

Improving Care: Priorities to Improve Electronic Health Record Usability

EXECUTIVE SUMMARY

The American Medical Association (AMA) recognizes the potential value of electronic health records (EHRs). Effective use of EHRs is a key element in achieving the Triple Aim—improving the patient experience of care (including quality and satisfaction), improving the health of populations and reducing the per capita cost of health care. Adoption and effective use of EHRs has been slow, however, in large part due to shortcomings with early generation EHRs that were, and frequently remain, poorly optimized to support efficient and effective clinical work provided by physicians and other clinicians.

Although EHR adoption has increased over the past decade due to market and government incentives, including the federal Meaningful Use (MU) program,¹ how to effectively use EHR products is an ongoing concern for physicians. Research suggests that this is because of the challenges physicians have interacting with the EHR to safely and effectively deliver care.² These challenges can be classified as usability issues—i.e., the design and implementation of EHRs do not align with the cognitive and/or workflow requirements and preferences of physicians within and across specialties and settings.

Achieving the Goal of Improved EHR Usability

Improving EHR usability and finding its proper place in the overall health information technology (health IT) ecosystem is an important goal for our nation's health care system. National leaders in health IT usability also

have identified this national priority and have made recommendations to improve usability.³ The AMA adds its voice to this call and believes that it is imperative to step back and reframe the discussion around the desired future capabilities of the EHR, making clinical care improvements the primary focus.

It is within this framework that the AMA identified key challenges physicians face with current EHRs and recommends eight EHR usability priorities to be urgently addressed. Additionally, AMA urges continued research to advance EHR usability through understanding and measuring its effectiveness for physicians and other health care professional users who increasingly rely on this technology.

The AMA recognizes that many of the recommendations can only be implemented in the long term due to vendor product development life-cycles, limitations of current legacy systems and existing contracts, regulations and institutional policies. However, there is a great sense of urgency to improve EHRs because every patient encounter and the physician's ability to provide high-quality care are affected by the current state of usability. Improving EHR usability requires significant effort among all stakeholders—vendors, physicians, other health care professionals, institutions, patients, researchers and policymakers.

Eight EHR Usability Priorities

1 Enhance Physicians' Ability to Provide High-Quality Patient Care. Effective communication and engagement between patients and physicians should

1 The Health Information Technology for Economic and Clinical Health (HITECH) Act, part of the American Recovery and Reinvestment Act (ARRA) enacted into law in 2009, was designed to create incentives for providers to adopt EHR technology. HITECH provides approximately \$30 billion in financial incentives to eligible professionals and other providers who treat Medicare and Medicaid patients. Physicians and other eligible professionals must meet federally-outlined criteria and utilize federally certified EHR technologies to receive reimbursement. This incentive program is known as the Meaningful Use (MU) program.

2 J Am Med Inform Assoc-2014-Meeks-amiajn1-2013-002578

3 Middleton, B., Bloomrosen M., Dente, M. et al. Enhancing patient safety and quality of care by improving the usability of electronic health record systems: recommendations from AMIA. J Am Med Inform Assoc 2013 20: e2-e8.

be of central importance in EHR design. The EHR should fit seamlessly into the practice and not distract physicians from patients.

2. **Support Team-Based Care.** EHR design and configuration must: (1) facilitate clinical staff to perform work as necessary and to the extent their licensure and privileges permit and (2) allow physicians to dynamically allocate and delegate work to appropriate members of the care team as permitted by institutional policies.
3. **Promote Care Coordination.** EHRs should have enhanced ability to automatically track referrals and consultations as well as ensure that the referring physician is able to follow the patient's progress/activity throughout the continuum of care.
4. **Offer Product Modularity and Configurability.** Modularity of technology will result in EHRs that offer flexibility to meet individual practice requirements. Application program interfaces (APIs) can be an important contributor to this modularity.
5. **Reduce Cognitive Workload.** EHRs should support medical-decision making by providing concise, context sensitive and real-time data uncluttered by extraneous information. EHRs should manage information flow and adjust for context, environment and user preferences.
6. **Promote Data Liquidity.** EHRs should facilitate connected health care—interoperability across different venues such as hospitals, ambulatory care settings, laboratories, pharmacies and post-acute and long-term care settings. This means not only being able to export data but also to properly incorporate external data from other systems into the longitudinal patient record. Data sharing and open architecture must address EHR data “lock in.”

