Development of the Learning Health System Researcher Core Competencies

Objective: To develop core competencies for learning health system (LHS) researchers to guide the development of training programs.

Data Sources: A systematic literature review, eight telephone-based key informant interviews, structured questionnaires from five AHRQ-funded health services research (HSR) training directors, and in-person and written feedback from a panel of 19 LHS experts representing the public and private sectors, and patient perspectives.

Study Design: The competencies were developed from August to December 2016. Qualitative methods were used to elicit, refine, and prioritize the competencies.

Data Collection/Extraction Methods: Three in-person technical expert panel (TEP) consensus development meetings, combined with review input gathered through key informants and two modified Delphi surveys of the expert panel were used in an iterative process to develop the final set of competencies for LHS researchers. The development process started with a systematic literature review, which formed the basis for the initial draft of a competency domain framework. Expert panel members formed writing teams to draft competencies for 10 competency domains resulting from discussion during the first expert panel meeting. Eight key informant semi-structured telephone interviews were conducted to gather input on the completeness of the competency domain framework and to gather input on key attributes of LHS researchers. Additional written feedback on the completeness of the competency domains was obtained from five AHRQ HSR training directors using a structured questionnaire. Two online modified Delphi surveys of the TEP were fielded between the second and third expert panel meetings to iteratively review and prioritize the competencies prepared by the expert writing teams. Facilitated discussion during the third expert panel meeting was used to arrive at a final draft set of competencies and domains in the framework. Following the third expert panel meeting, the competencies were refined and reviewed by the expert panel to create the final competencies included in this report.

Principal Findings: The iterative development process yielded seven competency domains: (1) Systems Science; (2) Research Questions and Standards of Scientific Evidence; (3) Research Methods; (4) Informatics; (5) Ethics of Research and Implementation in Health Systems; (6) Improvement and Implementation Science; and (7) Engagement, Leadership, and Research Management. A total of 33 core competencies were prioritized across these seven domains.

Conclusions: The LHS researcher core competencies can be used to guide the development of learning objectives, evaluation methods, and curricula for training programs.

Learning Health System

A system in which science, informatics, incentives, and culture are aligned for continuous improvement and innovation, with best practices seamlessly embedded in the care process, patients and families active participants in all elements, and new knowledge captured as an integral by-product of the care experience.

Source: Roundtable on Value & Science-Driven Health Care. *Best care at lower cost: The path to continuously learning health care in America.* (2012) Washington, DC: The National Academies Press. Washington, DC: Institute of Medicine.

Learning Health System Researcher Definition

An individual who is embedded within a health system and collaborates with its stakeholders to produce novel insights and evidence that can be rapidly implemented to improve the outcomes of individuals and populations and health system performance.

- By ***embedded*** we mean that the researcher is part of the system when conducting the research, either as an employee or as an invited guest who assists with the development, conduct, implementation, and dissemination of research.
- ***Health systems*** refer to one or more organizations and individuals that interact to restore or promote individual and population health.
- ***Stakeholders*** are patients, caregivers, clinicians, system leaders, improvement specialists, and other individuals who interact to carry out the functions of the health system.
- The word "***rapidly***" is used to connote the need in LHS research to ensure prompt and efficient knowledge generation and application.
- ***Outcomes*** include health, well-being, care experiences, quality, and costs of care.

Learning Health System Research Competency Framework

Table 1: Systems Science Competency Domain
Domain Definition To understand how health systems operate and how to apply systems theory to research and implementation. **Competencies** 1.1: Demonstrate knowledge of how systems theories can be used to understand how the interactions of the parts of health systems operate to produce value for stakeholders. 1.2: Demonstrate systems thinking in the design and conduct of research and implementation of its findings within the context of complex health systems. 1.3: Demonstrate knowledge of the financing, organization, delivery, and outcomes of health care services and their interrelationships. 1.4: Demonstrate the ability to assess the extent to which research activities will likely contribute to the quality, equity, or value of health systems.

Table 2: Research Questions and Standards of Scientific Evidence Competency Domain

Domain Definition

To ask meaningful questions and evaluate the usefulness of scientific evidence and insights.

Competencies

2.1: Demonstrate the ability to compose feasible and timely research questions and hypotheses, incorporating stakeholder priorities, to generate evidence that informs meaningful clinical and policy decisions.

2.2: Demonstrate the ability to engage with all relevant stakeholders (patients, families, clinicians, and system leaders) in the elicitation and prioritization of research questions that address current and future stakeholder needs.

2.3: Demonstrate the ability to critically analyze and assess available scientific evidence from peer-reviewed articles, systematic reviews, meta-analyses, and gray literature to identify novel LHS questions and to judge the applicability of the evidence to a local care setting.

