

The next-generation electronic health record: perspectives of key leaders from the US Department of Veterans Affairs

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ABSTRACT

The rapid change in healthcare has focused attention on the necessary development of a next-generation electronic health record (EHR) to support system transformation and more effective patient-centered care. The Department of Veterans Affairs (VA) is developing plans for the next-generation EHR to support improved care delivery for veterans. To understand the needs for a next-generation EHR, we interviewed 14 VA operational, clinical and informatics leaders for their vision about system needs. Leaders consistently identified priorities for development in the areas of cognitive support, information synthesis, teamwork and communication, interoperability, data availability, usability, customization, and information management. The need to reconcile different EHR initiatives currently underway in the VA, as well as opportunities for data sharing, will be critical for continued progress. These findings may support the VA's effort for evolutionary change to its information system and draw attention to necessary research and development for a next-generation information system and EHR nationally.

INTRODUCTION

The Department of Veterans Affairs (VA) is a leader in the adoption of health information technology (HIT).¹ The cumulative benefit of HIT investments in VA was recently estimated at over US\$3 billion, which is 'most likely an underestimate'.² Although VA and many large academic health centers have invested considerably in the development of advanced electronic resources, the broader uptake, application and use of these capacities have been limited.³⁻⁴ Even within integrated delivery systems, like VA's, important capabilities such as clinical decision support (CDS) has not achieved the impact it should, due to multiple factors, including failure to apply key strategies and practices, such as usability testing, redesigning work processes to integrate CDS optimally into practice, and inconsistent and incomplete implementation.⁵⁻⁶

Therefore, the VA needs a 'next-generation' electronic health record (EHR)—not just incremental changes to the existing one—to anticipate the needs rapidly emerging from a range of opportunities that include: (1) patient-centric records containing information from multiple sources, such as VA, Department of Defense (DoD), and non-VA/DoD providers and patients themselves; (2) changing patient profiles, (eg, women veterans); (3) evolving patient expectations for ready access to health information and communicating with

providers; (4) rapid medical advances; and (5) increasing numbers of options for care delivery, from healthcare facilities to 'care anywhere'. To understand the needs for a next-generation EHR, we interviewed a sample of key VA leaders for their perspectives and vision.

METHODS

Invitations to participate in the study were emailed to 31 people in leadership positions, as well as individuals who are regarded to be thought leaders in HIT and biomedical informatics, within the Department of VA. Participants were identified in two ways. First, two of the authors met to brainstorm names of VA operational, clinical, and informatics leaders. Second, the final question in our semistructured interview guide asked the current participant if they had recommendations for others we should consider interviewing for this study. These two strategies resulted in 31 individuals who were invited to participate. Of those invited to be interviewed, 14 agreed to participate. Phone interviews were scheduled for 30 min. All of the interviews were conducted using an interview guide developed by the authors that covered major topics related to the EHR (see supplementary appendix, available online only, for the complete interview guide). These interview topics were developed collaboratively by the authors based on our combined research and applied experience with HIT. During each interview, responses were handwritten by the interviewer and later typed for electronic storage and analysis. Data analysis followed a process of abstraction, in which specific, related responses for each question in the interview guide were organized into common themes.⁷⁻⁸ Two authors independently reviewed the typed transcripts and organized the responses into themes that were consistent across participants for each question. In a series of meetings, we came to consensus on the organizational structure of the themes. We integrated findings across the participants into meaningful patterns and abstracted the data into emerging themes⁹ that described different areas of EHR innovation.

RESULTS

Briefly, there was general agreement about the need to move beyond the current paradigm of the EHR as a computerized version of a paper chart, in order to provide better support of information synthesis, sense-making and improved cognitive support. Specific results are organized in the

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following subheadings, each of which corresponds to areas covered by the interview guide (see supplementary appendix, available online only).

Cognitive support

Interface

From a presentation perspective, participants noted the interface of the VA's current EHR, the Computerized Patient Record System, fails to integrate information and space effectively. They envisioned a highly interactive information environment providing the necessary knowledge at the right time and place. The new system should reduce information overload, minimize cognitive load, while increasing patient-relevant decision support, through enhanced interface design. For example, the volume of computerized clinical and administrative reminders that appear on the current interface is too extensive. A more knowledge-driven prioritization of the interface, based on system and population priorities, was recommended.

