Integrating Learning Health Systems into Medical Education

Jason D. Carr

WiredCosmos.com

Contact: Jason@wiredcosmos.com

Abstract

The original concepts behind learning health systems (LHS) were meant to address myriad concerns within the field of Western medicine, ranging from the high cost of healthcare (and resulting need for clinicians to provide greater overall value of care to their patients) to the wasteful gap of time between scientific innovations and their implementation within clinical environments. Although LHS have displayed much promise, and have begun to hasten the pace at which new insights can be put into real-time medical practice, they have faced significant stumbling blocks along the way. The reasons for this slow progress revolve around the ways in which LHS demand that clinicians learn not only new skills, but also new ways of thinking and making inquiries. In this arena, clinicians entering the workforce for the first time have a distinct advantage. They learn the basic philosophy and applications of LHS as a part of their baseline training, without needing to unlearn ingrained mental habits that are the result of old practice models. The influx of a new generation of clinicians promises to expedite the growth of LHS into a universal standard.

*Key words: learning health system, education, LHS, EHR*

Introduction

Our technological progress has outstripped the capacity for traditional Western medicine to access and make constructive use of its innovations. New medical knowledge is generated at such a fast rate that it threatens to overwhelm clinicians. Our health system is constantly confronted with more *options* than it has the capacity to implement. High healthcare costs, and concerns about the quality of care being provided, have heaped further strain upon its resources. Clinical directors feel a financial imperative to ascertain what *really works* in medical practice, to draw upon practice-based evidence, and to implement this knowledge quickly.[i]

Within such a climate, clinicians find themselves struggling to provide better and more affordable healthcare to a growing population of patients while continuing to educate themselves about the newest procedures that scientific innovation makes available.

Background and Significance

The concept of learning health systems (LHS) was first conceived as a means of rapidly converting scientific evidence into medical practice. It also envisioned a scenario wherein the relationship between medicine and scientific inquiry would be more reciprocal – i.e., research would be more closely aligned with the sorts of questions that practicing clinicians urgently *needed* answers for. Nowadays, the LHS model has begun to prove its efficiency in moving scientific innovations into the real world of clinical application.

Figure 1: Learning Health Systems Data Flow to Outcomes
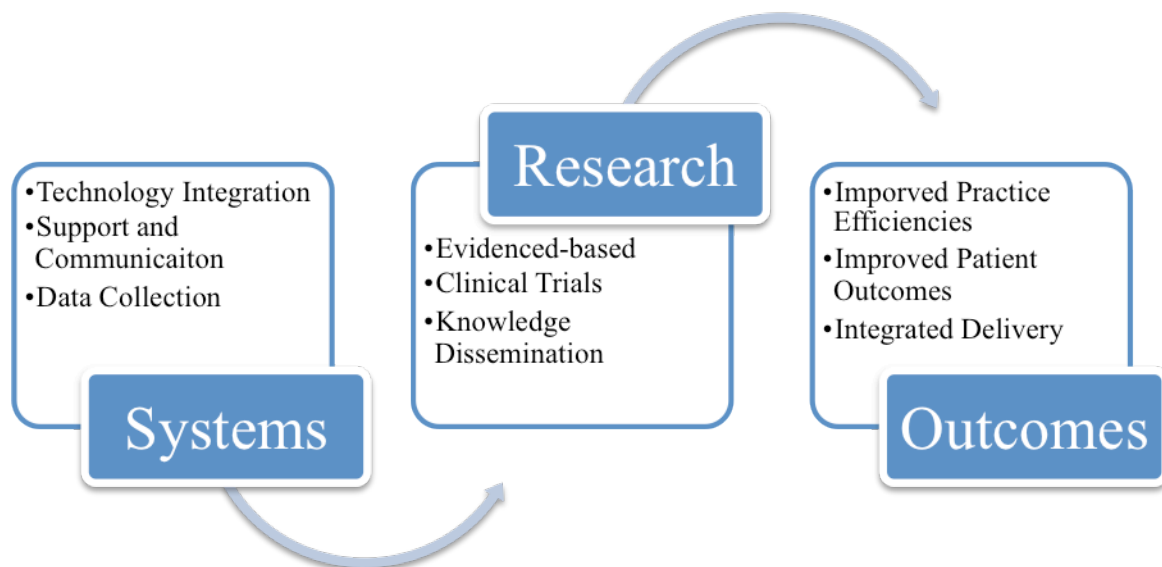
The idea of LHS has essentially arisen in acknowledgement of the fact that innovation in itself cannot fix our nation's healthcare system. In order for new information and evidence to have value, it must be put into use. Both clinicians and their patients benefit from the assurance that they are accessing the most state-of-the-art procedures. For too long, medical researchers and clinicians have operated in vastly different environments with incompatible timelines.[ii] This fragmentation of the health care system has taken a grievous toll in some crucial ways. Many innovations in the field of health care have taken years to finally become assimilated into common medical practice.[iii]

It isn't economically feasible for established medicine to achieve the best possible results through the procedures that it has long relied upon. Evidence-based medicine seeks to *do more* with the knowledge that is generated by research. It focuses upon innovation, quality, value and safety, and continually seeks areas that are in need of improvement. LHS strive to make the best evidence available when it comes time for healthcare providers and their patients to make crucial decisions. As matters stand at the moment, many of the decision-making models that Western medicine employs were created during a time when it had access to vastly fewer information streams.

