

Embedded Research: Applications for the Veteran's Health Administration

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By AcademyHealth

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Executive Summary

Evolving population needs, technological advances, market forces, and political context are changing health care delivery in the U.S. As health systems grapple with meeting patients' needs, they rely on scientific literature to inform medical care. One such science, health services research, helps us better understand and improve health system functions and care delivery. To keep up with these rapid changes, many health systems are recognizing the need for, and value of, in-house health services research conducted by investigators employed by that health system—also known as embedded research.

The Veteran's Health Administration (VA) emerged as an early leader in health services and embedded research and has been conducting embedded research in its efforts to improve the health of veterans. As private delivery systems innovate their own research enterprises, the VA is exploring opportunities to learn from their progress and successes. In September 2018, AcademyHealth launched a VA-funded project to learn about the practice of embedded research, with an emphasis on two issues of particular importance to the VA: 1) how health systems determine which health services research questions to pursue, and 2) how health systems incentivize researchers to address questions of interest to their own organization given that most researchers may have additional affiliations. Information gathered from two sources—key informant interviews and conference discussions at a collaborative meeting—was analyzed and forms the basis of this report. In addition, a separately conducted survey, funded by AcademyHealth, that included VA respondents provided additional information on the topic.

To gain a better understanding of the VA context, AcademyHealth interviewed select VA leaders about the challenges and opportunities encountered in their research programs. These leaders provided insights into research prioritization, recruitment of embedded researchers, dual appointments, and overall incentive structures. Although there is recognition within the VA of the importance of embedded research, there may also be some ambiguity about the value of such research relative to the VA's overall mission. The tension between "academic freedom" of researchers to pursue their own research interests and alignment of their research to the VA's goals was noted as a key challenge. Despite the many advantages of working at the VA, it was noted that academic center appointments overall have fewer restrictions, and since researchers with dual appointments retain their VA salary, dual appointments present an attractive option for many researchers. In light of this conflict, key informants identified the need to examine and transform incentive structures for embedded researchers at the VA.

AcademyHealth employed an online survey to gather information about research prioritization in other health systems. The results presented an overview of health systems' overall research goals, priority-setting, and key audiences. There was broad consensus that the key goal of research was improving patients' health and health care quality. Respondents indicated that specific research priorities were most often set by researchers, while health system leaders were ranked as the most important audience for research findings, indicating considerable potential for aligning researchers' priorities with health system needs.

In addition to the online survey, AcademyHealth interviewed private health system leaders to learn about their embedded research programs. Many of the key informants indicated their primary research priority is health care operations; this stands in contrast to academia, where the first priority is usually to publish research and secure grants. Several programs also noted the challenges of coordinating operational efforts with research, especially convincing health system leadership of the value of research in informing health care delivery.

While the survey and key informant interviews provided insights into the functioning of embedded research programs, discussions from a collaborative convening provided recommendations for enhancing embedded research. AcademyHealth collaborated with Kaiser Permanente Southern California, and with funding from the Agency for Healthcare Research and Quality (AHRQ), the Patient-Centered Outcomes Research Institute (PCORI), and the VA Health Services Research & Development Service (HSR&D), to

convene an expert meeting using the VA State of the Art (SOTA) format to explore embedded research opportunities. Key recommendations from the meeting for prioritizing health systems research at the organizational level included:

- Develop linkages between research, operations, and C-suite leadership, as all three must be aligned to support an effective embedded research program;
- Demonstrate and communicate the impact, value, and return on investment to internal and external stakeholders to garner support for embedded research;
- Conduct rapid research that is relevant to health system needs, while also maintaining rigor;
- Develop the infrastructure needed to support embedded research—data and staff, as well as integrate with quality improvement; and
- Develop structures for enhancing attention to implementation and implementation science, to further demonstrate the value of the embedded research enterprise.

A key challenge identified by the VA was incentivizing embedded researchers to produce work that benefits the health system and the veterans they serve, given competing priorities for the many researchers who are also affiliated with academic institutions. Leaders from private health systems noted that the potential for researchers to have a greater and more immediate impact at the health system level was a key leverage point for recruitment and retention. Key informants also referenced health system connections to, and partnerships with, academia as being helpful in the recruitment process. Among the challenges identified for health system embedded researchers were limited opportunities for publishing and the need for more rapid and responsive research to address health system needs. This research context is very different from what most researchers encounter in traditional academic settings, requiring considerable adaptation on the part of embedded researchers working in health systems. Additionally, the field of embedded research does not share the same level of recognition as academic research. Recommendations for incentivizing embedded researchers proposed at the collaborative convening, included:

- Develop career trajectories for embedded researchers, starting with pre-career and progressing through mid-career needs;
- Provide opportunities for mentorship and technical leadership roles, as well as for funding and training or fellowship programs;
- Develop opportunities for experimentation and innovation in research to better support recruitment; and
- Develop a national home or association for embedded researchers to further establish the field and provide a community for embedded researchers.

As researchers and health systems navigate the evolving health care landscape, there is clearly a role for embedded research, although challenges with operationalizing the embedded research function remain. Over the course of this project, a number of opportunities emerged for prioritizing embedded research at the organizational level and incentivizing embedded researchers to work on health system issues:

- System leadership must understand, value, and prioritize embedded research in the organization;
- Research priorities must be aligned with health system and operational priorities;
- The business case for embedded research must be communicated to system leadership;
- To recruit and retain researchers for embedded research programs, define and reward success using varied parameters that extend beyond publication, for example identifying success in relation to improving care delivery and having an immediate impact on the ground;
- Outline career trajectories for embedded researchers to provide direction and viable options for researchers outside the traditional academic setting; and
- Provide dedicated time and opportunities for embedded researchers to publish in the peer-review domain.

Introduction

The U.S. health care delivery landscape continues to evolve at an ever-increasing pace and within an increasingly complex environment. The combination of population needs, technological advances, market forces, and political context are all leading to unprecedented changes in how health care is delivered.

As health systems grapple with how best to meet the needs of their patients, they rely on scientific literature to inform medical care. One such science, health services research, helps us better understand and improve how a health system is functioning and delivering care. To keep up with the rapid pace of health care transformation, many health systems are also realizing the need for, and value of, conducting their own in-house health services research—also known as embedded research. Embedded research refers to research undertaken within an organization that delivers health care by investigators employed by that health system, and which serves a dual purpose of advancing science and addressing specific needs of that health system, regardless of the source of funding.

By conducting embedded research, health systems can ensure that researchers have an in-depth understanding of the health system in which they are working, as compared to external researchers whose exposure to the system would be more limited. Embedded research can also be more easily aligned with health system goals and objectives, as compared to independent, academic research. Moreover, embedded research can be more timely and responsive to the pressing needs of evolving health systems, as compared to research conducted within the traditional peer-review domain, which requires long cycles of reviews to meet publication criteria.

The Veteran's Health Administration (VA) emerged as an early leader in health services and embedded research, and has been conducting research on health care delivery to improve the health of veterans by implementing several programs focused on this area, including the Health Services Research & Development Service (HSR&D), Quality Enhancement Research Initiative (QUERI), and Centers of Innovation (COINs). In addition to improving patient care, these programs support research aimed at enhancing quality and safety as well as reducing costs through innovative and evidence-based strategies. As private delivery systems innovate their own research enterprises, the VA is exploring potential opportunities to learn from other health systems' progress and successes.

Given the promise of embedded research and its potential for improving care delivery, AcademyHealth sought to better understand the embedded research enterprise, its value and benefits, the challenges involved, and opportunities for improvement and growth. Funded by the VA, AcademyHealth launched a project in September 2018 to learn about the practice of embedded research, with an emphasis on applications for the VA and its own embedded research programs. The AcademyHealth project, *Planning, Conducting, and Leveraging Embedded Health Services Research: A Project to Identify Challenges, Solutions, and Best Practices for the VA*, explored opportunities for the VA health system to learn from embedded research in private health systems as a way to advance their own programs.