7. **Facilitate Digital and Mobile Patient Engagement.** Whether for health and wellness and/or the management of chronic illnesses, interoperability between a patient's mobile technology and the EHR will be an asset.
8. **Expedite User Input into Product Design and Post-Implementation Feedback.** An essential step to user-centered design is incorporating end-user feedback into the design and improvement of a product. EHR technology should facilitate this feedback.

The AMA is committed to improving EHR usability for physicians and other stakeholders in the health care industry. To advance these goals, the AMA plans to utilize these eight EHR usability priorities to:

- Work with vendors to foster the development of usable EHRs
- Advocate to federal and state policymakers to develop effective health IT policy
- Collaborate with institutions and health care systems to develop effective institutional health IT policies
- Partner with researchers to advance our understanding of health IT usability
- Educate physicians about these priorities so they can lead in the development and use of future EHRs that can improve patient care.

Through these efforts, we hope to advance the delivery of high quality and affordable health care. The AMA stands ready to partner with others across the health sector to bring this vision to life.

Improving Care: Priorities to Improve Electronic Health Record Usability

THE AMERICAN MEDICAL ASSOCIATION

Introduction

The American Medical Association (AMA) recognizes the potential value of electronic health records (EHRs). Effective use of EHRs is a key element in achieving the Triple Aim—improving the patient experience of care (including quality and satisfaction), improving the health of populations and reducing the per capita cost of health care. Adoption and effective use of EHRs has been slow, however, in large part due to shortcomings with early generation EHRs that were, and frequently remain, poorly optimized to support efficient and effective clinical work provided by physicians and other clinicians. Further, physicians and hospital systems had to make significant financial investments to adopt EHRs while the benefits of those EHRs were accrued primarily by private payers, creating a market imbalance.¹

Although EHR adoption has increased over the past decade due to market and government incentives, including the federal Meaningful Use (MU) program,² how to effectively use EHR products is an ongoing concern for physicians. Research suggests that this is because of the challenges physicians have interacting with the EHR to safely and effectively deliver care.³ These challenges can be classified as usability issues—i.e., the design and implementation of EHRs do not align with the cognitive and/or workflow requirements and/or

preferences of physicians within and across specialties and settings.

The AMA-sponsored RAND study, “Factors affecting physician professional satisfaction and their implications for patient care, health systems and health policy,” presents many challenges that physicians face today in delivering high-quality patient care, including the use of cumbersome EHRs.⁴ The report, a qualitative and quantitative study of physician practices from six states in 2013, identified a number of issues related to EHRs. Physicians noted that EHRs had the potential to improve some aspects of patient care and professional satisfaction. For many physicians, however, current EHR functionalities have led to professional dissatisfaction. Issues that many EHRs have today include “poor usability, time-consuming data entry, interference with face-to-face patient care, regulatory requirements, insufficient health information exchange and degradation of clinical documentation quality.” Physicians also singled out compliance with MU program requirements as the largest source of administrative burden in their practices. Numerous studies and surveys have supported the findings of the AMA sponsored study.⁵ For example, a recent International Data Corporation (IDC) survey found that 58 percent of ambulatory physician users were not satisfied with their EHR technology and “most office-based providers find themselves at lower productivity levels than before the implementation of their EHR”⁶ and that “workflow, usability, productivity, and vendor

1 Middleton, B. (2005). Achieving U.S. Health Information Technology Adoption: The Need For A Third Hand. *Health Affairs*, 24(5), 1269–1272. doi:10.1377/hlthaff.24.5.1269

2 The Health Information Technology for Economic and Clinical Health (HITECH) Act, part of the American Recovery and Reinvestment Act (ARRA) enacted into law in 2009, was designed to create incentives for providers to adopt EHR technology. HITECH provides approximately \$30 billion in financial incentives to eligible professionals and other providers who treat Medicare and Medicaid patients. Physicians and other eligible professionals must meet federally-outlined criteria and utilize federally certified EHR technologies to receive reimbursement. This incentive program is known as the Meaningful Use (MU) program.

