

# Clarifying and Measuring the Concept of Learning Health System

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# Starting Points

- A “Learning Healthcare System” (LHS) is something that health system leaders are increasingly encouraged to create/become.
- The CTSA program focuses on LHS as a critical conceptual framework to characterize the sort of transformation that CTSA is designed to foster (e.g., 2013 IOM report, NCATS emphasis on LHS).
- Yet the LHS concept is ambiguous and possibly too high-level to guide the actual work of becoming a LHS.
- The concept also needs to be further specified in order to measure an organization’s progress in becoming a LHS.
  - Wake Forest’s CTSI is developing an assessment tool as a key aim under its new award.

# Overview of Session and the Larger Arc

1. Introduce the concept of Learning Health System
2. Share the results of our literature review
3. Solicit feedback on what elements should be regarded as most essential
4. Conduct similar sessions in other venues (e.g., ACTS).
5. Synthesize findings to identify the core elements of LHS and to describe what a LHS looks like in practice
6. Move from further defining and conceptualizing LHS to the development of an assessment tool

# Definitions of Learning Healthcare/Health System

- **2007 IOM report<sup>1</sup>**: A learning healthcare system is designed to:
  - generate and apply the best evidence for the collaborative healthcare choices of each patient and provider;
  - drive the process of discovery as a natural outgrowth of patient care; and
  - ensure innovation, quality, safety, and value in health care.
- **2013 IOM report<sup>2</sup>**: Core concepts of a learning healthcare system include:
  - Translate “what we know” into “what we do”
  - Continuous improvement
  - Iterative process of innovation and learning
- **Current NAM definition<sup>3</sup>**: In a learning healthcare system,
  - Science, informatics, incentives, and culture are aligned
  - for continuous improvement and innovation,
  - with best practices seamlessly embedded in the delivery process, and
  - new knowledge captured as an integral by-product of the delivery experience.
- **AHRQ definition<sup>4</sup>**: In a learning health system,
  - Internal data and experience are systematically integrated with external evidence,
  - and that knowledge is put into practice.
  - As a result, patients get higher quality, safer, more efficient care, and
  - Health care delivery organizations become better places to work.

# Getting Concrete

- LHS is typically defined in only general, high-level terms.
  - What does an LHS look like in practice?
  - What are the essential elements?
  - How does an institution need to change in order to be an LHS?
  - What specifically should we measure?
- The WF CTSI Evaluation Program reviewed the scientific literature to identify instances in which LHS has been defined more precisely (i.e., operationalized).

# Wake Forest's Review of LHS Literature

- Library performed a search in PubMed for Learning Health System in December 2018 that returned 58 articles
- We reviewed and analyzed articles based on whether they included a definition of LHS, description of practices within LHS, and organizational characteristics of LHS
  - Only 12 articles met these criteria
- We extracted specific definitions and frameworks of LHS, principles and practices within LHS, and enabling factors to create an LHS

