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Electronic Health Record Functionality Needed to Better Support Primary Care

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ABSTRACT

Electronic health records (EHRs) must support primary care clinicians and patients, yet many clinicians remain dissatisfied with their system. This article presents a consensus statement about gaps in current EHR functionality and needed enhancements to support primary care. The Institute of Medicine primary care attributes were used to define needs and meaningful use (MU) objectives to define EHR functionality. Current objectives remain focused on disease rather than the whole person, ignoring factors such as personal risks, behaviors, family structure, and occupational and environmental influences. Primary care needs EHRs to move beyond documentation to interpreting and tracking information over time, as well as patient-partnering activities, support for team-based care, population-management tools that deliver care, and reduced documentation burden. While stage 3 MU's focus on outcomes is laudable, enhanced functionality is still needed, including EHR modifications, expanded use of patient portals, seamless integration with external applications, and advancement of national infrastructure and policies.

INTRODUCTION

The adoption and use of electronic health records (EHRs) holds the promise of improved care and better patient outcomes.[1–3] To ensure that all Americans enjoy benefits, national legislation charged the Office of the National Coordinator (ONC) and Centers for Medicare and Medicaid Services (CMS) with defining national EHR meaningful use (MU) objectives and measures.[4 5] Adherence to MU is being reinforced by US$27 billion in incentives.[6 7] While MU is intended to encourage clinician use of existing EHR features, it has effectively directed the energies and innovations of EHR vendors as well.[8]

MU is divided into three stages. Stage 1 focused on promoting data capture and sharing (2011), stage 2 on promoting exchange of health information (2014), and stage 3 on improving outcomes (2016).[9–11] Throughout, CMS and ONC have sought input from experts, clinicians, and the public.[12]

Many have questioned whether EHR design and MU support promising new care models, such as the Accountable Care Organization (ACO) and Patient Centered Medical Home (PCMH).[13–15] A useful evaluation, which has not been previously made, is how well EHR functionality supports primary care. The Institute of Medicine (IOM) asserts that 'primary care is the logical foundation of an effective health care system because it can address the large majority of health problems in the population.'[16] This is supported by evidence demonstrating that primary care extends life span, reduces morbidity, increases satisfaction, reduces disparities, and is cost effective.[17] It is also where the majority of people receive care.[18 19]

Primary care has embraced EHR adoption and MU. Online appendix A describes the phases of how practices achieve MU. In 2011, 57% of office-based physicians reported using any EHR, and, in 2013, more than half had received MU incentives.[20 21] Yet clinicians commonly report EHR dissatisfaction.[22–25]

This article presents a consensus statement from the American Academy of Family Physicians (AAFP), American Academy of Pediatrics (AAP), American Board of Family Medicine (ABFM), and North American Primary Care Research Group. It identifies gaps in current EHR functionality and makes enhancement recommendations to better support primary care. The IOM attributes of primary care were used to define primary care needs, and stage 2 MU eligible provider objectives were used to define EHR functionality. Steps to reach consensus included (1) assigning each MU objective to the primary care attribute it supported,[16 26] (2) identifying unmet needs within each attribute, and (3) obtaining iterative input from organization members and 148 practicing clinicians. Initial work was carried out by the 43 members of the NAPCRG Health Information Technology (HIT) working group (primary care HIT leaders from 38 institutions internationally). Practicing clinicians were identified from four practice-based research networks and included family physicians (n=78), internists (n=16), pediatricians (n=18), mid-level providers (n=12), nurses (n=15), and informatics staff (n=9) from 15 states in urban, suburban, and rural communities. Participant consensus was sought during each step.

PRIMARY CARE ATTRIBUTES

The IOM defines primary care as 'the provision of *integrated, accessible health care services* by clinicians who are *accountable* for addressing a large *majority of personal health needs*, developing a *sustained partnership* with *patients*, and practicing in the *context of family and community*.'[16] Central to primary care is the patient–clinician relationship, established with the mutual expectation of continuation over time and predicated on the development of mutual trust, respect, and responsibility. Family

