

Health Systems Innovation at Academic Health Centers: Leading in a New Era of Health Care Delivery

Andrew L. Ellner, MD, MSc, Somava Stout, MD, MS, Erin E. Sullivan, PhD, Elizabeth P. Griffiths, Ashlin Mountjoy, and Russell S. Phillips, MD

Abstract

Challenged by demands to reduce costs and improve service delivery, the U.S. health care system requires transformational change. Health systems innovation is defined broadly as novel ideas, products, services, and processes—including new ways to promote healthy behaviors and better integrate health services with public health and other social services—which achieve better health outcomes and/or patient experience at equal or lower cost. Academic health centers (AHCs) have an opportunity to focus their considerable influence and expertise on health systems

innovation to create new approaches to service delivery and to nurture leaders of transformation. AHCs have traditionally used their promotions criteria to signal their values; creating a health systems innovator promotion track could be a critical step towards creating opportunities for innovators in academic medicine. In this Perspective, the authors review publicly available promotions materials at top-ranked medical schools and find that while criteria for advancement increasingly recognize systems innovation, there is a lack of specificity on metrics beyond the traditional yardstick of

peer-reviewed publications. In addition to new promotions pathways and alternative evidence for the impact of scholarship, other approaches to fostering health systems innovation at AHCs include more robust funding for career development in health systems innovation, new curricula to enable trainees to develop skills in health systems innovation, and new ways for innovators to disseminate their work. AHCs that foster health systems innovation could meet a critical need to contribute both to the sustainability of our health care system and to AHCs' continued leadership role within it.

Health care costs threaten the viability of the U.S. economy and the ability to invest in other social goods such as education and infrastructure.¹ Despite spending nearly twice as much per capita on health care as most other high-income countries, quality and health outcomes in the United States are mediocre.^{2,3} Substantial disparities in care exist,⁴ as do inefficiencies and waste.⁵ Moving aggressively forward to fix our health system is a national priority.

Academic health centers (AHCs) in the United States have made extraordinary contributions in basic science and clinical research. However, AHCs are only slowly becoming hubs for health systems innovation and may require fundamental changes to thrive in the current health care climate.⁶ Although innovation is the purview of the private, for-profit sector

in most areas of our economy, there are several reasons for AHCs to embrace and promote health systems innovation. First, unlike the private, for-profit sector, AHCs are uniquely positioned to span the continuum from basic scientific research to implementation in clinical and community settings.⁷ Second, academia has a mission to rigorously evaluate and disseminate the findings of experimentation. Third, AHCs serve many of the most medically and psychosocially complex patients in our society, who also disproportionately contribute to total health care expenditure^{8,9}; health systems innovations at AHCs that promote efficiency and value could directly impact overall health expenditures. Fourth, unless AHCs act to constrain rising costs of care, society's capacity to invest in biomedical research at AHCs may be undermined. Finally, AHCs are responsible for training the future health care workforce. Without creating an environment at AHCs that supports health systems innovation, it is difficult to envision producing health care professionals capable of working within and leading innovative and high-value approaches to health care.

In this Perspective, we argue that increased support for and promotion

of health systems innovators at AHCs are critical for the advancement of U.S. health care goals. We first define health systems innovation, distinguishing it from biomedical innovation and quality improvement (QI), and then examine career opportunities for those who will lead health systems innovation. We review opportunities for health systems innovators to be promoted and conclude with suggestions for additional ways to foster health systems innovation at AHCs.

Defining Health Systems Innovation

Amid calls for¹⁰ and literature on¹¹ innovation in health service delivery or practice, clearly defining terms is a crucial step towards encouraging growth of the field. Because academic promotions criteria increasingly recognize biomedical innovation and QI, it is important to precisely distinguish health systems innovation from these concepts.

Health systems innovation versus biomedical innovation

Biomedical research, in the form of basic scientific and clinical research, and biomedical innovation, in the form of new technologies and approaches for

Please see the end of this article for information about the authors.

Correspondence should be addressed to Andrew L. Ellner, Harvard Medical School Center for Primary Care, 635 Huntington Ave., 2nd Floor, Boston, MA 02115; telephone: (617) 432-2222; e-mail: Andrew_Ellner@hms.harvard.edu.

Acad Med. 2015;90:872–880.

