
Perspective

The complex case of EHRs: examining the factors impacting the EHR user experience

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ABSTRACT

Physicians can spend more time completing administrative tasks in their electronic health record (EHR) than engaging in direct face time with patients. Increasing rates of burnout associated with EHR use necessitate improvements in how EHRs are developed and used. Although EHR design often bears the brunt of the blame for frustrations expressed by physicians, the EHR user experience is influenced by a variety of factors, including decisions made by entities other than the developers and end users, such as regulators, policymakers, and administrators. Identifying these key influences can help create a deeper understanding of the challenges in developing a better EHR user experience. There are multiple opportunities for regulators, policymakers, EHR developers, payers, health system leadership, and users each to make changes to collectively improve the use and efficacy of EHRs.

Key words: electronic health records, burnout, administrative burden

INTRODUCTION

Challenges with using electronic health records (EHRs) continue to be among the top complaints of physicians, yet most physicians recognize the value and do not want to return to paper-based records.¹ While some research has suggested improved workflow, productivity, and efficiency with EHR use,^{2,3} other evidence shows that end users are dissatisfied with many aspects of the EHR.^{4–8}

Many of the frustrations physicians experience with EHRs are related to the time required for documentation. One study of physicians determined that for every hour a physician spent on direct clinical care, he or she spent nearly 2 additional hours on EHR and desk work during the day and another 1–2 hours each evening.⁹ Another study of family physicians found they spent almost 6 hours per day interacting with the EHR during and after work; half of this time used for clerical and administrative tasks such as documentation, order entry, billing, coding, and system security.^{10–12}

The primary goal of the EHR should be to support patient care. However, many physicians feel the time spent interacting with the EHR is on non-value-added tasks. The American College of Physicians developed a framework to categorize administrative tasks by the source of task, intent

of the task, effect of the task, and approach to addressing the task. While there is important administrative work for physicians or their delegates to complete, we define burdensome administrative tasks as those that “have a negative effect on quality and patient care, that unnecessarily question the judgment of physicians and other clinicians, and/or that increase costs.”¹³ These could include tasks that are mandated to be performed by the physician but could safely be delegated to trained and supervised staff. Many of these incremental administrative tasks are requested by external entities, including government regulators, payers, and oversight entities. In addition, many do not require the unique skill set of a physician and thus are inappropriately consuming physician resources.

EHR USER EXPERIENCE

While much of physician frustration is directed at the EHR system, the user experience with an EHR is multidimensional with a variety of influences, some visible to and controllable by the end user, and others outside the end user's control. Decisions made by vendors, healthcare organizations, payers, lawmakers, and regulatory bodies impact the EHR user experience. The key influences can be

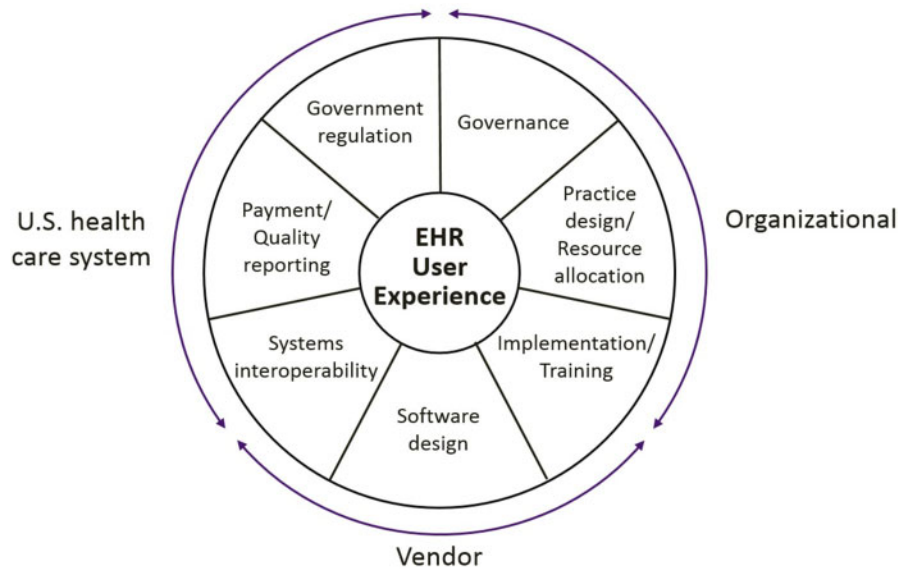


Figure 1. Electronic health record (EHR) user experience influences. Source: Authors' analysis of environmental factors contributing to EHR end-user experience as documented in current literature.

represented in a conceptual framework to demonstrate overarching categories and areas of overlap (Figure 1). This conceptual framework considers the complexity of the EHR user experience and the elements that affect physician interactions with the technology in practice.