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Primary care is…

1. **Accessible** in terms of patients both being able to have a primary care clinician and being able to receive care when needed and convenient.
2. **Coordinated** across all services and settings, proactively providing all needed care and information, in the right sequence, and appropriately using resources.
3. **Sustained** providing longitudinal care over a patient's lifetime, as opposed to a single encounter or isolated exchange, and continuous care for events occurring in disparate settings over time.
4. **Comprehensive** addressing the entire scope of services (prevention, chronic care, acute care, and mental health) at any given Stage of a person's life, and being delivered in all needed settings (office, home, emergency room, hospital, and nursing home).
5. **A partnership with patients** focusing on the therapeutic alliance and relationship-based approach to care to help advocate for and guide patients through the health system, seek agreement on health goals, and account for each individual's values and preferences.
6. **Person-centered** addressing whole person care and delivered in the context of family (living conditions, family dynamics, and cultural background) and community (context for identity, source for social and psychological support, and determinant of the patient's environment).
7. **Integrated** creating a system that allows all of the primary care attributes to function within practices, across the entire care delivery system, and throughout community population

Figure 1 Seven Key Primary Care Attributes Defines by the Institute of Medicine.

and community provide context, and an integrated delivery system provides the means for delivery of care.[16] The IOM indentifies seven attributes that characterize primary care (figure 1), [16] which are echoed in the Chronic Care Model, PCMH, and ACO design.[27–30] EHRs that meet the needs of primary care will meet the needs of these care models, specialists, and hospital-based clinicians.

MU OBJECTIVES AND PRIMARY CARE ATTRIBUTES

Stage 1 and 2 MU objectives were finalized on July 13, 2010 and August 23, 2012, respectively, and stage 3 will be finalized in 2015.[6 31] Two groups of participants are eligible to receive incentives—eligible providers and hospitals. This article focuses on stage 2 provider objectives.

MU objectives are defined by specific reportable measures and targets to achieve.[32] Stage 1 has 15 core objectives and 10 additional objectives—five of which clinicians select to report. Stage 2 consists of 17 core and six additional objectives—of which clinicians report three.[10] The assignment of each MU objective by the primary care attribute it best supports is presented in table 1. As the MU objectives were not specifically designed around the IOM primary care attributes, some objectives do not clearly support any primary care attribute, and others support multiple primary care attributes. For this perspective, each objective was categorized by group consensus as supporting only one attribute.

PRIMARY CARE NEEDS AND EHR ENHANCEMENTS

As demonstrated in table 1, the content of stage 2 MU objectives appears to inadequately support primary care attributes. MU has driven EHRs to better support the coordinated and integrated attributes, but they do less to promote the accessible, sustained, partnership, and person-centered attributes. For the variety, complexity, and comprehensiveness of primary care to be captured, a fundamental shift is needed from the documentation of episodic and procedural care to the evidence-based personalization of longitudinal whole-person care with active patient and care team participation. Specific EHR enhancements to address unmet primary care needs are outlined in box 1 and in the text below.

Accessibility

To increase clinician accessibility, EHRs need to reduce documentation burden, help clinicians move beyond visits to deliver care, and allow clinicians to evaluate, monitor, and improve accessibility. Current EHRs essentially add a 'third party' to the examination room, competing with patients for clinician attention.[33 34] This effect is greater when information is difficult to access or when documentation is time consuming.

If EHRs could easily aggregate and accept structured clinical data from external sources, they might reduce documentation workload, allowing the clinician to be fully present for the patient. Objectives require the ability to view, download, and transmit health information, but not update a clinician's EHR.[35] To extend care outside visits, clinicians need enhanced electronic communication tools coupled with capacity for patients to electronically share health information (eg, pictures, device data). Interactions with patients could expand beyond messaging and include video conferencing, yet clinicians report that EHRs lack even basic communication functions.[36]

Coordination

Clinicians need EHRs that can coordinate and track care delivery across all clinical settings. Stage 2 MU objectives advance the creation and use of information exchanges, an important prerequisite for coordinating care. While the ability to exchange information must exist in all certified EHRs, they often require the creation of individualized and costly interfaces. As a result, clinicians in small to medium sized practices are largely excluded.[37 38] Practices need access to 'out of the box' information exchanges that can easily send and receive a patient's health information. To have this functionality, EHRs need to adopt standard data models, coding systems, and vocabularies; clinicians need to adopt standardized methods for recording and tracking patient data.

