Title
The Hospital Medicine Reengineering Network (HOMERuN)

Authors
Auerbach, Andrew D
Patel, Mitesh S
Metlay, Joshua P
et al.

The Hospital Medicine Reengineering Network (HOMERuN): A learning organization focused on improving hospital care

Andrew D. Auerbach, MD, MPH[1], **Mitesh S. Patel, MD, MBA**[2], **Josh Metlay, MD, PhD**[2], **Jeffrey Schnipper, MD, MPH**[3], **Mark V. Williams, MD**[4], **Edmondo Robinson, MD, MBA**[5], **Sunil Kripalani, MD, MSc**[6], and **Peter K. Lindenauer, MD, MSc**[7]

[1]University of California, San Francisco Division of Hospital Medicine, San Francisco CA

[2]University of Pennsylvania School of Medicine, Section of Hospital Medicine, Philadelphia PA

[3]Brigham and Women's Hospital, Boston MA

[4]Northwestern University Feinberg School of Medicine, Division of Hospital Medicine, Chicago IL

[5]Wilmington Hospital, Wilmington DE

[6]Vanderbilt University Medical Center, Nashville TN

[7]Baystate Medical Center, Center for Quality and Safety Research, Springfield MA

Abstract

Converting the health care delivery system into a learning organization is a key strategy for improving health outcomes. While the learning organization approach has been successful in neonatal intensive care units and disease specific collaboratives there are few examples in general medicine and fewer still have leveraged the role of hospitalists to implement improvements. This

paper describes the rationale for and early work of the Hospital Medicine Reengineering Network (HOMERuN), a collaborative of hospitals, hospitalists, and care teams whose overarching purpose is to use data to guide collaborative efforts aimed at improving the care of hospitalized patients. We review HOMERuN's collaborative model, which focuses on a community-based participatory approach modified to include hospital-based as well as the larger community, and HOMERuN's initial project focusing on care transition improvement using perspectives from the patient and caregiver.

Introduction

The Institute of Medicine described the need for the US health care system to develop into a 'learning organization'[1]. Learning organizations are characterized by their engagement of front-line caregivers and health system leaders, commitment to making improvement a key feature of professional practice, and capacity to access and use data to inform the learning process.

The concept of the learning organization is not entirely new to healthcare. Established groups such as the Northern New England Disease Study Group (focused on cardiovascular surgery)[2] and the Vermont Oxford Collaborative[3,4] (focused on neonatal intensive care) have rigorously developed, shared and implemented clinical and organizational practices associated with better patient outcomes. These organizations successfully developed programs that improved patient outcomes among participating institutions and disseminated knowledge to the larger community.

The emergence and growth of the field of Hospital Medicine has set the stage for the creation of a new learning organization with tremendous potential for impact. Hospitalists are responsible for the care of an increasingly large proportion of hospitalized patients on general medical, surgical, and specialty services[5]. Moreover, while the learning networks of some disciplines have 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 impact the care of more than half of hospitalized Medicare patients[6]. Moreover, many hospitalists are deeply involved in quality improvement efforts in the hospital (e.g. increasing appropriate use of venous thromboembolism prophylaxis or ensuring better transitions of care at the time of discharge) thereby providing an opportunity to maximize improvements in outcomes, healthcare delivery, and knowledge generation— systems improvements that go well beyond simply improving the care for an individual patient population. Additionally, hospitals have become increasingly data-rich environments, permitting hospitalists the ability to measure and share empirical measures of patient care more easily.

This paper describes 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.

Rationale for HOMERuN

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 practices (new and existing) to make care within hospitals and after discharge safer, more effective, and less expensive[7]. As such, HOMERuN will serve 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 can facilitate dissemination and implementation across sites. Importantly, HOMERuN seeks to meet the dual goals of achieving the model of a learning collaborative that delivers knowledge to its members, as well as a more traditional 'research' collaborative, which aims to produce generalizable knowledge to the larger scientific community. Moreover, sharing and benchmarking risk-adjusted outcomes, quality, and cost data generated from individual sites across the HOMERuN network will be increasingly important for measuring and improving the value of healthcare[8] 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 healthcare improvements. Second, the needs of front-line clinical providers must drive priorities for the HOMERuN network. Third, reliable data will support decision-making. Given the currently limited spectrum of quality measures applicable to hospitalists' practice, we believe detailed analysis of hospitalist care at multiple sites is 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)[8], a parallel that we expand on within this discussion.