First published online March 2, 2015
doi: 10.1097/ACM.0000000000000679

preventing, diagnosing, and treating diseases, have long flourished at U.S. AHCs.¹² Biomedical technological innovation creates new devices and pharmaceuticals that save and extend lives and drive economic growth, but may also be a source of increased health care expenditures.¹³ The increase in costs sets the stage for a new round of innovation aimed at improving care outcomes and patient experience while reducing costs.

Looking toward global needs in the 21st century, experts have called for a new wave of medical education reforms on par with those touched off by the Flexner Report, “a third generation [of reforms] ... that should be systems based to improve the performance of health systems by adapting core professional competencies to specific contexts, while drawing on global knowledge.”¹⁴ Consistent with this and other recent reports and articles,^{15–18} complementary work at AHCs could focus on developing and continuously improving systems that produce better health at equal or lower cost, and better patient and provider experience of care. Table 1 provides examples of current health systems innovations emanating from AHCs.^{19–31} These innovations are focused on improving systems of care, rather than clinical management of specific diseases. Several focus on patient populations with attributes that make them particularly vulnerable to poor health outcomes, and all offer potential to reduce costs while improving health care quality.

The World Health Organization defines health systems as comprising “all organizations, institutions, and resources devoted to producing actions whose primary intent is to improve health.”³² In light of the importance of behaviors, environment, and social circumstance as determinants of health,³³ health systems innovation will reach outside of hospitals, clinics, electronic medical records, and other traditional approaches and infrastructure for health service delivery. Such work will likely include new approaches to better integrating health care delivery with public health, policy, and the delivery of other social services^{34–36} and promoting healthy behaviors.³⁷

QI versus innovation

Theories of quality and innovation are highly developed within management literature. Both are sources of sustained

competitive advantage and improved organizational performance that enable firms to thrive in the global economy.^{38–43} Although health care organizations and systems may not be as explicit in seeking competitive advantages compared with firms in other sectors, improving organizational performance is critical for increasing efficiency, improving care, and delivering greater value.⁴⁴

The focus on U.S. health care quality over the last few decades was preceded by a similar focus on QI in other sectors. As global competition increased in the late 1980s, firms prioritized total quality management (TQM), viewing continuous improvement as the only way to survive.⁴² The most emblematic example of TQM, the Toyota Production System, involved an approach that focused on the customer and continual QI through waste reduction and tightly integrated up- and downstream processes as part of a lean value chain.^{45,46}

Berwick⁴⁷ suggested adapting these principles to health care; the ideas gained mainstream attention though Institute of Medicine reports identifying quality in health care as a problem and QI as a solution.^{48,49} In this context, QI is defined as “systematic, data-guided activities designed to bring about immediate improvements in health care delivery in particular settings” that are “an intrinsic part of normal health care operations.”⁵⁰ QI encompasses the use of plan–do–study–act cycles or other approaches to continuously improving care processes. In health care, as in management, QI connotes a *way of working* involving customer or patient focus and continual process improvement.

Whereas TQM and QI are specifically defined, “innovation” is viewed more broadly. Innovation has been variously defined to include a change in product; change in production process; change in application or use of product or process; new products or processes; use of by-products; or technical services to customers.⁵¹ Scholars have defined several types of innovation based on certain attributes: radical versus incremental⁵²; sustaining versus disruptive⁵³; competence enhancing versus competence destroying⁵⁴; product versus process⁵⁵; and technical versus administrative.⁵⁶ Omachonu and Einspruch⁵⁷ defined health care

innovation as “the introduction of a new concept, idea, service, process, or product aimed at improving treatment, diagnosis, education, outreach, prevention and research, and with the long term goals of improving quality, safety, outcomes, efficiency, and costs.” Thus, the emerging understanding of health care innovation, and what we use here to define health systems innovation, not only encompasses specific QI activities, focused on continuous process improvement, but also other types of novel activities, such as the development of new products or services that produce better health, or better experience of care, at equal or lower cost.¹⁰

The University of New Mexico School of Medicine’s Project ECHO (Extension for Community Healthcare Outcomes) illustrates the distinction between QI and health systems innovation. In the ECHO model, primary care physicians manage hepatitis C virus (HCV) with videoconferencing support by specialists. QI efforts to improve care for HCV might have focused on testing small, incremental improvements to referral processes, communication, or the implementation of established clinical guidelines. Project ECHO demonstrated a new paradigm of care, using technology and education to empower primary care clinicians across New Mexico to manage HCV in their clinics, fundamentally changing where care was provided and by whom. QI likely played an important role in fine-tuning the model, but the innovation was a more radical departure from usual care.