The U.S. healthcare system influences EHR usability through government regulation, payment and quality reporting, and lack of widespread interoperability. Organizational decisions include those about governance, practice design, task distribution, resource allocation, implementation, and training. In addition, EHR vendors are often unable to devote significant resources to user-centered design or consider physician cognitive workload which can shape a physician's experience with an EHR. Vendors also make recommendations to institutions about implementation, role-type permissions, and workflows, and have an important role in the interoperability of an EHR.

U.S. HEALTHCARE SYSTEM INFLUENCES

Factors rooted in the U.S. healthcare system influence how EHRs are designed, implemented, and utilized in practice. Various government and industry entities have created some valuable, yet time-consuming and sometimes costly and burdensome, administrative tasks that affect the use of the EHR.

Government regulation

The Centers for Medicare and Medicaid Services (CMS) and the Office of the National Coordinator for Health Information Technology (ONC) implemented meaningful use standards in 2011.¹⁴ These regulations add to the amount of data entry required by clinicians to comply with regulatory requirements, above and beyond the data needed solely for patient care.¹⁵ In addition, these regulations provide standards by which EHR developers must design and update their systems to maintain certification and be listed on the certified health information technology (IT) product list. Furthermore, the ONC's safety-enhanced design standards provide precise requirements for user-centered design. Despite these criteria, evidence sug-

gests there is a lack of vendor adherence to ONC certification requirements and usability testing standards in their certified EHR products.¹⁶ There is no current government requirement or mechanism for assessing and quantifying the user experience across EHR vendors and across different installations of an EHR vendor's product.¹⁷ In addition, vendors have misperceptions about and variability with their approach to user-centered design practices.¹⁸ There is no evidence that the ONC requirements for user-centered design have resulted in better patient outcomes or user experiences.^{19,20} The Health Insurance Portability and Accountability Act of 1996 (HIPAA), which provides privacy and security provisions for protecting personal health information, also raises EHR compliance concerns for healthcare organizations.²¹

Payment and quality reporting

CMS consolidated reporting through the Advancing Care Information requirements in the Merit-based Incentive Payment System (MIPS) track of the Quality Payment Program (QPP) in 2017. Certified EHR technology is required for participation in this performance category of the QPP. Reporting requirements for MIPS have been phased in to provide organizations time to ramp up to the requirements; however, navigating the shifting targets has proven challenging, as only 65% of physicians surveyed in 2017 felt prepared to meet the 2018 MIPS requirements.²² Lack of clarity and frequent changes in reporting requirements for the use of certified EHRs and EHR-related measures, including electronic clinical quality measures, add further barriers to the efficient use of EHRs in daily practice.²²

Administrative tasks completed in EHRs include those mandated by payers, such as collecting data required for claim submission, prior authorization, prescription coverage, billing, and quality reporting. Quality reporting, specifically, has become progressively more important as both CMS and private payers increasingly link quality and performance to payment. Physician practices spend more than 3 staff and physician hours per physician per day on quality reporting.²³ Furthermore, there is a disconnect between quality

reporting requirements among private and public payers²⁴ that creates additional complexity.

