n=11), and discussed spread strategies more generally (n=37). Descriptions of publications in this latter group, which are discussed in less detail throughout the report, are available in Evidence Tables (Appendix G).

Figure 2. Literature Flow Chart



WHAT DOES LARGE MAGNITUDE SCALE-UP AND SPREAD LOOK LIKE?

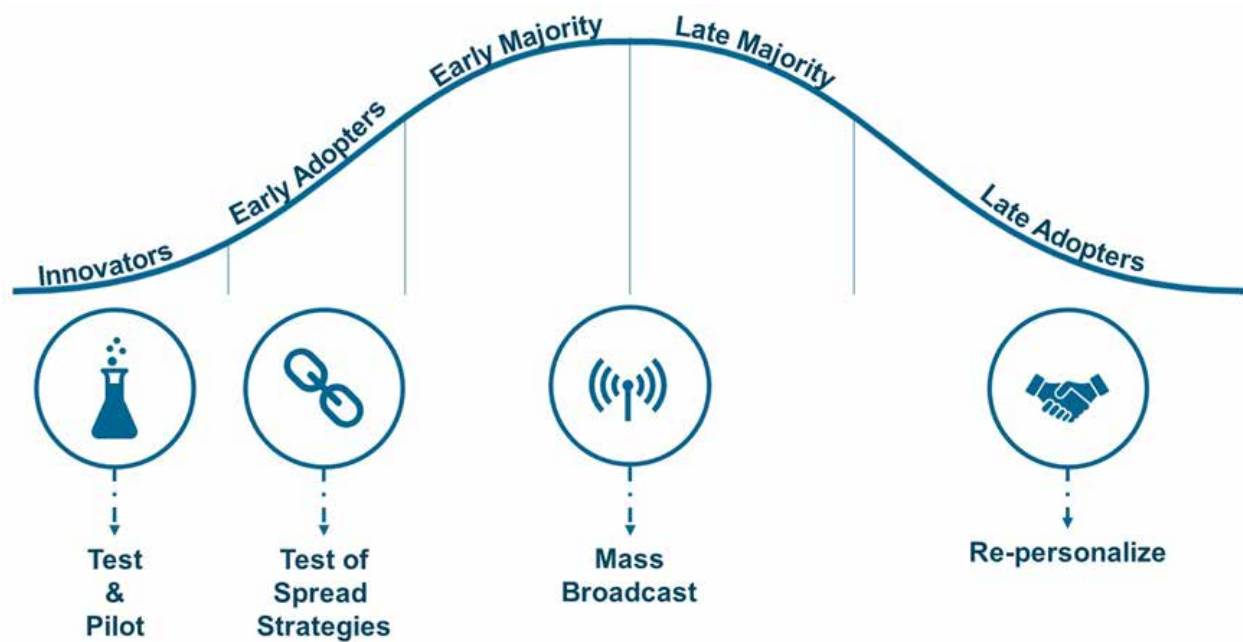
As the QUERI pipeline³⁵ and IHI Phases of Scale-up suggest,¹ large magnitude scale-up or spread is a planned and organized effort with various phases. We first propose additional specifications to the phases proposed by these frameworks to account for hard-to-engage sites. The organization or infrastructure supporting these efforts can take multiple forms or models, and here we highlight the 3 macro models we identified. We then discuss factors that repeatedly arose throughout the interviews and literature as crucial information to know prior to engaging in large magnitude scale-up. Finally, we discuss VA preconditions and existing networks for spread that currently facilitate diffusion throughout the system.

Breaking Down the National Scale-up or Spread Process

Of the 52 included publications, 7 publications went beyond discussing their overall spread approach to specifically describe strategies they used to work with hard-to-engage sites. Themes from these publications, as well as themes from the QUERI interviews, were combined into a synthesis related to how hard-to-engage sites relate to the overall process of scale-up or spread (see **Figure 3**).

The first 2 phases have been described by the QUERI pipeline³⁵ and IHI Phases of Scale-up,¹ and our data support their descriptions of these phases. Whether the earliest stage includes using an evidence-based innovation or developing a new idea, this phase includes small-scale testing or piloting with direct involvement of the team at the initial site or small number of sites. This work requires personalized, first-hand contact and typically builds relationships among those developing, implementing, and evaluating the initiative. As the phases of scale-up and spread progress, the breadth of contact across sites is emphasized over the depth of contact at any individual site.

While our data support much of what these frameworks describe, activities described in our data split the final phase of “going full-scale”¹ or “national roll-out effort”⁹ into 2 parts with distinct strategies. The first part of the full-scale spread, which we are calling the “mass broadcast” phase, uses strategies intended to reach maximal audience. This first part seems to align with the breadth of contact suggested by the frameworks. However, the second part of the full-scale spread phase, which we are calling the “re-personalize” phase, returns to using strategies more often employed in the first phase of the spread process. This final part of the scale-up or spread process is focused on those hard-to-engage sites that did not engage with the “mass broadcast” strategies or approach.

Figure 3. Large Magnitude Spread Process

The “**mass broadcast**” phase of large magnitude spread, in publications and interviews alike, was nearly always described as beginning with strong top-down support, as one interviewee notes:

“I think having a strong partnership with [national leaders] was a critical factor in making this happen and getting the facilities, the units involved as well because they knew that we had the backing of the National Program Office to make this happen.”

This could take the form of summits with all top-level leadership, for example: “... senior regional leadership identified reducing sepsis mortality as a key performance improvement goal... The effort was launched... at a Sepsis Summit.”⁴⁸ Other more formal arrangements like an official mandate or policy change were also used, with mandates present in nearly every QUERI interview like the following: “the... Directive, that was a top-down strategy where the government said everybody must do this.” This was typically effective during the “mass broadcast” phase of a national spread effort, and in garnering this leadership support it was often very important to have evidence of success from the innovators and early adopter groups, as noted by one national spread initiative of inpatient palliative care: “the evidence behind the model, demonstrated by the randomized trial, was an important factor promoting its spread.”⁴⁹ While these and other mass-scale approaches were helpful in amplifying the magnitude of spread to the majority audiences, typically additional strategies were needed for the hard-to-engage group, which are discussed as a separate phase below.

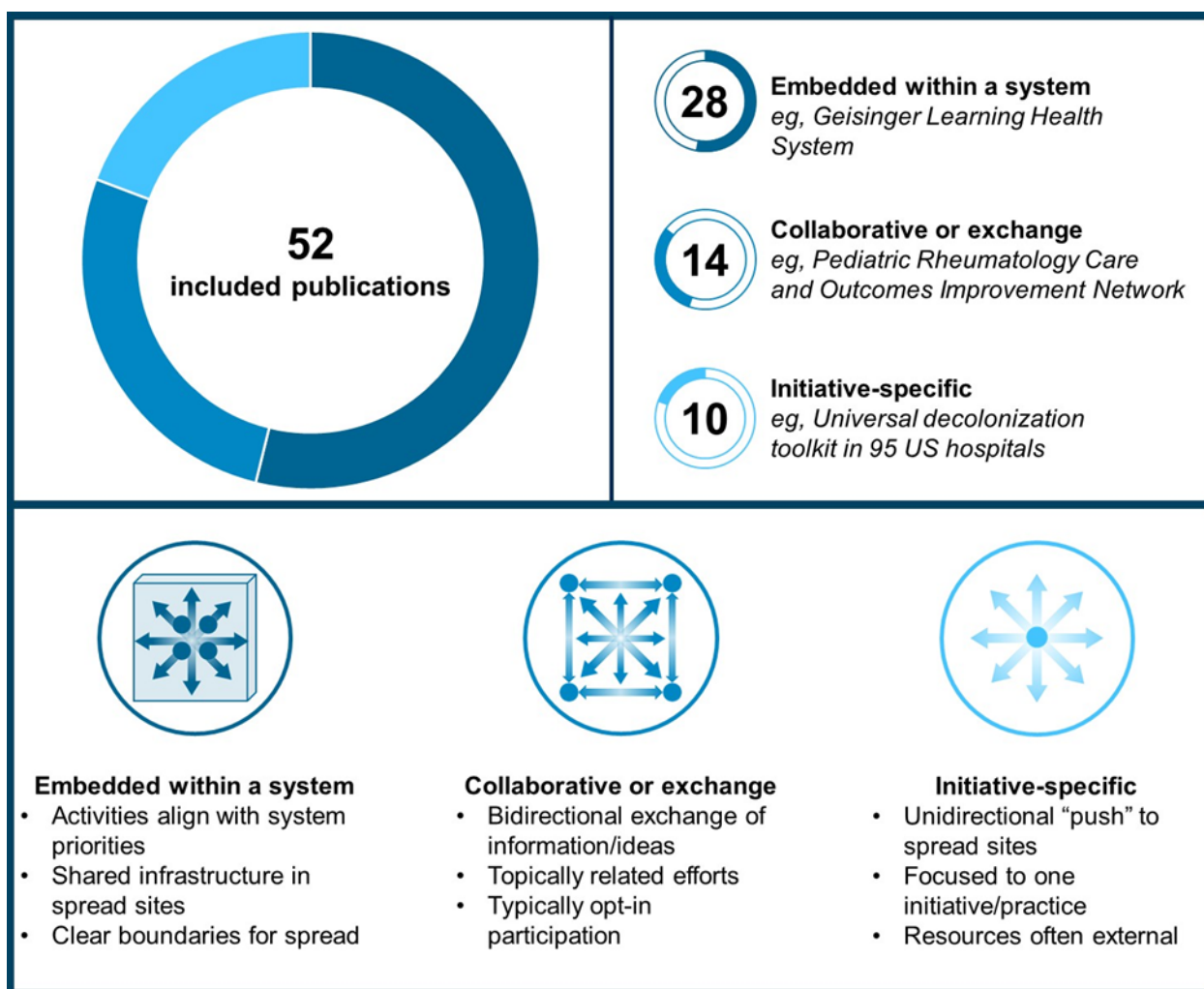
The “**re-personalize**” phase returns to an approach used in earlier phases, which reflects a return to more personalized and intensive engagement. In experimenting with and testing strategies early in the spread process, spread initiators are often engaging sites much more heavily to collect data, refine approaches, and learn from their early experiences. In some ways, the

strategies recommended for hard-to-engage sites tend to reflect a return to this increased connection with sites, and later sections of this report discuss specific strategies for hard-to-engage sites in greater detail.

Macro Models

We identified 3 distinct macro models to describe the organization or infrastructure of spread efforts in the 52 included publications. These included spread efforts that embedded scale-up or spread within a system of care (n=29), collaboratives or exchanges to support the spread of multiple initiatives within a specific topic area (n=14), and initiative-specific spread efforts (n=9). **Figure 4** displays this distribution of publications, as well as an example for each type of model and key features.

Figure 4. Macro Model Distributions and Descriptions



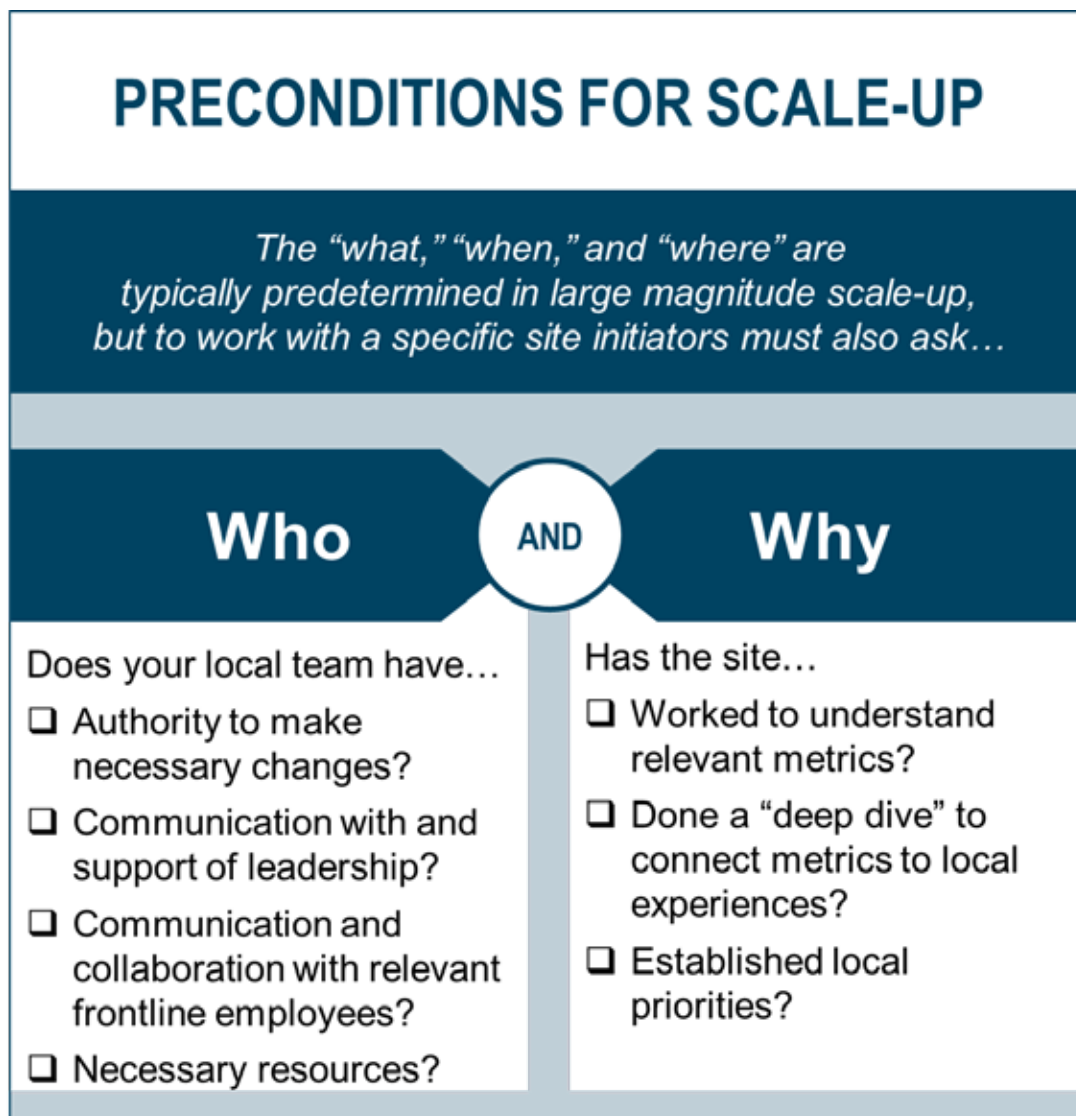
The 29 publications classified as embedded within systems either discussed specific projects within these systems or the system itself, which had spread infrastructure to tackle high priorities within the institution. Some, like Geisinger Learning Health System,⁵⁰ specifically use the learning health system term, whereas others describe similar attributes including system-wide infrastructure, shared priorities and agenda setting, and initiatives or practices aimed at supporting the larger system priorities. The VA, Kaiser Permanente Northern California, and the National Health Service in the UK are all examples of systems with publications describing embedded spread efforts. These organizations typically have shared infrastructure, like an electronic health record, and a clear number of sites that fall within the scope of any particular spread effort.