Promotions Pathways for Health Systems Innovators

Fostering health systems innovation at AHCs will require career pathways for health systems innovators, including promotion opportunities. Some medical schools have acknowledged the growing dissonance between traditional promotions criteria, developed decades ago to reward individual achievement and rapid career advancement—particularly in basic science research—and current realities. Today’s junior faculty may be engaged in highly collaborative work and have less personal flexibility to meet traditional promotion criteria.⁵⁸ Further, many talented trainees are interested in careers devoted to fixing health care systems.

Table 1

Examples of Health Systems Innovations at AHCs, 2014^a

Institution	Innovation	Problem	Approach/solution	Reported outputs and outcomes	Other potential measures of impact
University of California, San Francisco School of Medicine ^{19–21}	eReferral	Limited access for primary care physicians and patients to specialists in San Francisco's safety net hospitals and clinics; problematic paper-based referral system	- Electronic review of specialist referral requests from primary care physicians - Facilitated communication between providers - Designated specialist "reviewer" who processed and evaluated incoming referrals	- Effective use of specialist time, only seeing complex cases - Reduced wait times for patients - Streamlined patient info allowed for accurate diagnosis and follow-up	- Collaboration across medical specialty areas, clinics, AHCs, and government agencies - Improved efficiency and work absenteeism among patients, by avoiding unnecessary visits
University of New Mexico School of Medicine ^{22–24}	Project ECHO	Limited access to specialists and training opportunities for health care providers in rural and underserved areas	Physicians and health care staff connected with specialists via teleconferencing system in a "virtual clinic"	- Increased training/collaboration opportunities for health professionals - Reduced patient travel times to access specialists - Effective way to treat hepatitis C	- Built a thought community within the network "Demonopoliz(ed) medical knowledge"²² - Adopted by other AHCs; received multiple awards and other recognition - Model applied to other disease conditions
Boston University, Boston Medical Center ²⁵	Project RED	High hospital readmission rates among patients with complex conditions; poor coordination of care between hospital and primary care physician	Patients assigned to discharge advocates who helped coordinate care; checklist outlined how to work with patient during discharge; use of "virtual patient advocates" to deliver discharge plan	- Primary care physicians able to address medical issues; decreased hospital readmission rates - Decreased costs related to hospital readmission	- Received numerous awards and recognition for patient safety and innovation - Adopted by other AHCs
Stanford University School of Medicine ^{26,27}	Chronic Disease Self-Management Program	Patients lack self-efficacy support as they work to address their chronic diseases	Six-week course given by trained facilitators to patients in community settings; designed to create a space where patients supported each other as they worked toward better health	- Effective in helping patients control their chronic conditions - Reduced the number of readmissions and days spent in hospital	- Mobile app developed for participants to help them manage their progress - Delivered health programming in community settings; strengthened partnerships and collaboration - Replicated globally
Massachusetts General Hospital ^{28–31}	MassGeneral CMP	Medicare patients with complex conditions were about 10% of the Medicare patient population and reflected about 70% of Medicare costs	Added nurse case managers to primary care groups to coordinate care for elderly patients enrolled in the program; these nurses helped with discharge plans, explained medications, and made sure patients had psychosocial supports	- Reduced hospital readmissions, emergency room visits, and mortality rates - Increased patient satisfaction - Reduced health care costs	- Centers for Medicaid and Medicare Services continued support after initial demonstration project, and program was successfully expanded to two other hospitals - Primary care providers reported having increased work-life satisfaction - A CMP icon was added to MGH's electronic medical record system that allowed for streamlined care coordination across the MGH system

Abbreviations: AHC indicates academic health center; ECHO, Extension for Community Healthcare Outcomes; RED, reengineered discharge; CMP, Care-Management Program; MGH, Massachusetts General Hospital.

^a"Health systems innovations" are defined as novel ideas, products, services, and processes—including new ways to promote healthy behaviors and better integrate health services with public health and other social services—which achieve better health outcomes and/or patient experience at equal or lower cost. Quality improvement efforts are included as a type of health systems innovation focused on process improvements.

