The Hospital Medicine Reengineering Network (HOMERuN): A Learning Organization Focused on Improving Hospital Care

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Abstract

Converting the health care delivery system into a learning organization is a key strategy for improving health outcomes. Although the collaborative learning organization approach has been successful in neonatal intensive care units and disease-specific collaboratives, there are few examples in general medicine and none in adult medicine that have leveraged the role of hospitalists nationally across multiple institutions to implement improvements. The authors describe the rationale for and early work of the Hospital Medicine Reengineering Network (HOMERuN), a collaborative of hospitals, hospitalists, and multidisciplinary care teams founded in 2011 that seeks to measure, benchmark, and improve the efficiency, quality, and outcomes of care in the hospital and afterwards. Robust and timely evaluation, with learning and refinement of approaches across institutions, should accelerate improvement efforts. The authors review HOMERuN's implemented clinical and organizational practices associated with better patient outcomes. These organizations started by measuring and benchmarking quality of care across participating institutions, defining variations in care, and then they successfully developed programs that improved patient outcomes among these institutions and disseminated knowledge to the larger community.

The emergence and growth of the field of hospital medicine sets the stage for the creation of a new learning organization with great potential for impact. Hospitalists are responsible for the care of an increasingly large proportion of hospitalized patients on general medical, surgical, and specialty services. Moreover, although the public health impact of learning networks within some disciplines has been constrained by the small numbers of providers and patients in the network and the relatively specialized issues involved, the broad range of hospital medicine offers the potential to affect the care of substantial numbers of patients, including more than half of hospitalized Medicare patients. With systems-based care improvement seen as a core competency in hospital medicine, many hospitalists are deeply involved in quality improvement (QI) efforts in their institutions (e.g., increasing appropriate use of venous thromboembolism prophylaxis or ensuring better transitions of care at the time of discharge). These efforts thereby provide an opportunity to maximize improvements in outcomes, health care delivery, and knowledge generation—systems improvements that go well beyond simply improving the care for an individual patient population. With the rapid implementation of electronic health records by hospitals and concomitant data warehouses, hospitalists can help lead hospitals to leverage their data-rich environments to become learning organizations that more easily measure and share empirical measures of patient care, learn from natural variations in care, determine best practices, and use data to iteratively refine improvements in care delivery. The benefits of such work are magnified when several disparate organizations can collaborate in these efforts.

Here, we describe the rationale behind and early work of the Hospital Medicine Reengineering Network (HOMERuN), a nation-wide learning organization focused on measuring and improving the outcomes of hospitalized patients. We describe the network, its aims and collaborative model, and our initial project focused on transitions of care,
The Rationale for HOMERuN

HOMERuN was founded in 2011, after a series of informal discussions between investigators framed the need for a nationally based network of hospital medicine practices focused on sharing data for performance improvement and research purposes. The overarching goal of HOMERuN is to improve the outcomes of hospitalized patients by creating and expanding a learning organization that can discover, disseminate, implement, and improve best practices (new and existing) to make care within hospitals and after discharge safer, more effective, and less expensive. As such, HOMERuN serves as a laboratory within which we can test innovative care models to determine whether they actually result in better patient outcomes. For those found to be effective, the network will facilitate dissemination and implementation across sites. Importantly, HOMERuN seeks to meet the dual goals of achieving the model of a learning collaborative that provides direct benefit to its member institutions, as well as a more traditional “research” collaborative, which aims to produce knowledge generalizable to the larger scientific and medical community. Moreover, sharing and benchmarking risk-adjusted outcomes, quality measures, and cost data generated from individual sites across the HOMERuN network will be increasingly important for measuring and improving the value of health care on a continual basis.

HOMERuN is founded on four guiding principles. First, the growing number of hospitalists and their increasingly central roles in hospital operations can be leveraged to accelerate the speed and effectiveness of health care improvements. Second, the viewpoints and values of patients and frontline clinical providers from all disciplines will drive the work of HOMERuN. Third, reliable data must support decision making. Given the currently limited spectrum of quality measures applicable to hospitalists’ practice, we believe that detailed analyses of hospitalist care at multiple sites are essential to identify reliable and useful measures. Finally, the HOMERuN learning network will serve as a resource to develop and disseminate knowledge from the network to health systems nationwide. Each of these principles is analogous to the principles of community-based participatory research (CBPR), a parallel that we expand on within this discussion.