Through PCMH and ACO initiatives, practices are expanding staff roles, creating care teams, and partnering a growing cadre of ancillary services.[27–30] Clinicians will need EHRs that allow the electronic formation of teams with defined member roles, mechanisms to distribute tasks, processes for communication,

Table 1 Stage 1 and stage 2 meaningful use (MU) objectives categorized by primary care attribute

MU objectives	Stage 1 objectives	Stage 2 objectives
IOM primary care attribute: accessibility		
Secure messaging	No measure	Use secure messaging for 10% of patient communications (C)
IOM primary care attribute: coordination		
CPOE	Use CPOE for medication orders for 30% of patients (C)	Use CPOE for medication, laboratory results, and radiology orders for 60% of patients, includes drug-formulary check (C)
Drug-formulary checks	Implement drug-formulary checks (C)	
ePrescribing	Generate and transmit 40% of prescriptions electronically (C)	Generate and transmit 65% of prescriptions electronically (C)
Summary of care	Provide patient care summaries for 50% of care transitions (C)*	Provide patient care summaries for 65% of care transitions, includes up-to-date problem, medication, and allergy lists (C)
Problem list	Maintain an up-to-date problem list for 80% of patients (C)†	
Medication list	Maintain an active medication list for 80% of patients (C)†	
Medication allergy list	Maintain an active medication allergy list for 80% of patients (C)†	
Timely electronic access to health information	Provide 10% of patients timely electronic access to health information (E)	View, download, and transmit to 3rd party—revised objectives to provide 50% of patients the ability to view, download, and transmit health information electronically (C)
Electronic copy of health information	Provide patients with an electronic copy of their health information (C)	
Electronic copy of discharge instructions	No measure	
IOM primary care attribute: sustained care		
Patient reminders	Send reminders to 20% of patients for follow-up care (E)	Send reminders to 20% of patients for follow-up care (C)
Patient list	Generate one list of patients by condition for outreach (E)	Generate one list of patients by condition for outreach (C)
IOM primary care attribute: comprehensiveness		
Vital signs	Record vital signs (height, weight, blood pressure, BMI) on 50% patients (C)	Record vital signs (height, weight, blood pressure, BMI) on 50% patients (C)
Smoking status	Record 50% of patients' smoking status (C)	Record 80% of patients' smoking status (C)
Medication reconciliation	Perform medication reconciliation on 50% of patients (E)	Perform medication reconciliation on 65% of patients (C)
Laboratory results into EHR	Incorporate 40% of laboratory results as structured data (E)	Incorporate 55% of laboratory results as structured data (C)
Imaging results	No measure	40% of imaging results and information accessible through the EHR (E)
IOM primary care attribute: partnership with patients		
Clinical summaries for office visits	Provide patients a clinical summary after 50% of office visits (C)	Provide patients a clinical summary after 50% of office visits (C)
Patient-specific education	Identify patient-specific education resources for 10% of patients (E)	Identify patient-specific education resources for 10% of patients (C)
Advance directives	Record advanced directives for 50% of patients over 65 years (E)	Record advanced directives for 50% of patients over 65 years(E)
IOM primary care attribute: person-centered		
Demographics	Record demographics (language, gender, race, ethnicity, date of birth) on 50% patients (C)	Record demographics (language, gender, race, ethnicity, date of birth) on 80% patients (C)
Family history	No measure	Family history (E)
IOM primary care attribute: integrated		
CDS	Implement 1 clinical decision support rule (C)	Implement 5 clinical decision support rules counting drug–drug and drug–allergy interactions (C)
Drug–drug and drug–allergy interactions	Implement drug–drug and drug–allergy interaction checks (C)	
Immunization registry	Be capable of submitting electronic data to immunization registries (E)	Be capable of submitting electronic data to immunization registries (C)
Laboratory results to public health agency	Be capable of submitting electronic laboratory results to public health agencies (E)	Be capable of submitting electronic laboratory results to public health agencies (E)
Specialized registry	No measure	Be capable of identifying and reporting specific cases to a specialized registry (E)
Cancer registry	No measure	Be capable of identifying and reporting cancer cases to a State registry (E)
Privacy and security	Protect electronic health information (C)	Protect electronic health information (C)

*The stage 1 objective is better categorized as 'partnership with patients', but the stage 2 modification is categorized as 'coordinated'.
†The stage 1 objective is better categorized as 'comprehensive', but the stage 2 modification is categorized as 'coordinated'.
BMI, body mass index; C, core (required) MU objective; CDS, clinical decision support; CPOE, computerized physician order entry; E, elective MU objective; EHR, electronic health record; IOM, Institute of Medicine.