A review of promotions criteria at leading medical schools

To assess the incorporation of health systems innovation into promotion criteria, we reviewed publicly available information for the 20 highest-ranked medical schools in *U.S. News and World Report*.⁵⁹ We only included schools with promotions criteria specific to their medical school, eliminating schools for which criteria were only available for the university as a whole⁶⁰ or for individual medical departments.⁶¹ After these exclusions, 18 medical schools remained for analysis.

In March 2014, we reviewed promotions criteria to identify mention of health systems innovation and QI. Our review was followed by key term searches to ensure completeness. The search terms used were “system,” “quality,” “innovat-,” and “improvement.” These terms were evaluated in context and included if they referred to developing and implementing changes in the way health care is delivered, consistent with the definitions outlined above. For health systems innovation, this included mention of clinical program building, creating new ways of delivering care, addressing health care problems, and improving institutional clinical practices or clinical management. For QI, inclusion criteria were mentions of improving care quality, patient safety, process improvement or optimization, and preventing medical errors. Promotions criteria deemed inconsistent with our definitions included, but were not limited to the following: biomedical innovation; health policy or health services research; clinical and basic science research; population studies; innovations in the prevention, diagnosis, or treatment of disease; and development of practice guidelines or patient care protocols. References to “innovation” in teaching methods, treatments, or procedures were excluded, as were mentions of “quality” as an indicator of the caliber of contributions.

For a complete presentation of our findings, see Table 2.^{59,62–77} For instances in which a school’s promotion criteria had multiple references to the same health systems innovation or QI criteria, only one representative quote was included. Three medical schools had no promotion criteria meeting our definitions of health systems innovation

or QI; they were included in our sample for review but are not shown in the table.

In our review, one school⁶² created a separate promotions pathway focused on health systems innovation. Four other schools^{63,64,70,73} had thoroughly incorporated an explicit focus on health systems innovation and QI within existing promotions tracks. Several other schools made at least some mention of health systems innovation or QI implied by broad criteria such as “paradigm-shifting advances,”⁶⁸ “creative work,”⁶⁵ or “scholarship that has a national impact”⁷⁷ that could equally apply to biomedical innovation, health systems innovation, or QI.

Despite recognition of health systems innovation and QI as areas of excellence, the primary criterion for promotion at all of the schools reviewed remained publication in the peer-reviewed literature. In some cases, faculty were expressly warned that a focus on health systems innovation or QI should always be reported in the peer-reviewed literature in order to be considered for promotion. Other traditional metrics for promotion, such as external funding, invited lectures, and regional and national recognition, provided supporting evidence of the faculty member’s accomplishments within the field. Only one school⁷³ mentioned the outcomes of the health systems innovation itself (e.g., patient and provider satisfaction, quality indicators, costs of care) as criteria for promotion.

Explicit promotions criteria signal schools’ values and priorities. Our findings demonstrate that medical schools increasingly recognize the value of scholarship focused on health systems innovation, but they also show that promotion metrics may lack the flexibility to reflect the variety of ways that innovators may prove impact.

Expanding our view of scholarship

Academics have suggested new approaches to promotions that could be applied to health systems innovators. Boyer⁷⁸ proposed an expansion of the definition of scholarship to reward teaching and service; others have suggested rethinking promotions at AHCs.⁷⁹ To address AHCs’ teaching mission, Levinson and Rubenstein⁸⁰ recommended expanding opportunities for clinician educators. This led to

calls to recognize clinician educators,⁸¹ and then QI practitioners,⁸² through new promotions pathways with documentation including evidence of new curricula or QI initiatives.

This expanded view of scholarship could be applied to health systems innovator promotions. Armstrong and Barsion⁸³ highlighted the need for faculty to develop “innovator’s skills” to lead improvements in the health system and train future innovators. Ackerly et al⁸⁴ proposed a framework for those considering careers dedicated to improving health systems at the intersection of research, management, and policy. Zuckerman et al¹⁰ called for an increasing focus on health services innovation, noting that a rewards system focused on publication and funding for traditional research poses a barrier to faculty promotion in this area.

