

Learning health systems in dentistry: a lean challenge

A learning health system (LHS) is defined by the Agency for Healthcare Research and Quality as a health system in which internal data and experience are systematically integrated with external evidence to support evidence-based clinical decisions.¹ In other words, this is a systematic process for aligning science, informatics, and clinical practice to engage providers, researchers, and patients as active participants in evidence-based care to improve efficiencies and adopt evidence-based guidelines and translate research into practice.

It is evident that the LHS concept is a particular case of a lean process, ie, a cycle of continuous improvement that has the ultimate goal of creating value for the customer. This is reflected in basic established principles of the LHS, such as patient focus, standardized interprofessional care, emphasis on information systems, organizational culture, and performance management.² Specifically, the emphasis on information systems is anchored on the premise that vast amounts of data are integrated and managed throughout this process. To that end, the emergence of artificial intelligence is an additional stratum that provides new opportunities to leverage many streams of data to improve patient care. Part of the success of predictive analytic implementation relies on integration of sophisticated analytical tools within complex clinical workflows, which represent the essence of LHS.³

Since the Geis report was published in 1926,⁴ it was established that dentistry is a healing science and an essential component of higher education in the health professions. The dental profession made great strides to be recognized as such, to promote interprofessional education and collaboration, and to become a research partner with our colleagues in medicine and other health disciplines. More recently, we also are at the forefront of adopting digital and informatics technologies that changed treatment paradigms in clinical dentistry and education. In the United States, dental schools are engaged in serious conversations regarding how to facilitate communication or integration between dental and medical electronic health records (EHRs). These integrations aim to provide a patient-centered approach consistent with the basic principles of LHS, with the end result of safety, quality, and outcomes improvement.

It seems, therefore, that dentistry as a profession is well positioned to be a major partner in generating clinical, transla-

tional, and basic research data that will contribute to the LHS cycle. To elucidate this point, we performed on 25 July 2023 a PubMed search with the search string “learning health system.” The search resulted in 832 indexed manuscripts published since 2007. When we added the word dentistry outside the quotes of the previous search string, we only got 16 results, the first published in 2018. In light of these surprising results, the question is how come only 2% of the publications related to LHS are attributed to dentistry?

A recent article⁵ shows that the real-world challenges for data integration are complex and rooted in differences in quality improvement culture among institutions and health systems, together with the need for process champions who can determine clinically actionable items. Furthermore, when multiple EHRs are involved, database designs and the variable nature of information formats are also a roadblock. If we also account for the uniqueness of operational structures in dental academic institutions versus hospitals (even university hospitals), it becomes evident that the LHS concept, albeit attractive, is still at an aspirational stage as far as dentistry is concerned.

While some may think that these challenges are insurmountable, we would submit that the current situation presents significant opportunities for our profession. Considering that LHS is a representation of a lean process, it becomes evident that use of lean tools is the straightforward solution for this undertaking. One of these basic tools is the 5S that stands for Sort, Set in order, Shine, Standardize, and Sustain.⁶ This tool must be applied in tandem with the concept of “vital few” anchored in the Pareto principle of 80-20 that promulgates that analyzing 20% of the data (in our LHS study case) will provide 80% of the benefit. In other words, the task would be to identify what are the most meaningful clinical and research data that dentistry should incorporate in the medical system to provide the maximum benefit. Once these data are defined and agreed, systems such as EHRs need to be bridged, integrated, and standardized in such a way that data sharing is automated and allows real-time analysis. Finally, sustainability of these systems will only be ensured if the LHS delivers the ultimate promise of tangible continuous improvement of clinical outcomes for the benefits of the end customer, ie, the patients.

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