Through this project, AcademyHealth sought to:

- Understand the needs, challenges, and opportunities facing researchers embedded in health care delivery organizations;
- Learn how health systems determine research priorities, organize their internal research capacity, and disseminate and use research findings; and
- Explore and identify recommendations for advancing the embedded research enterprise.

While exploring these issues, AcademyHealth placed an emphasis on two areas of particular importance to the VA:

1. How health systems make decisions about what health services research questions to pursue; and

2. How health systems incentivize researchers to address questions of interest to their own organization, given that most health services researchers receive funding from outside sources such as the Agency for Healthcare Research and Quality (AHRQ) and the Patient-Centered Outcomes Research Institute (PCORI).

Information gathered from two sources—key informant interviews and conference discussions at a collaborative meeting—was analyzed and serves as the basis of this report, providing insight into these two questions for the VA. In addition, a separately conducted survey, funded by AcademyHealth, that included VA respondents provided additional information on the topic. Appendix A provides an in-depth description of the methods used.

Background: VA Context

As the key provider of health services to veterans across the United States, the VA is the largest integrated health care system in the country, and has also been a pioneer in conducting embedded research. As a large and diverse organization, the VA seeks to better understand and improve how health care is delivered within its health system. To learn about the challenges and opportunities faced by embedded research programs at the VA, AcademyHealth interviewed select VA leaders.¹ Their research areas of focus included applied research, quality and safety, and mental health. The key informants provided insights into their embedded research programs, including the extent to which research is prioritized, as well as issues related to recruitment, dual appointments, and overall incentive structures for embedded researchers at the VA.

Embedded Research as a Priority

Key informants discussed the VA's embedded research efforts and some of the impetus behind them, indicating some variation in how health services research is perceived and valued within the VA. Although there is recognition within the VA of the importance of embedded research, there may also be some ambiguity about the value of such research relative to the VA's overall mission of service delivery. One apparent challenge is whether and how research is valued as compared to other priorities, and the extent to which service delivery is actually guided by research. One interviewee noted that research and education have been valued at the VA, and recognized the need for the organization to use these assets more strategically for health care delivery. However, it was also noted that embedded research overall is not necessarily prioritized as other, more urgent, issues may take precedence. As further noted by the interviewee, they are now trying to set their own strategic priorities and acknowledge the role of research in responding to the needs of the health care system. Similarly, another key informant reported that research within their unit is indeed designed to inform clinical practice or policy, supporting work that will have an immediate impact.

Embedded Researchers: Recruitment and Dual Appointments

The question of dual appointments was another key issue that was raised during the interviews. This issue stems from the VA's joint recruitment efforts to hire researchers from affiliated academic institutions. Interviewees explored the tensions related to researchers who work both at the VA and in academic settings, including the benefits and challenges of these kinds of dual appointments.

Noting that the VA provides more early-career support than many academic settings, the VA was highlighted as a good place to be a physician investigator, which is an asset to the VA. However, it was also noted that researchers do not necessarily remain at the VA over the long term, choosing instead to go on to an academic career. One key informant indicated a fractured matrix for professional support at least within certain contexts/areas within the VA, noting that those interested in training know where to go, but that there is not an overall fixed infrastructure that has persisted over time.

¹ Appendix A provides an in-depth description of the methods used.

The tension between the “academic freedom” of researchers to pursue their own research interests and the significance and importance of their research to support VA goals was another key area of emphasis. One comment indicated that researchers resist embedded research because they have less freedom and must address specific issues, whereas in academic environments, researchers can focus on their areas of interest. By contrast, another interviewee highlighted that research priorities may reflect the interests of different centers, along with their academic affiliates. Interviewees also identified bureaucratic issues at the VA as an example of obstacles with which researchers must contend, related to privacy and security, e.g., restrictions on accessing email, using flash drives, etc. While there are many advantages to working at the VA, it was noted that academic center appointments overall have fewer restrictions, and since researchers with dual appointments retain their VA salary, dual appointments present an attractive option for many researchers. The downside is that researchers with dual appointments may tend to focus more time and resources on their academic research and less on their obligations to the VA.

Evaluating and Leveraging the Research Enterprise

Given the range and diversity of research at the VA, key informants identified the need to evaluate the research that is conducted—as well as its various components—in order to fully leverage the VA’s research capacity. Recognizing the variation across different VA centers, one key informant indicated that the VA must determine the relevance and value of its centers and research, taking into consideration potential gaps and redundancies, as there is no robust system for evaluating the research enterprise as a whole. Another interviewee highlighted the need to set up repeatable processes, noting that there has been such accomplishment coming out of the research capacity, albeit with considerable variation and challenges to scale. In this area also, interviewees identified dual appointments as potential sources of conflict and the need to address them. One comment specifically focused on the importance of getting the full value from researchers who work jointly with the VA and academic affiliates, ensuring that the research does not primarily benefit the academic centers to the detriment of the VA.

Incentivizing Embedded Researchers

Considering the tension that exists between academic researchers’ obligations to their institutions versus the VA, key informants identified the need to examine and transform incentive structures for researchers embedded within the VA. One interviewee indicated the need for a roadmap to motivate researchers to think beyond publication, highlighting the importance of defining success in relation to improvements in care delivery, a key area of focus for embedded research. The interviewee did note that this shift is already taking place as researchers are starting to think about how to collaborate and move beyond the publication phase. This is due, at least in part, to pioneering programs at the VA, such as Diffusion of Excellence, designed to harness innovations taking place at the operational level. These innovations are evaluated through rigorous research with the ultimate goal of being disseminated as best practices. By marrying the work of operational leaders and researchers, such programs can provide the support and infrastructure needed to encourage researchers to focus on health system issues that will have an impact on the ground.

Opportunities for Learning and Enhancement

Opportunities for learning and enhancing embedded research were also highlighted with an eye toward emphasizing for health services researchers the importance and value of embedded research, as well as opportunities to learn from successful models. As one key informant noted, “embedded research provides learning for everyone”, a notion that should be emphasized more broadly to advance the embedded research enterprise. Another key informant stressed the importance of reminding the field that those working in health services research are working in service of those working in health care, highlighting the natural alignment between health services and embedded research. Additionally, one key informant identified a number of examples of future state models of embedded research that could provide broader learning for the VA: Intermountain, Geisinger, AdventHealth (in Florida), Cleveland Clinic, and Kaiser Permanente.

Understanding Embedded Research in Health Systems

Although the VA has a long history of employing embedded researchers, it is by no means the only health system to do so. Private delivery systems are increasingly conducting embedded research and provide insights that can be beneficial to the VA and other systems that currently employ embedded researchers or plan to do so in the future. Given the VA context and issues most important to the VA, this report focuses on key issues related to prioritizing and incentivizing health systems research as raised in the online survey, key informant interviews with private health system leaders, and a collaborative conference on embedded research.

Prioritizing Health Systems Research at the Organizational Level

As previously noted, one of the challenges faced by the VA relates to prioritizing embedded research: the relative importance of embedded research within the system and which issues or topics should be studied. Unsurprisingly, these questions are not unique to the VA, and AcademyHealth sought to learn about ways in which other systems address these questions.

Overview

AcademyHealth employed an online survey to gather information about how research was prioritized at a range of health systems across the country.² Respondents were recruited through outreach to organizations and networks most likely to include embedded delivery system researchers. Results from the online survey provided an overview of health systems' overall research goals, priority-setting, as well as key audiences for dissemination. There was broad consensus among respondents from most health systems, who indicated that their key goal for conducting research was to improve patients' health and health care quality. The survey results revealed that specific priorities were most often set by researchers, while health system leaders were ranked as the most important audience for disseminating research findings—which indicates considerable potential for aligning researchers' priorities with health system needs. Additional detail regarding the survey questions and responses is provided below.