# LHS Articles Included

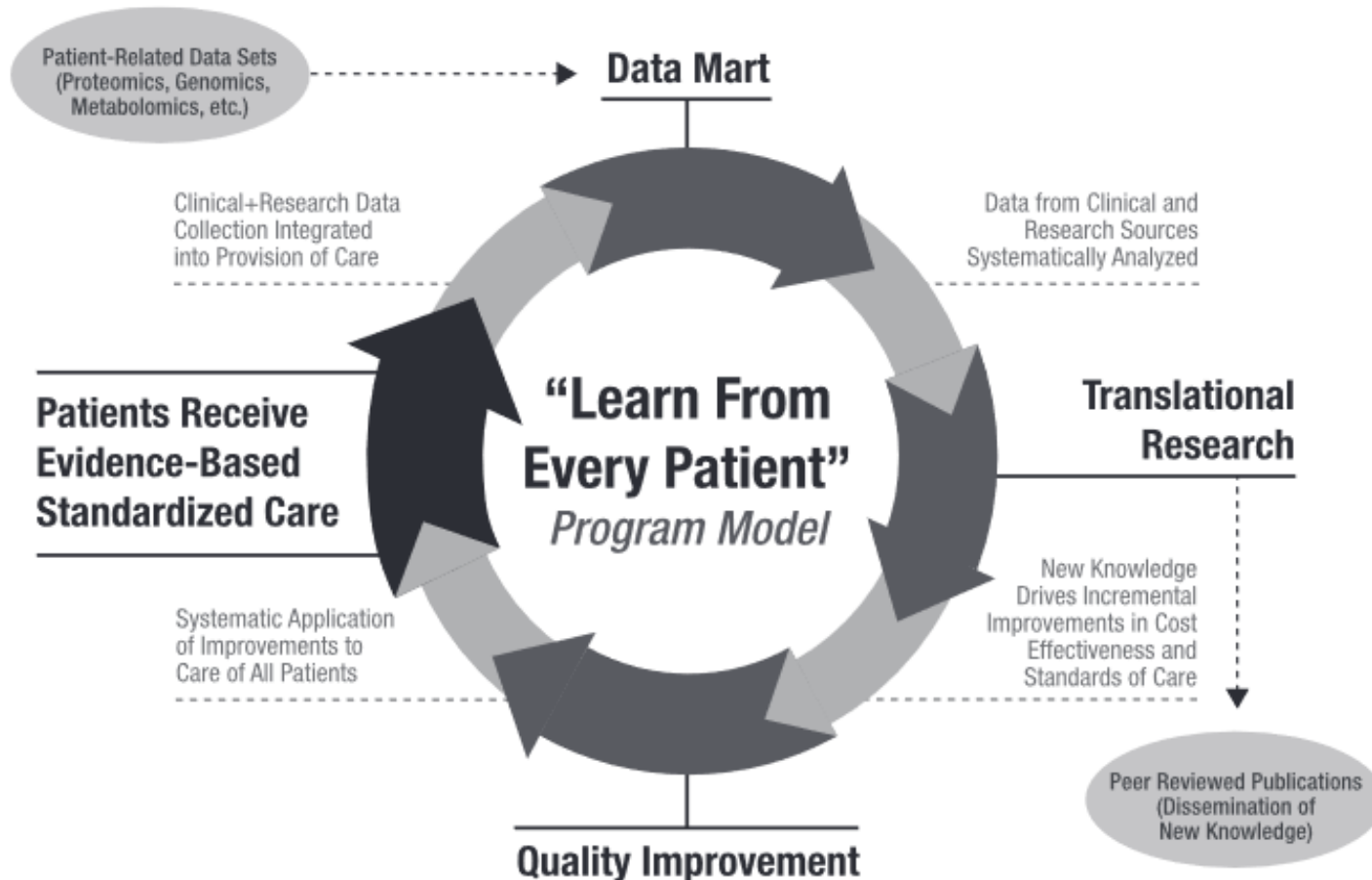
- Grumbach K, Lucey CR, Johnston SC. **Transforming From Centers of Learning to Learning Health Systems: The Challenge for Academic Health Centers.** *JAMA.* 2014;311(11):1109–1110. Available from: <https://doi.org/10.1001/jama.2014.705>
- Teare G, Keller M, Hall D. **Bringing Together Research and Quality Improvement: The Saskatchewan Approach.** *Healthcare Quality.* 2018;21(Special Issue). Available from: <https://www.longwoods.com/content/25637>
- McLachlan, Scott et al. **The Heimdall Framework for Supporting Characterisation of Learning Health Systems.** *Journal of Innovation in Health Informatics,* [S.I.]. 2018;25(2): 77-87. Available from: <http://dx.doi.org/10.14236/jhi.v25i2.996>
- Nwaru BI, Friedman C, Halamka J, Sheikh A. **Can learning health systems help organisations deliver personalised care?.** *BMC Med.* 2017;15(1):177. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5623976/>
- IOM Roundtable on Value & Science-Driven Care; Institute of Medicine. **Integrating Research and Practice: Health System Leaders Working Toward High-Value Care: Workshop Summary.** Washington (DC): *National Academies Press* (US); 2015 Mar 4. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK284660/>
- Guise, JM., Savitz, L.A. & Friedman, C.P. **Mind the Gap: Putting Evidence into Practice in the Era of Learning Health Systems.** *J Gen Intern Med.* 2018;33:2237. Available from: <https://link.springer.com/article/10.1007%2Fs11606-018-4633-1>
- Wysham NG, Howie L, Patel K, et al. **Development and Refinement of a Learning Health Systems Training Program.** *EGEMS (Wash DC).* 2016;4(1):1236. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5226386/>
- Stucki G, Bickenbach J. **The Implementation Challenge and the Learning Health System for SCI Initiative.** *American Journal of Physical Medicine & Rehabilitation.* 2007;96(2):S55-S60. Available from: <https://insights.ovid.com/crossref?an=00002060-201702001-00008>
- Lowes, L. P., Noritz, G. H., Newmeyer, A. , Embi, P. J., Yin, H. , Smoyer, W. E. **'Learn From Every Patient': implementation and early results of a learning health system.** *Dev Med Child Neurol.* 2017;59:183-191. Available from: <https://onlinelibrary.wiley.com/doi/full/10.1111/dmcn.13227>
- Bernstein, Jennifer A. et al. **Ensuring Public Health's Future in a National-Scale Learning Health System.** *American Journal of Preventive Medicine.* 2015;48(4):480 – 487. Available from: [https://www.ajpmonline.org/article/S0749-3797\(14\)00671-0/fulltext](https://www.ajpmonline.org/article/S0749-3797(14)00671-0/fulltext)
- Friedman C, Rubin J, Brown J, et al. **Toward a science of learning systems: a research agenda for the high-functioning Learning Health System.** *J Am Med Inform Assoc.* 2015;22(1):43–50. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4433378/>
- Forrest C, Margolis P, Seid M, Colletti R. PEDSnet: **How a Prototype Pediatric Learning Health System is Being Expanded Into a A National Network.** *Health Affairs.* 2014;33(7). Available from: [https://www.healthaffairs.org/doi/full/10.1377/hlthaff.2014.0127?url\\_ver=Z39.88-2003&rfr\\_id=ori%3Arid%3Acrossref.org&rfr\\_dat=cr\\_pub%3Dpubmed](https://www.healthaffairs.org/doi/full/10.1377/hlthaff.2014.0127?url_ver=Z39.88-2003&rfr_id=ori%3Arid%3Acrossref.org&rfr_dat=cr_pub%3Dpubmed)