Workflow

There was consensus that current cognitive support does not fit clinical workflow, support teamwork, or operational efficiency. The current system was also noted to force inefficient 'thought-flows' due to its limited capacity to integrate and manipulate the information space. To address this, the use of small applications curated for defining workflows, or modifiable for provider preference or the local context, was suggested.

Actionable

VA leaders consistently envisioned 'actionable' cognitive support. Cognitive support should suggest appropriate actions, having 'the interface leading the user'. The next-generation EHR 'needs a recommendation engine', which the more it is used, learns about the clinician's preferences and practices, tailoring recommendations for each user. Similarly, the recommendation engine should present information on how local or national peers approached and treated similar patients.

Information synthesis and sense-making

Structured versus narrative documentation

Several leaders noted the natural tension between a structured and a narrative style of documentation. More structured data capture enables greater ease and sophistication of manipulating those data for providing enhanced information synthesis and sense-making tools. However, the need for clinicians to be able to express their thoughts quickly in narrative style was considered equally important. One envisioned innovative ways for creating 'context sensitive, natural language looking' structured data. Many leaders saw the potential value of natural language processing tools to extract information from the many clinical text notes and to integrate those data with knowledge to make it more accessible to everyone. Notably, VA has an ongoing Consortium for Healthcare Informatics Research, focused on developing these tools. Leaders also noted the display of information in the current EHR is too rigid to support information synthesis and sense-making optimally. More extensive data visualization tools would be important capabilities to develop, in order to be more proactive and manage the health of a cohort, registry, or population.

Teamwork and communication

Despite the importance of interdisciplinary teamwork, the current EHR does very little to support it. Without integrated communication tools, clinicians use workarounds like adding

addenda to progress notes to share information with care team members. Shared notes were suggested, such that multiple clinicians could edit the same note (without legal liability). Current progress notes have private, 'hidden' goals; the next generation EHR needs shared notes with common goals. The integration and coordination of data elements are not well designed; for example, nursing and physician notes are completely separate and disconnected. Participants asserted that the EHR should be designed to facilitate communication among individuals or teams of clinicians (eg, alerts to interdisciplinary colleagues).

Participants noted that the current EHR was physician-centric and that there is a need to display data in multiple perspectives: provider teams, patient, family, community, and population. The next-generation EHR needs to be built around the concept of teams, including other key care providers (eg, nurses, physical therapists), caregivers, and the patient. Patients and caregivers are an underappreciated aspect of the learning healthcare system and their needs and perspectives are poorly understood.¹⁰

Interoperability

The importance of 'real', 'true' semantic interoperability, with standards for comprehensive datasets across all types of settings was a high priority. Leaders consistently noted the need for interoperability of information systems between the VA and DoD. However, one participant noted a counterpoint: 'Our need for DoD interoperability is dramatically overstated.' Other important priorities in improving interoperability included interoperability between VA and: (1) external community providers; (2) academic institutions; (3) personal health records and mobile health devices outside of usual care environments. Leaders also noted the need to improve interoperability between VA facilities. The notion of patient-centricity and data ownership was raised, and interoperability as it relates to a patient-controlled data environment. An important technological consideration related to interoperability included the need for data to live 'outside', agnostic of the information system using the data.

Data availability

Data availability was discussed in the context of big datasets and registries. One participant noted that 'registries are a hack solution', and contended that data availability rests on interoperability. Other participants mentioned a lack of governance and general agreement regarding the responsibilities and stewardship for use of large electronic health datasets. Leaders further noted the need for common datasets and infrastructure as end plan for registries, or as part of a larger enterprise (or even as opposed to registries as a long-term solution). One participant referred to VA's current corporate data warehouse as a 'data landfill' and suggested that the data need to be in a more usable format. The movement towards 'big data' was seen as beneficial in terms of being able to mine data for early recognition of patterns. It was suggested that as the Affordable Care Act is implemented, patients should be required to contribute their data for these efforts as a 'quid pro quo'. This relates to ongoing national discussions suggesting that data generated within the healthcare system should be used for system improvement and learning, as part of an ethical responsibility for social good.