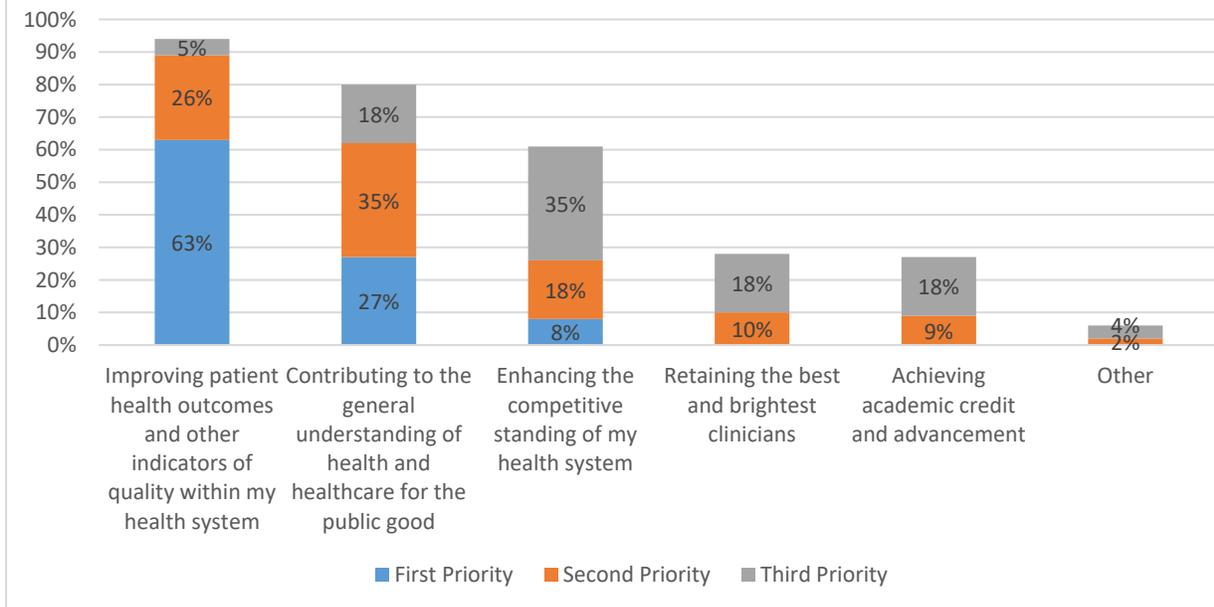
Health System Research Goals

To better understand why health systems have embedded research programs, AcademyHealth asked survey respondents to rank order a list of the potential goals of these efforts (Figure 1). A majority of respondents identified their health system's first priority for research as "improving patient health outcomes and other indicators of quality" (63%), followed by "contributing to the general understanding of health and health care for the public good" (27%), and "enhancing the competitive standing of my health system" (8%). Other priorities include: "retaining the best and brightest clinicians" and "achieving academic credit and advancement".

² Appendix A provides an in-depth description of the methods used.

Figure 1: Health System Goals in Order of Priority
(n=89)

First, Second, or Third Priority (Out of Five)



Notes:

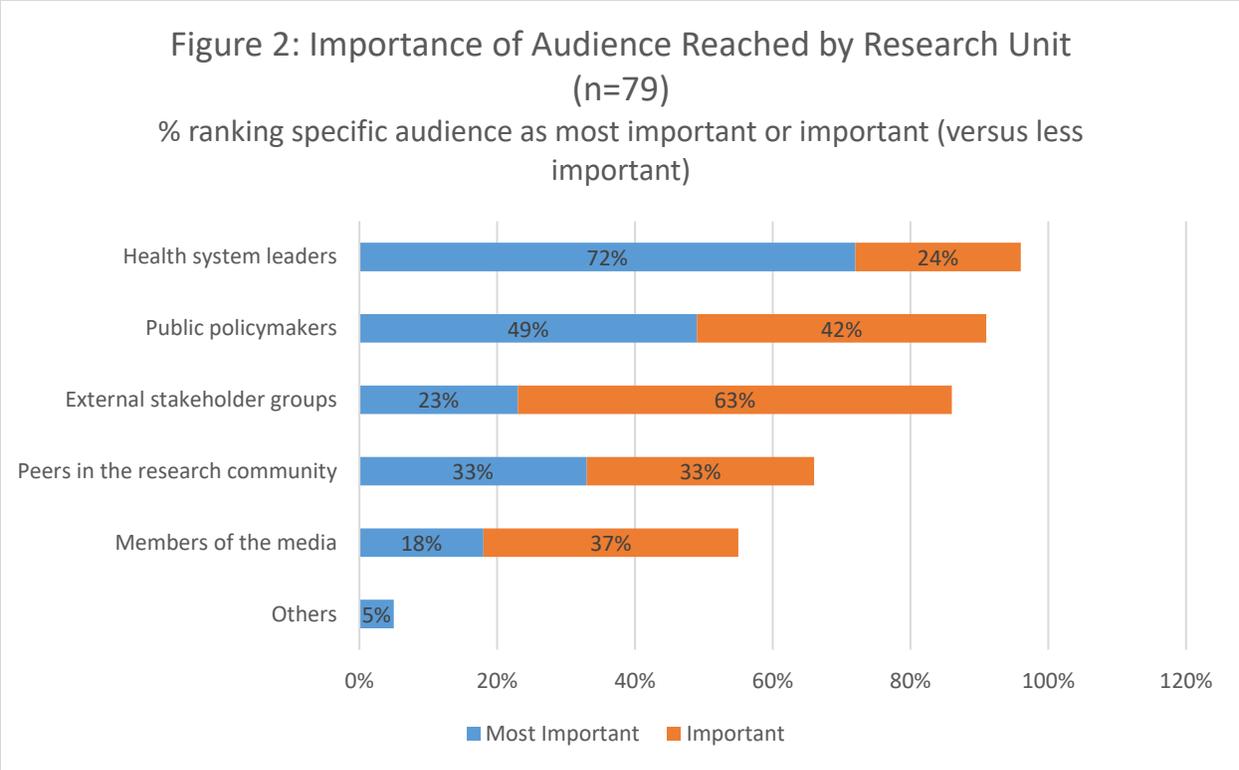
- Responses totaling less than 1% are not represented in the chart.
- "Other" research goals specified by respondents included: to do interesting work that generates knowledge, publishing, to work with government agencies on their regulatory mission, improving financial performance, and enhancing the reputations of the health system's leadership.

Priority-Setting

The survey also asked respondents to rank order how health services research priorities are determined within their health system. Researcher-initiated studies are most common, reported by 51% of respondents. Twenty-seven percent reported that research priorities are most commonly set by operational leaders, followed by extramural funding opportunities (17%), and intramural funding (4%).

Key Audiences for Dissemination

Survey respondents were also asked about key audiences for disseminating their research findings, lending additional insight into how health systems may set their goals and priorities. See Figure 2. In terms of the relative importance of potential audiences for their research, respondents ranked the following audiences as most important: health system leaders (72%), public policymakers (49%), peers in the research community (33%), and external stakeholder groups (23%). Survey respondents also specified a variety of "other" audiences: patients, clinicians, and operational leaders in health systems.



A Closer Look at Private Health Systems

In addition to the online survey, AcademyHealth conducted a series of nine interviews with private health system leaders.³ While the survey results provide an overview of health systems’ research goals and priority setting, these interviews yielded more in-depth insights into select embedded research programs, including their emergence and development.⁴ The information gathered from these interviews is outlined in the following section and highlights how embedded research is prioritized at the organizational level.