# The literature on LHS indicates that this concept can be applied at multiple levels

- **Individual healthcare organizations**
  - A single hospital
  - An organization with multiple hospitals and practices
  - A particular unit within a healthcare organization (e.g. heart and vascular service line)
- **Networks of healthcare organizations** (e.g. with a particular disease focus, such as PEDSnet or Learn From Every Patient)
- **Large data systems** that pool EHR data from multiple organizations (e.g. PCORnet)
- The **collection of all healthcare organizations and research institutions in a country** that generate and use clinically relevant data (more appropriately called a “Learning Health Ecosystem”)



# A specific LHS Model: *Learn from Every Patient*



- *A model of EHR-supported care for children with cerebral palsy.*
- *Integrates clinical care, QI, and research.*
- *Developed for a consortium of medical centers.*

# Conceptualizations of LHS (based on LHS-specific articles)

Domain	Element	# articles
Learning is a core practice (e.g., generating knowledge, translating knowledge into practice, learning cycles)	Apply Knowledge to improve patient care and decision making	10
	Generate New Knowledge - Research	9
	Intentional/Full integration of research, improvement, patient care	9
	Continuous Cycle of knowledge generation and application	8
	Prioritize-building evidence-share	1
Informatics and Data Systems	Capture Data from patient encounters (EHR)	7
	Establishing data system or infrastructure	5
	Utilizing data-computational science	2
	Data systems - Technology solutions	2
	Data security-safety	2
Quality Improvement	Activities focused around Quality Improvement	5
Engaging Patients and Other Stakeholders	Patient-centered	4
	Multi-stakeholder-Inclusive	4
	Engaging Stakeholders	2
	Capturing Patient Feedback	1
	Engaging Patient-Family in Decision Making	1
Context Supportive of Learning	Org architecture - Culture - Enabling Factors	8
	Governance-Leadership	4
	Transparency-trust-integrity	2

## *What needs to be present for a healthcare organization to be an LHS?*

- Providers are actively **using data** to **improve the quality of care** and **improve patient outcomes**.
  - “Data” can mean:
    - Local EHR data collected by a healthcare organization
    - Larger data systems that pool EHR data across institutions
    - Findings from published research studies
    - Data collected at point-of-care
- **Informatics methodologies and technologies** are used to **capture clinical data** and to make it **available, accessible and analyzable** by a wide range of users (e.g., scientific researchers, curious clinicians).
- **Data-informed quality improvement processes** (e.g., Plan-Do-Study-Act cycles) are embedded into the organization’s operations.
- Every employee (i.e. health care providers, researchers, administrators, and staff) is expected to be an **active learner** and to **contribute to the creation of new knowledge**. This could include generating questions, collecting or analyzing data, and interpreting or translating findings.

# Discussion Questions

1. On Slide 11, have we identified the right **Domains**?
  - A. Do these 5 domains fully capture the construct of LHS?
  - B. Have we omitted anything crucial?
  
2. On Slide 11, are any of the **Elements** NOT central to the concept of an LHS?
  
3. On Slide 12, we have attempted to synthesize available definitions and results of the literature review to create a more inclusive definition.
  - A. Please provide whatever critiques seem appropriate.
  - B. What does this definition suggest in terms of the feasibility or challenges associated with becoming an LHS?

# Thank You!

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