Health systems innovation may not lead to the same scholarship that results from biomedical research. Given our nascent understanding of how to design high-value systems of care, we need qualitative, descriptive, hypothesis-generating research to identify opportunities for improving our complex systems of care.⁸⁵ Further, as the implementation of health systems innovations are often iterative and lack fixed interventions, evaluation using standard randomized controlled designs is challenging and may be self-defeating.¹⁰ Traditional assessments of the quality of scholarship in health policy and health services research have focused on the rigor of the evaluation methodology; however, in assessing health systems innovation scholarship, it is at least as important to focus on the quality of the intervention.

Although academic promotion must rely on intellectual contribution, promotions criteria should recognize that successful health systems innovators may focus on changing complex systems rather than evaluating and describing the change, and may generate fewer peer-reviewed publications. Consistent with Levinson and colleagues⁸⁶ concept of creative professional activities, reputation and impact as demonstrated by peer evaluations, evidence of sustainability and replication of interventions, and other measures of influence might be considered as important as peer-reviewed publications in evaluating systems

Table 2

Findings From a Qualitative Review of Promotions Opportunities for Systems Innovators at Leading Medical Schools, 2014^{a,b}

School ^c	Relevant medical school promotion tracks	Systems innovation criteria	Quality improvement criteria
Harvard Medical School ⁶²	Clinical expertise and innovation	"The candidate may have a reputation as an innovator in approaches to diagnosis, treatment or prevention of disease, applications of technology to clinical care and/or in developing models of care delivery."	"Key role in development and local implementation of practice guidelines for care or to prevent medical errors" "Development of guidelines/protocols for quality improvement or management in area of clinical expertise"
	Investigation	"Investigation also includes the development of innovative methods/ technologies and/or novel applications of existing methods and technologies."	Not specified
Stanford University School of Medicine ⁶³	Medical center line	"Creation of novel diagnostic, therapeutic or administrative practices that may influence health care delivery; creation of major new patient services or new systems of health care; creation of mechanisms or tools to improve the efficiency of health services and/or systems of care" "Demonstrates leadership in clinical program development and administration" "May be recognized nationally as leaders of the health care system or of organizational change and measurement of health care systems"	"Participates in quality improvement activities"
	University tenure line	"Demonstrates leadership in clinical program development and administration"	"Participates in quality improvement activities"
Johns Hopkins University School of Medicine ⁶⁴	Single promotion track	"Leadership and scholarship in program building is reflected in development of a clinical, educational, or scientific program that is widely recognized as an outstanding model of its kind and/or that has had a substantial impact on the field."	- Innovation and quality improvement portfolio describing improvement projects or infrastructure development and their impact and results can be used to supplement promotion application. - Creation of "initiatives that built capacity or developed a lasting infrastructure to improve quality"
	Clinical professor series	"Development of innovative clinical programs or new approaches to disease management" "Development of innovative programs in health care itself"	Not specified
University of California (UCSF School of Medicine, David Geffen School of Medicine at UCLA, UCSD School of Medicine) ⁶⁵	Academic clinician	"Record of excellence in clinical practice and such accomplishments as innovation in delivery of care...."	"Record of excellence in clinical practice and such accomplishments as ... quality improvement initiatives"
Washington University School of Medicine in St. Louis ⁶⁷	All (investigator, clinician, researcher)	"Development of methods to improve quality and efficiency of clinical care"	"Development of methods to improve quality and efficiency of clinical care"
Pritzker School of Medicine—University of Chicago ⁶⁸	School of medicine pathways	"Evidence-based improvements in institutional clinical practices"	Not specified
University of Michigan Medical School ⁶⁹	Instructional	"Excellence is evidenced by documentation from independent authorities in the relevant field, regional reputation, and published work of clinical successes, innovations, or insights."	Not specified
Vanderbilt University School of Medicine ⁷⁰	All tracks	See Individual Tracks	"Must exhibit excellence in clinical skills and participate in practice management and quality improvement"
	Clinical practice	"Programs that enhance efficiency, patient safety, and processes of care."	"Patient Outcomes and Quality Improvement: Examples include, but are not limited to: participation in development of guidelines or critical pathways, development of programs or introduction of new methods, achievement in quality and process improvement projects/programs, consultation with industry, government, or other academic institutions"

(Table continues)

Table 2

(Continued)