Interviews were conducted with select leaders from embedded research programs representing both small and large health systems—ranging from systems with anywhere from 50 to 800 health care facilities, including hospitals, surgery centers, clinics, senior care facilities, and other patient care sites.⁵ Many of the health systems have gone through a range of mergers. The tenure of the research leaders interviewed ranged from 10 to 30 years at their respective health systems, and their areas of focus included clinical services, health services research/data analytics/population health, research leadership, quality improvement, and delivery science. Respondents included chief medical officers, presidents and vice presidents, research directors, chief quality officers, and senior scientists.

Origin and Evolution of Research

The interviews revealed that the development of embedded research programs evolved organically and varied along several dimensions. Regardless of how these programs were created, many initially shared a common need to address specific clinical or administrative challenges. Many had also adapted over

³ Appendix A provides an in-depth description of the methods used.
⁴ AcademyHealth was most interested in learning about health systems’ embedded research programs, but in some cases respondents referenced their clinical research programs, as noted in some of the specific comments.
⁵ Most of the comments summarized are representative of the larger health systems interviewed, as these systems are more analogous to the VA. Where relevant, comments from smaller systems are incorporated.

time to changes in service delivery, emergent diseases, and advancements in health information technology.

Most current embedded research programs grew out of research programs that were created 10 to 40 years ago, while one was developed 70 years ago. Many of the research programs were initiated to focus on specific health conditions or specialty areas, and many focused on clinical research. For example, they may have initially focused on cancer or pediatric research and then expanded to other areas of health care delivery research, such as cardiovascular health, mental and behavioral health, population health, genomics, personalized medicine, or opioids. Overall, the history of using research to inform health system decisions is relatively recent, having evolved within the last 10 to 20 years.

Most key informants indicated that their embedded research programs were often championed by leaders who were interested in such areas as operational quality improvement or the science of health care delivery. Respondents also revealed that research programs were the products of non-clinical concerns, as evidenced by the following examples:

- One interviewee indicated that Meaningful Use served as a catalyst, facilitating the availability of standardized data to perform research at scale and conduct embedded research for a learning health system.⁶
- Another key informant noted that their research center was developed so the health system could study itself, learn, and share their learnings with others.
- Another research leader had come to recognize that the health system would have questions that would be difficult to answer out of operations alone, highlighting the need for research; for example, studying the deployment of an EHR across the health system.
- Realizing that health system leadership was concerned about the bottom line, another leader asked researchers who were seeking to fill in gaps in their external funding, to develop projects to address operational needs—to inform leadership that they were focusing on health system problems.
- In another case, a research program started with the goal of quality improvement and health care research, where clinical scholars divided their time between quality improvement and developing research portfolios. The research later transitioned to focus on supporting operational initiatives, and most recently following a merger, new health system leadership is exploring future directions.

Research Agenda-Setting

There was also significant variation among health systems in terms of how they prioritize health services research as well as the extent to which they fund and/or use it to inform their decision-making. While conducting embedded health services research was a key priority for some health systems, others indicated challenges in setting their own research priorities, particularly when C-suite leaders did not fully understand the value of embedded research.

Many of the embedded research programs did indicate that their first priority as it relates to research is on health care operations, in contrast to academia, where the first priority is to publish and secure grants. Some health systems noted their research priorities were initially driven by their founders and other key leaders, often with a focus on specific health conditions, and that they have now moved into broader areas, such as operational quality improvement or population health.

- One key informant noted that their operational improvement activities guide research activities.

⁶ Meaningful Use is the Centers for Medicare & Medicaid Services electronic health record (EHR) incentive program designed to accelerate the adoption of EHRs. Through a series of program requirements, health care providers must demonstrate “meaningful use” of an EHR. Standardizing and accelerating the adoption of EHRs provides for the electronic exchange of health information to improve the quality of care.

- Another described the delivery system as “the master”, noting their research is driven by the needs of the populations they serve, e.g., based on the complexity of disease and high-utilizers, and how to improve health in those populations. While the research unit supports some clinical research based on physicians’ interests, it was noted that they are a delivery health system first and foremost, not an academic health system. The research unit is very agile and their priorities are set in response to needs that arise; they follow a direction and do not need perfect information.
- In another case, it was noted that priorities were set by a range of leaders—system leadership, clinical leaders, or service line leaders—who have questions about the effectiveness of procedures, costs, etc. As such, researchers work closely with clinical staff and try to feed findings back to them.
- Similarly, another key informant noted that their research center shares relevant learnings back with clinical and management leaders, and if actions are to be taken, those are rolled out in the care setting.

Several programs also noted that coordinating operational efforts with research can be challenging, especially in terms of convincing health system leadership of the value of conducting research on the health system and health care delivery.

- One interviewee noted that their executive colleagues did not fully understand the potential for coordinating operations and research despite efforts to communicate that linkage. The interviewee also noted that leaders of large regional systems, in general, do not have the research experience and are focused primarily on operations and reducing the cost of care, so it’s hard for them to see how research relates to operational improvements. The interviewee further noted that few health care systems are going to be able to develop and sustain what most people view as the science of health care delivery.
- Another interviewee also indicated challenges in ensuring that research is high on leadership’s agenda, noting that the research center continues to inform leadership that the center is relevant and critical to help them. The interviewee similarly highlighted challenges in justifying funding for research to leadership, noting it was easier to justify research as operational quality improvement. For example, population health was noted as a new area of focus for improving effectiveness and reducing costs, which both addresses the needs of leadership and justifies the research.
- In one case, a key informant did note that their former CEO indicated that the center was “the best business decision” because it’s how you learn the key strategic and operational details—information that has subsequently been used to convey the value of the center to other C-suite leaders.

Recommendations for Prioritizing Health Systems Research

While the survey and key informant interviews provided insights into the evolution and functioning of embedded research programs, conference discussions from a collaborative convening provided recommendations for enhancing embedded research. AcademyHealth collaborated with Kaiser Permanente Southern California, and with funding from AHRQ, PCORI, and VA HSR&D, to convene an expert meeting using the VA State of the Art (SOTA) format to explore embedded research opportunities.⁷ An embedded research conference was held from February 19-21, 2019 in Pasadena, CA. Approximately 115 stakeholders attended the conference, including junior and senior researchers as well as leaders from research centers, health systems, funding agencies, and professional associations. Appendix D includes a copy of the agenda, and appendix E includes a copy of the participant list.

Five conference working groups developed actionable recommendations for advancing embedded research across the following areas:

- organizational arrangements, including governance, staffing, and funding;

⁷ Appendix A provides an in-depth description of the methods used.

- research support for management decisions;
- data resources and data use;
- strengthening the embedded research community; and
- accelerating implementation of embedded research output.

Given the overlap in some of these areas, key recommendations of interest are organized according to the following key target audiences: research units and researchers, research funding and funders, and health system leaders. This section highlights key recommendations that are most relevant for priority-setting at the organizational level.

Overarching Themes

Most of the recommendations followed common themes across the target audiences. One of the key themes that emerged focused on developing and supporting linkages between research, operations, and C-suite leadership, as all three of these areas within the health system must be aligned in order to support an effective embedded research program. Demonstrating and communicating the impact, value, and return on investment of embedded research to both internal and external stakeholders was also noted as crucial to garner support for embedded research. On a similar note, the working groups proposed studying effective models for embedded research, as well as developing a learning repository to promote broader knowledge sharing. Another key area of emphasis was conducting rapid research that is relevant to health system needs, while also maintaining rigor—for example, exploring strategies to conduct research on a timeline that is suitable for health system leaders and sufficiently rigorous and generalizable for publication. Finally, the recommendations proposed developing the infrastructure needed to support embedded research, including the data and staff, as well as integration with quality improvement. The recommendations went on to propose developing structures for implementation science to further establish, publish, disseminate, and promote the embedded research enterprise.