HOMERuN and existing networks

While 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 (e.g. ARDSnet) generally carry out efficacy studies (such as traditional randomized controlled trials) rather than focusing on the development and testing of strategies designed to translate knowledge into practice. Further, they do so within tightly defined clinical patient groups, and thus often focus on questions that may have less direct impact on day-to-day clinical practice. On the other hand, traditional quality-improvement collaboratives generally prioritize experiential learning and narrative over empirical tests for success, thereby limiting these collaboratives' ability to develop generalizable recommendations.

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[2]. The Vermont Oxford collaborative has produced measurable improvements in neonates' outcomes through similar simultaneous focus on linking attention to outcomes and collaborative activities[9]. Both groups have been able to maintain effective collaborative

structures, measure care patterns and patient outcomes rigorously, and provide generalizable results. In this way, NECC and Vermont Oxford– and HOMERuN – can rightly be called community based participatory research organizations.

Principles of Community-Based Participatory Research guide HOMERuN

Community-based participatory research (CBPR) is an approach to connecting those who conduct translational research and those who will benefit from it[8]. CBPR represents a set of principles that guide the planning, implementation and evaluation of research in collaboration with community partners [10], and thus provides a useful framework for engaging health care systems in translational research activities.

Although most CBPR models 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. In a hospital-based CBPR, community engagement must target patients, but must also explicitly engage health care provider teams who will not only participate in the learning process but also potentially be affected by the results and groups (such as the hospitals and payors) who not only providing financial and personnel support for quality improvement, but are also often supporting hospitalist groups themselves [11].

Each of HOMERuN's four 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 – then building upon their strengths and resources. 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. As of the time of this paper's preparation, the details of accountable care organizations remain unclear, but the HOMERuN CBPR model would fit neatly into the accountable care model.

A broader way to use CBPR 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 pushing the team toward more effective and efficient care in a cyclical and iterative fashion[12]. Generalizability will be increased by providing empirical tests of change within our group while recognizing the variability in practices (and contexts) which exist in our group; variation in practice also provides the opportunity for more experienced or higher performing systems to 'mentor' other sites [13].

Description of HOMERuN Collaborative sites

A list of the founding HOMERuN sites is provided in Table 1. While HOMERuN sites are primarily teaching hospitals, they are diverse geographically; HOMERuN also includes two safety-net hospitals and one rural medical center.

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 transitions of care (such as use of an automated discharge summary). We have an initial focus on care transitions, and believe this exemplifies HOMERuN's attention to questions of critical interest to many stakeholders in Hospital Medicine. Most importantly, the process of measure development in this area of study has cemented connections between hospitalists and stakeholders (such as case managers, nurses, quality improvement staff) within each site, as well as across sites of the HOMERuN group.

Data infrastructure

In the short term, HOMERuN projects focus on patient and physician perspectives of gaps in care, data which are not obtainable from preexisting clinical data. As a result, in the short term HOMERuN is utilizing a secure data collection tool (RedCAP)[14]. RedCAP allows the development of chart tools, patient questionnaires, or physician surveys, which produce data then made available with appropriate data restrictions. Longer-term, HOMERuN will move towards automated, electronically-derived data from electronic medical records. Importantly, RedCAP tools allow us to validate electronically-collected data reasonably quickly – a key step in validating our data across sites and towards identifying places where directly collected data can be transitioned to electronic sources.

HOMERuN Transitions of Care Program

In keeping with HOMERuN's goals of maximizing the four key domains of its research model, it selected a project seeking to understand causes of readmissions from the patient perspective, to develop a progress whereby readmissions could be classified as preventable, and – after initial screening for preventable causes – identify opportunities for future interventions.

This project adheres to HOMERuN criteria for projects in that it 1) Is of intense interest to front line caregivers, 2) Provides the opportunity to develop and test new delivery system innovations, 3) emphasizes learning among HOMERuN group participants, and 4) Permit 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 pilot study 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 multicenter examination of care coordination practices using patient level data, and the first to explicitly examine 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 (e.g. RED, BOOST), and will potentially provide an opportunity to engage trainees (e.g. Fellows, residents) in the collaborative process. More importantly, 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 in part on the BOOST model developed by Williams[15] and colleagues, as well as work by Kripalani and Schnipper[16], the HOMERuN Transitions of Care Program is carrying out several aims.

1. <u>An audit to measure the quality of care coordination</u> (e.g. whether a discharge summary included diagnosis data) among patients discharged from HOMERUN sites. HOMERUN Care Coordination measures were developed based on those available in published literature (such as the Care Transition Measure, 3 item scale), measures proposed by national agencies such as PCPI and NQF, 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.