Entering a New Era

The key challenge inherent in implementing LHS is the actual dissemination of the new knowledge and evidence that is being generated by scientific research. Performing both research and clinical functions within the same organization can facilitate progress in this area. New insights and approaches must somehow reach clinical directors directly – and quickly.

One key tool that has enabled the medical profession to begin adapting to the pace of change is electronic health records (EHR). Large EHR databases have been the most crucial development in the evolution of LHS.[iv] Studies of large populations can be conducted quickly and with much less expense than previously possible. Gone are the days of consuming valuable time sifting through mounds of paper records. Now a veritable mountain of health data can be aggregated, analyzed, and then disseminated throughout the medical community.

With 5.3 million patients and over 1,400 sites, the Veterans Health Administration (VA) created the largest integrated EHR of its time.[v] The journey began in 1982 with its creation of the Decentralized Hospital Computer Program (DHCH), one of the first programs to pull together various healthcare settings from multiple databases into one location. A network of other sites contributed to the evolution of this program over the next few years. Now known as VistA, it handles a wide array of functions to serve administrative, clinical and financial needs.

Advances in EHR technology enable healthcare professionals to cull data from large populations and/or target their inquiries into specific health conditions. They can more easily draw conclusions about population measures of health and disease as well as the efficiency of their own performances – all while respecting the privacy of patients. Healthcare can be better coordinated between different branches of an organization. This is vital to optimizing resources within the medical infrastructure – i.e., improving the overall health of its patient constituency while reducing costs.[vi]

It could be said that the overarching goal of LHS is to create an environment wherein clinicians are able to learn the best *applications* of new technologies at the same pace at which those technologies are being produced. Current computer technology has opened avenues towards this reality in several ways. It's become easier for different organizations to synchronize their efforts, both in research and implementation. This creates a kind of *architecture* for LHS on a national level. The evidence base that clinicians have access to has expanded significantly.

Also, EHRs encourage patients to become more involved in the healthcare system. They can read their own records online as well as access other health information and online services. Some high-risk patients have in-home monitoring devices that can collect and transmit crucial information to care providers, enabling those providers to respond quickly in crisis situations. EHR also allow clinicians to identify more general trends that pertain to their practice. They can obtain a clearer picture of how well their care is working for a given individual over a period of time, for example. Data can also be cross-referenced to illustrate various drug interactions as well as low performance of certain medications across the board.

Short-Term Stumbling Blocks

EHR and other elements that are integral to LHS do not, as yet, compose a single system, but rather a series of interlinked systems – each with its own database. This limits a clinician's ability to form general conclusions based upon all the evidence available in a certain area. Inquiries into the entire catalog of a particular patient's history are difficult to make. Laboratory values have yet to be standardized across the field of medical practice, oftentimes making it hard to compare evidence between two or more systems. LHS can open up a much broader world of options and decisions for clinicians, and assimilate the constant stream of new evidence so that continual improvements can be made in the methods, philosophy and ideals of established medical practice. It is still in its nascent stages, however, and many changes must be implemented before it becomes a universal system.

The question of data collection – particularly, when and how it may overstep a patient's privacy rights - is one stumbling block.[vii] Concerns are often raised whenever clinicians desire access to data for any purpose beyond that of patient treatment (this is known as "secondary uses"). Privacy laws on both state and federal levels govern how the healthcare system can collect and disclose identifiable health information. Determining when any disclosure contributes to the good of the general public is oftentimes a gray area. Federal research regulations can thus become an obstacle in the path of evolving LHS.

Changes within any organization are oftentimes slow whenever they are profound enough to demand a shift in *thinking*. LHS represent a new model of the ways in which modern medicine can function. They essentially redefine every clinician's role in the new paradigm. New kinds of patient-provider interactions fundamentally change the way in which medicine is practiced. How flexible can the medical profession be in examining its own belief systems and accepting new findings that contradict old "facts" – and thus call for new procedures?

This can pose special challenges for clinicians who have been working in the field for a number of years. For such practitioners, old models of inquiry, research, education and procedure have become deeply ingrained. The process of *unlearning* must occur before the new system can be thoroughly accepted.