Table 3: Research Methods Competency Domain

Domain Definition

To conduct research within the context of complex health systems using appropriate study designs and analytic methods to assess outcomes of interest to health systems stakeholders.

Competencies

3.1: Demonstrate the ability to use theory and conceptual models in the design and interpretation of LHS research.

3.2: Demonstrate the ability to develop an appropriate observational, quasi-experimental, or experimental study design while mitigating threats to internal and external validity for research that is minimally disruptive to operations in real world health systems and practices.

3.3: Demonstrate knowledge of mixed methods and how they can be used to improve LHS research studies.

3.4: Demonstrate knowledge of how to assess multilevel determinants of health and health care disparities when designing studies.

3.5: Demonstrate the ability to select and interpret appropriate clinical, financial, and patient-centered outcomes of interest based on the concepts they measure and their measurement properties.

3.6: Demonstrate the ability to apply the principles of hypothesis testing and statistical inference to data collected routinely through the course of care as well as supplemental data from patients, providers, and health systems.

Table 4: Informatics Competency Domain

Domain Definition

To know how to use information systems to conduct LHS research and improve patient and health system outcomes.

Competencies

4.1: Demonstrate the ability to use data derived from electronic health records and other clinical information sources for research and quality improvement.

4.2: Demonstrate knowledge about additional data sources that can be linked to health system clinical data in order to augment exposure and outcome ascertainment.

4.3: Demonstrate the ability to assess data quality and apply data quality assurance processes, including error prevention, data cleaning, data monitoring, documentation, and relevant data standards.

4.4: Demonstrate knowledge of population health informatics, including disease surveillance, monitoring of community health, assessment of social and behavioral determinants of health, and geographic information systems.

4.5: Demonstrate knowledge of clinical information systems, including electronic health records, clinical documentation, computerized physician order entry (CPOE), clinical decision support systems, electronic prescribing, medical imaging, and clinical/population dashboards.

Table 5: Ethics of Research and Implementation in Health Systems Competency Domain

Domain Definition

To ensure that research and quality improvement done in health care settings adheres to the highest ethical standards.

Competencies

5.1: Demonstrate the ability to apply ethical principles in the engagement of health systems, including issues of business ethics and the importance of publishing both positive and negative findings in the public domain.

5.2: Demonstrate knowledge of what activities constitute research as opposed to quality improvement activities, and seek appropriate oversight for each.

5.3: Demonstrate knowledge of specific Health Insurance Portability and Accountability Act (HIPAA) requirements associated with varied data sources used in health systems research activities and seek appropriate approvals.

5.4: Demonstrate the ability to identify and minimize potential conflicts of interest in the design, conduct, and reporting of research conducted in health systems.

5.5: Demonstrate knowledge of ethical and legal considerations when engaging in multi-system studies for compliant collaboration and study conduct.

Table 6: Improvement and Implementation Science Competency Domain
Domain Definition To reduce avoidable variation in process and outcomes and ensure the systematic uptake of research findings in a health system. **Competencies** 6.1: Demonstrate the ability to employ specific quality improvement methods to reduce avoidable variation in clinical processes and outcomes in routine practice. 6.2: Demonstrate the ability to employ specific implementation science or quality improvement methods to study and promote systematic uptake of research findings and other effective clinical interventions into routine practice. 6.3: Demonstrate knowledge regarding when to mount larger efforts to scale up, spread, and sustain successful interventions based on strength of clinical evidence and organizational and provider readiness to change and adopt interventions.
Table 7: Engagement, Leadership, and Research Management Competency Domain
Domain Definition To engage stakeholders in all aspects of the research process and effectively lead and manage LHS research teams and projects. **Competencies** 7.1: Demonstrate the ability to build and lead research teams with diverse health system stakeholder representation. 7.2: Demonstrate knowledge of the values and communication mechanisms used by stakeholder groups involved in research in health systems. 7.3: Demonstrate the ability to translate, disseminate, and communicate the value proposition and business case for research to diverse health system stakeholders. 7.4: Demonstrate the ability to conduct effective team-based project management, employing skills in leadership, communication, negotiation, consensus building, and problem-solving. 7.5: Demonstrate the ability to develop protocols consistent with health systems needs and timelines, employing patient and clinician engagement, and using a mix of conventional and alternative funding sources. 7.6: Demonstrate the ability to implement protocols aligned with health systems operations and integrated into clinical settings, including engaging clinicians in the research process. 7.7: Demonstrate knowledge of participatory research approaches that foster participation and engagement of vulnerable populations.

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