Table 2 Electronic health record (EHR) and information technology enhancements not addressed by meaningful use (MU) and needed to better support primary care

Primary care attribute: accessibility

Make documenting, accessing, and conveying information non-labor-intensive, to increase time with patients
- Accept structured clinical data from existing external sources that can update EHRs
- Support EHR use by multiple staff members during clinical encounters for documentation and delivery of care
- Allow patients to directly enter health information through patient portals, open notes, and shared EHR space
- Do not allow EHRs to achieve MU through additional non-clinically relevant documentation

Support enhanced asynchronous care
- Allow clinician–patient email, texting, video conferencing, and other bidirectional communication mechanisms
- Allow patients to electronically share information they collect (documents, spreadsheets, pictures, device data, etc)

Embed tools to assess and monitor clinician accessibility
- Create queries for clinicians to track availability
- Support mechanisms for patients to electronically schedule appointments
- Collect patient reports on a clinician's accessibility

Primary care attribute: coordination

Expand capacity for EHRs to receive and aggregate information from all settings so primary care clinicians can proactively coordinate care
- Provide 'out of the box' health information exchange functionality to access all relevant health information
- Support timely health information exchanges so clinicians can aggregate information at the point of care
- Ensure vendor agnostic standardization of data
- Store and exchange all structured data linked to standardized meta-data identifiers
- Import discrete data from exchanges into the EHR (not just view data)

Provide functionality to help coordinate care among teams internally within offices and externally across organizations and systems
- Allow the electronic formation of clinical teams with defined roles for members
- Ensure that electronic tasks are distributed on the basis of defined roles
- Create tools to track the progress of tasks across team members

Track and coordinate ancillary and enabling services (eg, case management, transportation, interpretation, social services, financial assistance)
- Provide secure communication with coordination services
- Maintain a shared library of local coordination services tailored to the individual
- Create and maintain 'benefits formularies' delineating coverage of medications, tests, procedures, and services

Create a dashboard that synthesizes and prioritizes information about individual, and panels of, patients
- Identify and sequence visits with other clinicians, changes in medication and diagnoses, and key results
- Identify urgent messages or whether patients have been to an acute care facility or admitted to the hospital

Primary care attribute: sustained care

Track and support continuity of care
- Allow patients to define who they view as their primary care clinician
- Allow clinicians to track and limit patient panel size on the basis of number of patients and illness severity[61]
- Provide tools for practices to measure patient and clinician continuity of care

Track and support care over time
- Describe chronic conditions and events over time (beginning and end to conditions, changes in severity, and other temporal information)
- Update status and severity of chronic conditions based on other information available in the EHR
- Allow the documentation and use of health information based on episodes of care
- Provide trending tools to show health information as a function of time, influencing data, and events

Primary care attribute: comprehensiveness

Support the whole spectrum of clinical care
- Comprehensively support all aspects of preventive, chronic, acute, and mental health care through documentation, decision support, and outcomes tracking
- Support residential, ambulatory, nursing home, emergency, and hospital settings

Ensure the accuracy of EHR information
- Allow patients to review, correct, and update their health information
- Provide a means for clinicians to reconcile differences between patient-reported information, information from health information exchanges, and information in the existing EHR
- Build tools to auto-resolve outdated information and identify data inconsistencies

Primary care attribute: partnership with patients

Incorporate the patient's perspective into EHRs
- Document issues that are important to the patient (eg, patient goals, what life activities give meaning, what outcomes would be worse than death)
- Allow prioritization of patient goals
- Capture and track the patient's presenting complaint and symptoms as well as their evolution over time
- Allow patients to enter information into EHRs about their goals, values, beliefs, behaviors, and psychosocial factors

Support patient–clinician shared decision-making
- Identify who makes decisions, how decisions are made, and available social support
- Provide patients with educational material, decision aids, and value-assessment tools tailored to decision needs

Primary care attribute: person-centered

Support whole-person care[50]
- Describe and track who the patient is, including social and cultural context, patient narratives, meaningful life events
- Expand EHR functionality (eg, documentation, decision support, outcome tracking) beyond disease orientation to include a whole-person perspective