Research Units and Researchers

Specific recommendations proposed for research units and researchers as ways to advance embedded research are listed below:

- Align research goals with operational and overall health system goals, ensuring bidirectional priority-setting, as well as shared accountability
- Foster relationships with operational and C-suite leaders, adapting culture and language, e.g., speak CFO
- Engage stakeholders up front; include research staff (e.g., programmers) in meetings
- Integrate operations and quality improvement
 - Develop a taxonomy of embedded research to show how to integrate embedded research into the existing continuum of quality improvement and research activities
- Improve the design and data used for quality improvement projects so that results are more likely to add to cumulative knowledge
- Demonstrate the value proposition of high quality data and analysis, and why a health system should help maintain it

Pre-conditions for Embedded Research

One working group at the collaborative conference outlined a set of pre-conditions that would be important for developing an embedded research program. The following set of pre-conditions include key considerations that may be instructive for developing or enhancing embedded research:

- The highest performing health systems all have models of embedded research
- System feels level of urgency (from C-suite to middle managers to frontline staff): disrupt or die
- System leaders are incentivized to evaluate
 - System leaders value evidence
 - Include in performance evaluations
- Horizontal integration
- Alignment of incentives for the health system and researchers
- Metrics to measure success of embedded research
- Training is available

- Communicate the value proposition of embedded research to trainees, academic leaders, system leaders, payers, and patients
 - Define the role of an embedded researcher and program
 - Maintain rigor while still conducting rapid research
 - Demonstrate impact on quality, cost, and the patient and family experience
- Conduct research that is rapid, relevant, and rigorous
- Be nimble and ready to pivot: adjust timelines and redirect efforts as needed
- Ensure a sustained focus on learning health system competencies as well as nimbleness, strategy, communications, relationship-building, and organizational operations

Research Funding and Funders

Specific recommendations proposed for research funding and funders to further support embedded research are indicated below:

- Engage health system leaders to identify shared priorities for funding
- Align funding for embedded research with health system priorities
- Co-fund research with health systems
- Consider how the project funding can help build a sustainable data capability in health systems
- Leverage non-profit community benefit funds
- Demonstrate impact and return on investment of embedded research
- Fund research to determine the most effective models of embedded research and embedded data science
- Create and prioritize new streams of funding
 - Rapid submission and review (off cycle)
- Create study sections and train reviewers
- Fund a curated, embedded-research learning repository

Health System Leaders

Specific recommendations proposed for health system leaders as ways to foster embedded research are below (ranging from research unit leaders to quality improvement to C-suite and medical leadership):

- Ensure the C-suite includes a champion for embedded research
- Include embedded research in the organization's strategic plan
- Discourage silos between research and operations
 - Develop shared governance structures for embedded research and quality improvement
- Develop regular communication strategies with researchers
- Develop embedded research training programs for leaders as consumers and co-designers of embedded research, highlighting the business case
- Commitment to infrastructure—including the data and staff—to support a learning health system, e.g., contribute to salaries
- Participate in collaboratives (e.g., data sharing) and share findings so others can benefit
- Put implementation science structures in place to complement quality improvement
 - Ensure health systems have robust quality capabilities, e.g., project management, health information technology, data analytics, improvement advisors
 - Get embedded researchers involved from start to finish, ensure access to data
 - Need system for quality improvement determination and publication of non-human subjects research

Incentive Structures to Address Health System Research Questions

In addition to prioritizing embedded research issues, another key challenge identified by the VA was how to incentivize embedded researchers to produce work that is beneficial to the health system and

ultimately to the veterans they serve, given competing priorities for the many researchers who are also affiliated with academic institutions.⁸

Insights from Private Health Systems

Most of the insights about incentivizing researchers to focus on health system issues were highlighted during the key informant interviews with private delivery system leaders. Health system leaders noted both opportunities for incentivizing embedded researchers as well as challenges.

Opportunities

Embedded research programs provide unique opportunities for health services researchers that health systems can leverage for recruitment and retention. The potential for researchers to have a greater and more immediate impact at the health system level was noted as a key leverage point for recruiting and retaining embedded researchers. Key informants also referenced health system connections to and partnerships with academia as being helpful in the recruitment process.

- One key informant shared how their research center opened their data vault to attract academic researchers, who could then work through a data collaborative to access the health system's data. The health system worked with the researchers on rapid cycle projects for immediate application at the bedside. The interviewee also shared how their researchers now try to align academic research with health system needs, with the potential to acquire grant funding. While there is little time for traditional dissemination, it was noted that the projects that researchers are working on allow time for them to publish, should they so choose. Overall, the interviewee highlighted that despite fewer opportunities to publish, embedded researchers realize and appreciate the real and immediate impact they can have on care delivery.
- Another key informant noted that their center conducts research with clinicians, which helps with recruitment because it affords clinicians the opportunity to do research.
- Another key informant noted that their program partners with universities, and embedded researchers keep their academic roots and bring their own training. Additionally, the program provides training, with a focus on marrying advanced analytics and data with traditional research.

Challenges

Key informants also identified a number of challenges with recruitment and retention. Among these were limited opportunities for publishing and the need for more rapid and responsive research in order to address health system needs. This research context is very different from what most researchers encounter in more traditional academic settings, and requires considerable adaptation and adjustment on the part of embedded researchers. Additionally, the field of embedded research as a whole does not share the same level of recognition and establishment as academic research, which can present a challenge when recruiting embedded researchers.

- One key informant noted that those conducting operational research do not publish their findings; they are internally funded so their priorities are internal. It was noted that while there is no policy against publishing, their researchers aren't rewarded for it and it's not part of their job; however, some physicians, who are more academically oriented, may publish.
- Another key informant noted that researchers come and go because they are better served in academic environments or in the few health care systems prepared to sustain research.
- Another interviewee noted that finding researchers who understand and appreciate the linkages between research and operations, as well as the need for timeliness is a challenge, adding that their health system needs research that is ready to be applied, not stepping stones that require further research, especially given how quickly problems and issues change.
- Similarly, another key informant noted that the focus of embedded research should be on getting the research reasonably right most of the time for the people who need it and then moving on to

⁸ Appendix A provides an in-depth description of the methods used.

the next project—noting that this timeline and orientation is generally inconsistent with the process for peer-review publication. The interviewee also noted that embedded researchers often feel isolated and have limited recognition, given fewer opportunities to share information, especially for organizations that are not ready to share their embedded research publicly.

Interestingly, a couple of key informants commented that their centers do work on publishing papers and attend national meetings, an indication that some of the more traditional, academic structures may still be applicable or available to embedded researchers within health systems.

Recommendations for Incentivizing Embedded Researchers

Several recommendations for incentivizing embedded researchers were developed and proposed by the working groups at the collaborative conference.⁹ An overview of the key themes discussed is provided below followed by specific recommendations organized by key target audience: research units and researchers, research funding and funders, health system leaders, and other stakeholders.

Overarching Themes

Similar to the recommendations for prioritizing embedded research, most of the recommendations for incentivizing researchers followed complementary themes across the target audiences. One of the key themes that emerged focused on developing career trajectories for embedded researchers, starting with pre-career and progressing through mid-career needs. Providing opportunities for mentorship and technical leadership roles were also noted as important aspects for career-building, as were funding and training or fellowship programs. Developing opportunities for experimentation and innovation in research were also noted as valuable leverage points in the recruitment of embedded researchers. Finally, a key recommendation focused on developing a national home or association for embedded researchers, which would further establish and lend credence to the field, providing a community for embedded researchers and promoting shared learning.

