

Improving EHR Capabilities to Facilitate Stage 3 Meaningful Use Care Coordination Criteria

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Abstract

Primary care practices have been limited in their ability to leverage electronic health records (EHRs) and health information exchange (HIE) to improve care coordination, but will soon be incentivized to do so under proposed Stage 3 meaningful use criteria. We use mixed methods to understand how primary care practices manage, share and reconcile electronic patient information across care settings, and identify innovations in EHR design to support enhanced care coordination. Opportunities identified by practices focused on availability and usability of features that facilitate (1) generation of customized summary of care records, (2) team-based care approaches, and (3) management of the increased volume of electronic information generated and exchanged during care transitions. More broadly, vendors and policymakers need to continue to work together to improve interoperability as the key to effective care coordination. If these EHR innovations were widespread, the value of meeting the proposed Stage 3 care coordination criteria would be substantially enhanced.

Introduction

Background: The centerpiece of the Health Information Technology for Economic and Clinical Health (HITECH) Act of 2009 is financial incentives for providers who implement electronic health records (EHRs) and use them in accordance with federally-specified meaningful use criteria.¹ Criteria that promote care coordination are heavily emphasized because of the potential for EHRs, coupled with electronic health information exchange (HIE), to enable sharing of patients' health information between delivery settings and ultimately improve the quality, safety, and efficiency of care. These criteria were, however, largely deferred to later stages of meaningful use because few providers had EHRs that were capable of exchanging or using electronically shared clinical data for effective care coordination.^{2, 3, 4}

Objectives: We sought to identify EHR capabilities and innovations that would better enable primary care practices to meet the proposed Stage 3 care coordination criteria in a meaningful way.

Methods

Our study focused on the proposed Stage 3 meaningful use care coordination criteria from the perspective of primary care practices. At the time the study was designed, there were three proposed care coordination criteria:

1. **SGRP 302:** Reconcile patients' medications for more than 50% of transitions of care and reconcile patients' medication allergies and problems (e.g., uncontrolled diabetes) for more than 10% of transitions in care.
2. **SGRP 303:** Send a summary of care record (SCR) for at least 65% of transitions of care or referrals with at least 30% sent electronically. [*SCRs for referrals must include a "concise narrative in support of care transitions," i.e., free text that captures the current care synopsis and expectations for referral.*]
3. **SGRP 305:** Be prepared to receive an EHR-generated acknowledgement from practices that received information from the focal practice for at least 50% of referrals, i.e., a referral receipt, with at least 10% returned electronically.

Design and Setting

We use mixed quantitative and qualitative methods to identify technical barriers faced by primary care practices in the state of Michigan that are pursuing proposed Stage 3 meaningful use care coordination criteria, and develop recommendations for EHR innovations that would best enable practices to meet the criteria in ways that improve care coordination. Our study included a *statewide survey* of 328 primary care practices, complemented by three

rounds of interviews in 12 representative primary care practices (the *implementation sample*) working towards proposed Stage 3 care coordination criteria. Sample descriptive characteristics are reported in Table 1. All practices in both samples had achieved Stage 1 Meaningful Use (as of September 1, 2013) with support of the Michigan Center for Effective IT Adoption (M-CEITA), the Michigan Regional Extension Center.

Table 1. Characteristics of Primary Care Practices in Survey and Implementation Samples

	Statewide Survey Sample (n=328 practices)	Implementation Sample (n=12 practices)
Practice Size		
Small (2 or fewer)	45%	58%
Medium (2-5)	36%	17%
Large (6 or more)	19%	25%
Practice is Independently Owned	56%	92%
Practice is Affiliated with a Physician Organization*	88%	42%
Duration of EHR Use		
1-2 years	32%	33%
3-5 years	38%	17%
6+ years	30%	50%
Number of Different EHR Vendors Represented in the Sample	41	9

* In Michigan physician organizations are umbrella organizations—such as independent practice organizations, physician-hospital organizations, and large multispecialty group practices—that provide clinical leadership, administrative structure, technical infrastructure, and other resources for physician practices.

Data Collection

Survey: The *statewide survey* captured practice demographics, readiness for Stage 2 and Stage 3 meaningful use care coordination criteria, health information exchange (HIE) participation, facilitators and barriers to meeting Stage 3 criteria, perceived impact of Stage 3 criteria and optimal approach to information sharing to support care coordination. Some questions were targeted to the practice manager (PM) and others were targeted to a primary care provider (PCP) in the practice.

