Clinical decision support in small community practice settings: a case study

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ABSTRACT

Using an eight-dimensional model for studying socio-technical systems, a multidisciplinary team of investigators identified barriers and facilitators to clinical decision support (CDS) implementation in a community setting, the Mid-Valley Independent Physicians Association in the Salem, Oregon area. The team used the Rapid Assessment Process, which included nine formal interviews with CDS stakeholders, and observation of 27 clinicians. The research team, which has studied 21 healthcare sites of various sizes over the past 12 years, believes this site is an excellent example of an organization which is using a commercially available electronic-health-record system with CDS well. The eight-dimensional model proved useful as an organizing structure for the evaluation.

INTRODUCTION

The Provider Order Entry Team has studied 21 different clinical sites over the past 12 years and has previously published cross-site evaluation studies rather than individual case studies. There are several reasons why we felt compelled to break tradition and share the Mid-Valley Independent Physicians Association (MVIPA) story. First, MVIPA is geographically, organizationally, and technically representative of the majority of ambulatory clinics in this country with a preponderance of small (eg, fewer than 10 healthcare providers), independent clinics in semirural and rural settings and little electronic integration with local hospitals. Second, the IPA structure represents a growing trend for clinics to form loosely coupled groups to produce economies of scale for purchasing while staying largely independent. Reddy et al have described a parallel trend for a group of rural hospitals buying services from a larger one.[1] Third, MVIPA's experience provides lessons that should prove valuable to organizations such as the federally funded Regional Extension Centers, which may provide services similar to those offered by MVIPA information systems staff.[2] Finally, we hope this story will motivate similar organizations to adopt commercial electronic health records (EHRs) with clinical decision support (CDS), but to do so with care.

CDS has been defined as 'passive and active referential information as well as computer-based order sets, reminders, alerts, and condition or patient-specific data displays that are accessible at the point of care'[3] (p. 524). To this general CDS definition, we add condition- and task-specific documentation templates[4] as an important form of decision support. EHRs with CDS have been shown to improve care,[5–8] but unfortunately, little is known about CDS implementation in ambulatory care community settings using commercial electronic health record (EHR) systems. We do know that, although 17% of physicians in ambulatory settings were using EHRs, only 4% used systems that include CDS.[9] Federal incentives are likely to spur a rapid increase in EHR implementations over the next few years,[10] so the Provider Order Entry Team sought to investigate barriers and facilitators to use of EHRs with CDS in ambulatory settings.

BACKGROUND
Framework for the study

To guide design of this study, we used the Multiple Perspectives framework we have used in the past to ensure that we gathered all appropriate stakeholder perspectives.[11] However, for interpreting and organizing our results, we chose to test the recently published Socio-Technical Model for Health Information Technology, which includes eight dimensions: hardware/software; clinical content; human—computer interaction; people; workflow and communication; internal organizational features; external rules and regulations; and measurement and metrics. These are interacting dimensions, to be considered in relation to one another rather than as independent sequential steps.[12]

About the Mid-Valley IPA

The Mid-Valley Independent Physicians Association (MVIPA) in Salem, OR, has 170 practices, half of which are solo practices, in its membership. IPAs are groups of clinicians in which 'physicians typically have nonexclusive contractual relationships with IPAs and generally manage their own offices independently'[13] (p. 826). MVIPA began implementing what they call their 'community EHR' in 2005 using a centrally hosted model in partnership with NextGen Healthcare Information Systems (Horsham, Pennsylvania). At the time of our study in December 2008, 45 clinics were using the practice management system, and 35 clinics were also using the EHR. These clinics disproportionately represent the larger clinics within the IPA. Therefore, nearly 60% of all providers within MVIPA were using an EHR. This is a laudable community acceptance level considering that their rollout was not yet complete, and the national average for clinician adoption of EHRs was less than 20%.[9] Results of regularly administered surveys of MVIPA providers indicated heavy EHR use and provider satisfaction increasing over time.

Case report

The CDS interventions within the EHR consist of an e-prescribing module with dosage controls and provider order groups of commonly prescribed medications, drug—drug, drug—condition, and drug—allergy interaction checking and duplicate medication checking, a patient care plan dashboard that includes alerts and reminders, order sets for common conditions, and nearly 3000 point-and-click templates for documentation. These condition- or task-specific templates are NextGen's predominate mode for providing CDS. These evidence-based clinical documentation templates help remind clinicians of the appropriate diagnostic and therapeutic procedures (eg, interview and physical exam elements, diagnostic tests and therapies). Our goal was to identify barriers and facilitators for CDS implementation and knowledge management at this site.

RESEARCH METHODS

A thorough description of our adaptation of the Rapid Assessment Process has been published elsewhere,[14] [15] but we will review it briefly here.