Research Units and Researchers

Specific recommendations proposed for research units and researchers as ways to advance embedded research are below:

- Develop career trajectories for embedded researchers, including an internal career ladder and non-managerial leadership roles for technical experts
- Ensure a sustained focus on mid-career and pre-career pipeline and needs
- Ensure mentorship and protected time for new hires to develop relationships, funding, and organizational understanding
- Pilot a grant program driven by system priorities

Research Funding and Funders

Specific recommendations proposed for research funding and funders to further support embedded research are below:

- Increase funding for training programs (e.g., fellowships, targeted opportunities), dissemination and implementation, and novel funding mechanisms (e.g. rapid response, interim deliverables)
- Fund career development opportunities targeted at embedded research, including fellowships, conferences or institutes (including for mid-career level)

Health System Leaders

Specific recommendations proposed for health system leaders to foster embedded research are below:

- Develop pathways for embedded researchers/health services researchers to use their knowledge of the health care system to advance to positions of leadership.

⁹ Appendix A provides an in-depth description of the methods used.

- Keep embedded researchers informed about organizational priorities
- Facilitate bi-directional flow of ideas and information
- Encourage experimentation, e.g., consider innovation labs
- Support recruitment through academic affiliations

Other Stakeholders

Specific recommendations proposed for other stakeholders to accelerate embedded research are below:

- Create a national home or association for embedded research:
 - Share training and funding opportunities
 - Create a broad-based international and/or national database for sharing findings, practices, etc. (that is not a journal)
 - Establish benchmarks for an embedded research program to create more standardization across systems
 - Develop metrics to assess the value of an embedded research program, beyond publications and grants
 - Develop a common lexicon
- Ensure that relevant training programs and accrediting bodies have a core competency for health care delivery science

Conclusion

Drawing on a variety of complementary data sources, this report highlights some of the key needs, challenges, and opportunities facing embedded researchers and health systems alike. As researchers and health systems navigate the evolving health care landscape, there is clearly a role for embedded research. However, operationalizing the embedded research function remains a challenge. Given the variety and diversity of embedded research programs, there is no one model of embedded research that emerges for other health systems to follow. Rather, most embedded research programs have developed organically based their health system's particular needs and circumstances. Nevertheless, a number of key themes emerged across the survey results, key informant interviews, and collaborative conference. Key themes are outlined below with a focus on opportunities for prioritizing embedded research at the organizational level and incentivizing embedded researchers to work on health system issues.

- Opportunities for prioritizing embedded research at the organizational level: As noted by most health systems, their first priority is focused on improving patient outcomes and health care operations. As such, their internal research capacities are designed to address these priorities, in contrast to academic settings where publishing research remains a key concern. Research leaders also noted the importance of ensuring that health system leadership understands, values, and prioritizes embedded research within the organization, highlighting the need to align research priorities with health system and operational priorities and communicate the business case for embedded research to system leadership. Similarly, the need to communicate research results back to clinical leaders and health system leadership was emphasized to ensure all stakeholders remain informed and invested.
- Incentivizing embedded researchers to work on health system issues: In order to recruit and retain researchers for embedded research programs, research leaders emphasized the need to define and reward success using varied parameters—going beyond publication, for example identifying success as it relates to improving care delivery and having an immediate impact on the ground. Outlining career trajectories for embedded researchers was also noted as a key area for development in order to provide direction and viable options for researchers outside the traditional academic setting. Additionally, providing some allotment of time and opportunity for embedded researchers to publish in the peer-review domain was also raised as a feasible option.

Limitations

The information collected through the online survey, key informant interviews, and conference discussions is intended to provide a better understanding of the emergence of embedded research programs, including their role and value within health systems, key challenges, as well as potential opportunities to support and strengthen embedded research. The information presented is not intended to be a representative sample of the overall embedded research community. The methods used provide complementary perspectives on the embedded research enterprise and collectively represent a qualitative research effort aimed at contextualizing our understanding of embedded research. The key issues discussed in this report represent a subset of the information collected, highlighting that which is of most importance to the VA—how health systems make decisions about what health services research questions to pursue and how health systems incentivize researchers to address questions of interest to their own organization.

Appendix A: Methods

AcademyHealth employed two methods to gather evidence from a diverse range of key stakeholders about health systems' embedded research programs: semi-structured key informant interviews and a collaborative conference on embedded research. In addition, a separately conducted survey, funded by AcademyHealth, that included VA respondents provided additional information on the topic.

Online Survey

To better understand the growing segment of embedded health services researchers, AcademyHealth surveyed a convenience sample of 89 professionals from health systems using an online survey fielded from September to December 2018.¹⁰ The survey consisted of thirteen questions that explored health systems' sources of research priorities and funding, approaches to organizing their research units, and challenges facing embedded researchers. Appendix B includes a copy of the survey questions.

Respondents were recruited through outreach to organizations and networks most likely to include embedded delivery system researchers.¹¹ While not representative, the networks surveyed would have included the bulk of embedded health system researchers in the U.S., with the breadth of networks surveyed across such areas as health, public health, patient-centered care, and the medical field.

Often, a staff member within the research network sent the survey link to network members on AcademyHealth's behalf via email; in a few cases, AcademyHealth sent the survey link to network members directly. AcademyHealth created a unique survey link for each research network, allowing project staff to see the total number of completed surveys from each network. The networks surveyed and number of responses from each network are listed in Table 1.

Research network	Number of completed surveys received (response rates in parentheses)
Health Care Systems Research Network (HCSRN)	56 (*)
High Value Healthcare Collaborative (HVHC)	7 (*)
PCORnet (The National Patient-Centered Clinical Research Network)	11 (.02)
Association of American Medical Colleges (AAMC's) Research on Care Community (ROCC)	4 (.36)
National Cancer Institute's Community Oncology Research Program (NCORP) and Population-based Research to Optimize the Screening Process (PROSPR)	2 (.04)
VA's HSR&D	7 (.12)
Individual	2 (*)
Total	89 (*)

* Total number of individuals receiving the survey not given. HCSRN comprises 18 health systems and HVHC comprises 10 health systems.

¹⁰ This report draws on the AcademyHealth survey results given their relevance to this work, although the survey was conducted using non-VA funds.

¹¹ This effort benefited from the time and expertise of several informal advisors, including Sarah Greene (Health Care Systems Research Network), Gene Rich (Mathematica Policy Research), Lucy Savitz (Kaiser Permanente, Northwest Region), and Becky Yano (VA Greater Los Angeles Healthcare System, UCLA).

The majority of respondents (n=60) indicated their primary sector of employment as health care delivery (61%), followed by academia (20%), health plan (7%), and other, specified by respondents as “government,” “research,” “research institute,” or “health plan and hospitals (integrated)” (12%). In terms of their primary role, the vast majority of respondents (n=60) identified their primary role as a researcher (80%), with the remainder reporting that they serve as administrators (8.5%), C-suite leaders (7%), or in some other capacity, specified by respondents as “physician,” “programmer,” or “operational leader” (5%). The length of time that respondents (n=60) have worked in the field was evenly distributed across the career spectrum: from more than 20 years (41%), to 10-20 years (29%), to less than 10 years (31%).

AcademyHealth staff reviewed and analyzed all survey responses to gain a better understanding of key issues confronting embedded health services researchers. A memo detailing the survey results was developed and shared with attendees at the Pasadena conference to inform their discussions. This report highlights key survey findings that illustrate how health systems prioritize embedded research.

Key Informant Interviews

Between October 2018 and March 2019, AcademyHealth conducted nine key informant interviews with research leaders from health systems. The interviews were conducted during a 30-minute timeframe via phone call. An interview guide with about 20 questions was used to lead the discussions focusing on the following areas: purpose and organization of research activities, research agenda-setting, dissemination of research findings, and challenges and opportunities facing researchers and analytics staff. All key informants received a copy of the interview guide in advance of the call. Appendix C includes a copy of the guide.