Collaboratives or exchanges, which were described in 14 included publications, span multiple organizations. They share a topic or priority area, such as pediatric rheumatology,⁵¹ or breast health,⁵² and may be defined by a particular locality, like the Indianapolis Discovery Network for Dementia.⁵³ The organizations typically receive little to no incentive to participate, choosing to opt-in voluntarily. The intention of these networks is bi-directional exchange, so organizations could be described as learning together simultaneously.

The final model, initiative-specific spread, most aligns with the classic models described in the frameworks described earlier.^{1,35} In this model the initiative or practice in question has been developed and is now moving to new sites. While it may be a bundle or toolkit, there is a defined set or package that is being pushed out. The spread activities are often funded by the origin site or other sources external to the adopter sites. While this model could include smaller spread efforts, this review limited spread magnitude to include 10 or more sites, and the identified publications described spread efforts that were usually regional or national in scope. Examples include the scale-up of a universal decolonization toolkit to 95 hospitals across the United States,⁵⁴ as well as a state-wide spread of a clozapine management system in Australia.⁵⁵

Preconditions to Consider in Large Magnitude Scale-up

This section describes factors that repeatedly arose throughout the interviews as crucial information to gather prior to engaging in large magnitude scale-up. This was corroborated by the types of issues raised in the 11 publications that described hard-to-engage sites. Initiators of scale-up should not assume that all sites have similar conditions, and understanding salient preexisting factors was consistently highlighted across both sets of interviews and the included publications. Initiators of scale-up efforts often know what they are scaling, when they would want to scale, and where they would like to scale in order to define their scope of work. But having more knowledge about the sites is also crucial to planning a scale-up effort. Gathering more information on who will need to be involved locally and local reasons why sites may (or may not) align with the goals of the scale-up is central information in the planning stages of large magnitude scale-up (see **Figure 5**). Any effort to engage a site should consider this information-gathering in the early formative stages, regardless of variations in later plans.

Figure 5. Preconditions for Scale-up

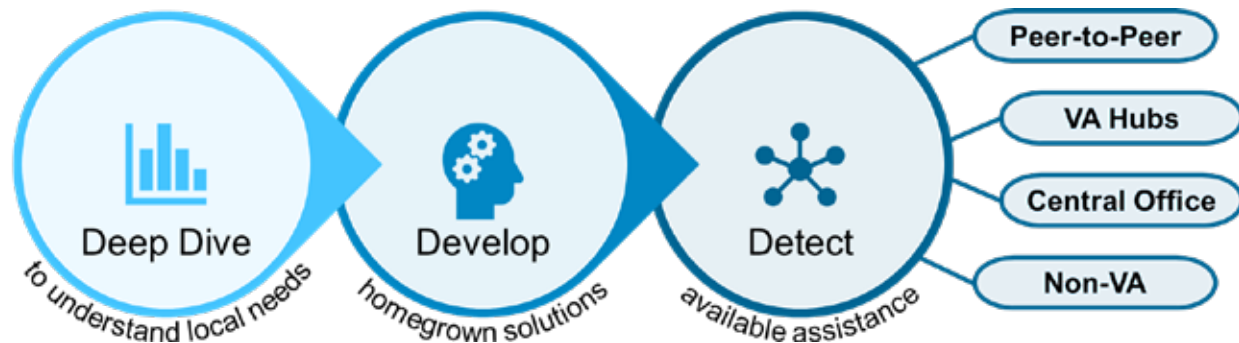
VA Preconditions and Existing Networks for Spread

In addition to building networks de novo for a specific collaborative or exchange, spread efforts can also leverage existing networks in a similar model to collaboratives or exchanges. To better understand the existing conditions in VA that could facilitate spread efforts, we used data from the SAIL improver interviews. The VA interviewees looking to improve their SAIL measures described several sources from which they sought information on potential improvement methods (see **Figure 6**). We describe here the way participants use these sources of information, which parallels the preconditions discussed for scale-up initiators, in that here we discuss the preconditions individual sites take prior to engaging in spread.

This information-seeking almost always occurred after working on homegrown solutions and analyzing local priorities and challenges. Once specific initiatives or issues had been identified, SAIL improvers sought information related to that particular area of interest. **Figure 6** below

highlights this process, as well as sources of information and assistance, as described by the SAIL improver key informant interviews. These sources of information and assistance all facilitate the spread of ideas, interventions, and information.

Figure 6. Local Preconditions Prior to Engaging in Spread



Peer to Peer Connections

SAIL improvers very often described reaching out to other sites to hear about their peers' experiences. While these connections would sometimes happen on VA Pulse or through cold-calling, the VISNs often facilitated this connection by highlighting sites with interesting or successful approaches and holding VISN-wide meetings or calls: "the VISN was helpful in that they really did organize... forums where best practices can be shared but more importantly it gave key folks in our facility [a venue] to present their work." Sites particularly wanted connections with other sites that seemed similar to their own sites or to "see where those other high performing facilities are and then we need to reach out to them."

"we have the ability to reach out and get some great best practices from the other sites"



Existing VA Hubs of Information

While VA Pulse was most often endorsed, other hubs including the VA Performance Improvement Hub,⁵⁶ the VHA Shark Tank Competition,⁵⁷ and the VHA Access to Care Initiative Hub⁵⁸ were also mentioned by key informants. One site shared the following strategy for staying connected to a variety of hubs:

"We have link to all those [hubs] listed in our ... project repository SharePoint site, so... if somebody wants to get an idea on how to improve patient cancelations, they can go to the VA Performance [Improvement Hub], or they can go to the VHA Access to Care Initiative and search for that. We also use VA

Pulse quite a bit actually, where we'll go on there and we'll do a search and look for specific project assistance".

Another interviewee highlighted a challenge of finding information within the VA:

“It's very hard in this huge healthcare system to find these toolkits... if your computer ever crashes, you're in trouble because once you find the link you've gotta bookmark it. There's no real fully-organized place for that stuff... it shouldn't be that hard to find that stuff. And sometimes I find it and then I can't find it again.”

Central Office support

SAIL improvers would proactively contact national program offices, like the Office of Nursing Services or the Office of Mental Health for specific questions. These often included questions about how a particular metric was constructed, to see if there were best practices or advice that office could share about a particular metric, or to be connected with a site that had best practices.

Key informants also highlighted the usefulness of having a site visit or “deep dive” into the statistics and measures of the SAIL program with Dr. Almenoff, Director of Organizational Excellence in the VA Secretary's Office. There were also multiple sites who used the SAIL mini-series lectures, which were so popular that “things actually started to get to the point where you need to register the moment that they came out and they ran out of spots... we kept all of the information, kept good records.”

Non-VA entities

To a lesser extent, informants named organizations including the Institute for Healthcare Improvement (IHI), National Institutes for Health (NIH), or other non-VA resources like professional societies or private sector organizations as potential sources for guideline information, protocols, toolkits, and other topic-specific or skill-specific guidance. These informants described wanting evidence to support their work:

“IHI, NIH, and some of the things that are out there that already have synthesized the evidence-based practice and kind of put it all together. I mean you can do a big lit search and that kind of stuff, but if it's already put together and it's already proven and it has like toolkits and those kind of things... [these groups] would synthesize the data, they would look at best practices, then they would develop a toolkit and they would give you all of that”.

CONSIDERATIONS AND STRATEGIES FOR WORKING WITH HARD-TO-ENGAGE SITES

“I give you a whole bunch of N-of-1s, but there’s a lot of experience there”



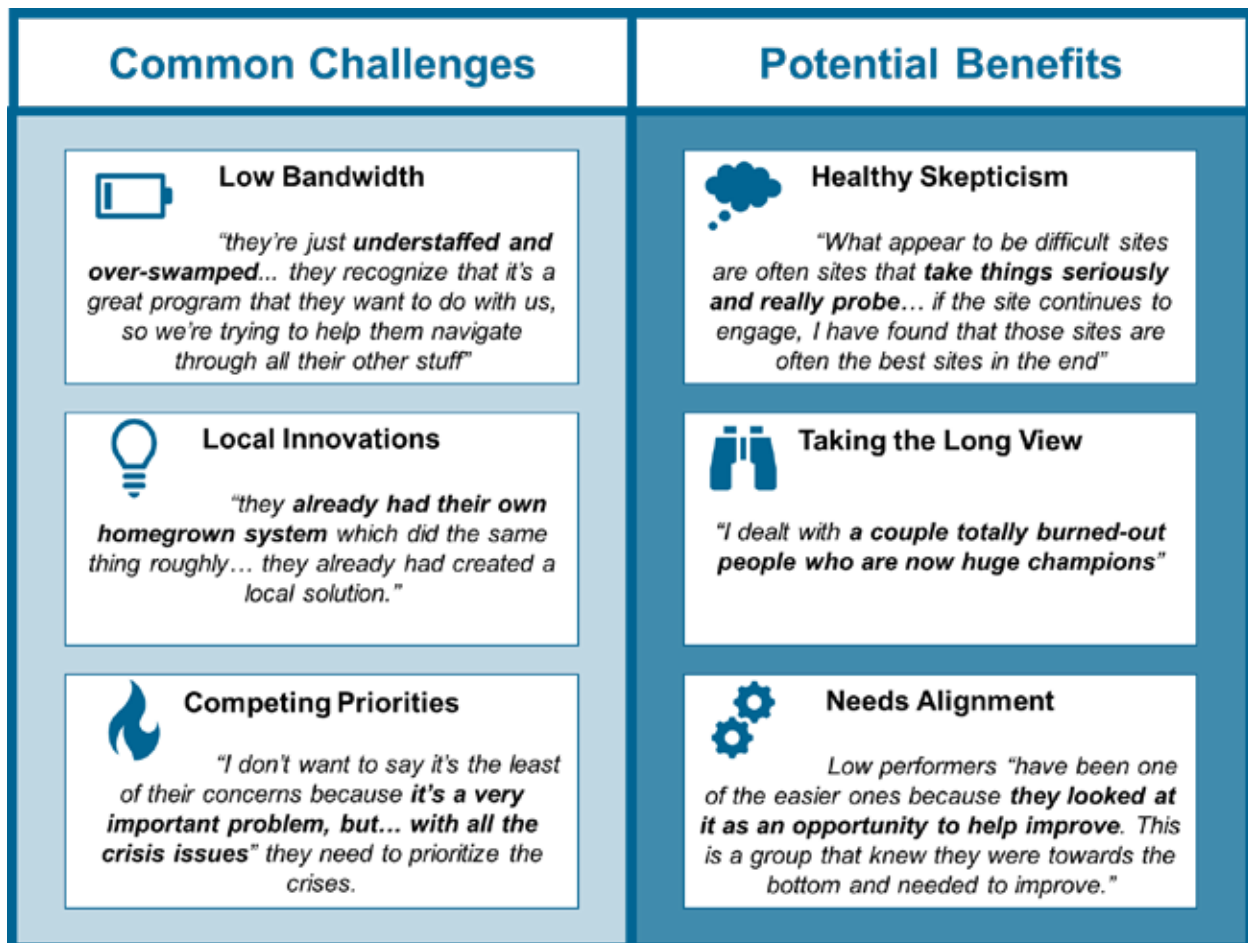
Hard-to-engage sites were described both in the interviews and systematic review findings. We drew from the QUERI spread project papers and interviews, as well as from the 18 publications we identified as either providing descriptions of hard-to-engage sites (n=11) or additionally providing descriptions of strategies used with these hard-to-engage sites after identifying/describing them (n=7).

Generally speaking, hard-to-engage sites had issues meeting the preconditions for scale-up, as described in an earlier section. Common challenges are described below, but the preconditions may not be met for a number of reasons, and interviewees and publications alike supported the highly context-specific nature of challenges faced by hard-to-engage sites, whose “problems vary tremendously” with a “myriad of individual reasons.” The phrase “N-of-1” was used repeatedly throughout the interviews to describe experiences working with hard-to-engage sites.