Research site and participants

The Steering Committee of the Agency for Healthcare Research & Quality (AHRQ)-funded CDS Consortium (CDSC) project[16] selected MVIPA on our behalf as a representative community site that uses EHRs with CDS. Both the EHR vendor and clinical site were willing to collaborate with the Consortium. MVIPA is representative in that all providers are independent practitioners in small practices (ie, most less than three providers), it is not part of a clinical teaching program, and it spans rural, suburban, and small urban landscapes.

We received IRB approval from each investigator's organization. Clinics were selected for geographic distribution, size, specialty, and EHR utilization levels. We sought interview subjects who were experts in CDS content and technology, and were knowledgeable about CDS governance. We interviewed MVIPA board members, individuals who modify and manage CDS, and who provide training and support. We selected clinicians to interview and shadow who were representative of a wide variety of clinicians, including allopathic and osteopathic physicians, medical assistants, nurses, nurse practitioners, and physician assistants. We deliberately selected a range of providers along the continuum from EHR and CDS skeptics to champions.[17]

Data collection and analysis

Before the site visit, we asked the Medical Director of Information Systems (MDIS) to complete a 'site profile.' This is a checklist of types of CDS and a list of questions about CDS management.[18] We also received a demonstration of the system via webex. Based on this information, we developed interview questions using the local language (eg, calling the head of the project the MDIS, rather than the CMIO and referring to their EHR by the name the locals use). Formal semistructured interviews were recorded and transcribed.

We first conducted an expedited, on-site data analysis by debriefing frequently during site visits, developing general themes and, using a template method,[19] roughly coding the data. This resulted in an oral report at the end of the visit, followed shortly thereafter by a written report for use by the site to help them improve. We then used a more traditional grounded theory approach that was both inductive and interpretive. Interview transcripts and fieldnotes were analyzed using open coding.[19]

RESULTS

Overview

Six researchers conducted the site visit. We interviewed nine subjects, including the MDIS, his staff members, and physicians who serve on the Board of the IPA. We observed and informally interviewed 27 clinicians in nine clinics, for a total of 33 h.

Eight dimensions

For each dimension, we will summarize facilitators and barriers related to CDS.

Dimension 1: hardware/software

Facilitators

MVIPA uses an application service provider model in that NextGen is hosted on servers owned and maintained by the IPA, and each clinic connects remotely to its own instance of NextGen. The application service provider model was chosen because server centralization facilitates system maintenance and support, and hiring of knowledgeable, dedicated, technical support staff. This particular system can be customized at various levels, including MVIPA-wide, clinic-wide, and somewhat by users themselves (users can adjust the severity level of alerts). Over time, users begin to take advantage of such system capabilities. Most CDS content is standardized across MVIPA for primary care. Charting templates were in use via tablet computers in many clinics, with providers using them during exam room encounters.

Barriers

The largest hospital in the region uses a different EHR, which does not currently include an interface with MVIPA's system. Clinicians appreciate templates for implicit decision support and help with billing, but not always for their effect on documentation (ie, generation of some poorly worded, computer-generated textual notes).

Dimension 2: clinical content

Facilitators

Content provided by the vendor is reviewed/modified by local staff. It is standardized across primary care clinics, though it varies across specialty clinics. New content is incorporated systematically through user requests or environmental scanning. An EHR policy committee of information systems staff and MVIPA Board members (physicians) provides oversight. Much content is embedded in the templates.

Barriers

A small percentage of clinicians still do not use templates in the exam room and prefer free text, so coded data are not captured, and additional decision support, based on these findings, is unavailable to them.

Dimension 3: human—computer interaction

Facilitators

Clinicians have choices about how they interact with the system. Two physicians in the same clinic 'got the tablet PCs and while he prefers typing [free text] because he's pretty good at it, she prefers using the touch screen and templates.' While free-text data entry reduces the utility of the data for future CDS and quality measurement, it improves clinician acceptance of the overall EHR which is necessary for other types of CDS. In addition, free-text notes can be more expressive and descriptive, and provide a more accurate picture of the patient's condition. Clinics are required by the IPA to use the practice management system before the EHR is implemented, so everyone gets accustomed to the EHR's user interface.

Barriers

Clinicians are often unaware that they can modify the severity level of alerts. The system is sometimes confusing, so clinicians complain that they cannot find items they need.

Dimension 4: people
Facilitators

The IPA staff members provide a buffer between the users and the vendor, an arrangement appreciated by users. Staff members are local and responsive, and know users personally. The MDIS is well known and informatics-trained. Each clinic has an identified clinical champion and a super user (who may not have a clinical background). Clinic managers are knowledgeable about the system and aware of changes.