In consultation with the VA, AcademyHealth identified leaders from a range of health systems engaged in embedded research to serve as key informants. Three interviews were conducted with leaders from the U.S. Department of Veterans Affairs in order to gain a better understanding of their overall context and challenges in conducting embedded research. Interviewees discussed their work in the following research areas within the VA: Center for Innovation; Office of Discovery, Education and Affiliate Networks; and Office of Mental Health and Suicide Prevention. Six interviews were conducted with research leaders from private delivery systems to gain a better understanding of their embedded research programs and potential learning opportunities for the VA. Representatives from the following private health systems were interviewed: Baylor Scott & White Health, Henry Ford Health System, Hospital Corporation of America (HCA), Palo Alto Medical Foundation Research Institute (PAMFRI), and Sanford Health. For each interview, two to three AcademyHealth staff took detailed notes to document the discussion. Interviewees were informed that they would not be quoted or cited without their consent.

AcademyHealth staff compiled and reviewed all interview notes to assess key themes emerging from each interview and across all nine interviews. A summative document of key takeaways from the six key informant interviews with leaders from private health systems was developed and shared with conference attendees in Pasadena to inform their discussions. This report details key findings from the key informant interviews with an emphasis on highlighting how health systems prioritize embedded research and how they incentivize researchers with mixed funding sources to work on health system issues.

Embedded Research Conference

AcademyHealth collaborated with Kaiser Permanente Southern California, and with funding from the Agency for Healthcare Research and Quality (AHRQ), the Patient-Centered Outcomes Research Institute (PCORI), and VA HSR&D, to collectively plan and conduct an expert meeting to further explore embedded research opportunities. An embedded research conference was held from February 19-21, 2019 in Pasadena, CA. Appendix D includes a copy of the agenda. The conference focused on advancing embedded research through exploration of five key areas, addressed by five working groups:

- Group A: Organizational arrangements;

- Group B: Research support for management decisions;
- Group C: Data resources and data use;
- Group D: Strengthening the embedded research community; and
- Group E: Accelerating implementation of embedded research output.

The participant invitation list was developed in coordination with all conference partners, with an emphasis on identifying a diverse range of participants including junior and senior researchers as well as leaders from research centers, health systems, funding agencies, and professional associations. Approximately 115 stakeholders attended the conference. Appendix E includes a copy of the participant list.

All participants were assigned to a working group in advance of the conference based on their preferences and expertise. They received relevant background reading for the overall conference and their specific working group). Modelled after the VA's State of the Art (SOTA) conferences, participants spent the bulk of the meeting in their work groups with introductory plenaries featuring panel discussions at the outset of the meeting and report-outs from each working group at the end. All working groups were led by facilitators to guide the conversation, and note takers documented the discussions. Each working group developed a PowerPoint presentation to summarize their discussions in a standardized format reporting on:

- Workgroup goals and vision for their assigned feature of embedded research;
- Current state of the group's assigned topic;
- Barriers to achieving their vision;
- Recommendations for key stakeholders (e.g., research units, research funders, health system leaders, and others) to achieve their vision; and
- Immediate next steps.

AcademyHealth staff reviewed key discussion items and recommendations from the working groups. Drawing on the meeting discussions, this report highlights key recommendations focused on how health systems can prioritize among potential embedded research needs and incentivize researchers to address these needs.

Appendix B: Survey Questions

AcademyHealth Survey on Health Systems' Research Capacity and Activities

Thank you for taking the time to complete this survey. The survey will take approximately 10 minutes to complete. Your input will help AcademyHealth understand the needs, challenges, and opportunities facing researchers “embedded” in health care delivery organizations. Please contact Lauren Gerlach at lauren.gerlach@academyhealth.org with any questions.

Section I: Purpose of research within your health system

1. Please rank in order of priority (1 being most important) the main goals of research in your health system.
 - a. Improving patient health outcomes and other indicators of quality within my health system _____
 - b. Enhancing the competitive standing of my health system _____
 - c. Contributing to the general understanding of health and health care for the public good
 - d. Achieving academic credit and advancement _____
 - e. Retaining the best and brightest clinicians _____
 - f. Other (please specify): _____

Section II: Organization of research activities

2. Different words are used to describe different aspects of health services research. Please select 3 of the following that best describe the type of research your health system undertakes:
 - a. Delivery system science/health care delivery research
 - b. Dissemination and implementation research
 - c. Patient outcomes research (including patient-centered outcomes research)
 - d. Patient safety/quality research (including improvement science)
 - e. Clinical effectiveness research (including comparative effectiveness)
 - f. Clinical epidemiology
 - g. Health economics
 - h. Other (please specify): _____

Section III: Research agenda setting

3. Please rank in order of priority (1 being most important) how your research unit's priorities determined.
 - a. Researchers or investigators determine their own research priorities
 - b. Operational leaders are engaged in setting research priorities
 - c. Priorities are set by extramural funding opportunities
 - d. Priorities are set by intramural funding opportunities
 - e. Priorities are set by academic institutions who work with the health system
 - f. Other (please specify): _____

Section IV: Dissemination of research findings

4. In the past year, how often has your research unit disseminated your research in the following ways?

	Never	Sometimes	Frequently	Always
Emails to health system staff				
Presentations at professional conferences				

Presentations at meetings within the health system (e.g., grand rounds)				
Public-facing webinars				
Publications in the peer-reviewed literature				
Media outreach (e.g., press releases)				
Other publications (e.g., briefs, reports, blog posts)				
Other: _____				

5. Please rank in order of priority (1 being most important) the audience you would like your research unit to reach more often.
- Health system leaders _____
 - Members of the media _____
 - External stakeholder groups (e.g., community-based organizations, advocacy groups, industry groups) _____
 - Public policymakers (e.g., state and local government officials) _____
 - Peers in the research community _____
 - Other: _____

Section V: Professional affiliations and needs of researchers/analytic staff

6. What is the primary professional home for individuals in your research unit? Please select up to 3:
- Society of General Internal Medicine (SGIM)
 - American Medical Informatics Association (AMIA)
 - AcademyHealth
 - Condition-focused associations (e.g., American Cancer Society, American Heart Association, American Diabetes Association, American Geriatrics Society, or similar)
 - International Society for Pharmacoeconomics and Outcomes Research (ISPOR)
 - Society of Behavioral Medicine (SBM)
 - American Public Health Association (APHA)
 - Society for Epidemiologic Research (SER)
 - American Academy of Pediatrics (AAP)
 - American Society of Health Economists (ASHEcon)
 - Other: _____

7. Among the resources listed below, how helpful would each be to researchers in your unit?

	Very Helpful	Somewhat Helpful	Not Helpful
Networking opportunities			
Ability to present my work			
Advocacy efforts for health services research and health policy analysis			
Participation in topic-specific Interest Group (IG) meetings			
New online learning activities that include ongoing, facilitated discussion and web-based resources			

Education courses focused on writing, project management, and proposal development for researchers			
Mentoring programs with traditional mentors and peer-to-peer learning			
Virtual participation in existing conferences (e.g., AcademyHealth's Annual Research Meeting)			
Scholarship and fellowship offerings			
Educational activities/services specifically developed for masters-level health services research (HSR) professionals			
HSR credential			
Continuous professional development opportunities (e.g. management or leadership training)			
Other: _____			

Section VI: Miscellaneous Questions

8. Can you provide one or more examples from the past year of how research from your unit has been used by your health system? Are you aware of any impact it may have had?

Respondent Information:

9. What is the primary sector in which you work?
- Health care delivery
 - Health plan
 - Academia
 - Other (please specify)

10. What is your primary role in your organization?
- Clinician
 - Administrator
 - Researcher
 - C-suite leader
 - Other (please specify)

11. How many years have you been in the field?
- 0-10 years
 - 11-20 years
 - More than 20 years

12. What is the name of your health system?

13. AcademyHealth may be interested in following up with you about your responses. Would you be willing to participate in a 15-to 30-minute phone call, scheduled at your convenience? If so, please provide your name and email address.