Similar to the distribution of the Diffusion of Innovation curve,³⁶ the proportion of hard-to-engage sites was described as small, with one interviewee directly acknowledging that their spread effort followed “a classic diffusion curve.” Other descriptions were comparable, with proportions of hard-to-engage described as “only a handful” and “up to about 80 to 90 percent adoption went very smoothly,” with the final 10 to 20 percent as hard-to-engage.

While descriptions of hard-to-engage sites often portrayed challenges, a number of beneficial characteristics also warrant mention due to their repeated appearance. The image of the hard-to-engage site is nuanced, and **Figure 7** highlights quotes from the interviews that supported the themes that emerged from both literature and interview sources. While these sites may not become early adopters, a better understanding of the variety of hard-to-engage sites may help with tailoring strategies and approaches, rather than treating all hard-to-engage sites the same. What follows is more discussion of these themes.

Figure 7. Hard-to-engage Site Characteristics



Common Challenges for Spreading to Hard-to-engage Sites

Certain challenges, summarized in the figure above, that sites themselves and/or spread initiators may face when working with hard-to-engage sites are described in greater detail below.

Limited bandwidth or resources to devote to engaging with a particular spread effort was mentioned in nearly every source for this section. Turnover, lack of funding or implementation as an added duty without additional compensation,⁵⁹ and burnout were common in hard-to-engage sites. In one typical description, an effort within VA found that “sites often encountered resource shortages... lack of administrative support, time constraints, [and] departure of key team members.”⁶⁰ No system or model of spread seemed to be immune, as “lack of resources” was frequently mentioned as a factor impeding spread in a non-VA spread effort that was national in scope as well.⁴⁹ Because of a lack of resources or reliance on volunteer effort, potential site personnel would often feel like they “can’t take one more thing” on top of their existing responsibilities, which would often lead to burnout as well.

Local innovations or homegrown solutions to the same problem can present competition that impedes spread, since “there was no expressed need for the program.”⁶¹ Because their needs are already met locally, “sites with pre-existing [programs] tended to move more slowly to adopt.”⁴⁹

This group can look more like innovators than late adopters in the Diffusions of Innovations model,³⁶ as one interviewee noted:

“It doesn’t mean they were low quality sites, though, but that they’re just last sites to adopt. In some ways they were often high-quality, forward-thinking sites that had already tried to solve the solution... they were laggards in terms of adopting [our practice].”

Competing priorities were another challenge for spread efforts, with potential spread sites often very busy addressing local priorities that may not overlap with the aims of a particular spread initiative. “Low implementation facilities were struggling to respond to other higher priority initiatives,”⁶¹ and “sites often encountered resource shortages because of competing organizational initiatives and a lack of prioritization... at the level of the executive suite.”⁶⁰ While some sites may be low performing sites “in extremis” that are “falling apart... they’re concerned with getting through the day,” the opposite can be true as well: “some of the [hard-to-engage sites] that are otherwise big academic places... they’re focused on something for themselves.”

Potential Benefits of Working with Hard-to-engage Sites

“Many sites are difficult. I don’t think that makes them bad sites”



In juxtaposition with the challenges, spread initiators raised several ways that they viewed hard-to-engage sites as benefitting their projects, or that the eventual implementation, while slower to start, reaped unique benefits for the sites themselves.

Healthy skepticism was described by interviewees in situations where sites or people initially displayed skepticism, but that this led to collaboration and, in some cases, improvement of the practice or initiative being spread. Rather than being skeptical and slowing spread with malintent, spread initiators distinguished slow-for-slow sake from this group with healthy skepticism, saying they are seeking to understand and appraise the added value of any proposed change: “they are activated and I think in it to win it for their patients.” This initial skepticism is actually a form of engagement, but may be categorized by spread initiators as hard-to-engage if initiators do not continue the conversation. Rather than framing skepticism as opposition, “it can be a way to engage a site by letting them in on what you find and getting their perspectives on what might help”.

Taking the long view was another way to view the potential benefits of working with hard-to-engage sites, as some spread initiators noted that early adoption could lead to superficial engagement and, consequently, abandonment. Conversely, hard-to-engage sites can be signaling

that once they are engaged, their hard-won adoption could lead to more sustainable successes in the long-term. One description captured this sentiment well: ⁵⁹

“the region that decided to postpone implementation benefitted from the experience of the other regions in working out issues... [they] joined the monthly conference calls and asked many clarifying questions regarding the issues being discussed... [this region] waited and then built a strong base of support for the program... chose to take time to build organizational readiness... when they implemented the program...they were successful”.

Additionally, a late start can proffer other benefits to adopters: “the advantage of later joiners... was that they could draw on and gain support from the experience of early enrollees.”⁶²

Alignment with needs between what a spread effort offers and local priorities can be a boon for low performing sites. This underscores the distinction between hard-to-engage sites like late adopters and low performers. These 2 groups may or may not always overlap, and the interviews with spread leads provided a balanced perspective regarding how low performing sites can be easier to work with in regards to aligned priorities:

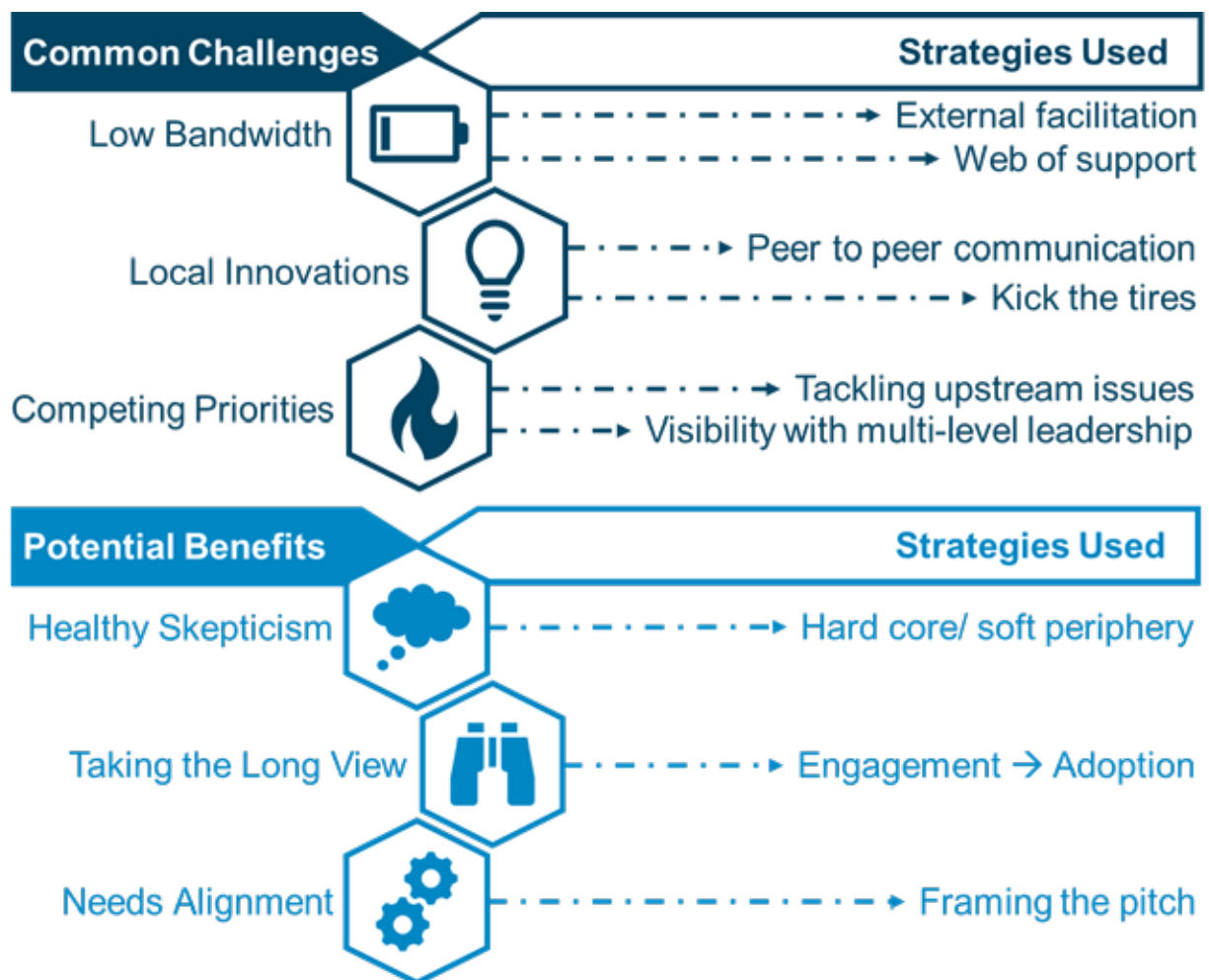
“there are some [low performers] who want to hide their low-performance status and there are others who want to really get better and take advantage of a learning community and work on it and improve.”

There are some late adopter, low performer sites similar to popular conceptions: “they close themselves off from the outside world because they know they’re not doing well and they can’t take on” a new project. But because a spread effort has so much to offer in addressing a priority need and perceived benefits, this is a group where the strategy or approach to engagement can make a difference in framing the issues as compatibility with existing priorities and support, rather than a punitive situation.

Useful Strategies for Hard-to-engage Sites

Here we define useful strategies for hard-to-engage sites mapped to hard-to-engage characteristics as shown in **Figure 8**. The interviews with QUERI project leads and their corresponding publications provided valuable insights for this topic, as most publications did not provide any specific strategies for hard-to-engage sites, and those that did spent no more than a few sentences at most discussing the topic. Thus, the following section is a synthesis of the 7 publications discussing spread strategies for hard-to-engage sites and the QUERI interviews.

Since hard-to-engage sites are highly variable in their needs, QUERI interviewees recommended “a flexible, tailored approach to one [site] at a time,” with another saying, “There’s not just one strategy, but I do think it is a bundle of strategies and some probably work better than others depending on the situation.” The following list (**Figure 8**) is not exhaustive of all strategies mentioned, but rather highlights the most salient themes from the literature and interviews in how to tailor approaches based on the characteristics described in the last section. To draw linkages between characteristics and strategies, we relied on the descriptions in interviews and literature of both the hard-to-engage sites and the strategies used for those sites.

Figure 8. Strategies Addressing Hard-to-engage Site Needs

Strategies Used to Address Common Challenges

Spread initiators described a variety of approaches tailored to hard-to-engage sites that faced common challenges. While these linkages between site challenges and strategies do not imply that these are the only strategies that would be helpful in working with hard-to-engage sites, these serve as examples of successful strategies used by spread initiators.

External facilitation is a “multi-faceted process of enabling and supporting individuals, groups and organizations in their efforts to adopt and incorporate clinical innovations into routine practices,”³⁸ which includes “interactive problem solving and support.”³⁹ The strategy of providing additional supports to those sites with low bandwidth, or who may need extra support for other reasons, was described repeatedly, as in a publication where “iterative quality improvement processes were supported by... the national team”,⁴⁹ where the national team refers to a team of researchers and support staff dedicated to the scale-up of the program. External facilitation often included phone calls where spread initiators helped with “troubleshooting to make sure that things were moving forward.”

QUERI interviewees describe “the sites have said just having regular calls was critical to them just kind of keeping one foot in front of the other,” with sites showing gratitude for the external facilitation: “Thank you for giving me the space. Even though it was squeezed in the margins, you were willing to spend a half-hour call at the end of my day.”

Creating a “**web of support**,” or working with multiple local people, reduces the burden on any individual and strengthens overall linkages to that site for a spread initiative: “you kind of have to create a web of support around trying to work these things through. So it's never good to have a single person be your point person in many of these places.” By fostering connections with multiple site contacts, “other team members were able to step in and ... they got to know us and [they] were comfortable talking with us as much as the team leaders.” Because that QUERI interviewee, who was the project lead, and their team “did go on site for the big kickoff,” they were able to meet additional site contacts and start relationship-building. This included frontline staff who were to be involved in the work, as well as middle management and even site leadership. The web of support created a redundancy so that if, for instance, a nurse champion was moved out of the initiative, other potential nurse champions were already known to the QUERI team.

Peer to peer communication is important for spread generally, but especially key for sites where local champions are very engaged with the topic and likely have expertise in the area. While this could apply to innovator sites, it also applies to hard-to-engage sites that have homegrown solutions, or who are skeptical about the innovation. This peer to peer communication can be used in a few different scenarios that were highlighted in the literature and interviews. Initially during the buy-in or introductory period, innovations “benefited from champions in each respective practice and specialty to ensure that buy-in was achieved in all facets of the organization.”⁶³ Peers with influence may have personal relationships or credibility off which a spread effort can capitalize, as one QUERI interviewee noted:

“it may have given her many contacts throughout the field at local facilities as she worked for several years prior to joining us... thus giving us both our entrée into sites which facilitated and giving us, shall we say, a better contextual knowledge to customize our interventions to the needs of the sites... her credibility in the field was an exceptional part here”.

The peer to peer communication can also be a powerful tool during implementation, with sites working together to learn from one another: “The best part of it is really when teams talk to each other.”

“they kind of stole from each other, which was great”



A variation on this theme included “a system where they had the high-performing sites working with the low-performing sites... to communicate directly with each other. And I think that was really helpful to people.” However, another QUERI interviewee warned that power dynamics needed to be carefully considered: “let me emphasize the words ‘peer-to-peer,’ they have to be on the same exact level and view those people as peers.”