Interface usability

Comments about the importance of interface usability were articulated throughout the interviews. These supported the need to move beyond the current substantiation of EHR as electronic paper records to a true next generation for interface usability

and design. It was noted that even small enhancements to the design of the interface can have tremendous impact on usability. Furthermore, what is intuitive in terms of interface design may be different with a new generation of users. Technology-enabled electronic data capture and documentation was given as one example for potentially enhancing both the depth and breadth of information capture, and interface usability of the next-generation EHR.

Customization

Leaders identified the important polarity of pros and cons in the tensions between a customizable interface for different user groups or individuals, while maintaining a common underlying architecture and database. Another tension involved the need to balance customization with standardization. Ideally, the next generation EHR interface would include both mandatory components and customizable configurations. Data flows should be customizable by users, as well as a capability to configure the environment, within certain boundaries, to suit individuals' needs. However, one user thought that more evidence that customization will provide some benefit is needed.

Managing information

Managing information related to distilling and representing relevant data from the large volume of information in the EHR was consistently identified as a developmental priority. The current 'high noise' environment (ie, large amount of irrelevant information) in the EHR was considered potentially to induce errors. A next generation EHR needs to help the clinician filter through the noise and draw attention to the most important, relevant information on which to focus action. Many of the responses throughout the interviews related to this goal. Furthermore, a patient-centered management approach and patient-enabled delegation (eg, via a personal health record) was an important innovation. Such a patient-centered approach should include the ability to push data to whoever the patient chooses (eg, health-care providers from different institutions).

Overall vision

Although a consistent overall vision for the next-generation EHR was not apparent, there was widespread agreement about the need for investment in such research and development. Notably, the consistencies in participants' responses described in the preceding sections form the basis of a unified vision. One participant noted the need to reconcile the different EHR initiatives currently underway in the VA: the Integrated EHR for VA and DoD, the VA's Health Informatics Initiative Health Management Platform, and local versus national VA initiatives, including local packages for care management. The evolution for these initiatives and ideal pathway for reconciling them were seen as critical for a unified vision for the next-generation EHR. Leaders cautioned that the next-generation information system should not be a 'huge, monolithic system' tied to an institution. Rather, they saw the future EHR as a series of small, interoperable applications built around functions integrated from the back end and connected to home, clinic, hospital and any physical settings that the patient encountered.

DISCUSSION

This paper identifies consistent themes from a sample of VA leaders on areas of cognitive support, information synthesis, teamwork and communication, interoperability, data availability, usability, customization, and information management critical to a next-generation information system and EHR. Research is

needed to examine the role of organizational and contextual factors in both informing plans for the next-generation EHR, as well as efforts to redesign VA's care delivery system and business processes to meet both the challenges of the present and the next generation. Since these interviews were conducted, the VA and DoD announced that they will abandon plans to create a joint EHR system and instead work to make their current systems more interoperable. As participants were asked to respond to the interview questions with their personal opinions rather than about plans that have already been documented (see supplementary appendix, available online only, for the interview guide), the content of our results is not expected to change substantially based on this development, especially considering the interoperability between VA and DoD systems remains a funded priority. We intend to conduct a broader study with a larger sample of VA and non-VA leaders in HIT as part of a grant to investigate organizational factors and practices in VA's information system resources. We anticipate that these findings may inform the VA's current effort to re-engineer its information system and EHR radically. Perhaps they may also help inform research and development in the broader commercial information system ecostructure.

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Contributors JJS and BND conceived and designed this study, including the development of the interview guide. JJS conducted all of the data collection. JJS and MEF conducted the analysis and initial interpretation of the data. JJS had principal responsibility for drafting the manuscript. JD and NRW assisted with the interpretation of data and revised the manuscript critically for important intellectual content. All authors critically edited the manuscript and approved the final version.

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