3 J Am Med Inform Assoc-2014-Meeks-amaajnl-2013-002578

4 Freidberg, M., et al, Factors Affecting Physician Professional Satisfaction and Their Implications for Patient Care, Health Systems, and Health Policy, RAND Corporation, Oct, 2013

5 Hill RG, et al, 4000 Clicks: a productivity analysis of electronic medical records in a community hospital ED, *Am J Emerg Med* (2013), <http://dx.doi.org/10.1016/j.ajem.2013.06.028>

6 <http://www.idc.com/getdoc.jsp?containerId=HI244027>

quality issues continue to drive dissatisfaction.”⁷ A National Research Council Report underscored the concern that EHRs were designed to support transaction processing and billing, and did not adequately provide “cognitive support for health care providers and for patients and family caregivers.”⁸

Unfortunately, the very incentives intended to drive widespread EHR adoption have exacerbated and, in some instances, directly caused usability issues. According to a report by Black Book Rankings, the MU incentives have created an artificial market for immature products. The report also found that many EHR vendors are preoccupied with backlogged implementations and selling current products, and that this has resulted in neglect of development priorities that could improve usability. The report also found that vendors report that the majority of their time is spent designing and engineering around MU requirements. This work is displacing the backlog of requests from physicians and other EHR users to improve critical functionality that is not required by MU but can enhance general usability of their products.

Despite numerous usability issues, physicians are mandated to use certified EHR technology (CEHRT) to participate in the MU program. The complexities of the MU criteria, coupled with the drawbacks of using EHRs in the practice, may reduce the MU program’s success. Federal data from early 2014 depicted a downward trend in physician participation—20 percent of physicians left the program in March and newer attestation data place the number at 22 percent in May. If substantial changes are not made to improve EHR usability, the physician dropout rate will likely continue to rise.

Federal agencies are devoting increased attention to this matter. The Office of the National Coordinator (ONC), which is responsible for overseeing EHR certification for the MU program, is aware that the requirements EHR vendors must meet to obtain product certification should be changed to enable the development of high-performing products. The Agency for Healthcare Research and Quality (AHRQ) and the National Institute of Standards and Technology

(NIST) are also exploring the issue of EHR usability and adoption rates in greater depth.

According to the NIST:

“Usability represents an important yet often overlooked factor impacting the adoption and meaningful use of electronic health record (EHR) systems. Without usable systems, doctors, medical technicians, nurses, administrative staff, consumers, and other users cannot gain the potential benefits of features and functions of EHR systems.”

According to a recent AHRQ report:

“Current best practices and standards of design, testing, and monitoring EHR product(s), particularly for usability, are varied and not well disseminated...Driving the EHR market toward creation of usable products requires development of a process that accurately identifies usable products, establishes and disseminates standards, and encourages innovation.”

Achieving the Goal of Improved EHR Usability

Improving EHR usability and finding its proper place in the overall health information technology (health IT) ecosystem is an important goal for our nation’s health care system. National leaders in health IT usability also have identified this national priority and have made recommendations to improve usability.⁹ The AMA adds its voice to this call and believes that it is imperative to step back and reframe the discussion around the desired future capabilities of the EHR, emphasizing clinical care improvements as the primary focus.

Making clinical care improvements the primary focus of EHRs requires a more open platform that not only contributes to “big data” and gains benefits from big data analytics but also facilitates individual patient encounters through the use of “small data.” Instead of focusing on the EHR as the centerpiece of the health IT ecosystem, the EHR should be viewed as one of many contributors to the future health IT landscape. To achieve this, vendors

7 Ibid.

8 Stead, W. W., & Lin, H. S. (2009). *Computational Technology for Effective Health Care: Immediate Steps and Strategic Directions*. Washington (DC): National Academies Press (US).