Trialability,³⁶ or letting them “**kick the tires**,” gives local innovators a chance to test against local innovations and can improve the innovation in the process. Spread initiators recommended highlighting the exploratory nature of trying out the innovation: “and if you don't like it, you can walk away.” One spread initiator had a consistent pitch he used throughout his effort when approaching new sites:

“It's not perfect, but let's walk you through it. Here's how to use it. Hopefully it's pretty straightforward. Give me any feedback you have... so what we're asking you to do is take it, use it, either on test cases, just practice with it, or start to deploy it in real reporting. But kick the tires”.

In this case the spread initiator was also a peer to the contacts at the spread sites, which amplified his message by combining the trialability with peer to peer communication. His introduction went on to describe how the innovation was “being used by and for clinicians who developed it.”

Another key to having this strategy be effective is to incorporate feedback received from the spread sites, thereby closing the loop between sites and spread initiators:

“over many years [the team had] a mechanism of feedback from the field, from the users... we had a workgroup of peers for the community... and we rotated them, by the way, every couple years so that lots of people could get experience across the system in this... these small iterative version of the changes that would then get implemented nationally”.

Tackling upstream issues can give a local team an early win related to local priorities, while simultaneously solving issues slowing adoption. Sometimes it is building competencies: “some units didn't know how to download ... a mailing list with labels ... so we had to help them work through how to be able to do those types of activities.” Other times it may be building local relationships: “some places had some issues ... getting their [IT] to work with them.” For other sites that may “not have as much of a quality improvement or system redesign infrastructure” that was needed for an innovation’s implementation, spread initiators described working on these competencies first. As one QUERI interviewee described, this is particularly important for sites with competing priorities:

“we're trying to help them navigate through all their other stuff. And they are making an effort... So among all their other activities and other requirements, we're trying to help them participate and do the work.”

“we'll go fight the battles for you”



Increasing visibility with multiple levels of leadership, such as engaging the regional leadership, national program offices or policy makers, and local leadership, can help protect the initiative and demonstrate success for those sites involved. As one publication described: “having the involvement of multiple levels of leadership creates a snowball effect throughout an organization and is a significant contributor to Measure Up/Pressure Down’s success”⁶³ QUERI interviewees helped build this visibility by giving materials to “our clinical champions to share with their leadership to show that look at the good work we’re doing” and by ensuring that those materials are aligned with the leaders’ interests, the sites have “gotten great direct feedback from the administration.” By also including from the national leadership “a letter congratulating the local team for taking this work on and kudos to them for putting the effort in,” this spread initiator found many ways to connect multiple levels of leadership. Other QUERI interviewees described having national leadership representation as “part of a very engaged executive steering committee, and so we would be feeding results back to them on quite a regular basis.” One QUERI interviewee summed this strategy up as:

“We also give them a voice with leadership above...so I think what we're kind of referring to as the multilevel stakeholder engagement piece becomes really important, and then having a communications plan from the local folks on up to the [regional] level and up to the medical center level, and in some cases all the way up to [national] levels, becomes really important.”

Strategies Used to Maximize Potential Benefits

In working with hard-to-engage sites that demonstrated the potential benefits these sites offer during implementation, spread initiators described using a few strategies that maximized engagement and, in turn, potential benefits.

Many spread initiators described using the “**hard core and a soft periphery**”⁶⁴ model of intervention where the core model is adaptable to local context. This is helpful to get local compatibility and fit with needs that may be different from innovator sites where the intervention was originally tested. In this way a “core provides a standardized method... the soft periphery...adapted by organizations in different ways to maximize fit in the local context and to build acceptability among staff”.⁶²

“It’s not one size fits all. They have room to adapt.”



Nearly every QUERI interviewee described using this type of approach, although using different terminology or theoretical support: “we called it a multipronged intervention, but everyone didn’t do the same thing” and another where there was “a small bit of customization, but all the core” pieces were standardized. The final example described a theoretical approach to intervention development with this strategy as a central tenant:

“this whole sort of Evidence-Based Quality Improvement approach is to be responsive to the time and the situation... it was really designed to get a lot of input both at the [regional] level and at the site level in how to adapt or tailor. And it sort of started with an agreement that the ultimate models at the sites would reflect the key elements of the literature in areas that the literature addressed, but that outside of those kind of pillars, the project model would be shaped by the sites themselves.”

Maintaining engagement with sites that are involved in spread activities but not yet adopters, even for prolonged periods of time, gives opportunities for slower adopters to build commitment and find avenues to adoption within their local contexts. In some cases, addressing the concerns of those with negative views by incorporating discussions of their concerns “built up a community of people who could further advocate for the use of the vaccine”⁶⁵ among former skeptics. Other times it may be as simple as allowing non-adopters to continue to participate: when “the region that did not initially start the [program] with other regions... [had a] regional representative joined the study’s monthly conference calls,”⁵⁹ this region later became an adopter.

Framing the message when talking to potential adopter sites is a key consideration, and with hard-to-engage sites, QUERI interviewees described a few approaches that they found to be helpful. In-person initial visits, when possible, had the added benefit of building the “web of support” as described above. QUERI interviewees consistently described focusing on being seen as helpful, rather than punitive or authoritarian – as one interviewee lamented: “I get the sense often that people feel blamed for their problems rather than being made to feel part of the solution.” Another agreed, saying authoritarian styles of engagement “always come across as punishment.” This was counter to what interviewees believed worked well, which included using local baseline data and tying to local priorities in a customized way, as well as using shared learning approaches or an “education focus ... [which] resulted in relationships” being built. These all align with the peer to peer communication strategy above as well, by building collaborative relationships:

“somebody there locally recognizes, hey, wait a minute, this might be something that could actually help us. So it’s a little bit of social marketing. And whether you

can do that, again, with numbers, definitely trying to communicate to the administration what your intentions are because they get very—nobody wants to be pointed out again that they're not doing well. So then you actually might be able there to help”.

SUMMARY AND DISCUSSION

SUMMARY

What Does Large Magnitude Scale-up and Spread Look Like?

Breaking down the national spread process

After working with innovators to test and pilot the initiative and then working with early adopters to test scale-up and spread strategies, activities described in our data split the final phase of full-scale spread into 2 parts with distinct strategies. The first part of the full-scale spread, which we are calling the “mass broadcast” phase, uses strategies intended to reach a maximal audience. The second part of the full-scale spread phase, which we are calling the “re-personalize” phase, returns to using strategies more often employed in the first 2 phases of the spread process.

Macro models

We identified 3 distinct macro models to describe the organization or infrastructure of spread efforts in the 52 included publications. These included spread efforts that embedded scale-up or spread within a system of care (n=29), collaboratives or exchanges to support the spread of multiple initiatives within a specific topic area (n=14), and initiative-specific spread efforts (n=9).

Preconditions to consider in large-magnitude scale-up

Several factors repeatedly arose throughout the QUERI interviews, SAIL interviews, and literature as crucial information to gather prior to engaging in large magnitude scale-up. It is crucial that scale-up initiators gather information on who will need to be involved at each site and identify context-specific that will be align with the goals of the spread.

VA preconditions and existing networks for spread

In addition to building networks de novo for a specific collaborative or exchange, spread efforts can also leverage existing networks in a similar model to collaboratives or exchanges. To better understand the existing conditions in VA that could facilitate spread efforts, we used data from the SAIL improver interviews. This information-seeking almost always occurred after working on homegrown solutions and analyzing local priorities and challenges. Once specific initiatives or issues had been identified, SAIL improvers sought information related to that particular area of interest. Existing sources of spread in the VA include peer to peer connections, existing VA hubs of information, central office expertise, and some non-VA entities.

Considerations and Strategies for Working with Hard-to-engage Sites

We drew from the QUERI spread project papers and interviews, as well as from the 18 publications we identified as either providing descriptions of hard-to-engage sites (n=11) or additionally providing descriptions of strategies used with these hard-to-engage sites after identifying/describing them (n=7). The proportion of hard-to-engage sites was small, and the phrase “N-of-1” was used repeatedly throughout the QUERI interviews to describe experiences working with hard-to-engage sites. While descriptions of hard-to-engage sites often portrayed

challenges, a number of beneficial characteristics also warrant mention due to their repeated appearance. Hard-to-engage sites may have low bandwidth or limited resources, local innovations or homegrown solutions that present competition for an innovation, or competing priorities that do not overlap with the priorities of a spread initiative. While these were among the common challenges hard-to-engage-sites might face, a number of potential benefits were also highlighted: a healthy skepticism can lead to collaboration and potential innovation improvement, hard-won engagement that is slow to come may be more durable in the long-term, and low performing sites can sometimes be easier to engage since their priorities are in alignment with a spread initiative's goals.

Since hard-to-engage sites are highly variable in their needs, QUERI interviewees recommended “a flexible, tailored approach to one [site] at a time.” Useful strategies for hard-to-engage sites, as highlighted in the most salient themes from the literature and interviews, include facilitation, creating a web of support, establishing peer to peer communication, allowing sites to kick the tires of an innovation, tackling upstream issues, increasing visibility with multiple levels of leadership, utilizing a hard core with soft periphery model of innovation, maintaining engagement with non-adopter sites, and framing the message to initiate positive and helpful working relationships.

LIMITATIONS

The primary challenge for topics without a specific disease or therapy is identifying relevant literature. Because terminology related to scale and spread is evolving, there are no reliable, standardized terms for systematically searching databases for literature related to this topic, so relevant literature might have been missed. In addition, our use of key informant interviews was limited to informants discussing experiences within the VA system. For the scope of this report we limited to VA-relevant experiences because the findings are intended to be applied in VA settings. However, lessons from stakeholders outside the VA may have provided more diverse lessons which could be applicable, especially from other large healthcare systems such as the National Health Service in the UK.

There are several challenges common in literature synthesis studies that also affect this review. Studies often do not describe the types of details needed for a particular review. Such is the case here for studies that have conducted large magnitude scale initiatives, especially related to hard-to-engage sites. While data limitations prevent us from performing a statistical test of publication bias, such bias is almost certainly present, as less-than-successful spread efforts are unlikely to be written up for publication. Even successful spread may not be written into reports or materials that would be identified by literature synthesis techniques, and these would also be missed in our process. We would expect that there have been more than the 52 spread efforts we identified in our review, and we do not have information about the contexts or success of these unpublished spread efforts. For instance, multiple VA QUERI projects we identified through our search of the QUERI database did not have any publications associated with their entries.

A key assumption in this report and in much of the scale-up and spread work included was that a given initiative was broadly desirable or necessary, but there are initiatives and programs that don't work well for every site. It is worth noting that the best decision for a given site might be to say no to a change initiative, particularly in situations where there is low bandwidth, a large

set of competing demands, or a homegrown solution that works. Virtually any change initiative is stressful and disruptive, and there are certainly circumstances where the work would not be beneficial in the broader context of a site.

While scale-up and spread are often used interchangeably, they are distinct, as Ilott and colleagues differentiate in describing “scale-up” as typically relying on a planned top-down strategy to diffuse innovation, while “spread” is related to horizontal diffusion of innovations.⁶⁶ The distinctions are nuanced but important when attempting to identify strategies and moderators of increasing use of an innovation. In the context of this report, we use these definitions when possible. However, because the original sources often did not distinguish between these terms, or necessarily provide details that would allow us to distinguish which of these terms best fit, our resulting language also lacks definitional clarity between scale-up and spread.

RESEARCH GAPS AND RECOMMENDATIONS FOR FUTURE RESEARCH

Expanding upon the study of scale-up and spread in implementation science, future work moving from the early stages of scale-up and spread into a more detailed description of the full spread phase could focus on testing different strategies for large magnitude spread and for reaching hard-to-engage sites in particular. This effort could also include better documentation of tailoring or adaptations that occur towards later stages of spread efforts, including specific approaches and strategies used to engage hard-to-engage sites.

The relationship between the 3 macro models described in this report, or the organization of spread efforts more generally, and particular strategies and target audiences was difficult to describe with the literature we identified. For instance, no collaboratives described strategies for hard-to-engage-sites, so it is unknown how hard-to-engage sites might fit into this model. While theoretically any macro model could use strategies to work with hard-to-engage groups, embedded system spread efforts may have more incentive to do so, since they were most often describing their work with hard-to-engage sites.

In addition, defining the overlap between low performing and late adopting or hard-to-engage adopters would aid in better tailoring strategies for both groups. While there may be substantial overlap, some distinctions were also made, particularly in the QUERI interviews. For instance, high performing sites may be hard to engage if they do not have a need for the intervention, and low performing sites, in contrast, may have needs that align with an intervention and thus may be eager to engage. This work could be done both empirically, but also conceptually.

RECOMMENDATIONS FOR FUTURE SCALE-UP/SPREAD EFFORTS

Here we highlight some recommendations for future work in implementing scale-up or spread efforts.

- Before engaging sites, take time to understand the salient local factors (see **Figure 5**) and determine if there are existing networks that could be leveraged (see **Figure 6**).
- In organizing a spread or scale-up effort, consider the various models infrastructure could take and how these may impact the effort.
- Using the knowledge of local sites that has been gathered, identify potential challenges or characteristics of these sites that might make them hard-to-engage and tailor strategies appropriately.

CONCLUSIONS

Low performers and hard-to-engage audiences are most in need of engagement when spreading innovations intended to standardize practice or improve quality of care, but they were understudied in the identified literature on large magnitude spread efforts, which can be embedded spread within a system of care, collaboratives or exchanges, or initiative-specific spread efforts. Variations in care delivery will require a better understanding of how to work with low performer and hard-to-engage groups. Hard-to-engage sites can be highly variable in terms of the challenges or barriers they face, which can include low bandwidth, different priorities from a spread effort's intended goals, and homegrown solutions that compete with innovations being spread. For the myriad of individual factors these sites face, bundles of engagement strategies that are more personalized and intensive can help spread initiators reach these groups. More testing of strategies to use with these groups, as well as documentation of adaptations or tailoring large magnitude spread efforts make in engaging different groups of adopters, is needed.

