Original research

Using health information exchanges to calculate clinical quality measures: A study of barriers and facilitators

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ABSTRACT

Background: A key motivation for the large national investment in electronic health record systems is to promote electronic reporting of quality measures that can be used as the basis for moving to value-based payment. Given the fragmented delivery system, robust quality reporting requires aggregating data across sites of care. Health information exchanges (HIEs) have emerged to facilitate exchange of clinical data across provider organizations and, therefore, should be well-positioned to support clinical quality measure reporting.
Methods: By interviewing representatives from 36 HIEs across the United States, we aimed to determine whether HIEs are capable of computing National Quality Forum measures for 6 cardiovascular disease preventive services.
Results: Eleven HIEs (30%) reported computing at least one CQM; six computed one or more of the measures, and no HIE computed a measure in each of the 6 areas. Barriers to computing CQMs included data quality, completeness, sharing, and transmission issues; organizational structure, maturity, and sustainability issues; and vendor issues.
Conclusions: The ability to compute CQMs at the HIE level is still yet to be developed; currently, very few HIEs are able to do so for a variety of reasons. As HIE services expand and HIEs mature organizationally, the viability and utility of CQM reporting at the HIE level will increase.
Implications: As the healthcare system migrates towards a value-based payment system these broad challenges will need to be addressed.
Level of Evidence: Cross-sectional semi-structured qualitative interviews

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1. Background

The increasing adoption of electronic health records (EHRs) offers the potential to capture information about the quality of care efficiently and at regular intervals. Health information exchanges (HIEs) are organizations dedicated to the secure exchange of health-related data.[1] These organizations receive or access EHR data via one of three technical architectures: central, federated, or hybrid. In the central model, patient data is stored within the HIE and updated through receipt of messages containing health information about the patient sent by provider offices. In the federated model, patient data resides only within the EHR at the provider offices and must be queried through the HIE. In the hybrid model, patient data is stored centrally at the HIE, but only for a limited time.[2] When EHRs are combined with HIE capabilities, where electronic sharing of clinical information spans the boundaries of healthcare organizations, these quality measures can cross sites of care and provide a longitudinal perspective.[3] Physician practices are limited in that they can only report on the EHR data they have within their systems.[4,5] If all practices exchanged data via regional or state HIEs, more robust and routine quality reporting could take place, particularly of preventive services measures, which are powerful enablers of the transition from volume to value-based payment. However, the extent to which HIE efforts can support reporting of clinical quality measures (CQMs) is unknown. A recent survey that examined HIEs quality reporting activities indicate that only 34% currently have this capability, with an additional 34% planning for this capability.[2] Since few viable alternatives to robust CQM reporting exist, it is critical to assess the extent to which HIEs can provide such reporting and the barriers they face. HIEs are facing many challenges and an eHealth Initiative survey of HIES found that developing a sustainable

business model to be the most frequently reported challenge by HIEs.[6] Many were funded with start-up money, but lack a long-term stream of funding for ongoing operations. This has made evaluation of their usefulness difficult. [3]

Therefore, as part of two pilot research projects conducted for the Centers for Disease Control and Prevention (CDC), this research team sought to assess whether HIE data could be used to measure and track delivery of community-level preventive services for cardiovascular diseases over time.[7,8] Previous efforts at measuring the frequency at which preventive services are offered have relied on time-consuming chart reviews and focused only on specific health conditions or services measured over a limited time.[9,10] We chose the ABCS (aspirin therapy, blood pressure screening, cholesterol screening, and smoking cessation) based on CDC's prior work with the Million Hearts initiative, which focuses on reducing cardiovascular disease (CVD).[11] We added BMI and diabetes measures because they are frequently comorbid with CVD risk factors. We also sought to assess the barriers to computing CQMs.

2. Methods

This study sought to understand (1) the availability to HIEs of EHR data needed to compute CQMs, (2) if data were available, whether HIEs were then calculating (and/or reporting) National Quality Forum (NQF)[6] eMeasures for the ABCS, BMI and diabetes measures and how, (3) if so, whether data were calculated for ABCS, BMI, and diabetes measures, and (4) if CQMs were not being calculated, what the barriers were to their collection and/or calculation. We also sought to understand whether the HIEs' structural and organizational model as well as their maturity stage influenced their ability to calculate CQMs; their sustainability, including sources of funding; data use agreement practices; and their ability to make data publicly available.

We conducted semi-structured interviews with HIEs that self-reported the ability to exchange data that could be used to calculate standard quality metrics in a prior national HIE survey.[12] We also obtained contact information for member HIEs from the eHealth Initiative (eHI), targeting those that were mature enough to be exchanging data and possibly computing quality measures, defined as operational exchanges by eHI (stages 5–7).[6,13] All organizations who met this criteria were invited to participate and were offered a $100 gift card as an incentive for participation.