Appendix C: Interview Guide

AcademyHealth Key Informant Interview Guide

This interview is part of an AcademyHealth/VA/Kaiser Permanente project that seeks to understand how health systems determine research priorities, organize their internal research capacity, and disseminate and use research findings, both within and outside the organization. You will not be quoted or cited without your consent.

Introductory questions:

1. Prior to our outreach to you, had you heard of AcademyHealth?
2. Have you ever been a member of AcademyHealth, or are you a member now? Have you ever participated in any AcademyHealth-related events/activities?
3. From what you know of AcademyHealth, can you tell us your sense of what we do?

Section I: Purpose of research capacity

1. What is your role/involvement with your health system's research activity?
2. Recognizing the many different terms used to describe research into the delivery, organization, and financing of care, what do you call the research that your unit/health system undertakes?
3. What are the goals of the research your health system undertakes?
4. When and why was your research unit established and for what purpose(s)?

Section II: Organization of research activities

1. How big are your health system's research units? How are they organized?
2. Who is responsible for leading the health system's research unit(s)? To whom do they report within the organization?
3. How does your research unit interact or relate to your units who manage quality improvement, data analytics, benchmarking, and related activities?

Section III: Research agenda setting

1. How are your health system's research priorities determined? Who is involved in setting these priorities?
2. Can you describe how research units in your health system are funded? Through internal funding sources? External sources? Both?

Section IV: Dissemination of research findings

1. How do you determine which research findings to share, when, and with whom?
2. For those you do choose to share, how often, and in what ways?
3. Are research findings from your unit/system shared with external audiences? If so, how are they shared and with what audiences?
4. Can you provide one or two examples of how research findings have been used by your health system to improve care? Are you aware of any impact this may have had?

Section V: Challenges and opportunities facing researchers/analytic staff

1. We would like to understand a bit more about the background and skills of researchers within your research unit/health system:
 - a. What is the educational distribution of researchers in your unit/health system? How many masters versus doctoral researchers do you have?
 - b. What are the disciplines in which researchers in your unit/system are trained?
 - c. How are they trained?

- d. What are the criteria you consider when hiring?
2. What are the biggest challenges facing your research unit?
3. What resources do you think would be most helpful to researchers in your unit/system?
4. Do researchers in your unit/system attend professional conferences? If so, which ones?
5. Do researchers in your unit/system interact with other professional organizations? If so, which ones and in what ways? (e.g., attend conferences, hold membership, participate in workgroups, etc.)

Appendix D: Embedded Research Conference Agenda

Accelerating the Development of Learning Healthcare Systems through Embedded Research

February 19-21, 2019

Langham Huntington Hotel, Pasadena California

MEETING AGENDA

Tue Feb 19	DAY 1: Opening Reception, Dinner and Panel	Location
5:00 – 7:00 pm	Reception and Embedded Research Fair	Promenade Foyer
7:00 – 9:00 pm	Dinner <ul style="list-style-type: none"> • Welcome and introductions • Health system leader panel: <i>What do leaders need from embedded research to address healthcare delivery needs? What are key challenges?</i> Moderator: Lisa Simpson Panel: Castulo de la Rocha, AltaMed Andrew Masica, Baylor Scott and White Hal Yee, L.A. County Dept of Health Services 	Georgian Ballroom
Wed Feb 20	DAY 2: Workgroup Deliberations	
7:00 – 8:00 am	<i>Breakfast</i>	Georgian Ballroom
8:00 – 9:00 am	Opening Session <ul style="list-style-type: none"> • Welcome • Embedded research leader panel: <i>What aspects of your embedded research program are you most proud of? What are your key challenges?</i> Moderator: Beth McGlynn Panel: Lee Fleisher, Univ Pennsylvania Eve Kerr, Ann Arbor VA / Univ Michigan Raj Srivastava, Intermountain Healthcare • Overview of agenda and charge for the day 	Georgian Ballroom
9:00 – 10:30 am	Workgroup deliberations <ul style="list-style-type: none"> A. Organizational Arrangements B. Research Support for Management Decisions C. Data Resources and Data Use D. Strengthening the Embedded Research Community E. Accelerating Implementation of Embedded Research Output 	<ul style="list-style-type: none"> A. Consulate B. Diplomat C. Georgian Ballroom D. Ambassador E. Wentworth
10:30 – 10:45 am	<i>Morning break</i>	Georgian Ballroom

10:45 – 12:00 pm	Workgroup deliberations (continued)	
12:00– 1:15 pm	<i>Lunch</i>	Georgian Ballroom
1:15 – 3:00 pm	Workgroup deliberations (continued)	
3:00 – 3:30 pm	<i>Afternoon break</i>	Georgian Ballroom
3:30 – 5:00 pm	Workgroup deliberations (continued)	
Evening	Free time Workgroup facilitators & recorders work on presentations	
Thu Feb 21	DAY 3: Workgroup Reports; Next Steps	
7:00 – 8:00 am	Working breakfast: Workgroups reconvene to review and finalize presentations and recommendations	Georgian Ballroom
8:00 – 9:15 am	Plenary Session <ul style="list-style-type: none"> • Groups A, B, C: 30 mins • Discussants: 25 mins • Open Discussion: 20 mins 	
9:15 – 9:30 am	<i>Morning break</i>	Georgian Ballroom
9:30 – 11:00 am	Plenary Session <ul style="list-style-type: none"> • Groups D, E: 20 mins • Discussants: 20 mins • Open Discussion: 15 mins • Next Steps, Conclusion: 35 min 	Georgian Ballroom
11:00 – 12:00 pm	<i>Boxed lunches</i>	Georgian Ballroom



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Appendix E: Embedded Research Conference Participants

Accelerating the Development of Learning Healthcare Systems through Embedded Research

February 19-21, 2019

Langham Huntington Hotel, Pasadena California

PARTICIPANT ROSTER

John Adams, PhD
*Principle Senior Statistician,
Kaiser Permanente Center for
Effectiveness & Safety Research*

Terry Adirim, MD, MPH, MBA
*Deputy Assistant Secretary of
Defense for Health Services
Policy and Oversight,
Department of Defense*

Steven Asch, MD, MPH
*Director, Center for Innovation
to Implementation (Ci2i),
Department of Veterans Affairs
Palo Alto Health Care System*

David Atkins, MD, MPH
*Director, Health Services
Research and Development
Service, Department of Veterans
Affairs*

Miya Barnett, PhD
*Assistant Professor, The Gevirtz
Graduate School of Education
University of California, Santa
Barbara*

Vance Bauer
*Vice President of Research,
Oregon Community Health
Information Network*

Timothy Beebe, PhD
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and Management, School of
Public Health, University of
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Eran Bellin, MD
*Vice President, Clinical IT
Research and Development,
Montefiore Information
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Einstein College of Medicine*

Andrew Bindman, MD
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Heather Black, PhD
*Director, Healthcare Quality
Research, Merck*

George Blike, MD
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Medicine, Dartmouth Geisel
School of Medicine*

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Medical Director, Telligen

Benjamin Broder, MD
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California Permanente Medical
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Diana Buist, PhD, MPH
*Director of Research and
Strategic Partnerships and
Senior Investigator, Kaiser
Permanente Washington Health
Research Institute*

Diana Chingos, MS, MFA
*Patient Navigator and Patient
Advocate in Research*

Paul Chung, MD, MS
*Chair, Health Systems Science,
Kaiser Permanente School of
Medicine*

Deborah Cohen, PhD
*Professor and Vice Chair of
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Science University*

Ashley Collinsworth, ScD, MPH
*Director, Delivery Science, Baylor
Scott & White Health*

Douglas Corley, MD, PhD, MPH
*Director, Delivery Science and
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Permanente Northern California*

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Anne Escaron, PhD, MPH
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Chief Experience Officer, University of Miami Health System

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