9 Blackford Middleton, Meryl Bloomrosen, Mark A Dente, et al. Enhancing patient safety and quality of care by improving the usability of electronic health record systems: recommendations from AMIA. *J Am Med Inform Assoc* 2013 20: e2-e8.

must develop EHRs not as an application that serves “all things for all people” (i.e., multiple functions fit the broader needs of users) but as a more nimble, supportive application that facilitates the data capture and displays data, tailored to the end-user. Small-data capabilities connect physicians with timely and meaningful insights that are accessible, understandable and critical to performing the necessary tasks to provide high-quality patient care. A practical example is the ability to collect and analyze data on a group of patients, within a practice or organization, and track interventions and outcomes that can lead to improved care.

It is within this framework that the AMA identified key challenges physicians face with current EHRs and recommends eight EHR usability priorities to be urgently addressed. Additionally, the AMA urges continued research to advance EHR usability through understanding and measuring its effectiveness among physicians and other health care professional users who increasingly rely on this technology. The proposed eight usability priorities were developed with the support of the AMA Advisory Committee on Physician EHR Usability, an external group of individuals composed of practicing physicians with expertise in EHRs, nationally recognized health informaticists, human factors researchers and noted chief medical information officers and chief information officers of leading health care systems (see Committee Roster in Appendix).

The AMA recognizes that many of the recommendations can only be implemented in the long term due to vendor product development cycles, the use of current legacy systems and existing contracts, regulations and institutional policies. However, there is a great sense of urgency to improve EHRs because every patient encounter and the physician’s ability to provide high-quality care are affected by the current state of usability. Improving EHR usability requires significant effort among all stakeholders—vendors, physicians, other health care professionals, institutions, patients, researchers and policymakers.

The AMA believes that overly specific regulatory requirements have unintended consequences and that user demands and vendor responses are more naturally aligned with needs and usability. Regulatory efforts should be reserved for addressing objectives that are not achieved by competitive market forces. This principle is critical today as MU Stage Two is

currently being refined and MU Stage Three is under development. The AMA and its physician members will continue to be constructively and fully engaged in this important effort.

Key Challenges Physicians Face with Current EHRs

The AMA recognizes that not all EHR usability issues are directly related to software design. Software design varies greatly among vendors and specific organizations that often customize EHR functions. For example, some EHR usability issues are a result of sub-optimal implementation, required by the practice itself or part of an organizational policy (e.g., risk management, institutional liability concerns or inadequate training of users). Other issues may be related to regulatory requirements (e.g., state and federal regulations such as an overly prescriptive MU). EHR usability issues may also be due to suboptimal practice workflow processes that have been incorporated into EHRs. Workflow analysis, collaborative end-to-end workflow design and associated training are very expensive and are often neglected in projects with limited budgets and strict timeframes to meet MU requirements (i.e., deadlines to receive subsidies and/or to avoid penalties). Within this context, the AMA identified key challenges physicians face with current EHRs:

- Interference with the patient visit
- Lack of system-design support for team-based care
- Issues with care coordination due to lack of interoperability
- Increased cognitive workload for physicians
- Lack of data liquidity and high switching costs
- Lack of product modularity to support unique physician practices and population needs
- Communicating with patients in a changing digital landscape
- Insufficient support for incorporating end-user input into product design and post-implementation feedback for product improvement

Eight EHR Usability Priorities

1. Enhance Physicians’ Ability to Provide High-Quality Patient Care

- **Challenge:** EHRs can require a significant amount of attention from the physician that reduces the time available to interact with patients. Many

physicians report that using poorly designed EHRs (1) interferes with the face-to-face patient interaction visit, (2) requires more time documenting patient encounters, (3) compels the collection of time-consuming information of questionable value and (4) is slower at accessing needed information during the patient encounter. Interactions among physicians, clinical team members and patients were very complex prior to EHR implementation and they have become even more complicated with poorly designed and/or configured systems. These issues can be addressed through awareness of a combination of factors including (1) clinical/operational context, (2) workflow considerations during the history and physical data acquisition and documentation, (3) shared decision making and (4) attention to inter-related, sequential processes associated with team-based care.