For these reasons, LHS have not been broadly utilized by Western medicine, despite the fact that the Institute of Medicine and many prominent clinicians throughout the U.S. have long championed them.

A Possible Way Forward

These particular challenges won't exist for clinicians entering the workforce for the first time, however. For decades, employment in the healthcare industry has been growing, undeterred even by our economic downturn. Health care opened its arms to 559,000 new employees between December of 2007, when the current recession began, and November 2009.[viii]

The level of employment in healthcare-related occupations is projected to keep increasing, as well. Several factors can account for this growth. Technological advances in patient care allows for a greater number of health problems to be treated. Statistically, increasing numbers of people are seeking – and receiving – preventative care as well.

What's more, our nation's population is both growing and aging. The baby boomers are entering a stage of life that typically involves more medical concerns and the need for added attention. Modern medical knowledge and procedure has extended the general life expectancy, creating a situation wherein our nation has a larger population of elderly people than it ever supported in the past. It is projected that by 2030 more than a fifth of the American population (70 million people) will be over the age of 65.[ix]

This ensures the growth of career opportunities for geriatric health workers. The *need* for an influx of new employees in the field of healthcare is obvious. But advances in online educational opportunities have streamlined the training process for many people, as well, enabling them to qualify for certain positions much more quickly than workers of previous generations were able to.

All of these workers entering into the field of healthcare will learn the fundamentals of LHS as part of their primary medical education.[x xi] This will include the increasing use of physics- and computer-based technology and training via simulation. They will not have to *unlearn* old mental habits before they assimilate these new models and procedures. Using a computed health-knowledge base profoundly alters traditional roles and responsibilities within the clinical world. They demand changes in what a clinician *needs to know* as well as in the *ways* that he or she learns. But all of this is easier for people who are getting acclimated to the system for the first time, and are not steeped in older structures of medical thought.

Such people will contribute greatly to the growth of LHS because they will absorb its basic principles as part of their fundamental medical education and then build upon that knowledge base for the remainder of their careers. Unhampered by previous (and now outdated) models and practices, they'll be able to move forward with this new approach to medicine without having to fight against old ingrained habits. They will be more comfortable than their predecessors would have been in a working environment where new research constantly influences and changes existing practice.

References

1. Etheredge, Lynn M. "A Rapid-Learning Health System,". Health Aff March 2007 26:2w107-w118; published ahead of print January 26, 2007, doi:10.1377/hlthaff.26.2.w107.
2. A 'learning health system' moves from idea to action," Medicalxpress.com, August 2012.
3. McGraw, Devin (2012) "Paving the Regulatory Road to the 'Learning Health Care System'" Stanford Law Review Online. http://www.stanfordlawreview.org/online/privacy-paradox/learning-health-care-system
4. Etheredge, Lynn M. "Envisioning a Rapid-Learning Healthcare System", Institute of Medicine (US) Roundtable on Evidence-Based Medicine; Olsen LA, Aisner D, McGinnis JM, editors. The Learning Healthcare System: Workshop Summary. Washington (DC): National Academies Press (US); 2007. 4, New Approaches—Learning Systems in Progress.
5. Implementation of evidence-based practices: Applying a goal commitment framework," Chou, Ann F.; Vaughn, Thomas E.; McCoy, Kimberly D.; Doebbeling, Bradley N. Health Care Management Review: January/March 2011 - Volume 36 - Issue 1 - pp 4-17 doi: 10.1097/HMR.0b013e3181dc8233.
6. Elmore, Rich (2012) "Toward a learning health system" The Allscripts Blog.
7. "The Common Rule and Continuous Improvement in Health Care: A Learning Health System Perspective," Harry Selker, Claudia Grossmann, Alyce Adams, Donald Goldmann, Christopher Dezii, Gregg Meyer, Veronique Roger, Lucy Savitz and Richard Platt. October 2011. P.6.
8. United States Department of Labor. Bureau of Labor Statistics: Health Care, 2009.
9. "America's aging will increase demand for geriatric health workers," Explore Health Careers.org, 2009.
10. "The case for knowledge translation: shortening the journey from evidence to effect," Dave Davis, Mike Evans, Alex Jadad, Laure Perrier, Darlyne Rath, David Ryan, Gary Sibbald, Sharon Straus, Susan Rappolt, Maria Wowk, Merrick Zwarenstein. BMJ. 2003 July 5; 327(7405): 33–35.
11. "Training the Learning Health Professional." Institute of Medicine (US) Roundtable on Evidence-Based Medicine; Olsen LA, Aisner D, McGinnis JM, editors. The Learning Healthcare System: Workshop Summary. Washington (DC): National Academies Press (US); 2007. 7.