A random sample of 328 primary care practices completed the survey between November 2013 and March 2014. Participants were offered multiple means to complete the survey: phone, online (Qualtrics), or on paper via fax or mail. We received responses from 233 practice managers (71% response rate) and 174 primary care providers (53% response rate). Data were imported and analyzed in STATA 12.0. We estimated all figures using survey sampling weights based on our sampling strategy in order to generalize results to the statewide population of primary care practices that had achieved Stage 1 meaningful use.

Implementation Sample: We selected 12 practices to receive technical assistance to facilitate achievement of proposed Stage 3 meaningful use care coordination criteria. We conducted three rounds of semi-structured interviews with key practice staff (the practice manager and at least one PCP) between October 2013 and June 2014; interviews were in person at the outset of implementation (i.e., before attempting to achieve the Stage 3 criteria), by phone three months later, and again in person six months following initiation of implementation. The initial round of interviews focused on current state processes of supporting care coordination using EHRs. The second round of interviews focused on barriers to achieving Stage 3 care coordination measures and potential strategies to overcome them. The final round of interviews focused on progress towards achieving the criteria, suggested changes to the criteria, strategies for increasing the impact of the criteria, and EHR innovations to support criteria achievement. Interview guides were developed using the Consolidated Framework for Implementation Research, which provides a pragmatic structure for organizing key domains across published implementation theories (1, 2). It is particularly well suited to technology evaluation because it addresses the complex, interacting, multi-level, and transient nature

of phenomenon in real-world healthcare settings. Teams of two researchers trained and experienced in qualitative interviewing conducted all interviews.

Data Analysis

From the survey data, we generated descriptive statistics to capture current EHR and HIE capabilities related to care coordination as well as the ability to meet proposed Stage 3 coordination criteria. From the interview data, we sought to understand *how* EHRs and other types of health IT were used to manage patient care across delivery settings, and identify opportunities for innovation in EHR design to support enhanced care coordination. Codes were developed a priori based on constructs hypothesized to be relevant based on the literature and were expanded as needed to incorporate emergent themes.^{6, 7} Two researchers independently coded all transcripts and met to reconcile codes through discussion. Final coded transcripts were coded imported into Atlas.ti and analyzed to extract key findings after each phase of interviewing.

Results

EHR Innovation to Improve Summary of Care Records (SCRs)

Practices in the implementation sample had EHRs capable of generating Summary of Care Records, and most utilized the local health information exchange effort (Michigan Health Connect) to send them electronically during a referral by uploading the SCR to a portal. A common challenge was that SCRs contained a lot of superfluous information that was auto-generated by the EHR and this interfered with clinicians' ability to locate relevant information. Primary care providers (PCPs) felt that specialists often missed important details relevant for the referral because they were so difficult to find in the SCR. As a result, one-third of practices inconsistently or never used the auto-generate SCR feature within their EHR.

Data from our statewide survey revealed varied opinions across PCPs as to which record elements should be shared when patients are transferred across care settings (Table 2). Practices in the implementation sample further explained that decisions about the relevancy of certain information also varied within provider, based on the patient, his/her history and preferences of the receiving physician. While federal criteria will dictate the types of information that must be shared to support transitions of care, our data point to the value of designing EHR functionality that enables more customization of SCRs.

Table 2. Percent of Primary Care Providers Responding that Specific Information Elements should be Shared during Transitions of Care (N=174 PCPs)

	REFER a patient to a specialist	RECEIVE a patient back from a specialist	RECEIVE a patient after discharge from the hospital
Problem list	77%	59%	73%
Assessment (e.g., notes summarizing key problems)	76%	78%	75%
Medication allergies	75%	60%	60%
Radiology reports	75%	76%	76%
Lab test results	74%	78%	78%
Known contra-indications for medications patient is taking	64%	55%	59%
Care plan	44%	79%	75%
Radiology images	40%	39%	36%
Social history	35%	16%	16%
Assessment of functional status (e.g., ability to perform ADLs)	35%	45%	56%

Approximately one-quarter of implementation sample practices reported that their EHR currently included some functionality to customize SCRs, such as the ability to limit information by date range, check-boxes or radio buttons to deselect certain types of information, and/or templates to consistently pull the same information for specific specialists or referral types. A few providers also designed customizations with their vendor to have flexibility in structuring the document so that they could prioritize a concise narrative and emphasize the most relevant details. These features typically included moving the narratives to the front of the document and other visual cues (e.g. highlighting or bolding) to indicate importance.