2.1. Interviews

All respondents were queried about their current ability and future plans to calculate CQMs. A prescreen letter, which was sent to the director of the HIE explained the goals of the study and asked whether the HIE had access to the EHR data needed to compute CQMs. The letter and full interview guide are provided in Appendices A and B, respectively. If these data were available, we then asked whether HIEs were calculating or reporting CQMs and how they were doing it (Q3, Q10, Q12–14). If they were calculating CQMs, we then asked if they were calculating NQF measures for the ABCS, BMI and diabetes measures described in Appendix C.[14] If CQMs were not being calculated, we asked what the barriers were to their collection and/or calculation (Q11). We also collected information about staff roles, HIE characteristics (Q1–2), the methods HIEs used to exchange EHR data, and HIE sustainability including sources of funding, data use agreement practices, and ability to make data publicly available (Q15–18). The interview guide was piloted internally with the research team and with several early respondents. No significant changes were found to be needed as a result of the pilot testing.

Interviews were conducted over the phone by one of three female members of the research team with a doctoral degree. Each of these researchers has extensive experience in interviewing and other qualitative methods. All interviews were audio recorded and a member of the team served as a back-up note-taker, with no additional persons participating in the calls. Each interview lasted between 30 and 90 min, depending on the level of detail provided by the respondent. Because of the level of detail provided in the prescreen letter we let the HIE decide who would be best to participate in the interview.

2.2. Data Analysis

We imported transcribed verbatim interview notes into QSR NVivo 9 qualitative analysis software for structured analysis and data interpretation. We identified key areas of focus based on our discussion guide, and coded the notes using deductive coding methodology. Additional emerging themes were incorporated into the coding structure as needed. All interviews were single coded, and coding

reports were reviewed and analyzed in detail by two of the authors. All authors reviewed and agreed upon the final coded data prior to analysis.

3. Results

3.1. Respondents

Recruiting HIEs to participate in our study was challenging; some refused to participate because their repository structure or data use agreements precluded CQM calculation or data sharing. Our prescreen letter included a detailed description of the CQMs of interest to our study. Therefore, it is likely that those less mature HIEs who were not calculating these measures were less inclined to agree to participate in the study. We completed telephone interviews with 41 individuals from 36 unique HIEs, with equal geographic distributions across the U.S. We spoke with between one and five representatives from each of 25 states (one HIE covered more than one state). Table 1 summarizes roles of the individuals we interviewed from each of the HIEs.

Our primary research question was whether HIEs are computing clinical quality measures, focusing specifically on the ABCS, BMI and diabetes measures. Eleven HIEs (30%) reported computing at least one CQM; six computed one or more of the 12 ABCS, BMI and diabetes measures (Table 2), and no HIE computed a measure for each of the ABCS, BMI and diabetes categories. Of these 12 CQMs, the HIEs we interviewed computed only *Controlling High Blood Pressure, Diabetes: LDL Management and Control, Tobacco Use Assessment, Diabetes: HbA1c Poor Control*, and *Diabetes: HbA1c Control < 8%*. Of the respondents currently computing any type of CQM, all had started doing so within the past 4 years.

Table 3 compares the characteristics of the HIEs regarding structural type, organizational composition, maturity, and opt-in and opt-out policies based on whether they reported computing CQMs. Overall, most HIEs were hybrid and community based, many at stage 6 or higher, meaning the exchanges were fully operational, having a sustainable business model, and are transmitting data that is being used by healthcare stakeholders.[13] Compared with the HIEs that currently do not compute CQMs, HIEs that do report more often self-described their structure as a hybrid model and were primarily part of an opt-out rather than opt-in participation model. Community HIEs were also more likely to compute CQMs than HIEs that described themselves as enterprise or mixed models.

3.2. Barriers

We discovered a variety of barriers associated with the ability of HIEs to compute CQMs. Completeness and quality of clinical data were the most commonly reported barriers to computing CQMs. Respondents reported that they do not receive all EHR data for patients because patients typically see more than one health care provider and not all providers transmit data to the HIE. Additionally, some clinical measures within the EHR are incomplete.

HIE policies for patient data sharing can also affect completeness of data and availability. Some states have an opt-in policy: patients must agree and consent prior to exchange of their data whereas other states have an opt-out policy, in which patients must contact the HIE to say they do not want their data included and exchanged. HIEs with an opt-in policy reported challenges with enrolling patients as well as challenges getting necessary authorizations for clinicians to access data when needed. A few organizations reported they were in the process of switching, or had already switched, to an opt-out model to increase participation rates and data completion.

Some HIEs reported they had data use agreements that allow public health reporting; however, many HIEs' agreements do not encompass public health reporting. A few respondents suggested hesitation exists among providers about sharing data with outside organizations. Two respondents likened current data sharing through HIEs to the challenges experienced in the early stages of immunization registries.

In addition to these issues of data quality and policy, some ABCS measures do not lend themselves to computation at the HIE level. For example, aspirin use may not be recorded in the patient medical record because it is an over-the-counter drug or this information may be included in the unstructured visit notes. Therefore, data for this measure are overwhelmingly missing. Respondents also reported that BMI and blood pressure data are often incomplete in the EHR data provided to HIEs.

Table 1
Respondent roles.

Role type	Number of respondents
Administrative Director	23
Medical Director	2
Technology Director	7
Other	9
Total	41