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99. Parv L, Kruus P, Motte K, Ross P. An evaluation of e-prescribing at a national level. *Informatics for health & social care*. 2016;41(1):78-95.

100. Pearce C, Bartlett J, McLeod A, Eustace P, Amos R, Shearer M. Effectiveness of local support for the adoption of a national programme--a descriptive study. *Informatics in primary care*. 2014;21(4):171-178.

APPENDIX A. SEARCH STRATEGY

TOPIC 1 – SCALING/SPREAD OF HEALTH INTERVENTIONS
TOPIC 2 – IMPROVING LOW-PERFORMING ORGANIZATIONS
TOPIC 3 – LEARNING HEALTHCARE SYSTEMS

SEARCH TOPIC 1 – SCALING/SPREAD:

DATABASE SEARCHED & TIME PERIOD COVERED:

PubMed – From inception to 1/4/2018

LANGUAGE:

English

SEARCH STRATEGY:

scale-out[tiab] OR scaling-out[tiab] OR scaling[ti] OR scaling-up[tiab] OR scale-up[ti] OR spread*[ti] OR spread*[ot] OR scale-out[ot] OR scaling-out[ot] OR scaling[ot] OR scaling-up[ot] OR scale-up[ot] OR large-scale OR "large scale" OR national[ti] OR system-wide OR "system wide" OR multi-institutional system* OR "Multi-Institutional Systems"[Mesh]
 AND
 "organizational culture"[ti] OR "organisational culture"[ti] OR organizational chang*[ti] OR organisational chang*[ti] OR organizational innovat* OR "diffusion of innovation"
 AND
 interven*[tiab] OR interven*[ot] OR initiative*[tiab] OR initiative*[ot] OR implement* OR practice[tiab]

DATABASE SEARCHED & TIME PERIOD COVERED:

PubMed – From inception to 1/4/2018

LANGUAGE:

English

SEARCH STRATEGY:

SIMILAR ARTICLE SEARCHES –

Aarons, Gregory A.

"Scaling-out" evidence-based interventions to new populations or new health care delivery systems.

Implement Sci. 2017 Sep 6;12(1):111.

Yano, Elizabeth M

Implementation and spread of interventions into the multilevel context of routine practice and policy: implications for the cancer care continuum.

J Natl Cancer Inst Monogr. 2012 May;2012(44):86-99

DATABASE SEARCHED & TIME PERIOD COVERED:

WorldCat – From inception to 1/3/2018

LANGUAGE:

English

SEARCH STRATEGY:

ti: scale-out OR ti: scaling-out OR ti: scaling OR ti: scaling-up OR ti: scale-up OR ti: spread* OR ti: large-scale OR ti: large w scale OR ti: system-wide OR ti: system w wide OR ti: multi-institutional w system OR ti: multi-institutional w systems)) or (su: scale-out OR su: scaling-out OR su: scaling OR su: scaling-up OR su: scale-up OR su: spread* OR su: large-scale OR su: large w scale OR su: system-wide OR su: system w wide OR su: multi-institutional w system OR su: multi-institutional w systems)) not mt: juv) not mt: fic and (dt= "bks" or dt= "ser" or dt= "url")

AND

ti: medical OR ti: health* OR ti: hospital OR ti: hospitals

AND

ti: chang* OR ti: innovat* OR ti: implement* OR ti: initiative* OR ti: interven* OR ti: cultur* or su: chang* OR su: innovat* OR su: implement* OR su: initiative* OR su: interven* OR su: cultur*

AND

ti: quality OR ti: improv* or su: quality OR su: improv*

DATABASE SEARCHED & TIME PERIOD COVERED:

Web of Science – From inception to 1/3/2018

LANGUAGE:

English

SEARCH STRATEGY:

ti=(scale-out OR scaling-out OR scaling OR scaling-up OR scale-up OR spread* OR large-scale OR large near scale OR system-wide OR system near wide OR multi-institutional near system OR multi-institutional near systems)

AND

ts=(medical OR health* OR hospital OR hospitals)

AND

ts=(chang* OR innovat* OR implement* OR initiative* OR interven* OR culture*)

AND

ti=(quality OR improv*)

Refined by: [excluding] WEB OF SCIENCE CATEGORIES: (FOOD SCIENCE TECHNOLOGY OR GREEN SUSTAINABLE SCIENCE TECHNOLOGY OR URBAN STUDIES OR ENVIRONMENTAL SCIENCES OR VETERINARY SCIENCES OR BIOCHEMICAL RESEARCH METHODS OR BIOCHEMISTRY MOLECULAR BIOLOGY OR BIOLOGY OR EDUCATION SCIENTIFIC DISCIPLINES OR BIOPHYSICS OR ENERGY FUELS OR BUSINESS OR ENVIRONMENTAL STUDIES OR BUSINESS FINANCE OR METEOROLOGY ATMOSPHERIC SCIENCES OR CELL BIOLOGY OR MULTIDISCIPLINARY SCIENCES OR CHEMISTRY MULTIDISCIPLINARY OR COMPUTER SCIENCE ARTIFICIAL INTELLIGENCE OR AGRICULTURE DAIRY ANIMAL SCIENCE OR COMPUTER SCIENCE HARDWARE ARCHITECTURE OR AGRICULTURE MULTIDISCIPLINARY OR COMPUTER SCIENCE INFORMATION SYSTEMS OR AUDIOLOGY SPEECH LANGUAGE PATHOLOGY OR COMPUTER SCIENCE SOFTWARE ENGINEERING OR SPORT SCIENCES OR BIOTECHNOLOGY APPLIED MICROBIOLOGY OR CONSTRUCTION BUILDING TECHNOLOGY OR CHEMISTRY PHYSICAL OR CRYSTALLOGRAPHY OR COMPUTER SCIENCE INTERDISCIPLINARY APPLICATIONS OR EDUCATION SPECIAL OR COMPUTER SCIENCE THEORY METHODS OR ELECTROCHEMISTRY OR DEMOGRAPHY OR ENGINEERING CIVIL OR WATER RESOURCES OR ENGINEERING ELECTRICAL ELECTRONIC OR EDUCATION EDUCATIONAL RESEARCH OR ENGINEERING MANUFACTURING OR ECOLOGY OR ENGINEERING MECHANICAL OR GEOGRAPHY OR

ETHICS OR EVOLUTIONARY BIOLOGY OR MARINE FRESHWATER BIOLOGY OR FORESTRY OR MATHEMATICS INTERDISCIPLINARY APPLICATIONS OR GENETICS HEREDITY)

OR

ts=(implementation science) AND ts=(system* near chang*)

Refined by: WEB OF SCIENCE CATEGORIES: (NEUROSCIENCES OR HEALTH CARE SCIENCES SERVICES OR IMMUNOLOGY OR HEALTH POLICY SERVICES OR MEDICINE GENERAL INTERNAL OR PSYCHOLOGY CLINICAL OR PSYCHOLOGY DEVELOPMENTAL OR PSYCHOLOGY EDUCATIONAL OR PSYCHOLOGY MULTIDISCIPLINARY OR ONCOLOGY OR PHARMACOLOGY PHARMACY OR SOCIAL SCIENCES BIOMEDICAL OR CLINICAL NEUROLOGY OR MEDICAL INFORMATICS OR SOCIAL SCIENCES INTERDISCIPLINARY OR HEMATOLOGY OR INFECTIOUS DISEASES OR SOCIAL ISSUES OR MEDICINE RESEARCH EXPERIMENTAL)

DATABASE SEARCHED & TIME PERIOD COVERED:

Web of Science – From inception to 1/4/2018

LANGUAGE:

English

SEARCH STRATEGY:

“Forward” search on the following article:

Yano, Elizabeth M

Implementation and spread of interventions into the multilevel context of routine practice and policy: implications for the cancer care continuum.

J Natl Cancer Inst Monogr. 2012 May;2012(44):86-99

=====
SEARCH TOPIC 2 – LOW-PERFORMING ORGANIZATIONS

DATABASE SEARCHED & TIME PERIOD COVERED:

PubMed – From inception to 11/21/2017

LANGUAGE:

English

SEARCH STRATEGY #1 (ORIGINAL VERSION)

organization* AND perform*[ti]

AND

low OR lower OR lowest OR low-perform* OR poor* OR substandard

AND

interven* OR improv*

DATABASE SEARCHED & TIME PERIOD COVERED:

PubMed – From inception to 1/3/2018

LANGUAGE:

English

SEARCH STRATEGY #2 (REVISED VERSION)

low perform* OR low-perform* OR lower perform* OR lower-perform* OR lowest perform* OR lowest-perform* OR perform* poor*

AND

"organizational culture"[ti] OR "organizational culture"[mh] OR "organisational culture"[ti] OR organizational chang*[ti] OR organisational chang*[ti] OR organizational innovat* OR "diffusion of innovation"

DATABASE SEARCHED & TIME PERIOD COVERED:

Business Source Complete – From inception to 11/21/2017

LANGUAGE:

English

SEARCH STRATEGY:

SU organizational performance

AND

TI (low OR lower OR lowest OR low-perform* OR poor* OR substandard)

AND

interven* OR improv*

Search modes - Find all search terms

SEARCH TOPIC 3 – LEARNING HEALTHCARE SYSTEMS**DATABASE SEARCHED & TIME PERIOD COVERED:**

PubMed- From inception to 1/10/2018

LANGUAGE:

English

SEARCH STRATEGY:

learning health system* OR learning healthcare system* OR "learn from every patient"

OR

("learn from every patient" OR lfep) AND ("nationwide children's hospital" OR "nationwide childrens hospital")

OR

“SIMILAR ARTICLE” SEARCHES ON THE FOLLOWING ARTICLES:

Grumbach, Kevin, “Transforming from centers of learning to learning health systems: the challenge for academic health centers,” JAMA. 2014 Mar 19;311(11):1109-10.

Lowes, Linda P., “Learn From Every Patient’: implementation and early results of a learning health System,” Dev Med Child Neurol. 2017 Feb;59(2):183-191.

Smoyer, William E., “Creating Local Learning Health Systems: Think Globally, Act Locally,” JAMA. 2016 Dec 20;316(23):2481-2482.

OR

JOURNAL - "Hospitals and Health Networks" for all issues in 2017

DATABASE SEARCHED & TIME PERIOD COVERED:

WorldCat: - From inception to 1/10/2018

LANGUAGE:

English

SEARCH STRATEGY:

kw: learning w health w system* OR kw: learning w healthcare w system* OR kw: learn w1 every w1 patient

AND

DOCUMENT TYPE= BOOKS OR SERIALS OR ARTICLES OR URL

NOT

SUBJECT= education OR MEDIA TYPE=juvenile OR MEDIA TYPE=fiction

DATABASE SEARCHED & TIME PERIOD COVERED:

Web of Science - From inception to 1/10/2018

LANGUAGE:

English

SEARCH STRATEGY #1:

ts=("learning health system" OR "learning health systems" OR "learning healthcare system" OR "learning healthcare systems" OR "learn from every patient")

SEARCH STRATEGY #2:

Forward searches on Grumbach, Lowes, & Smoyer articles

DATABASE SEARCHED & TIME PERIOD COVERED:

Scopus - From inception to 1/10/2018

LANGUAGE:

English

SEARCH STRATEGY #1:

TITLE-ABS-KEY ("learning health system" OR "learning health systems" OR "learning healthcare system" OR "learning healthcare systems" OR "learn from every patient")

SEARCH STRATEGY #2:

Forward searches on Grumbach, Lowes, & Smoyer articles

DATABASE SEARCHED & TIME PERIOD COVERED:

IEEE XPLORE - From inception to 1/10/2018

LANGUAGE:

English

SEARCH STRATEGY:

"learning health system" OR "learning health systems" OR "learning healthcare system" OR "learning healthcare systems" OR "learn from every patient"

DATABASE SEARCHED & TIME PERIOD COVERED:

Embase - From inception to 1/10/2018

LANGUAGE:

English

SEARCH STRATEGY:

'learning health system' OR 'learning health systems' OR 'learning healthcare system' OR 'learning healthcare systems' OR 'learn from every patient'

AND

Humans

DATABASE SEARCHED & TIME PERIOD COVERED:

ACM Digital Library - From inception to 1/10/2018

SEARCH STRATEGY:

"learning health system" OR "learning health systems" OR "learning healthcare system" OR "learning healthcare systems" OR "learn from every patient"

DATABASE SEARCHED & TIME PERIOD COVERED:

CINAHL - From inception to 1/10/2018

LANGUAGE:

English

SEARCH STRATEGY:

TI ("learning health system" OR "learning health systems" OR "learning healthcare system" OR "learning healthcare systems" OR "learn from every patient") OR AB ("learning health system" OR "learning health systems" OR "learning healthcare system" OR "learning healthcare systems" OR "learn from every patient") OR MW ("learning health system" OR "learning health systems" OR "learning healthcare system" OR "learning healthcare systems" OR "learn from every patient")

DATABASE SEARCHED & TIME PERIOD COVERED:

PsycINFO - From inception to 1/10/2018

LANGUAGE:

English

SEARCH STRATEGY:

TI ("learning health system" OR "learning health systems" OR "learning healthcare system" OR "learning healthcare systems" OR "learn from every patient") OR AB ("learning health system" OR "learning health systems" OR "learning healthcare system" OR "learning healthcare systems" OR "learn from every patient") OR ("learning health system" OR "learning health systems" OR "learning healthcare system" OR "learning healthcare systems" OR "learn from every patient")

NOTE: RESULTS OF ORIGINAL PUBMED AND BUSINESS SOURCE COMPLETE SEARCH VERSIONS WERE REVIEWED AND ONLY SELECTED RELEVANT ITEMS WERE INCLUDED IN FINAL SET

APPENDIX B. INTERVIEW GUIDE QUESTIONS

INTERVIEW GUIDE QUESTIONS – QUERI Interviewees

[QUESTIONS FOLLOW INTERVIEW GUIDE INTRODUCTORY SECTION]

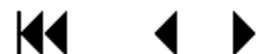
We understand you were the Principal Investigator for the QUERI project [PROJECT NAME]. We are particularly interested in this project because it was an example of spreading an existing project.