Meaningfully record the patient's family history
- Cluster family records within EHRs to allow Health Insurance Portability and Accountability Act (HIPPA)-compliant cross-referencing and provide family context
- Allow patients to record and update family genograms in a simple and intuitive format
- Link family history to clinical decision support to identify high-risk individuals and personalize support

Identify environmental and community health factors
- Record environmental and community health factors, such as living situation, occupation, context for identity, and psychological support
- Link the patient's environmental health factors to public health data and proactively identify relevant health needs

Integrate and share clinical and community-based care
- Identify community resources, programs, and caregivers that may support a patient's healthcare needs
- Allow communication with and shared access to EHR information for community caregivers
- Provide real-time coverage assessment and cost information about community resources

Primary care attribute: integrated

Integrate care settings
- Support the integration of clinical care and mental health
- Support the integration of clinical care and public health

Support the individual needs of practices
- Allow for local tailoring of content, display, and functionality while maintaining necessary standardization
- Embed functionality and tools for continuing medical education and maintenance of certification

Support national health recommendations and priorities
- Ensure that patient health information is collected with adequate detail to support national guidelines
- Integrate national guidelines into the EHR
- Supply clinicians and patients with timely prompts to support care

Allow population management
- Provide tools to track patient population health, adjusted for illness severity, and nationally/regionally benchmarked
- Provide tools to identify and reach out to patients overdue for care
- Include bidirectional flow of information to and from public health, cancer, immunization, and specialized registries
- Integrate local and national benchmarking into outcomes reports

Promote accountability for care
- Document important outcomes to patients and public health entities
- Allow information sharing and collaboration with population health partners

and tools to track patient progress. These functions will need to extend beyond individual practices to integrate a range of clinicians and services in multiple healthcare settings and the community. Such functionality is essential to support clinical–mental health and primary care–public health integrations.[39]

A more fundamental deficiency for supporting coordination is EHRs' focus on information documentation rather than extraction. Clinicians need a dashboard that synthesizes and prioritizes information across clinicians and settings to clearly show what has happened to a patient or what is happening within a panel of patients. A patient dashboard might show the sequence of clinicians that have seen the patient, changes in medications and diagnoses, and results from tests and procedures. A panel dashboard might show urgent messages or a list of patients seen in an acute care facility or admitted to the hospital.

Sustained care

To promote sustained care, MU only mandates that EHRs have reminders and generate registries. More is needed to promote both continuity and longitudinality. Continuity requires establishing and defining relationships and tracking how well relationships are maintained. EHRs need to allow patients to identify their clinicians. Clinicians need to define and track their patient panel size.

Clinicians need EHRs that have evolved beyond merely linking data according to data type (laboratory results, medications) or units of service (visits) in support of fee-for-service billing to provide the capacity to view episodes of care and display the chronological progression of signs and symptoms.[40–42] For chronic conditions, EHRs could make it easy, within the same graphic representation, to see a timeline of laboratory results, medication changes, and symptom/disease evolution.

Comprehensiveness

MU has begun to advance data acquisition and documentation, basic decision support, and outcome tracking, but objectives remain process- (eg, record smoking status) and disease-focused. Primary care addresses the entire health spectrum and will need EHRs with more robust decision support to address all of prevention, acute care, chronic care, and mental health.[43 44] To provide comprehensive care, clinicians need accurate health information. Beyond medication reconciliation, no objectives address information accuracy. EHRs could be configured to automate resolution of outdated information, identify data inconsistencies, and allow patients to participate in the reconciliation process.

Partnership with patients

Care needs to be tailored to each individual through shared decision-making and patient and family engagement.[45] Objectives do little to support this, beyond sharing clinical summaries, providing basic educational resources, and documenting

advanced directives. Contextual factors that influence decision-making (eg, goals, values, preferences, priorities, resources) need to be included in EHRs. EHRs need to clarify how decisions are made, initiate delivery of decision-support material, and integrate use of materials into encounters.[46 47] The record should capture and document a patient's readiness to change unhealthy behaviors and also appropriately provide tailored prompts and materials to clinicians, patients, and families to better motivate and support change.[47] Integrated health risk appraisals and other prioritization tools completed by patients can further help to move beyond disease-oriented care to goal-directed care.[48 49]

Person-centered

An understanding of the patient is central to creating long-term partnerships. The current objectives of recording demographics and family history do not support addressing whole-person care in the context of family and community. Person-centered care requires integration of social, cultural, and community context, biomedical, behavioral, and social risks, and personal goals and preferences.[50] A person-centered summary, or 'patient profile,' should be available as a dashboard in the EHR, and decision-support tools should be tailored on the basis of these factors. Through patient portals, patients should be able to enter and edit their own information to improve accuracy and ease of data collection.