School ^a	Relevant medical school promotion tracks	Systems innovation criteria	Quality improvement criteria
Weill Cornell Medical College ⁷¹	Basic science educator/clinician educator	• "Introduction of innovative advances to clinical medicine that reflect the candidate's status as being on the 'cutting edge' of clinical management." • "Programs that enhance efficiency, patient safety, and processes of care."	"Objectively measured achievements in quality and process improvement projects."
	Basic science investigator/physician scientist investigator	"Innovative conceptualizations or novel solutions to health care problems that receive national recognition"	See above
	Academic-clinical	"Introduction and evaluation of innovative clinical approaches and/or the development of a standard of patient care"	Not specified
	Clinical	"The introduction and/or evaluation of innovations in clinical practice"	Not specified
Icahn School of Medicine at Mount Sinai ⁷²	Clinician educator	• "Scholarship can also include the design of programs of excellence in delivery of clinical care, innovative methods of care and integration of teaching into clinical practice." • "Development of highly innovative clinical programs with leadership in those programs; development or introduction of new methods of delivery of care"	• "Design and participation in quality assurance and improvement of care" • "Development of innovative methods of assessing quality and outcomes"
	Practice	"Evidence that a candidate has created and nurtured a clinical program known widely for innovation and excellence will be given strong consideration."	Not specified
	Investigator	"Evidence of innovative accomplishments may vary by discipline, and can include but is not limited to novel approaches to problem solving, product discovery and/or development, patents and patent applications, new and/or collaborative programs."	Not specified
Feinberg School of Medicine–Northwestern University ⁷³	Clinician educator	"Health Services and Management Portfolio: Development and/or leadership of significant clinical programs or clinical support programs which improve the effectiveness, efficiency, safety, timeliness, patient-centeredness or equity in health care delivery, development of physician leadership training programs, and/or scholarly evaluation of health care delivery"	"Development and implementation of clinical protocols and guidelines, clinical programs, and/or quality initiatives"
New York University School of Medicine ⁷⁴	Investigator clinician/educator	"Innovative conceptualizations or novel solutions to health care problems"	Not specified

Abbreviations: UCSF indicates University of California, San Francisco; UCLA, University of California, Los Angeles; UCSD, University of California, San Diego.

^aInclusion criteria: top 20 medical schools (*U.S. News and World Report 2015 Best Medical Schools: Research*)⁵⁹ with specific academic promotions criteria for the school of medicine that are publicly available.

^bMethods of evaluation: In March–April 2014, publicly available promotions criteria documents were read through completely to identify means of promotion related to health systems innovation or quality improvement; this was followed by key term searches to ensure completeness (search terms used: system, quality, innovat-, improvement). These terms were then evaluated in context and included if they were in reference to developing and implementing changes in the way health care is delivered.

^cMedical schools with specific academic promotions criteria publicly available but with no reference to health systems innovation or quality improvement are considered part of our sample but were not included in the table (Yale School of Medicine, Duke University School of Medicine, and University of Pittsburgh School of Medicine).^{75–77}

innovators for promotion. In Table 1, we list possible outcomes of these innovators' work that might provide evidence for impact to complement peer-reviewed scholarship, or serve as an alternative to such scholarship.

New approaches to dissemination

Dissemination of health systems innovations will likely differ from traditional scholarly work. Rather than publishing in the most competitive research journals, innovations work may

appear in newer peer-reviewed journals and/or those with lower impact factors, or be presented at invited lectures, webinars, and as abstracts in clinical meetings. Editors should continue to work with health systems innovators to

develop standards for publication that recognize the challenges in the traditional scholarly approach to such innovation, and create article types that feature this work.⁵⁸

Considering the need for rapid change across health care systems and the importance of spreading and replicating successful innovations, there may also be a role for new approaches to evaluating and disseminating advances in this area. Given that the relevance of an innovation may be less related to the rigor of the evaluation methodology, one alternative might be to use rapid, online publication and social media to assess the applicability and usefulness of an innovation in solving similar problems, rather than traditional peer review.

Further Fostering Health Systems Innovation at AHCs

Fostering health systems innovation at AHCs with urgency and at a scope commensurate with the health care crisis will require more than promotion opportunities. AHC leaders and policy makers might consider adapting approaches that have enabled creative, rigorous, and, at times, disruptive biomedical discovery to establish an environment that fosters health systems innovation. As others have argued, this includes funding for career development and health systems experimentation, new approaches to training, and new approaches to dissemination.¹⁰ Here we review these approaches in more depth.