1. Please tell us about your experience with this project.
2. Can you describe the strategy for the spread of [INITIATIVE/PRACTICE]?
 - a. Who was involved in making the decision to spread beyond the earlier sites?
 - b. Who was involved in the spread effort itself?
3. What factors [national/regional/local/site specific] facilitated the spread of the project?
4. What factors [national/regional/local/site specific] impeded the spread of the project?
5. Were certain sites more difficult to engage?
 - a. If so, what factors contributed to this?
 - b. *Potential factors to probe: leadership, resources, lines of reporting/authority to make changes, structural factors*
 - i. Was low performance a factor?
 - ii. Were there specific challenges?
 - c. Were there specific strategies used for engaging or working with this group of sites?
6. During spread efforts, was fidelity of implementation monitored?
 - a. If so, how?
 - b. During spread, was fidelity to original model strong?
 - c. Were modifications made to the model or strategy?
 - i. If so, why?
 - ii. What changes to the strategy were most successful?
 - iii. Which were less successful?
7. From the time the idea for [INITIATIVE/PRACTICE] was first conceived, could you briefly describe the key time points in the process?

Eg, initial idea, first piloting/demo, early spread, full/national roll-out

Is there anything else you would like to share with us, particularly about working with hard-to-engage sites? Please feel free to draw on other experience you may have had.

Thank you for your time!



INTERVIEW GUIDE QUESTIONS – SAIL Improvers

[QUESTIONS FOLLOW INTERVIEW GUIDE INTRODUCTORY SECTION]

The [SITE] facility had improved its overall SAIL score around [YEAR]. We are particularly interested in your site because it was able to make these improvements and maintain them. We understand that you were there during these changes, and would like to hear, from your perspective, more about how this improvement happened.

1. Can you describe your role?
2. From your perspective, what is the story of the improvement during [BEGINNING YEAR] until now? How did the improvement happen?
3. What were one or 2 underlying approaches that were necessary to make the change happen?
4. What factors at your site contributed to the improvement?
Leadership changes, leadership support/engagement, structure, lines of reporting, analytics/data, etc.
5. Did you specifically focus on any particular metrics? Did this change over time?
6. Did you have specific interventions or tools your site used during this improvement process? Where did they come from?
7. When did the SAIL improvement begin and what motivated it?
8. What role has the VISN played over the course of these improvements? What types of SAIL-related resources or interactions have you shared?

Is there anything else you would like to share with us?

Thank you for your time!

APPENDIX C. SAIL DATA EXEMPLARS

Fiscal year	'11				'12				'13				'14				'15				'16				'17			
	Quarter	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3
Low quintile score examples	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	
	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	
	4	5	4	5	5	4	5	5	3	4	4	4	4	4	4	5	5	5	5	5	5	5	4	4	4	4	4	
	5	5	5	5	5	5	4	3	4	3	3	4	4	4	4	5	4	3	4	3	3	3	3	3	3	3	3	
	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	4	5	5	5	5	
High quintile score examples	1	1	1	2	2	3	3	3	3	2	2	2	2	2	3	3	2	2	2	1	1	1	2	2	2	2	2	
	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
	2	2	2	2	2	2	2	2	2	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	
	2	3	3	3	2	2	3	3	2	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	3	3	3	
	2	2	1	1	1	1	1	1	1	1	1	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	
Improving scores (n=16)	A	4	4	3	3	3	3	3	4	3	4	4	3	3	2	2	2	1	1	1	1	1	1	1	1	1	1	
	B	5	4	4	4	5	5	5	4	3	3	4	4	4	4	4	3	2	3	3	3	3	3	3	3	3	3	
	C	4	4	4	4	3	3	4	4	4	4	4	3	4	4	4	3	3	3	2	1	1	1	1	1	1	1	
	D	4	4	5	5	5	5	5	4	5	4	3	2	3	3	3	4	3	3	3	3	3	2	2	2	2	1	
	E	5	4	4	4	4	3	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
	F	3	3	3	3	4	5	5	5	5	4	5	5	5	5	5	3	3	2	2	2	2	2	1	2	2	2	
	G	4	4	4	4	4	5	4	4	5	4	5	4	4	5	5	5	5	4	4	3	3	3	3	2	3	3	
	H	4	4	4	5	4	4	3	2	2	3	3	4	3	4	4	4	4	4	4	3	2	2	2	2	3	3	
	I	3	4	4	4	4	4	4	4	5	5	5	4	4	3	3	2	3	2	2	2	2	2	2	2	2	2	
	J	4	4	3	4	4	4	4	4	4	4	4	3	3	3	3	3	3	3	2	3	3	3	3	3	2	3	
	K	4	4	4	4	3	3	4	3	4	4	4	4	4	4	4	4	4	3	3	2	1	2	1	2	3	3	
	L	3	3	3	2	3	4	4	4	5	5	4	4	5	5	5	5	4	3	3	3	2	2	1	1	1	1	
	M	4	4	4	4	4	4	4	4	4	4	4	3	3	2	3	3	4	4	4	4	4	3	3	2	2	2	
	N	4	3	4	4	4	4	4	4	4	4	5	5	5	5	5	5	5	5	5	5	4	3	2	2	2	2	
	O	3	3	3	3	4	4	4	3	3	3	3	3	4	4	3	3	1	1	2	2	2	2	1	1	1	1	
	P	3	3	2	3	3	4	4	4	3	3	3	4	4	4	4	4	3	2	2	2	2	2	2	2	2	2	
Changing score examples, other	1	1	1	1	1	1	2	2	2	3	3	3	3	3	3	4	4	5	4	5	5	5	5	5	5	5		
	2	2	2	2	2	2	2	2	2	1	1	1	1	2	3	2	1	1	1	2	2	3	4	4	3	3		
	2	2	1	1	1	2	4	4	5	4	4	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5		
	3	3	3	3	3	2	2	3	4	4	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1	2		
	3	4	4	4	4	3	3	3	2	4	4	4	4	4	5	5	5	5	5	4	4	5	4	5	5	5		
	3	2	3	3	2	2	2	2	4	4	5	4	3	3	3	3	4	4	4	4	4	5	5	5	5	4		
	4	3	3	3	2	3	2	2	3	3	3	3	3	3	3	4	4	4	4	4	4	4	4	4	4	4		
	4	4	5	4	4	5	5	5	5	4	3	3	2	3	3	4	3	3	4	4	4	4	4	4	4	4		
	4	4	4	4	3	2	3	3	4	3	3	2	2	3	2	3	4	4	4	4	4	4	4	4	4	4		
	5	5	5	4	4	4	4	4	3	3	2	3	4	4	5	5	5	5	5	4	4	3	3	4	5	5		
5	2	1	2	2	5	5	4	5	5	5	4	4	4	4	5	5	5	4	5	5	4	5	5	5	5			

*Data were only collected once in FY2011



APPENDIX D. QUERI AND SAIL TEMPLATES USED IN ANALYSIS

QUERI

Project/ Transcript ID	What makes sites hard to engage?	Strategies/facilitators to engagement (or lack thereof, include mandates and other external factors, changes over time to implementation strategy)	Description of intervention (how much effort on part of sites, fidelity of practice/changes over time)	Timeline (How long different steps took, and was full scale/spread achieved?)	Other stuff
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SAIL

Project/ Transcript ID	Why started/what motivated/initial catalyst?	Overall approach over time? <i>Key strategies used, changes over time, specific metrics focused on, where did they find materials or resources (eg homegrown or from a group or person)</i>	How used analytics/data/coding in process	Who is involved? <i>Leadership role/activities, autonomy of people involved to make decisions, stability of personnel</i>	Other stuff/activities
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APPENDIX E. PEER REVIEW COMMENTS/AUTHOR RESPONSES

Reviewer	Comment	Response
Reviewer #1	<p>Multiple objectives, unclear which is highest priority; discussion focuses primarily on the interview data, which does not fully reflect what has been learned from the literature. Mismatch between literature review objectives and interview objectives, not fully addressed or described. I would strongly advise providing clear synthesis of what was learned from the literature before going into the interview data. Primary bias is towards internal VA information, which is not from published literature, but comes from interviews. As I note above, the objectives of the literature review and those of the interviews do not seem well meshed, and the presentation is not very clear as a result.</p> <p>I would strongly recommend dividing into 2 sections: the review of the literature, and the interviews. The 2 seem only somewhat related, with the interviews focusing on issues of hard to engage sites, and other issues which are not well covered in the literature, but not really with the central questions of the literature review.</p>	<p>Both the literature and interview data were used to address the same research aim, which is now broken into 2 sections rather than the 4 original sections. This change was made for clarity and to align with other reviewer comments related to re-organizing the content. We have clarified the objectives of the report and we have described more explicitly how both the literature review and interviews contributed to each section and the relevant findings therein. We also describe the bias towards internal VA information in the limitations section.</p>
Reviewer #2	<p>As indicated by the authors, by nature of the topic, there are potentially projects/studies missed because of either different search terms or simply because of the work, projects of spread may not be reported in the literature. The other bias as indicated by the authors is the VA-centricity of the report which is fine to ensure an appropriate scope, but there may be other lessons/experiences learned that may be beneficial and generalizable to the VA. In general, I would not recommend add anything different to the report, but ensuring these limitations are clear and possibly making some recommendations for future projects on authors should report results regarding disseminating and spreading best practices.</p>	<p>We have revised the limitations section to emphasize these points and ensured that the recommendations for future research describe ways reporting could be strengthened (eg, describing adaptations/tailoring or how efforts work with hard to engage sites specifically).</p>
Reviewer #3	<p>The focus on “late adopters” (or low performing?) sites needs to be more explicitly stated up front – including in the executive summary.</p> <p>The authors present the Rogers Diffusion of Innovations’ curve of adoption and in some places use that language (eg, late adopters, etc)</p>	<p>We have added language to emphasize our focus on hard-to-engage sites in the executive summary and discuss in more detail the late adopter/hard-to-engage site terminology in the introduction.</p>

	<p>but in other places use the term “low performers.” These are not necessarily the same sites or contexts. Late adopters are in this category simply because they are slow to adopt a particular innovation and may be in this category for quite rational reasons, some of which the authors acknowledge (<i>eg</i>, sites have already “invented” a solution in place of the targeted innovation). Low performers, on the other hand, are low performers on a particular quality metric or cluster of metrics (and could be a “high performer” on other metrics) and need “solutions” which a particular innovation may or may not align with; <i>eg</i>, a low performer may need innovations targeted to reducing hospital-acquired infections but a particular innovation may address a topic that is less important for them to address. This distinction needs to be clarified...including both is ok but the authors need to be careful not to conflate the terms. It may be best to focus on the term “late adopter”... where one reason for late adoption may be because the topic that a particular innovation is designed to address is not aligned with quality gaps experienced by “low performers.” Another reason for late adoption might be a general inability or incapacity to implement innovations, often seen in pervasively low performing sites. Who is hard to engage? This question is unclear...is the focus on characterizing ‘late adopters?’</p> <p>“Hard-to-engage” is yet another term for late adopters/low performers</p>	<p>We agree that low performers are a distinct, if potentially overlapping group. We have rephrased all instances where we conflate them with the other group, so that they are more distinct and intentionally described as low performers where applicable, rather than lumping them with the adopter categories.</p>
Reviewer #3	<p>The authors highlight the need to define terms, stating that the terms “scale-up” and “spread” are often used interchangeably (I would go further and say, “conflated”) and then suggest a definition that continues conflation of these terms. In fact, these are distinctly different terms. <i>Eg</i>, Ilot et al 2013 (https://implementationscience.biomedcentral.com/articles/10.1186/1748-5908-8-128) suggest distinct definitions with citations. It is important to distinguish these terms because these topics are a central focus of this synthesis. If the definitions adopted by Ilot et al are used, scale-up typically relies on a planned top-down strategy to diffuse innovation while “spread” is related to horizontal diffusion of innovations. The distinctions are nuanced but important when attempting to identify strategies and moderators of increasing use of an innovation. The authors, in fact, seem to recognize these as</p>	<p>We have reviewed and updated our own use of terminology related to scaling/spreading throughout the report and have added more discussion in the limitations about the conflation and our use of terms in the report.</p>