Integration

Clinicians need EHRs to serve as the information backbone across all primary care attributes throughout a clinician's practice, community, and career.[14 27–30] Clinicians will need more robust clinical decision support that facilitates integration of all aspects of evidence-based guidelines, including high-risk individuals, guideline exceptions, influence of comorbidities, and patient preference.[51] Current decision support is too simplistic, resulting in inaccurate prompts, alert fatigue, and inappropriate care.[52 53] Greater federal coordination is needed to ensure that decision supports are implemented consistent with, and prioritized to, national needs.[54–56]

At the practice level, clinicians need more effective population-management tools. They need to be able to generate their own quality reports on demand, tailor reports to individual needs, and seamlessly move from population measures to initiating care delivery for patients in need of services.[57] Important clinical outcomes, such as death, hospitalization, quality of life, and satisfaction with care, need to be systematically documented, tracked, and benchmarked. Given that information and patient needs vary between clinicians, EHRs need to allow local tailoring of functionality and content while maintaining standardization.

Throughout their careers, clinicians must maintain competencies and core skills, demonstrated through board (re)certification and maintenance of certification. To support this process, clinicians need tools embedded in EHRs to measure, trend, and benchmark performance, conduct knowledge assessments based on practice behaviors, and support continuous quality improvement.[58]

DISCUSSION

Providing primary care is an important but daunting task, and designing EHRs to support primary care is equally challenging. The systematic process of comparing the stage 2 MU objectives with the IOM core attributes of primary care demonstrates that EHRs are not being required to consistently support all attributes of primary care.

As detailed in box 1, this analysis suggests that primary care needs additional EHR functions, but some are more critical than others. High-priority items per group consensus include:

1. Enhancing the extraction, interpretation, and prioritization of critical health information for individual patients and a clinician's patient panel;
2. Advancing information exchange to coordinate care across clinicians and settings;
3. Greater patient engagement;
4. Population-management tools to deliver care;
5. Reduction in documentation burden;
6. Better integration of care across settings.

It will be tempting for ONC and EHR vendors to discount these suggestions, stating that the issue is one of implementation and not development. However, clinician input and review of this article, as well as the literature, reveal that major advances in EHRs are needed. Take for example the objective to 'view, download, and transmit health information'; an EHR can meet this requirement without being functional by merely having the capability to assemble and send information.[59 60] This does not require data integration, update EHR content, provide care coordination, or even provide an easy transfer mechanism.

The approach used in this article of comparing the stage 2 MU objectives with the IOM core attributes of primary care has several limitations. First, while MU has incentivized EHR advances, EHRs have functionality not defined by MU objectives. Second, neither MU objectives nor EHR functionality were explicitly designed around primary care attributes. Although categorizing existing objectives and desired EHR additions is a useful and systematic approach, it is a subjective process. Third, the recommendations made in this article are not prescriptively detailed. Many EHR additions and enhancements will require innovative and novel ideas and solutions. This article purposefully focuses on what primary care clinicians think they need and not what can easily be done. Fourth, the stage 3 MU objectives currently under review may address some of the deficiencies identified in this article. Finally, just because there is a gap in EHR functionality does not mean that adding the functionality will improve outcomes. Research is needed to ensure that functions work and do not introduce unintended consequences.

More is outlined in this article than can be accomplished by MU or EHR developers alone. Years of effort, from many entities, are needed to improve EHR functionality. Some functions will be technically difficult; others may require fundamental EHR redesign. Some functions may be delivered best through external applications that are easily integrated into EHRs. Finally, some functions will require infrastructure development, new business models, and policy changes outside the control of EHR developers, such as health information exchange advancement, data standardization, privacy and security regulatory reform, and integration of national guidelines and priorities.

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