Barriers

Many clinicians do not make full use of all of the EHR's advanced CDS capabilities, such as protocols, reminders, and charting templates because they are unaware of them. Following completion of the EHR rollout, information systems staff should have more time to provide additional training to help clinicians optimize their workflows.

Dimension 5: workflow and communication
Facilitators

Guidance for clinicians is tightly integrated with their workflow. Interruptive alerts are minimal; charting templates provide guidance without interference. Workflow analyses were performed in each clinic prior to implementation. Users provide feedback through the Help Desk and personal communication with local staff. Feedback is routed to the appropriate person for analysis, action, and, if necessary, escalation to the MDIS or the vendor. Providers are kept up to date through many communication channels, including regular visits by IPA staff.

Barriers

We were told that there was a 'valley of despair' for 3 to 6 months after implementation in each clinic when workflow was disrupted. The intensity varied according to the extent of the workflow analysis and amount of 'prework' by the clinicians, including practicing use of the system, organizing and creating new templates, reducing the number of alerts, and identifying favorites (eg, most commonly ordered medications and lab tests).

Dimension 6: internal organizational features
Facilitators

The organizational structure of the IPA lends itself to centralized EHR and CDS design, development, implementation, and provision, as well as a community-wide governance structure. Practices can afford the system and benefit from shared, skilled technical support, despite their small size. The IPA Board of 16 physicians is closely involved because most are users as well as decision-makers.

Barriers

Individual practices vary in nature from naturopathic practices to highly specialized cardiac services, making development of shared clinical content difficult. Furthermore, clinicians value their independence and are hesitant to share patient-specific, clinical information (other than demographics) beyond individual clinics.

Dimension 7: external rules and regulations
Facilitators

There is an identified mechanism for the Board and MDIS for scanning the environment so that new clinical knowledge can be integrated into the system to help meet outside quality reporting requirements. The IPA strategizes on behalf of members and considers itself in an ideal position to benefit from federal meaningful use initiatives.[10]

Barriers

Although all IPA member practices are currently hosted on the same physical instance of the EHR, users cannot see patient data from other practices owing to privacy and data ownership concerns. This limits the ability of CDS interventions to fully reason over a patient's entire clinical state, since data are not available for review (despite existing in the database). This is a technically feasible but organizationally challenging situation to remedy.

Dimension 8: measurement and metrics
Facilitators

Reports are now produced for individual clinics on demand, and planning has begun for calculation and distribution of community-wide quality measures.

Barriers

Common metrics need to be established so that the effectiveness of the system's CDS can be measured over time. Staff members know that primary care providers use the disease-management dashboard, but not how much. Tracking usage of the documentation templates is a future goal: right now, there is great variation because some providers still dictate notes.

DISCUSSION

The small, independent clinics that make up the MVIPA are well on their way to successfully implementing a commercial EHR with CDS. We identified three main reasons for their success. First, by agreeing to join together to select, purchase, and implement a commercially available EHR with CDS, they have achieved many economies of scale. For example, they all share a central data center that is responsible for keeping the servers up and running, performing regular system backups, and installing regular operating system, application software, and CDS updates. Second, the centrally managed EHR provides a solid clinical and financial workflow solution for all members of the IPA. The central information services group with its clinical and informatics expertise modifies and maintains the CDS features and functions (ie, alerts, order sets, protocols, billing, and charting templates). At the local clinic level, individuals are able to make minor modifications to CDS content, for example, to customize templates, change the alerting severity level for drug—drug interactions, and create new order sets, which helps them to optimize their workflow. Finally, the EHR provides a solid foundation for the collection, storage, and transmission of data, which is essential for CDS. However, if MVIPA clinicians and their patients are to realize the vast, transformative power of EHRs with advanced CDS capabilities that so many have promised, more data must be available. We also note that aggregating and displaying patient data across clinics would provide clinicians with an even more comprehensive view of all patient information, which would greatly facilitate direct patient care by reducing the need for duplicate data entry as well as provide additional data to enhance CDS and clinicians' decision-making.

Use of the eight-dimensional model and study limitations

The Socio-Technical Model of Health Information Technology served us well, in that it provided a broad structure for analysis and presentation of results. Like any case study, results may be transferable, but not generalizable.

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CONCLUSION

This case study describes an IPA which has implemented a commercial EHR with CDS. The eight dimensional socio-technical model provided a sound framework for organizing results. A team of outside investigators collected data from nine clinics and was impressed with positive user reaction. If a group of very diverse small independent clinics in Oregon, spread across two large counties that include many areas designated as rural, can succeed in this endeavor, we believe similar clinics across the nation can as well.

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