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Leveraging the electronic health record to improve dermatologic care delivery: The importance of finding structure in data

Andrew J. Park, MD, MBA[a], **Gil S. Weintraub, MD**[b], **Maryam M. Asgari, MD, MPH**[c,d]

[a]Department of Medicine, Kaiser Permanente Oakland Medical Center;

[b]Department of Dermatology, University of Colorado Denver, Aurora;

[c]Department of Dermatology, Massachusetts General Hospital, Boston;

[d]Department of Population Medicine, Harvard Medical School, Boston.

Abstract

The federal mandate for electronic health record (EHR) keeping for health care providers impacted the burden placed on dermatologists for medical documentation. The hope that EHR would improve care quality and efficiency and reduce health disparities has yet to be fully realized. Despite the significant time and effort spent on documentation, the majority of EHR clinical data remain unstructured and therefore, difficult to process and analyze. Structured data can provide a way for dermatologists and data scientists to make more effective use of clinical data —not only to improve the dermatologist's experience with EHRs, but also to manage technology-related administrative burden, accelerate understanding of disease, and enhance care delivery for patients. Understanding the importance of structured data will allow dermatologists to actively engage in how clinical data will be collected and used to advance patient care.

Keywords

EHR; NLP; PROM; structured data

The Health Information Technology for Economic and Clinical Health Act spurred a nationwide shift from paper records to electronic health records (EHRs), with the aims of improving patient safety and health system efficiency.[1] However, mandating EHR use has produced inadvertent consequences, including increased administrative costs and burden, reduced physician productivity, revenue losses,[2] and physician burnout.[3] As practicing dermatologists, our goal is to leverage EHRs to improve our practices and dermatologic care delivery, but how can we accomplish this?

Correspondence to: Maryam M. Asgari, MD, MPH, Department of Dermatology, Massachusetts General Hospital, 50 Staniford St, Ste 230, Boston, MA 02114. PORES@mgh.harvard.edu.

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Structured data are data that are organized so that elements can be quickly processed and analyzed, such as with categorical or continuous data (Table I). Structuring health data can help dermatologists view their patients' outcomes across time, assess treatment patterns, and inform quality improvement strategies. It also facilitates participation in federally based incentive payment programs. Unfortunately, most clinical information in dermatology, such as freeform text, is unstructured, making it highly variable and difficult to query. This poses a substantial barrier to learning from our data to improve care delivery. We propose 3 ways in which dermatologist can actively engage in being part of the solution.

USE VALIDATED PATIENT-REPORTED OUTCOME MEASURES IN CLINICAL DOCUMENTATION

Patient-reported outcome measures (PROMs) are instruments completed by patients that capture standardized information about disease-associated outcome, including symptoms, functioning, and quality of life.[4] The American Academy of Dermatology and International Dermatology Outcome Measures initiative is developing consensus-driven PROMs for a variety of dermatologic conditions. The ability to interpret and apply PROMs in clinical practice can facilitate real-time disease prognostication and treatment response assessments at the individual level. Aggregate responses can guide care delivery at the population level.

SUPPORT EFFORTS TO FIND STRUCTURE IN UNSTRUCTURED DATA

Natural language processing is the arm of artificial intelligence involved in the analysis of human language, and it can produce structured data from unstructured content. In dermatology, natural language processing has already been used to infer diagnoses from electronic pathology reports and can be applied across dermatologic care.[5] Extracting structured data from unstructured content is a significant area of focus for health care information technology companies, and dermatologists must be engaged so that these developments remain clinically meaningful.

WORK WITH RELEVANT STAKEHOLDERS TO MANDATE IMPROVED DATA INTEROPERABILITY AND ADHERE TO BEST-PRACTICE DATA GOVERNANCE

At the health systems level, high standards of data governance and interoperability must be enforced so that high-quality data can be used, trusted, and reliably transferred among providers, patients, and systems. It is imperative that dermatologists remain informed and adhere to these standards so that clinical data retain their fidelity and can evolve with emerging advances in health information technology.

Structuring clinical data is an important step in ensuring that technology can help dermatologists improve health care delivery. Efforts to structure clinically meaningful data should be led by dermatologists working collaboratively with health informatics experts, systems experts, EHR manufacturers, and policy makers. Improving the collection and handling of our data can ultimately have positive impacts on our professional lives and the lives of our patients.

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Abbreviations used:

EHR	electronic heath record
PROM	patient reported outcome measure

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Table I.

Characteristics and examples of unstructured and structured data

	Unstructured data	structured data
Characteristics	• Difficult to query and search • Cannot be easily classified or formatted • From heterogenous sources (eg, photographs, videos, free-form text, scanned documents, e-mails) • Reside in multiple applications and warehouses in heterogenous formats • Apt target for analysis with big data technologies (eg, natural language processing) to understand patterns and behaviors of data • The vast majority of extant clinical information	• Highly organized and easier to query and Search • Ideally resides in data warehouses and typically formatted in tables • Usually managed with structured query language • Usually text or numbers format
Examples	• Chief complain and subjective concerns of the patient • Free-form narrative physician's notes • Subjective treatment response • Communication with patients (eg, e-mails, phone calls) • Photographs of patient disease • Descriptive biopsy results	• Demographic information • Diagnostic and procedural codes • Medications and doses • Standardized disease metrics and symptom scales • Standardized clinical photographs with associated metadata • Numeric laboratory test results • Data from wearable devices • Metadata about features in a clinical photograph or narrative block of text