	<p>distinct terms on p 11, where they introduce IHI and QUERI frameworks and position that innovations may be first tested for “scale-up before moving to full scale/spread.”</p> <p>The authors “sought to define what forms large magnitude spread take (what do you mean by “forms”) and what should be considered prior to engaging in large magnitude spread take (is this the same as large-scale? scale-up? spread? Be consistent in use of terms), and what should be considered prior to engaging in large magnitude spread ...</p>	
Reviewer #3	<p>Is this a “rapid review?” If so, this needs to be specifically stated. If not, then this synthesis needs a much deeper description of methods and demonstration that the content of the included articles was methodically abstracted using a defined/described process and template (eg, were both qualitative and quantitative findings used? If so, how were they integrated? Also, how was interview data integrated with published articles). As it is, it reads as a “rapid review” meaning that findings are presented as relatively high level with less in-depth and systematic analysis of themes derived from findings.</p>	<p>This is not a rapid review, and we have revised our data abstraction description in the methods section to add more details of our process.</p> <p>We have also revised our description in the methods section of our integration of the interview and literature synthesis findings to provide more clarity here as well.</p>
Reviewer #3	<p>Figure 3 shows “macro models” that “describe the organization...of spread efforts.” This diagram can be simplified by taking out the circle with 52 publications. “Eg,” needs to be added to the examples to make clear that eg, Geisinger Learning Health System is an example</p> <p>The brief bullets describing the 3 models are not clearly described – especially in relation to how successful they are. These seem to be purely descriptive. It would be more useful to characterize success within each type of model with reflections on their applicability as an intentional strategy</p>	<p>We have added “eg” into the figure, but kept the 52 publications circle to provide the denominator for the smaller circles.</p> <p>While we would have liked to include information about how successful these different models are, the original articles often did not provide this information, and we were not able to draw conclusions that compared these models in terms of success.</p>
Reviewer #3	<p>Page 21, 2nd paragraph is quite awkwardly worded with reference to Figure 4 that needs more explanation. I imagine that these preconditions may differ depending on the “macro model” context...or do these principles apply regardless of model?</p>	<p>We have revised this text to be more descriptive, and to clarify that these seemed to be principles that apply regardless of the model.</p>
Reviewer #3	<p>Figure 5 lists “potential benefits” first but the text describes “common challenges first.” Order in text versus figure order needs to be aligned. The characterization of “benefits” is unclear and unexpected. An overall description of the meaning of this term here is needed.</p>	<p>This figure has been updated to reflect the correct order of the text and we provide clarification about the term benefit.</p>

Reviewer #3	<p>It is hard to know what to do with the information offered related to each benefit – can these insights be leveraged intentionally and strategically to turn these into earlier adopting sites?</p> <p>Regarding “challenges” – reflections on how to overcome and/or whether the presence of these challenges means that efforts to force use of an innovation should be abandoned, would be helpful. For example, if a site has created a “local innovation” that addresses a quality gap, should that site be “forced” to use the new innovation?</p>	<p>In the later section with Figure 7 and the corresponding text these benefits are connected to suggested strategies that may help with engagement. While these sites may not become early adopters, a better understanding of the variety of hard-to-engage sites may help with tailoring strategies and approaches, rather than treating all hard-to-engage sites the same. More discussion of this has been added to the text in this section to presage the later discussion.</p>
Reviewer #3	<p>Figure 6 would be better understood within the “macro model” section of findings. “re-personalize” is confusing... the authors state it is something used in earlier phases and yet the earlier phases do not discuss “personalization.”</p>	<p>We have moved this Figure earlier in the report.</p> <p>We now emphasize the personalized nature of the early phases to justify our later use of the re-personalize term.</p>
Reviewer #3	<p>Figure 7 is very hard to understand. Linkages are made that do not make sense, nor do the explanations help to make these linkages more clear. <i>Eg</i>, the Figure shows that Low bandwidth is linked to external facilitation. The text refers to “facilitation” (not “external facilitation”) and needs to describe what “low bandwidth” is and how facilitation addresses this. These linkages each need to be described in text.</p>	<p>We have worked to be more consistent with our terminology in this section (<i>eg</i>, using external facilitation throughout) and</p> <p>have clarified the connections between our earlier description of types of hard-to-engage sites and this section.</p> <p>We have also added more language describing how these linkages were made, either by literature or interviewees.</p>
Reviewer #3	<p>What about the “pull” perspective? This question is meaningless on its own. “Pull” must be defined more clearly with explanation about why it is an important question to answer.</p> <p>Figure 8 doesn’t relate to text and needs better explanation. <i>Eg</i>, how does “deep dive- to understand local needs” relate to “pull?”</p>	<p>This has been re-organized to a new section of the report and more language has been added to explain the figure (now “VA preconditions and networks for spread”). The “Pull” terminology has been removed, as we determined it was distracting from the purpose of the content.</p>
Reviewer #3	<p>The Summary should include more concrete recommendations derived from findings presented.</p>	<p>Recommendations for future work have been highlighted with bullets in the abstract and end summary sections.</p>
Reviewer #3	<p>It is not clear how data from interviews were integrated with findings from published literature. Findings from literature (based on the 52 articles) should be presented within each section and then clearly and separately extended or further explicated by the</p>	<p>We have described more explicitly how both the literature review and interviews contributed to each section and the relevant findings therein.</p>

	interviews. Readers need to know the relative strength of evidence for the assertions made in this synthesis – published, peer-reviewed articles provide stronger evidence though the interviews can provide deeper insights or confirmation of published findings.	
Reviewer #3	The QUERI and IHI “models” should be characterized as frameworks – they are high-level, conceptual processes. I’m not sure of the appropriateness of combining these to guide this synthesis. QUERI is very much focused on moving research evidence to practice; characterizing the process as a “pipeline.” This pipeline has a core premise that innovations must be “evidence-based” – a top-down process is then assumed to get that innovation broadly implemented. IHI, on the other hand, is very much focused on grassroots process improvement. Scientific evidence is not germane, rather, local demonstration of improvement is necessary (through piloting and initial testing as the authors state) before scaling up and/or spreading more broadly. It is important to highlight these distinctions and to clarify whether this synthesis truly draws on both scenarios or is focused on a more “QUERI pipeline” approach to identifying evidence-based innovations which then need to be scaled up and spread more broadly.	We have highlighted this key distinction in our discussion of these frameworks and have noted that while there is a fundamental difference between the evidence-based approach and the grassroots process improvement approach, the similarities in the later stages of these frameworks is the key factor we wanted to emphasize in this report, and that in many cases it was not clear from published reports which approach had been used, so we chose to draw from both scenarios. We also now refer to these as frameworks.
Reviewer #4	Methods section (p.13), included mention of the TEP. Although this was defined earlier, it was not immediately clear who this was. It is recommended that the authors use the full term "Technical Expert Panel," especially since this seems to be the main place that the TEP was references.	This has been updated
Reviewer #4	Methods section (p.13), guiding question #3 (How can you work with hard-to-engage sites?) ends in a question but is a statement.	We have revised our framing of the questions and this question no longer appears here.
Reviewer #4	In Search Strategy (p.13), you reference the "Error! Reference source not found" which I had difficulty locating in the document. Could you perhaps include a page number to help others locate this (and other appendices) more easily? This is especially important when your search approach/search terms are not presented in the body of the document but instead as an appendix. It would be nice to make it easier for readers to access this information while reading the body of the document, perhaps by including page numbers in the text.	We have fixed the error message and also added page numbers for all referenced appendices throughout the report.

Reviewer #4	In Study Selection (p.14), you might consider offering some additional information to support your decisions related to studies that were rejected from your sample. More specifically, why were low-income country settings excluded? What was the basis of excluding studies that spread to less than 10 sites?	We now describe the rationale for excluding low-income countries and studies that spread to less than 10 sites.
Reviewer #4	In the SAIL Improvers section (p.15), you state the some sites were non-responsive and that site interviews were still ongoing. This suggests that data collection and analysis were not complete for the version of this report that was reviewed. Is this a concern? Will there be additional edits/expansions to this report after review by myself and the other reviewers?	<p>At the time of the report drafting, all interviews had been conducted and notes from these interviews were taken into account, but some later interviews were not transcribed and formally analyzed. We have now conducted our process as described in the methods section and found no grounds for changing any of our findings or conclusions. However, we had wanted to be transparent about this issue at the time of draft report.</p> <p>We have also now included more specific information in the methods section, as described by the COREQ guidelines, about the non-responsive sites.</p>
Reviewer #4	The Preconditions for Large Magnitude Spread (p.21) section was a bit confusing. Is the figure presenting a tool to be used by sites hoping to support spread? Areas that need to be assessed prior to beginning a spread effort? The presentation of this information seemed to introduce this topic for later exploration, but then left it without providing findings or recommendations. Again, there seemed to be a lack of continuity, as the topic of "Preconditions for Spread" appears to encompass all sites, while the later discussion mainly focuses on Hard-to-Engage sites. It felt as if there needed to be more exploration of the concept of "Spread Preconditions" and/or more of a transition to a focus on hard-to-engage sites.	The organization of the sections has been updated and more language to help with flow has been added. We have also added language to better contextualize this figure/section.
Reviewer #4	I wonder if it might be helpful to more explicitly link these strategies to challenges in the text by creating some sub-headers within the text that would mirror the organization presented in Figure 7? The current write-up does a nice job of focusing on the strategies but could use more emphasis on the ways that these strategies could be used to address the specific challenges, and build from the benefits, characteristics of hard-to-engage sites.	Sub-headers in this section have been added and brief descriptions have been added to summarize the links between characteristics of sites and strategies.

Reviewer #4	In the "What About the 'Pull' Perspective?" section (p.33), it might be helpful to briefly talk about how these local/"pull" approaches interact/relate to "push" or spread approaches. As this is currently written, it feels a bit too reductionistic and missed opportunities for explanation/big picture views of these 2 forces that I fear would not be available to your average reader naïve to QI methods.	This has been re-organized to a new section of the report and more language has been added to explain the figure (now "VA preconditions and networks for spread"). The "Pull" terminology has been removed, as we determined it was distracting from the purpose of the content.
Reviewer #4	p. 34 - Existing VA Hubs of Information - you do not capitalize "Shark Tank" or the names of the other hubs. Should these be capitalized?	Yes, these are now capitalized.
Reviewer #4	The transition from "hard to engage sites" discussion, which is based on interviews and literature reviews, to the "what about the 'pull' perspective," which is based on interviews alone, is a bit jarring (p.33). Perhaps it would be helpful to provide a bit more framing to explain that you are transitioning from a consideration of the perspectives/lessons learned from research/interviews with persons who support practice spread to sites that are the recipients of these spread efforts? It seems that this is what you were intending - to understand the spread process from both sides, correct? Either way, this section would benefit from more framing and introduction as the tone is very different from the previous sections.	We have re-organized the report, which we hope addresses this concern.
Reviewer #4	p.35 - your summary of your findings related to practice spread were confusingly stated: "... activities described in our data split the final phase of full-scale spread into 2 phases with distinct strategies. The third phase, or first part of the full-scale spread, which we are calling the 'mass broadcast' phase, uses strategies... The fourth phase, or second part of the full-scale spread phase..." Perhaps it would be easier to read/understand if you proposed that the current spread model be expanded or re-labeled, to avoid this confusion related to first/third and second/fourth stages.	We have revised and edited our language for clarity as suggested.
Reviewer #4	p.36 - In the "What about the 'Pull' Perspective?", "Pull" should be capitalized. Also, I would recommend that you drop "in the SAIL interviews" from the end of the first sentence in this section - as it is currently written, it sounds as if sites are seeking out information from the interviews, rather than the sites were discussing their sources of information within the interviews that you conducted.	These updates have been made.
Reviewer #4	You make the distinction between "late adopters" and "low performing" sites in your Summary section (p.37). It may be useful to	We have added more discussion of the late adopter/low performer/hard-to-engage site terminology in the

	<p>provide a little more information about the value of distinguishing between these 2 types of sites. You mention that "while there may (be) substantial overlap, some distinctions were also made, particularly in the QUERI interviews." Can you briefly summarize these distinctions in this section? Keep in mind this may be the only section that some readers read.</p>	<p>introduction to help support this later discussion.</p> <p>We have also now added brief examples to the summary section.</p>
Reviewer #5	<p>I think there are 2 problems with applying the Diffusion of Innovations adopter groups in this setting.</p> <p>The most important problem is that Rogers may have misunderstood the association between innovation adoption and the group characteristics. Instead of those in the early adopter group being generally more innovative and those in the late adopter group being generally skeptical and slow to change, it may be that those found in the early adopter group are generally higher status (<i>eg</i>, more educated, more metropolitan, wealthier) and are more likely to be copied than those in the late adopter group. It calls into question the idea some people are (in many/most aspects of life) generally more innovative and some generally more resistant to change. See John Henrich's paper Henrich, J. (2001). Cultural transmission and the diffusion of innovations: Adoption dynamics indicate that biased cultural transmission is the predominate force in behavioral change. <i>American Anthropologist</i>, 103(4), 992-1013.</p> <p>Another conceptual problem is that Rogers' adopter groups were based on observations about individuals, and many of the defining characteristics of those individuals do not translate or translate imperfectly to organizations, <i>eg</i>, innovators being more metropolitan and educated than late adopters.</p> <p>I don't think this critique is a serious one in terms of the validity of the findings, but as a conceptual guiding model I think it's probably important to point out that it has some potential flaws. The authors might bring this up in the discussion of who is hard to engage (page 22).</p>	<p>We have now incorporated a more thorough discussion about Diffusion of Innovations in the Introduction section, and removed some of the later references to this theory to de-emphasize it.</p>
Reviewer #5	<p>I think there needs to be greater emphasis and discussion about allowing sites to say no to a change initiative. The authors do an excellent job of acknowledging and describing how late adopters were observed to have some beneficial characteristics. But other than the observation about taking the long view (page</p>	<p>This is a key point, and is now included in the discussion section.</p>