The ways that EHRs structure information, process data and generate clinical reminders (e.g. “pop-ups”) too often detracts from physician time with a patient. For EHR users, inflexible software with cumbersome menus or poor graphical user interface configurations leads to excessive clicking and scrolling which increases the administrative time spent during patient visits compared to use of paper charts. Contributing to this problem, many existing EHRs grew out of practice management systems, in which billing and claims are the primary focus and performed by non-clinical staff whose workflow requirements differ significantly from clinicians. Another challenge is that physicians who move between ambulatory and inpatient settings are often required to use multiple EHRs with very different user interfaces; this can impede their ability to achieve high proficiency and provide efficient care.

Although some EHR vendors have implemented User-Centered Design (UCD)—i.e., “product[s] [that] can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use”—their results have been inconsistent and many other vendors have not implemented UCD.

- **Solution:** Effective communication and engagement between patients and physicians

should be of central importance in EHR design. The EHR should fit seamlessly into the practice and not distract physicians from patients. The arrangement of electronic devices in the care setting should seek to limit distractions.

EHRs should be designed and developed to meet the cognitive and workflow needs of physicians. This involves adhering to proper UCD techniques and conducting research to understand how physicians perform their daily work. EHR vendors must also focus more on user interface and cognitive workflow design in the development of their products.

Change in design and development priorities will require more flexibility in the MU program. Today physicians and vendors are focused on MU compliance, which is preventing them from focusing on collaborating around prioritization of software development according to clinical care needs. Consideration should also be given to the development of a common style guide—designed through collaboration between physicians and vendors—so physicians who practice in different care settings can move easily from one EHR to another.

The AMA recognizes that even the best designed products require physician and staff to undergo significant training to make the best use of their EHR. Vendors can offer more flexible training methods to accommodate different learning styles and provide tools to verify that staff received the necessary training and developed the necessary proficiencies to properly operate the system. Well-done training and ongoing support can markedly improve user experiences.¹⁰

2. Support Team-Based Care

- **Challenge:** With the emergence of new care delivery and payment models, there is more emphasis on team-based care. In this model, clinical team members practice at the “top of their license” (i.e., providing care that is commensurate with their training and scope of practice) to maximize the productivity of each team member

¹⁰ The Correlation of Training Duration with EHR Usability and Satisfaction: Implications for Meaningful Use, AmericanEHR Partners, Oct. 2011

and distribute work appropriately across members of the care team. In spite of these developments, many EHR systems are not well configured to facilitate team-based care and require physicians to enter data or perform tasks that other team members should be empowered to complete. Institutional policies, often driven by fears of litigation or compliance audit failures, can also be a factor in requiring physicians to enter data that could be delegated to other team members.

- **Solution:** EHR design and configuration must: (1) facilitate clinical staff to perform work as necessary and to the extent their licensure and privileges permit and (2) allow physicians to dynamically allocate and delegate work to appropriate members of the care team as permitted by institutional policies. Since licensure and privileging policies vary by state, some degree of flexibility is necessary. All EHRs should provide the ability to define user groups, associate them with specific features/functions they can access and keep a record of each team member who contributes to the patient record. These options will allow team members, other than the physician, to enter vital signs, document vaccinations, place orders, enter notes, complete charge masters, and perform similar tasks. Supporting this ability to have clear role transferability and accountability within the team can enhance workflow efficiency.

Institutional policies and federal requirements regarding who may enter or perform tasks in the EHR also need to support physician-led team-based care. New research, quantifying the adverse financial impact of onerous administrative tasks performed by physicians should be undertaken.

3. Promote Care Coordination

- **Challenge:** Transitions of care (e.g., referrals and the movement of patients between care settings) have always been a challenge to delivering efficient, high-quality care. While a technology-connected health care environment is expected to overcome this challenge, there remains a lack of usable interoperability and insufficient tracking of these transitions to alert the care team when disconnects occur that impede effective care coordination.