HOMERuN and Existing Networks

Although a large number of clinical research and benchmarking networks exist, HOMERuN fills an unmet need in the field of hospital medicine and has potential scope exceeding that of most other networks. Traditional research networks generally carry out efficacy studies (such as traditional randomized controlled trials) within tightly defined patient groups, rather than focusing on the effectiveness of interventions in real-world environments and their implementation among broader patient populations. On the other hand, traditional quality improvement collaboratives, which may be broader in scope, generally prioritize experiential learning and narrative over empirical tests for success, thereby limiting these collaboratives’ ability to prove improvement in clinical outcomes. Other national QI collaboratives focus on data collection and sharing followed by benchmarking of performance, then relying on local teams to implement changes to improve outcomes, often with little specific guidance on best practices.

Between these two ends of the spectrum lie models that have been useful in drawing HOMERuN’s initial road map. For example, the Northern New England Cardiovascular Cooperative has improved outcomes of cardiac surgery through a combination of sharing risk-adjusted outcomes data and structured collaboration around methods to improve care. The Vermont Oxford collaborative has produced measurable improvements in neonates’ outcomes through similar simultaneous focus on linking attention to outcomes and collaborative activities. Both groups have been able to maintain effective collaborative structures, measure care patterns and patient outcomes rigorously, and provide generalizable results.

The Principles of CBPR Guide HOMERuN

CBPR is an approach to connecting those who conduct translational research and those who will benefit from it. CBPR represents a set of principles that guide the planning, implementation, and evaluation of research in collaboration with community partners, and thus provides a useful framework for engaging health care systems in translational research activities.

Although most CBPR models in health and health care have been outpatient based, this approach can be used to create a model for establishing infrastructure within hospitals systems as well. CBPR in the outpatient setting focuses on the population-based community, because most care is administered by patients and their caregivers between encounters with the medical system.

HOMERuN’s guiding principles can be aligned with the principles of CBPR (Figure 1). First, HOMERuN began by recognizing its community—patients, hospitalists, primary care clinics and doctors, hospitals, and members of the implementation teams—and then building on their strengths and resources. In the HOMERuN model, the focus remains patient-centered, but also explicitly engages health care provider teams who participate in the learning process but are potentially affected by the results. In addition, the HOMERuN CBPR model engages groups (such as the hospitals and payers) who not only provide financial and personnel support for QI but are also often supporting hospitalist groups themselves. Particular attention focuses on involving patients and families in the process of choosing improvement targets and tailoring interventions so that patient-centered care is delivered. The first accountable care organizations have emerged, and the HOMERuN approach would align well with emerging accountable care systems.

A broader way to use CBPR principles to improve hospital outcomes will involve using knowledge and experiences from our sites to inform HOMERuN members, an approach that will increase the likelihood that HOMERuN’s efforts can produce broader change. Collaborative decisions should be supported and driven by data so that decisions push the
team toward more effective and efficient care in a cyclical and iterative fashion. Generalizability will be increased by providing empirical, rigorously evaluated tests of standard interventions within the network while recognizing the variability in practices (and contexts) that exist across sites in the network. Identifying variation in practice and "best performers" also provides the opportunity for more experienced or higher-performing systems to "mentor" other sites. Lastly, lessons learned about more and less successful implementation of best practices, based on our network’s experience and using mixed-methods analyses, can be used to improve implementation success in the future, both within the network and more generally.

**Description of HOMERuN Collaborative Sites**

A list of the founding HOMERuN sites is provided in Table 1. HOMERuN sites are primarily teaching hospitals, thereby potentially limiting generalizability of our findings during this early phase of development. Having said this, HOMERuN sites are diverse geographically and include safety-net hospitals as well as non-university-affiliated academic medical centers.

In keeping with its strategy of focusing on empirical measures of effectiveness, HOMERuN is developing a set of performance measures that will be collected and benchmarked across participating sites. In developing these measures, HOMERuN is also creating a comprehensive site-survey tool useful in understanding the availability and use of various care systems thought to improve care (e.g., regarding transitions of care, as described in more detail below).

Most important, the process of measure development in this area of study has kept our focus on patient-centered measures and has cemented connections between hospitalists and stakeholders (e.g., case managers, nurses, QI staff) within each site, as well as across sites of the HOMERuN group.

**HOMERuN Data Infrastructure**

In the short term, HOMERuN projects focus on patient and physician perspectives of gaps in care, data that are not obtainable from preexisting published research or clinical data warehouses. As a result, HOMERuN is using a secure data collection tool (REDCap) to support manually obtained data collection. REDCap allows the development of chart tools, patient questionnaires, or physician surveys for data collection, and the data can then be shared with HIPAA-appropriate protections. Longer-term, HOMERuN will complement these data with automated, electronically derived data from electronic medical records, laboratory data, and billing data. Importantly, REDCap tools allow us to validate electronically collected data.
data reasonably quickly—a key step in validating our data across sites and towards identifying where directly collected data can be transitioned to electronic sources.