Practices in the implementation sample felt that SCR functionalities could be further improved by enhancing usability and degree of available customization. For example, practices sought better filtering options to specify a more granular level of patient history to be included in the SCR while still meeting meaningful use criteria. Practices also felt that branching logic or guided steps would make it easier to streamline the creation of customized SCRs.

Primary care providers valued receiving SCRs from specialists. However, they cited similar challenges in that the SCRs generated by specialists' EHRs were often dense and obscured relevant new information. PCPs felt that SCRs that visually highlighted new or updated information generated during the referral would help them review the SCR and identify what to incorporate into their EHR.

Current SCR Features Valued for Care Coordination:

- Customization/electronic editing of information contained in SCRs through use of check-boxes, date range filters and templates
- Strategic location of concise narrative; reordering of SCR components to emphasize important information

Future SCR Innovations to Enhance Care Coordination:

- Ability to better filter information for a more concise and usable SCR, while still meeting meaningful use criteria
- Branching logic or guided workflows to facilitate customization of SCRs
- SCR generation *from primary care to specialists*: Functionality to visually or otherwise highlight most important pieces of information throughout the document

- SCR generation *from specialists to primary care*: Functionality to visually or otherwise highlight new or updated information resulting from the referral

EHR Innovation to Support Team-based Primary Care Delivery

A broader set of policy efforts beyond meaningful use promotes enhanced primary care delivery models that have significantly increased care coordination and documentation requirements for primary care practices. In response, many implementation sample practices described transitioning to team-based care models that better utilize staff at different levels of training in order to meet patient care needs without additional physician burden. Implementation sample practices described a need for their EHR to better accommodate and support the documentation, workflows and necessary communication tools of multi-disciplinary care teams. Specifically, EHR innovations are needed that improve work coordination among staff and increase transparency of accountability when multiple individuals are providing care to the same patient.

The most common EHR feature used to support team-based care was tasking and task management. Over two-thirds of practices used tasking to track patient care needs as well as to delegate and follow up on staff responsibilities. Some EHR task features were more robust, allowing providers and staff to indicate status of a task, and run reports or receive alerts when tasks were incomplete. Many practices coupled this functionality with use of internal notes or messaging functions to create a record of task hand-offs and provide a communication space for shared understanding of responsibility. Having a team operate off of an assigned task queue served to coordinate tasks and also kept workloads open and transparent, providing accountability and ensuring tasks were completed in a timely way.

A small subset of implementation sample practices used embedded templates and clinical decision support features to facilitate greater autonomy and scope of work for non-physician staff. For example, templates and guided workflows with pop-up decision support helped one practice better utilize their nurses and mid-level staff in more enhanced care roles. Additional features, such as the ability to rank tasks by sensitivity or deadline, were requested by several practices. Practices also called for further EHR innovations to accommodate and integrate the workflow and documentation needs of ancillary team members, such as care managers, who are increasingly being incorporated in to care teams.

Current Team-based Care Features Valued for Care Coordination:

- Robust tasking features with shared queues, direct assignment and alerts to identify incomplete tasks
- Plural patient record access to support concurrent workflows of team members
- Ability to electronically transmit notes to other team members within the EHR for improved communication
- Templates and guided workflows with clinical decision support to enable more delegation and greater autonomy to lower-level staff

Future Team-based Care Innovations to Enhance Care Coordination:

- Enhanced task functionality such as on-screen to-do lists and ability to rank tasks by sensitivity or deadline
- Functionalities to accommodate and integrate workflow and documentation needs of ancillary team members, such as care managers

EHR Innovation to Better Manage Patient Care in an Information-Rich Context

Richer information flowing between and within practices has the potential to enhance primary care provider decision-making and improve care coordination. In the absence of interoperability across EHR vendor systems, however, practices struggled to effectively manage this information and therefore felt they were not fully capturing the potential benefits of their EHR. EHR innovations to better manage patient care in an information-rich context fell into two areas: receipt of information and reconciliation of information.