There are also concerns about the perceived misalignment between data entered into an EHR for the purposes of patient care, and data entered for quality reporting and meeting MIPS and QPP requirements.^{1,25,26} The increasing demands that the EHR be used as a tool for documenting mandatory payment data and quality reporting, paired with the possibility that EHR functionality may not be sufficient to support all of these demands, affect EHR usability.²⁷ Modifying EHRs to collect data needed to succeed in alternative payment models also continues to be a challenge for physicians and their practices.²⁶

Systems interoperability

Improving interoperability has been a focus of many regulatory programs; however, progress has been slow. Despite significant investments in technology, physicians do not always have access to patient records that originated in another clinic or hospital, or even from within their organization, which creates frustration, delays in care, and patient safety risks.²⁸ Some organizations share information internally and interface with laboratories, pharmacies, and imaging centers; however, interoperability with external health systems, vendors, registries, and state and local public health systems remains a challenge.^{28,29}

There are several organizations working to achieve interoperability through the creation of technical standards, principles on governance and use, and connecting health information exchanges; however, these disparate efforts have yet to realize their collective impact.²⁸ While the 21st Century Cures Act, MIPS, and the need for information to support value-based care create incentives for interoperability, strong disincentives such as cost and business interests continue to limit information exchange.³⁰ In addition, fearing penalties for HIPAA violations, some organizations have adopted conservative approaches to sharing information, which often hinders interoperability and can have a negative impact on both patients and physicians.^{31,32} Finally, lack of education about or misinterpretation of HIPAA regulations can result in unnecessary information blocking.³³

ORGANIZATIONAL INFLUENCES

Decisions made at the organizational level have significant implications for how effectively an EHR is implemented and used in a practice, and can have lasting effects on the end-user experience.

Governance

Healthcare organizations have created complex governance practices related to the implementation and management of their EHR.³⁴ These governance policies include those related to compliance and risk management. Policies adopted at the organizational level can aim to ensure patient safety, maximize efficiency, improve reporting data, or favorably impact financial performance, but may also have inadvertent effects on end users of the EHR, and even instigate the use of workarounds that expose new risks. For example, “note bloat” has become an issue with the rise of copy-and-paste functions in the EHR as physicians and organizations attempt to maximize efficiency and guard against legal disputes.³⁵ This note bloat can make it more difficult to find and read key clinical information, perpetuating documentation errors and enabling new errors.³⁶

Some governance decisions limit the ability to adopt team-based care because they require the physician to complete all documentation and order entry. While these decisions on the surface appear to limit the risk for the organization, requiring the physician alone to complete all documentation can increase burnout and the risk for other potential errors in the workflow, such as diagnostic, therapeutic, and communication errors related to inattention, multitasking, and cognitive and information overload.

Implementation and training

Implementing or upgrading an EHR is a major endeavor for any healthcare organization. Factors that can negatively impact implementation include lack of engagement across stakeholders, overly cautious or misinformed compliance departments, inadequate allocation of IT resources pre- and postimplementation, poor system design and functionality decisions, intensity and delivery of training, inadequate staffing levels, and inattention to workflow redesign necessary to effectively integrate new technology.³⁷ The costs of implementation can include not only the staff time for implementation and the purchase of the software, but also the additional hardware, workflow redesign, and training, as well as decreased productivity and revenue.³⁸

Decisions on the implementation process, including user training and customization of the product, can have long-term implications for the usability of the EHR. While many EHR vendors offer a suggested implementation process and product design, customization decisions made by the purchasing organization can contribute to long-term challenges in upgrades, variability in product design across locations, and difficulty in training.

Practice design and resource allocation

The way a practice is designed requires consideration when deploying or updating an EHR. Practice design—defined as the way in which members of a healthcare team are organized and assigned, how the delivery of patient care is coordinated and executed, and how clinical care space is utilized—is an important factor that impacts the EHR user experience. Attention to team workflow, including diagramming organizational processes, can allow organizations to compare their EHR to their stated workflow. Data extracted from an EHR database that show time spent on specific activities by physicians may be a useful tool to assess practice design.¹⁰

Many practices are designed in ways that require the physician to be primarily responsible for documentation. In a practice using a team-based care model, however, various members of the care team, such as documentation assistants, medical assistants, nurses, and advanced practice clinicians, help facilitate medical record documentation in the EHR. Dictation and transcription devices can also help streamline the documentation process. This additional support enables physicians to engage in more face-to-face time with their patients.⁹

Clinical care space is another key aspect of practice design that can affect the way EHRs are used and how their use can impact the patient-physician relationship. For example, widescreen monitors and printers in every exam room can increase efficiency. In addition, improving the patient room arrangement can enable better eye contact and the ability to share the computer screen with a patient.^{18,39} Finally, a leadership decision to maintain outdated servers or EHR software to reduce operational costs could result in slow systems, loss of information, unplanned downtime, or dangerous workarounds—all which have the potential to cause loss of productivity or risks to patients.