- **Solution:** EHRs should have enhanced ability to automatically track referrals and consultations as well as ensure that the referring physician is easily able to follow the patient's progress/activity throughout the continuum of care. The same approach can be used for tracking orders such as whether or not laboratory test result orders are reported to patients, and when/where the patient's prescriptions are filled. Physician practices should be able to configure their tracking abilities to fit their model of care (e.g., patient-centered medical home (PCMH), accountable care organization (ACO), individual practice, etc.) in order to avoid information chaos and overload. Usable interoperability between EHRs and other forms of health IT is an essential requirement to facilitate the flow of relevant information across care transitions.

4. Offer Product Modularity and Configurability

- **Challenge:** Physician practice patterns and workflows vary by size, specialty and setting. EHR products, however, frequently have limited flexibility to accommodate these differences. While third-party products can offer documentation, data analytic and/or other "plugins" to support practice needs, most EHRs are not built to accommodate them.
- **Solution:** Modularity of technology will result in EHRs that can offer flexibility in the practice. Physician practices are best positioned to configure their health IT environment in ways that best suit their workflow and patient population. To be done well, such enhanced customization must balance (1) the vendor's ability to technologically produce, (2) the development of clinical processes necessary to support and (3) the physician and institution's commitment to the effective execution of both the customization and clinical processes support.

Application program interfaces (APIs) can be an important contributor to this modularity. APIs are routines, protocols and tools for building software applications for a specific purpose or adding on to existing products such as an EHR. For instance, EHR vendors can provide an API that allows other applications, utilizing natural language processing,

to document an office note on the physician's behalf. This offloads the work of voice transcription to a much more specialized software module. APIs open the door for hundreds of developers to develop very specialized applications focused on providing benefits to the end user.

A recently commissioned AHRQ report, undertaken by JASON¹¹ for the MITRE Corporation and titled "A Robust Health Data Infrastructure,"¹² outlines a health IT framework that defines data access, authentication and storage/transport layers. This health IT framework does not redefine the EHR but, rather, establishes methods and reasoning for creating an open architecture. While the immediate concern is to improve the EHR usability, the AMA believes that JASON offers some useful suggestions that can alleviate physician's user interface frustration including EHR vendors incorporating an open API technology.

5. Reduce Cognitive Workload

- **Challenge:** Current EHRs focus primarily on data collection rather than synthesis of data at the patient level. Current data synthesis methods are typically neither context nor patient specific. The lack of context awareness can lead to frequent clinical and administrative reminders that may force physicians to make hard stops, even for non-urgent matters, to address these issues. As a result, the physicians' workflow is interrupted and patient encounters are disrupted.

Today's EHRs create a tension between unstructured and structured data that many physicians believe degrades the quality of their clinical care narrative. This tension has compelled physicians and others to enter data into EHRs without regard to the value, or lack thereof, created through this substantial additional work. The overall workload—reading, writing, thinking and navigating the system—in EHRs is not well balanced. Many physicians find that the quality of the clinical narrative in paper charts are more succinct and reflective of the patient's perspective

and physician's thought process. In contrast, unlike paper charts, EHRs favor structured data capture in the form of drop-down menus and templates that can interfere with the creation of a coherent narrative.

- **Solutions:** EHRs should support medical decision-making by providing concise, context-sensitive and real-time data uncluttered by extraneous information. EHRs should manage information flow and adjust for context, environment and user preferences. Preferences can include how reminders and alerts are presented and whether or not reminders and alerts require action before the physician can proceed to the patient's medical record.

EHRs need to offer more flexibility in workflow design, data entry and data presentation to accommodate the physician's cognitive skills. UCD should address these issues at numerous stages including the design, customization, and implementation of EHRs. As specific examples, this approach could reduce the clutter associated with patient problem and medication lists that do not differentiate between current and out-of-date information, mitigate instances requiring excessive scrolling and improve upon navigating functions that are unable to return to the previous page.

Even though most EHRs have reporting and clinical decision support (CDS) tools built into the system, it is impossible for any vendor to fully predict the different reporting needs of physicians or anticipate their specific CDS requirements. Sophisticated reporting, data analytics and decision support tools that can be customized to meet each practice environment are needed and may require integration with third-party applications. One way to address this concern may be the AHRQ/JASON report recommendation that EHR vendors publish their APIs to support third-party decision support applications.