2. <u>Site level Care Coordination practices</u>: Interpretation of care coordination measures requires understanding each site's systems, such as those used for managing documentation, or roles of particular caregivers (e.g. case management, 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 performance data can be interpreted.

3. <u>Readmission Assessment</u>: Readmission assessments identify potential causes and preventability of readmissions by comparing information gained from patient interview, as well as surveys of the patient's primary care physician, their past inpatient attending physician, and their current inpatient attending physician. These data are reviewed by a separate two-physician team, who then makes a judgment regarding whether the readmission was preventable, potential contributing causes, and areas for potential improvement.

Conclusions

Transforming the US healthcare system into a learning organization – one that can effectively engage front line 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 paper we have described the initial steps we have taken to create a learning network in hospital medicine. While learning networks may be new to our young field, they have an impressive track record in the inpatient setting –organizations like the Northern New England Disease Study Group and the Vermont Oxford Network have each built a strong legacy of collaborative learning, founded on measurement of outcomes and sharing of best practices. While in a nascent stage, we hope that over time HOMERuN will grow to meet the needs of hospitalists, hospitals and, most importantly, the patients for whom they care.

Acknowledgments

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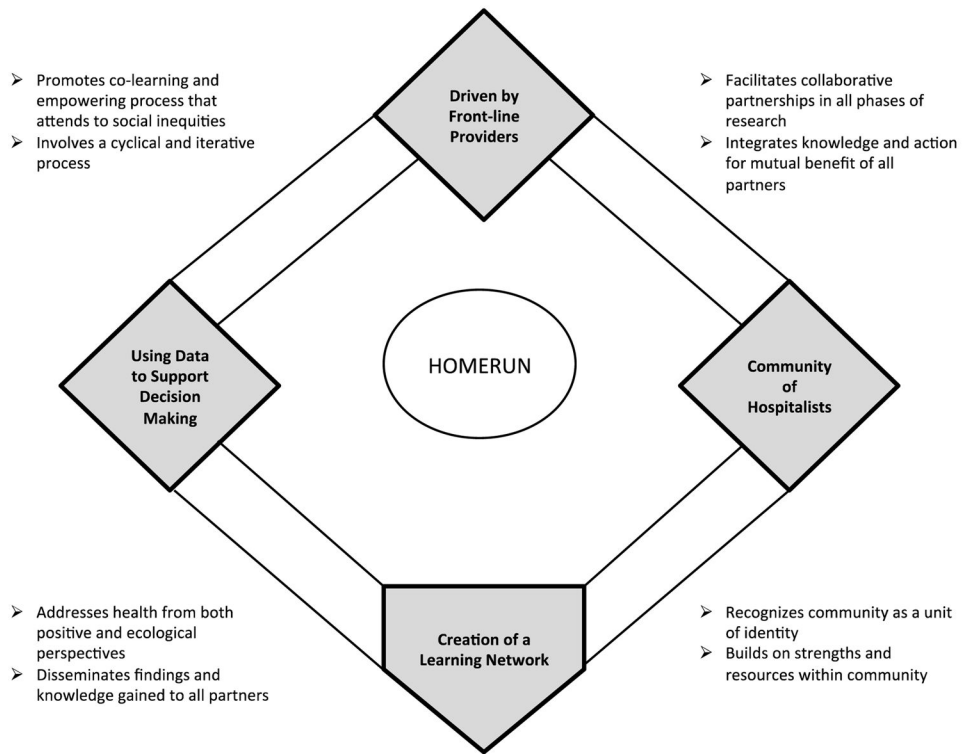
Figure 1.
Components of the HOMERuN community based participatory research model

Table 1

Initial HOMERuN sites

Site	Hospital type
UCSF (Co-coordinating Center)	University
Baystate Medical Center (Co-coordinating Center, Springfield MA)	Community teaching
San Francisco General Hospital	University/Safety net
Beth Israel Deaconness Medical Center (Boston, MA)	University
Brigham and Women's Hospital (Boston, MA)	University
University of Pennsylvania (Philadelphia PA)	University
University of Michigan Hospital (Ann Arbor, MI)	University
University of California, Davis (Davis, CA)[*]	University
Vanderbilt University Medical Center (Nashville, TN)	University
University of Chicago (Chicago, IL)	University
Northwestern Memorial Hospital (Chicago, IL)	University
University of Washington, Harborview Hospital (Seattle, WA	University/Safety net
California Pacific Medical Center (Sutter Hospitals, San Francisco CA)	Community teaching

[*] Data infrastructure only