Funding careers in health systems innovation

For health systems innovation to thrive, AHCs need to provide substantive protected time and space for innovators to engage in the intellectual and creative work critical to innovation. The federal government has begun funding innovation advisors, who receive protected time and salary support for leading and participating in a curriculum that supports innovation.⁸⁷ This level of support is insufficient, however. The highly competitive National Institutes of Health (NIH) program for funding career development and experimentation provides an excellent model that could be applied to health systems innovation. Although the Patient Centered Outcomes Research Institute

has an extensive budget for grant funding for comparative effectiveness research, it does not explicitly provide for investigators' career development. Given that health care is a nearly \$3 trillion annual industry, the potential for efficiency gains would suggest that an investment in health systems innovation at AHCs commensurate with the current NIH budget of \$30 billion, which only represents 1% of total health care spending, is highly worthwhile.

As changes in reimbursement better align with value in health care, there may also be a role for novel public-private partnerships between care delivery systems, universities, and government to fund the work of health systems innovators. Many innovations may reduce the need and revenue streams for health care delivery systems, however, so there will be need for outside public and private investment in this work. Major foundations and private philanthropy could also play important roles through new career development awards and grant support.

Training health systems innovators

Leaders in health systems innovation will require a different set of skills and competencies than those fostered by the traditional medical training curriculum. Expert commentators have already identified crucial skills for those leading new approaches to primary care, which are also applicable for leading health systems innovation, including skills in operations design, managing teams, financial control, negotiation and conflict resolution, innovation and performance improvement, and engaging patients and families, among others.^{88,89} Others have suggested that physicians might be developed as "catalysts for change" to more high-functioning systems, rather than serving as the "glue" holding together dysfunctional systems, through incorporation of interprofessional training and encouraging physicians to "grow in areas outside the 'purely clinical' realm."⁹⁰

In addition to interprofessional education, trainees will require exposure to basic principles of leadership, management, and systems thinking. Although masters programs in business administration, public health, and public policy may provide aspects of this

training, none may be comprehensive enough, and it is unlikely that all future health systems innovators will pursue one of these degrees on top of their already-extensive training requirements. Therefore, this material should be incorporated into the core curriculum at the undergraduate and graduate levels of medical training. For those interested in careers as health systems innovators, there could also be fellowships with more advanced and in-depth training.

Conclusion

Pathways that encourage health systems innovation are important to the future of academic medicine and the U.S. health care system. Leading medical schools are beginning to develop promotions criteria for health systems innovators, but much more could be done to support health systems innovation at AHCs. This is an imperative that extends beyond individuals seeking academic promotion. Ultimately, the success of our AHCs rests on the ability to perform research, educate, and provide clinical services. Fostering health systems innovation at AHCs will help sustain the other core missions of research and education and could bring AHCs into closer alignment with our country's need for better health at a sustainable cost.

Acknowledgments: The authors wish to acknowledge Theodore Hufstader and Zara Ibrahim for their help in preparing the manuscript.

Funding/Support: None reported.

Other disclosures: R.S. Phillips serves as an advisor to Rise Labs, which provides personalized nutrition coaching.

Ethical approval: Reported as not applicable.

A.L. Ellner is associate physician and assistant professor of medicine, Division of Global Health Equity, Brigham and Women's Hospital, and codirector, Harvard Medical School Center for Primary Care, Boston, Massachusetts.

S. Stout is director, Harvard Medical School Center for Primary Care Innovation Fellows Program, and executive external lead for health improvement, Institute for Healthcare Improvement, Boston, Massachusetts.

E.E. Sullivan is research and curriculum director, Harvard Medical School Center for Primary Care, Boston, Massachusetts.

E.P. Griffiths is a medical student, University of California, San Diego School of Medicine, San Diego, California, and a master of public health candidate, Harvard T.H. Chan School of Public Health, Boston, Massachusetts.

A. Mountjoy is a medical student, University of California, San Diego School of Medicine, San Diego, California, and a master of public health candidate, Harvard T.H. Chan School of Public Health, Boston, Massachusetts.

R.S. Phillips is director, Harvard Medical School Center for Primary Care, and William Applebaum Professor of Medicine, Harvard Medical School, Boston, Massachusetts.

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