6. Promote Data Liquidity

- **Challenge:** True usable interoperability and exchange of data are a prerequisite to improve patient care. This will contribute to enhanced

11 JASON is an independent group of scientists which advises the US government on matters of science and technology.

12 <http://healthit.ahrq.gov/ahrq-funded-projects/robust-health-data-infrastructure>

usability and protect against EHR data lock in, which can contribute to increased physician dissatisfaction and expense. Serious concerns over EHR sustainability and the high cost of available solutions have been a substantial deterrent and limitation to their use.

The health information exchange (HIE) environment, characterized by a mix of public and privately funded exchanges, cannot support true interoperability without commitments from EHR vendors and the ONC. Both EHR vendors and the ONC need to support current and future data exchange standards that ensure data exchanged between EHRs is accurate, timely and resistant to errors. Additionally, overreaching regulatory requirements and institutional policies attempting to make the EHR “all things to all people” has compelled the collection of too many disparate types of information in one place and enormously complicated the ability for HIEs to exchange a standardized data set in an efficient and reliable manner.

Another obstacle to useable interoperability is the failure to establish a reliable method for identity management. Without this capability, patient identity matching between institutions has become a highly manual and costly process.

Further still, an additional major impediment to the usability of information exchange is the failure of MU to require intercalation of inbound data from external sources into the longitudinal record of the recipient system referred to as *semantic interoperability*. This creates “blobs” of imported external data that are effectively discontinuous with the native data within the receiving EHR system thereby making the review of the longitudinal record difficult.

- **Solution:** EHRs should facilitate connected health care—interoperability across different venues such as hospitals, ambulatory care settings, laboratories, pharmacies and post-acute and long-term care settings. This means not only being able to export data but also to properly incorporate external data from other systems. These capabilities should present a coherent longitudinal patient record, built from various

sources and viewed among different entities that share the data. The AHRQ/JASON report¹³ envisions such a model.

Interoperability extends beyond EHRs and will need to support other health IT systems and emerging mobile health and telehealth applications. Identity management and identity proofing of physicians, patients and organizations must also be addressed.

Additionally, while MU now requires that EHR vendors send documents in the Continuity of Care Document/consolidated Clinical Document Architecture (CCD and cCDA) formats, the cCDA format is still a draft standard, which allows variability in its use. Consequently, issues arise when local EHRs need to accept the data because variability in data representation makes it difficult to consume. EHR vendors should use inbound information to create a longitudinal record for each patient. Longitudinal records can only result when three things occur: (1) records are sent using basic interoperability standards (e.g., CCD and cCDA); (2) there is a reduction in variability in these formats and (3) records are received and incorporated into the chart in a form consistent with the both the originating and receiving records.

The AMA recognizes that true usable interoperability is complex and may not be achievable in today’s information exchange environment, data standards and certification constructs. It will take commitment, concerted effort and cooperation from standard-setting bodies, information exchanges (both public and private), vendors, testing authorities and the ONC to consider a more workable method for certifying EHRs. ONC’s recently announced 10-year vision for an interoperable framework highlights the need to address several of these issues.

Efforts such as Healthways, Commonwell and the newly announced, Carequality initiative will hopefully contribute to this goal. Vendors should also adhere to the Electronic Health Records Association (EHRA) Code of Conduct,

13 <http://healthit.ahrq.gov/ahrq-funded-projects/robust-health-data-infrastructure>

which states that "...[EHRs] will enable, at a minimum, the export of one or more standards-based clinical summary formats such as CCD/ cCDA (or the then-current equivalent) for all patients." The use of metadata tagging will further facilitate data liquidity. The national goal should be true, transparent and persistent interoperability that requires little to no human intervention or disruption in workflow (i.e. "usable interoperability").

7. Facilitate Digital and Mobile Patient Engagement

- **Challenge:** Unlike other industries, where customers can interact digitally, the health care industry remains the exception rather than the norm. Outside of face-to-face office visits, many physician practices still interact with patients via phone, fax, email and text. Because MU requires physicians to provide patients with the ability to view, download and transmit patient records securely, physicians who do not yet have a patient portal may be compelled to purchase one at the cost of tens of thousands of dollars. Many of these requirements could be facilitated through digital patient engagement, but most EHRs are not designed to support it.