EHR functionality for receiving information during patient care transitions

Referrals: All practices hoped that interoperability across EHR vendor systems would enable automated updating of information within their EHR. Specific to referrals, practices wanted their EHR to contain current referral status and

information from referral reports. Practices that were part of an integrated health system and on a shared EHR platform had these features and described more timely notification about referral status, and better integration of information from those encounters into their EHR.

Despite a lack of interoperability, some practices' EHRs did a better job of supporting referral workflow and streamlining staff processes to better manage patients' care transitions. For example, some practices used task lists or orders to track referrals or manage communication with specialists. These items were kept "open" in the EHR until the referral report was received. Staff found it particularly useful to be able to run reports on pending or overdue communication from the specialist regarding appointments or visit notes. Maintaining an accurate status of referrals, however, required substantial human-mediated communication with specialists.

Practices also requested better tools to incorporate information from external settings into their EHR in a consistent and easily accessible way. Providers were often unaware that new information was available because the EHR offered multiple options for where the information might be stored and it was not obvious when new information had been entered. Providers therefore failed to use documentation sent from external settings to inform care. Design elements such as the ability to tag or label documents for cross-listing in multiple places within the EHR would help providers more easily locate and utilize information.

Hospitalizations: Many practices relied on hospital portals to learn if their patients were hospitalized and to download documentation about their patients. Some practices received automated admission, discharge, or transfer (ADT) alerts, but felt overwhelmed by the volume of separate notices received throughout a patient's hospital visit and post-hospitalization. Providers and staff were most interested in notice of admission and details contained in the discharge summary; intermediate notifications were considered less useful. Threading of hospital communications and ability to have EHR systems recognize and flag incoming communication by level of importance were therefore perceived as valuable.

Current Data Management Features Valued for Care Coordination:

- Ability for practices to run reports on pending or overdue tasks/orders to manage and close the loop on patient referrals

Future Data Management Innovations to Enhance Care Coordination:

- Automatic incorporation of referral reports, other incoming information, in to relevant section of patient record
- Document tagging and/or ability to cross-list documents in multiple EHR locations for easier information retrieval
- More automation in closing out pending tasks/orders for completed referrals, e.g. when referral reports are scanned in
- Enhanced notification system for arrival of new information in the EHR, including ability to filter/sort by importance

EHR functionality for managing information following patient care transitions

Reconciliation: Practices struggled to incorporate large volumes of incoming documentation into their EHR. Practices expressed desire for auto-reconciliation features, with some automatic import and integration of data from hospitals and specialists. With the exception of labs and imaging, practices were still largely receiving read-only files – via fax, mail, or hospital portal download – that require scanning into the EHR. Even documents received electronically through the community HIE platform or via e-fax were still read-only documents; reconciliation therefore required a visual comparison of records with manual entry of new information.

A frustrating result of this process was multiple entries of the same (or similar) diagnoses or prescriptions that were entered into the EHR, cluttering the problem and medication lists. EHR auto-reconciliation functionality – the ability to support de-duplication or collapsing of similar entries to produce cleaner, more usable lists – was therefore perceived as valuable. Practices felt that the ability to easily tie ICD codes to entries within both the problem and medication lists would be one useful way to provide underlying structure for this functionality. Linking entries to the ICD coding classification system would also enable better organization of existing information within the record and provide the basis for enhanced interaction and safety alerts.

Some practices had the option to embed links to ICD codes using structured fields; however, practices reported inconsistent use of the functionality. Clinicians struggled to search underlying databases to locate and attach the appropriate ICD code; currently available software did not provide intuitive, comprehensive or consistently accurate ICD search capability. While auto-reconciliation of internal records with documentation from specialists, hospitals or third-party sources of pharmacy information is not possible in the absence of interoperability, practices felt that receiving incoming documentation with attached ICD codes would still provide value by aiding their staff in performing manual reconciliation.

Acute vs. Chronic Documentation: At least half of implementation sample practices described challenges related to accurate and efficient documentation of short-term, acute problems or medications in their EHRs. Providers sought EHR enhancements that would improve their ability to capture the distinction between active versus past medications, and acute versus chronic conditions when managing and sending out patient information. Lack of this functionality resulted in providers making documentation decisions likely to compromise patient care. For example, some practices chose not to enter acute problems, such as sinus infections, in the problem list to avoid clutter. This information may be valuable to specialists and without it providers may fail to identify chronic issues.