EHR VENDOR INFLUENCES

The ONC has established criteria that require vendors to use a user-centered design process and test 8 specific EHR functions to become certified; however, physicians still report clunky interfaces and confusing displays.¹⁸ Variation in user-centered design processes and nonadherence to postcertification standards have resulted in disparate practices and usability.^{16,18} Additionally, it is not uncommon for there to be no clinician or physician participation in the usability testing of vendor products.¹⁶ Many EHR products were designed with billing, payer requirements, and meaningful use criteria in mind, rather than clinician use, resulting in a user experience laden with data entry that causes decreased productivity and efficiency, and a diminished patient-physician relationship.⁴⁰

Health IT vendors can also have a significant influence on interoperability. Across vendors, there is variation in data formats (technical interoperability), lack of shared meaning (semantic interoperability), and unusable delivery to physicians, further limiting interoperability.^{21,41} Lack of health IT standards conformance testing, validation, and transparency continues to hinder seamless information exchange.⁴² Additionally, some vendors have imposed contractual, technical, or financial limitations on their clients in an effort to thwart competition and lock customers into their products.³³ These practices are a form of information blocking and hinder interoperability.

Vendors play a key role in the success of an organization's implementation of their EHR product. Vendors can provide guidance on realistic go-live timelines and make recommendations about resources and training to ensure a successful implementation.⁴³ In addition, many vendors have product versions and training programs that have yielded positive outcomes for end users; however, due to timing, pressures to increase productivity, or cost limitations, these best practices are not always implemented. As a result, similar installations of the same EHR product at different institutions can require a different number of clicks to complete the same task.⁴⁴

RECOMMENDATIONS

The classifications defined here identify the influences on the EHR user experience. However, this does not imply that these factors are isolated or mutually exclusive. There are areas in which these factors overlap or even result from the effects of another influence. It is also important to emphasize that easing the administrative burden cannot be accomplished by a single-stakeholder approach because the EHR user experience is varied and influenced by a multitude of factors.

EHR vendors, regulatory agencies, insurance payers, and health-care organizations all must understand how their decisions may influence the usability of an EHR and the effects it may have on professional satisfaction and patient care. To enable progress,^{12,45,46}

- Payers and regulators can transition to less burdensome documentation requirements for payment and quality reporting, remembering clinicians' first job is patient care.
- Quality officers and practice administrators can track EHR use, including click, motion, and time-in-screen data, along with "work after work" data, to measure and improve task time and activity patterns through training and staffing.
- Organizational leadership can actively engage physicians in the EHR implementation process, taking personal interaction needs

and workflow design into consideration and supporting advanced models of team-based care, coordination of care, and new models of charting.

- Implementation teams can complete pre- and postimplementation testing using rigorous, real-world scenarios focused on improving safety and reducing clinician burden.
- Health IT vendors can increase transparency around product costs, functionality, and performance, and support advances in voice recognition, artificial intelligence, and other technologies with a focus on user-centered design that could catalyze improvements in EHR usability and interoperability and reduce cognitive work load.

CONCLUSION

EHRs are powerful tools that, despite the challenges experienced in their use, are an integral element of the U.S. healthcare system. There are multiple opportunities for regulators, policymakers, EHR developers, payers, health system leadership, and users each to make changes to collectively improve the use and efficacy of EHRs. Using a conceptual framework to understand the complexity of and influences on the EHR user experience is an important step in finding and implementing solutions to the burdens associated with administrative EHR tasks.

AUTHOR CONTRIBUTIONS

MT developed the conceptual framework; LC completed the literature review; all authors were involved in the writing and editing of the manuscript.

CONFLICT OF INTEREST STATEMENT

The authors are employed by the American Medical Association. The opinions expressed in this article are those of the authors and should not be interpreted as American Medical Association policy.

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