In addition, an increasing number of patients are taking advantage of wearable sensor technologies to allow for real-time monitoring and tracking of important medical information. Over time, it is anticipated that wearable sensor technologies will become an important feature of the health IT ecosystem. Current EHRs offer limited or no capability to download and synthesize data from these technologies.

Solution: Use of digital and mobile technology among patients and physicians are on the rise and is expected to play a fundamental role in new payment and care delivery models. Patients themselves can be useful sources of their own medical information when well-designed tools and processes are put in place. Whether for health and wellness and/or the management of chronic illnesses, interoperability between a patient's mobile technology, telehealth technologies and EHR will be an asset. EHR vendors must anticipate this when incorporating

interoperability in the design of future products. Many of the recommendations for data liquidity and modularity will support this capability.

8. Expedite User Input into Product Design and Post-Implementation Feedback

- **Challenge:** Although physicians are required to use certified EHR technology (CEHRT) to participate in the MU program, there are no post-certification processes in place to ensure CEHRT performs as anticipated in actual practice environments. ONC's certification process is conducted in a laboratory setting where most of the variables are controlled and a limited number of preselected tests are performed. The current certification process has resulted in poor or incorrect performance of CEHRT when used by practicing physicians in real-world practice settings. Additionally, a lack of clear and concise implementation guidelines has contributed to this problem.
- **Solution:** An essential step to user-centered design is incorporating end-user feedback into the design and improvement of a product. EHR technology should facilitate this feedback. The ability to provide feedback within the EHR that is context sensitive could address some of the frustration that physicians and staff experience. Such feedback is particularly important in addressing situations that can affect patient safety.

Feedback pertaining to issues that arise during individual patient encounters should be automated to facilitate communication between the user and vendor. Using a standardized feedback process in the EHR, the user could categorize their issues and use an unstructured note field to elaborate on them. These reports would be automatically recorded within the EHR and communicated to the vendor. These reports should be reviewed on a regular basis, acknowledgment of the feedback should be provided and systems should be updated as necessary to enhance the EHR. The AMA cautions against creating regulatory oversight of this process and suggests that more flexibility in MU requirements around functionality will allow more resources to be focused on UCD and user feedback.

Conclusion: The Road Forward

According to the AMA Rand study, the single largest driver of professional satisfaction is the physician's perceived ability to deliver high quality care to patients. The AMA believes that if the above priorities were implemented in the EHR design, it would (1) enable physicians to deliver such care, (2) improve physician experience with the technology, (3) increase physician productivity and (4) reduce administrative costs.

Aside from these eight EHR usability priorities, the AMA believes that additional research is needed to determine how EHR use promotes or inhibits high quality care. It is essential to better understand the cognitive needs of physicians and how EHR products can meet them, identify evidence that outlines the benefit tools that support decision-making and explore how EHRs influence the patient encounter. All are opportunities for research that would benefit the advancement of EHR technology. Finding evidence of what works and what doesn't work will be critical to improving EHRs.

The AMA is committed to improving EHR usability for physicians and other stakeholders in the health care industry. To advance these goals, the AMA plans to utilize these eight EHR usability priorities to:

- Work with vendors to develop usable EHRs and evaluate their usability
- Advocate federal and state policymakers to develop effective health IT policy
- Collaborate with institutions and health care systems to develop effective institutional health IT policies
- Partner with researchers to advance health IT research
- Educate physicians about these priorities so they can lead in the development and use of future EHRs that can improve patient care.

Through these efforts, we hope to advance the delivery of high quality and affordable health care. The AMA stands ready to partner with others across the health sector to bring this vision to life.

APPENDIX

American Medical Association Advisory Committee on EHR Physician Usability

The following committee members provided their personal expertise and insight to assist in the development of the AMA EHR Usability Priorities; however, the EHR Usability Priorities have not been endorsed by, nor should they be attributed to, the member organizations, employers, or other affiliated partners of the individual members of the advisory committee.

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