	<p>24), there doesn't seem to be an acknowledgement that the best decision for a given site might be to say no to the change initiative, particularly in situations where there is low bandwidth, large sets of competing demands, or a homegrown solution that works. Virtually any change initiative is stressful and disruptive. I can understand that it may be that this was not a finding (i.e., the wisdom of declining to adopt/participate did not emerge in interviews or the literature), and therefore it is not appropriate to interject it with empirically-grounded findings. But perhaps the authors could note in the limitations or elsewhere in the discussion that a key assumption here was that a given initiative was broadly desirable or necessary, and we all know that there are initiatives and programs that don't work well for every site.</p>	
Reviewer #5	<p>I would like to see more concrete examples. I like the use of the quotes, but they're often too vague to really illustrate the findings for the reader. For example, page 29, on creating a web of support, it would be helpful to know what the setting was that the quotes come from; who the team leader was; who the other team members in the web were, etc. Another example is on page 31, with the quote about evidence-based quality improvement. It would be very helpful to provide some details about the project and how sites shaped the project to their needs and context.</p>	<p>We have added specific examples to the first quote described, but we went back to the interview and unfortunately we did not have more site-specific information to give about the evidence-based quality improvement work.</p>
Reviewer #5	<p>Page 5, line 38, I'm not sure I understand why findings from low income settings wouldn't be applicable in high-income settings. There may be resource issues, but many of the dynamics in my experience are similar, eg, issues of planning, competing priorities, clarity about roles and goals.</p>	<p>We now describe the rationale for excluding low-income countries.</p>
Reviewer #5	<p>Page 6, line 42. The sentence, "these included spread efforts that were embedded spread within a system of care" is hard to understand. I think I understand after reading it 4 or 5 times.</p>	<p>We have clarified this wording.</p>
Reviewer #5	<p>Page. 6, line 48-49. The sentence, "for sites spread initiators intend to work with," is another very difficult to understand phrase.</p>	<p>We have clarified this wording.</p>
Reviewer #5	<p>Page 13, line 56. There's an error note from citation software (Error! Reference source not found).</p>	<p>This has been corrected.</p>
Reviewer #5	<p>Page 13, line 53-54. The number of non-responsive sites still has the XX placeholder</p>	<p>At the time of the report drafting, all interviews had been conducted and notes from these interviews were</p>

	and there's an editorial note in brackets to fill it in.	taken into account, but some later interviews were not transcribed and formally analyzed, so we wanted to wait to finalize these last parts of the report. We had wanted to be transparent about this issue at the time of draft report.
Reviewer #2	there were terms like 'hard to engage' used that lacked clear operationalizaion	We have added more discussion around several terms as suggested by this and other peer reviewers, including "hard-to-engage."
Reviewer #2	why were articles that evaluated spread in 10 or more used? were there a lot of studies under 10 excluded? did this impact the potential conclusions	We have now added a justification for this exclusion code, we excluded 20 such studies and felt that, when looking at them as a group, they were not discussing large-scale spread, but more focused on a regional or first-iteration scale-up effort. Thus, they did not address the objectives of this report and would not change the conclusions we reached.
Reviewer #2	would recommend considering a section or in the conclusion, some potential recommendations that may be gathered from the review.	We have now added recommendations to the summary section.
Reviewer #2	page 6 - not sure what is meant by similar articles. also would be helpful to confirm if these are mesh term and if not, how were the terms confirmed - that is, where possible terms missed?	"Similar articles" search is a type of search available in several databases. In the appendix that describes the full search strategy those terms that are MeSH terms are noted, however almost none of the terms we used were MeSH terms. As we note in the limitations section, this is definitely an issue with searches of this nature.
Reviewer #2	page 7 - it states that 16 stakeholders were invited to participate, did all agree to participate? if not what percentage? any characteristics you can provide?	We now describe in further detail our interviewees and non-respondents within the methods section.
Reviewer #2	page 16 - how was the one person closely involved in the SAIL improvement activities identified?	This is now described.
Reviewer #2	page 18 - why is discussion of spread not relevant? clarify what constitutes piloting or initial testing and why not included - less than 10 sites?	Both of these exclusion criteria are now discussed further in the report.

APPENDIX F. CITATIONS FOR EXCLUDED STUDIES

Learning health system but not spread (n=62)

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Duplicate (n=1)

Smoyer W, Embi PJ, Moffatt-Bruce S. Creating Local Learning Health Systems Think Globally, Act Locally. *JAMA - Journal of the American Medical Association*. 2016;316(23):2481-2482.

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APPENDIX G. EVIDENCE TABLES

Author, year	Focus area/topic	Size of rollout Setting	Described hard-to- engage sites?	Hard-to- engage strategies?
SYSTEM (n=29)				
VA				
Blue-Howells 2013 ⁶⁷	Veterans Justice Programs (VJP) to address the needs of justice-involved veterans by offering services to veterans at multiple points in their involvement in the criminal justice system	National VA	No	No
Box 2009 ⁶⁸	Implementation of EMR for cardiac catheterization procedures called the Cardiovascular Assessment, Reporting and Tracking (CART) system	77 hospitals, national VA	No	No
Damschroder 2013 ⁶¹	MOVE! w8 management program	55 medical centers & 872 community-based outpatient clinics VA	Yes	No
Goetz 2008 ⁶⁹	A system-wide intervention to improve HIV-testing in the Veterans Health Administration	18 sites within southern Nevada, California VA	No	No
Mills 2003 ⁷⁰	Quality Interagency Coordination Task Force (QuIC) initiative to reduce medical errors	22 hospitals VA	No	No
Resnick 2007 ⁷¹	Supported employment for veterans	21 sites across the VA VA	No	No
Resnick 2009 ⁷²		166 VA medical centers VA	No	No
Rubenstein 2010 ⁷³	Implementation of Translating Initiatives in Depression into Effective Solution (TIDES) aimed to translate research-based collaborative care for depression	Medium-sized primary care practices within the VA VA	No	No

Author, year	Focus area/topic	Size of rollout Setting	Described hard-to-engage sites?	Hard-to-engage strategies?
Curran 2011 ⁷⁴	Implementation of collaborative care for depression in HIV clinics (HIV Translating Initiatives for Depression into Effective Solutions, HITIDES)	3 sites VA	No	No
Luck 2009 ⁷⁵	Implementation of Translating Initiatives in Depression into Effective Solution (TIDES) aimed to translate research-based collaborative care for depression	National VA	No	No
Sherman 2007 ⁷⁶	Implementation of Translating Initiatives in Depression into Effective Solution (TIDES) aimed to translate research-based collaborative care for depression	National VA	Yes	No
Smith 2008 ⁷⁷	Development of a national dissemination plan for collaborative care for depression	National VA	No	No
Yano 2015 ⁷⁶	The Collaborative Research to Advance Transformation and Excellence (CREATE) Initiative for comprehensive care for women veterans	National VA	No	No
Non-VA				
Best 2016 ⁷⁷	British Columbia Ministry of Health's Clinical Care Management (CCM) initiative, with particular focus on sepsis; surgical checklist and surgical site infection; and venous thromboembolism (VTE)	British Columbia National	No	No
Cheyne 2013 ⁷⁸	Keeping Childbirth Natural and Dynamic (KCND), a maternity care program that aimed to support normal birth by implementing multi-professional care pathways and making midwife-led care for healthy pregnant women the national norm	NHS, Scotland Scotland	Yes	Yes
Clarke 2014 ⁷⁹	The National Dementia Strategy for England	40 NHS sites UK	Yes	No

Author, year	Focus area/topic	Size of rollout Setting	Described hard-to-engage sites?	Hard-to-engage strategies?
Hendrich 2007 ⁸⁰	Ascension Health's "Healthcare That Works, Healthcare That is Safe, and Healthcare That Leaves No One Behind" with goal of zero preventable injuries or deaths	Ascension Health hospitals (65 sites) USA	No	No
Hung 2017 ⁸¹	LEAN redesign in clinic	All primary care in Sutter Health (13 sites) USA	Yes	No
Kellogg 2017 ⁸²	Tested a new method of intra-organizational process development and spread of quality improvement innovations	10 sites within North Shore Physicians Group USA	No	No
Lennon 2017 ⁸³	Delivering Assisted Living Lifestyles at Scale (dallas), a national digital health program	NHS UK	No	No
Liu 2016 ⁴⁸	Quality of sepsis care	Kaiser Permanente Northern California (21 hospitals) USA	No	No
Lorig 2004 ⁵⁹	The six-week peer-led Chronic Disease Self-Management Program	10 of 12 regions within Kaiser Permanente USA	Yes	Yes
Marshall 2014 ⁸⁴	Chronic obstructive pulmonary disease (COPD) quality improvement program	189 general practices in 4 Northeast London boroughs UK	Yes	No
Noyes 2014 ⁸⁵	Nurse-led implementation, optimization, and evaluation of a complex children's continuing-care policy	12 sites within the NHS UK	Yes	No
Ovseiko 2014 ⁸⁶	Health Innovation and Education Clusters (HIECS)	NHS UK	No	No

Author, year	Focus area/topic	Size of rollout Setting	Described hard-to-engage sites?	Hard-to-engage strategies?
Penna 2009 ⁴⁹	Implementation of a consultative model of interdisciplinary, inpatient-based palliative care (IPT)	7 of 8 regions, Kaiser Permanente USA	Yes	Yes
Psek 2015 ⁵⁰	Operationalizing the learning health care system (LHCS) in an integrated delivery system	Geisinger Health System (8 hospitals) USA	No	No
Robert 2011 ³⁷	The “Productive Ward,” a national quality improvement program	10 strategic health authorities (SHA), NHS UK	Yes	Yes
Schmittiel 2017 ⁸⁷	The Delivery Science Rapid Analysis Program (RAP)	Kaiser Permanente in Northern California USA	No	No
COLLABORATIVE (n=14)				
Azar 2015 ⁸⁸	Indiana University Center for Healthcare Innovation and Implementation Science (IU-CHIIS)	Indiana Clinical and Translational Sciences Institute, Regenstrief Institute, Inc., Indiana University School of Medicine, and their clinical healthcare partners USA	No	No
Boustani 2012 ⁵³	Indianapolis Discovery Network for Dementia (IDND)	5 health care systems in Indiana, including Regenstrief Institute, Inc., and Indiana University School of Medicine USA	No	No

Author, year	Focus area/topic	Size of rollout Setting	Described hard-to-engage sites?	Hard-to-engage strategies?
Cyr 2009 ⁸⁹	Intervention to reduce door-to-balloon (D2B) time for myocardial infarction	12 community hospitals within University of Massachusetts Memorial Health Care's service area USA	No	No
Duckers 2014 ⁹⁰	Quality improvement collaboratives (QIC) involvement to predict dissemination of projects within hospitals	24 hospitals the Netherlands	No	No
Elson 2013 ⁵²	Athena Breast Health Network	5 University of California health systems and cancer centers USA	No	No
Harris 2016 ⁵¹	Pediatric Rheumatology Care and Outcomes Improvement Network	17 sites USA & Canada	No	No
Johnson 2017 ⁹¹	Inflammatory Bowel Disease (IBD) Qorus learning health system	20 adult IBD care USA	No	No
Kwon 2012 ⁹²	Washington State's Surgical Care and Outcomes Assessment Program (SCOAP)	60 of 65 hospitals in State of Washington USA	No	No
Lannon 2013 ⁹³	Pediatric Collaborative Improvement Networks to improve pediatric subspecialty care	Multi-institution USA	No	No
Nolan 2005 ⁴	Advanced Clinic Access (ACA) initiative to reduce waiting times for patients	National VA	Yes	No
Ramsey 2017 ⁹⁴	ImproveCareNow Network to facilitate personalized medicine for children and adolescents with inflammatory bowel disease (IBD)	92 care centers USA, England, Qatar	No	No

Author, year	Focus area/topic	Size of rollout Setting	Described hard-to-engage sites?	Hard-to-engage strategies?
Rocker 2017 ⁹⁵	INSPIRED COPD outreach program	19 teams in 10 provinces Canada	No	No
Rogers 2014 ⁶⁰	The Society of Hospital Medicine's Glycemic Control Mentored Implementation (GCMI)	114 sites within Society of Hospital Medicine's network USA	Yes	No
van Schendel 2017 ⁹⁶	Non-invasive prenatal testing (NIPT) for aneuploidy in prenatal healthcare	National (8 medical centers) the Netherlands	Yes	No
INITIATIVE-SPECIFIC (n=9)				
Clark 2014 ⁵⁵	State-wide clozapine management system	Adelaide metropolitan area South Australia	No	No
Gardner 2010 ⁶²	The Audit and Best Practice for Chronic Disease (ABCD) project	12 indigenous primary health care services in the Northern Territory of Western Australia	Yes	Yes
Grayson 2011 ⁹⁷	Australian National Hand Hygiene Initiative (NHHI); infection control initiatives	521 hospitals Australia	No	No
Lustig 2016 ⁶³	Measure Up/Pressure Down hypertension control campaign	Summit Medical Group (SMG) and Cornerstone Health Care (CHC) USA	Yes	Yes
McMullen 2015 ⁹⁸	HIV testing	40 of 45 practices in a London borough the UK	Yes	No

Author, year	Focus area/topic	Size of rollout Setting	Described hard-to-engage sites?	Hard-to-engage strategies?
Parv 2016 ⁹⁹	A national e-prescription service	National Estonia	Yes	No
Patel 2016 ⁶⁵	HPV vaccination program	23 provinces Argentina	Yes	Yes
Pearce 2014 ¹⁰⁰	Personally controlled electronic health record (PCEHR)	74 practices across metro Melbourne Australia	Yes	No
Septimus 2016 ⁵⁴	Implementation of universal decolonization to reduce healthcare associated Central line-associated bloodstream infections (CLABSI)	136 ICUs in 95 hospitals affiliated with Hospital Corporation of America USA	No	No