HOMERuN’s First Project: Hospital Discharge Transitions of Care

In keeping with HOMERuN’s goals of maximizing the four key domains of its research model, the network selected a project seeking to measure and benchmark the quality of transitional care across our institutions, to understand causes of hospital readmissions from the patient perspective, to develop a process whereby readmissions could be classified as preventable, and—after initial screening for preventable causes—to identify opportunities for future interventions.

This project adheres to HOMERuN criteria for projects in that it is of intense interest to frontline caregivers and patients, provides the opportunity to develop and test new delivery system innovations, emphasizes learning among HOMERuN group participants, and permits empirical tests, both in terms of identifying factors that may be associated with preventable readmission risk as well as providing benchmarking information regarding best practices.

The overall goal of this future project will be to implement and then refine tools needed to characterize readmissions and provide a framework for collaborative efforts to reduce readmissions based on benchmarked performance data leading to targeted, patient-centered interventions. To our knowledge, this will be the first national examination of transitional care practices using patient-level data and the first to examine explicitly what patients and doctors think cause readmissions. This sequence of projects will support a number of ongoing efforts at our sites, does not rely on adoption of a specific care transitions model, and will provide an opportunity to engage trainees (e.g., fellows, residents) in the collaborative research process. More important, it will provide useful, short-turnaround information on risk factors for readmissions, as well as collaborative information needed to accelerate improvements that explicitly address needs of patients in the discharge process and afterwards; these are the key elements of a “learning organization.”

Based on part on the BOOST model developed by Williams and Coleman,18 as well as work by Schnipper et al,19 the HOMERuN Transitions of Care Program is carrying out several aims.

Aim 1: Site-level transitional care practices

Interpretation of transitional care measures requires understanding each site’s systems, such as those used for managing documentation or supporting medication reconciliation, or roles of particular caregivers (e.g., case management, or whether or not interns or attendings document discharge summaries). To this end, the HOMERuN team has developed and implemented a site-based survey that is used to provide a framework within which each site’s individual performance data are collected, and that can be used to compare sites and identify best practices.

Aim 2: An audit to measure the quality of transitional care at the individual patient level

This audit will measure care among patients discharged from HOMERuN sites (e.g., whether a discharge summary included appropriate follow-up information and pending test data, whether a postdischarge phone call was made, whether goals of care were discussed in patients with terminal illnesses). HOMERuN transitional care measures were developed on the basis of those available in published literature (such as the Care Transition Measure, three-item scale), measures proposed by national agencies such as the Physician Consortium for Performance Improvement and the National Quality Forum, as well as measures developed by experts in our group (such as whether elements of a high-quality medication reconciliation process were documented at discharge). In many sites, this chart review is incorporated into ongoing auditing activities with minimal incremental work. The goals of this work are twofold: to compare and benchmark best practices at each of our sites, in conjunction with the site survey, above; and to determine whether, after thorough risk adjustment, process measures can be correlated with readmission risk across institutions. Such work can both validate our risk adjustment models and provide at least some evidence of the importance of certain processes of care in reducing readmission risk.

Aim 3: Readmission assessment

Readmission assessments identify potential causes and preventability of readmissions by aggregating information.
A comprehensive review of readmissions will provide invaluable information to the leadership of each of our sites, as well as to the medical community at large, regarding where resources should be dedicated to prevent future readmissions.

**Next Steps and Sustainability**

Sustainability of the HOMErU N network will ultimately rely on our ability to develop and implement care innovations in a testable fashion, and in our ability to measure performance and deliver improvements—through benchmarking, collaboration, and effective dissemination of best practices—to our stakeholders. The former activities are of interest to research funders, with the Patient Centered Outcomes Institute being a key future funder. The latter function is traditionally of interest to health systems and payers. We are confident that our initial suite of measures involved in the Transitions of Care program will meet both potential audiences’ needs and pave the way for long-term sustainability.

Transforming the U.S. health care system into a learning organization—one that can effectively engage frontline staff in a continuous process of improvement and that does so through rigorous analysis of processes and outcomes of care—has never been a greater priority. In this article we have described the initial steps we have taken to create a learning network in hospital medicine. Although learning networks may be new to the field of hospital medicine, they have an impressive track record in other clinical fields, where existing organizations have built a strong legacy of collaborative learning, founded on measurement of outcomes and sharing of best practices. Although in a nascent stage, we hope that over time HOMErU N will grow to meet the needs of hospitals, hospitals and, most important, the patients for whom they care.

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**References**