Several EHRs allowed providers to enter course of treatment information for prescriptions so that medications would automatically drop off of the “current” medication list. Providers valued drag-and-drop functionality and radio buttons to easily move entries between the active and past sections of problem and medication lists.

Current Documentation Features Valued for Care Coordination:

- Auto-removal of short-term medications from active medication list based on entered course of treatment
- Drag-and-drop or radio button features to easily move problems or medications to past information section(s)

Future Documentation Innovations to Enhance Care Coordination:

- Ability to attach ICD codes to problems and medications, enabling:
 - easier reconciliation
 - threading/grouping of similar issues
 - improved interaction alerts and decision support
- Tailored functionality for differentiating acute versus chronic problems and medications

Discussion

Despite significant increases in EHR adoption since the passage of HITECH, most primary care providers have little experience exchanging or using electronically shared clinical data to support care coordination and associated improvements in care quality, safety and efficiency. This study is one of the first to examine practices’ capabilities and use of EHRs and HIE to support care coordination in the context of proposed Stage 3 meaningful use objectives. Findings reveal key ways in which EHR and HIE functionality is already being used to support care coordination, and areas of opportunity for further innovation. Specifically, primary care practices called for improved availability and usability of features that facilitate (1) generation of customized SCRs, (2) team-based care approaches, and (3) management of the increased volume of electronic information generated and exchanged during patient care transitions.

Some of these innovations are likely much easier than others for EHR vendors to implement; for example, improved filtering mechanisms or highlighting functionality to improve SCR customization. Other innovations such as incorporating ICD codes into problem and medication lists may be more difficult to implement, or, in the case of widespread interoperability, are difficult for EHR vendors to tackle individually. For these, policymakers should consider including them in certification criteria, and, in parallel, consider creating communities of practice that enable EHR vendors to come together (perhaps with providers as well) and work to refine and specify the innovations. Policymakers and vendors must also remain cognizant of not just availability but also usability of different EHR features. Increased focus by developers on human-centered design methods and use of workflow analysis to inform the development of these enhanced EHR functionalities will be critical to realizing intended benefits of IT adoption.

Bolstered by Stage 3 meaningful use criteria and simultaneous delivery system reform efforts such as patient-centered medical homes and accountable care organizations, there will be increased pressure on EHRs to support improved care coordination. EHR vendors, guided by market demand and policy efforts, play a critical role in ensuring that practices have the technical capability – and usability – to enhance their care management practices. Beyond adding or enhancing system features, vendors are a key stakeholder in national conversations around achieving greater interoperability. Going forward, vendors and policymakers need to work in concert to create conditions in which all stakeholders see the benefit of and are willing to invest in robust information exchange capability in order to achieve optimal care coordination.

Conclusion

The ability of practices to effectively use EHRs and electronic information exchange to enhance care coordination practices is essential to translate the large national investment in health IT into improved care and patient outcomes. This study examines practices' current capabilities and use of EHRs to support care coordination in the context of Stage 3 meaningful use objectives, with the specific goal of providing key recommendations for how to enhance EHR functionality. Vendors ultimately need to work with policymakers to find a viable approach to interoperability and create market conditions in which secure electronic sharing of patient information can be achieved to improve care coordination.

References

1. Blumenthal D, Tavenner, M. The "Meaningful Use" Regulation for Electronic Health Records. *N Engl J Med* 2010;**363**:501-504.
2. Blumenthal, D. Implementation of the Federal Health Information Technology Initiative. *N Engl J Med* 2011;**365**(25):2426-2431.
3. O'Malley AS, Grossman JM, Cohen GR, et al. Are electronic medical records helpful for care coordination? Experiences of physician practices. *J Gen Intern Med* 2010;**25**:177–85.
4. O'Malley AS, Draper K, Gourevitch R, Cross DA, Scholle SH. Electronic health records and support for primary care teamwork. *JAMIA* Published Online First: 27 January 2015. doi:10.1093/jamia/ocu029
5. Damschroder, L.J., et al., Fostering implementation of health services research findings into practice: a consolidated framework for advancing implementation science. *Implement Sci*, 2009. **4**(1):50.
6. Miles, M, Huberman AM. *Qualitative Data Analysis: An Expanded Sourcebook*. 1994, Thousand Oaks, CA: SAGE Publications, Inc. 211-249.
7. Trochim, W., et al. Evaluating Translational Research: A Process Marker Model. *Clinical and Translational Science*, 2011; **4**(3): 153-162.