TBM

Information technologies that facilitate care coordination: provider and patient perspectives

Brian E. Dixon,[1,2,3] Peter J. Embi,[2] David A. Haggstrom[2,3,4]

[1]Department of Epidemiology, Indiana University, Richard M. Fairbanks School of Public Health, Indianapolis, IN 46202, USA

[2]Regenstrief Institute, Inc., Indianapolis, IN 46202, USA

[3]Center for Health Information and Communication, Department of Veterans Affairs, Veterans Health Administration, Health Services Research and Development Service, IN 46202, USA

[4]Department of Medicine, Indiana University School of Medicine, Indianapolis, IN 46202, USA

Correspondence to: David A. Haggstrom, dahaggst@iupui.edu

Abstract

Health information technology is a core infrastructure for the chronic care model, integrated care, and other organized care delivery models. From the provider perspective, health information exchange (HIE) helps aggregate and share information about a patient or population from several sources. HIE technologies include direct messages, transfer of care, and event notification services. From the patient perspective, personal health records, secure messaging, text messages, and other mHealth applications may coordinate patients and providers. Patient-reported outcomes and social media technologies enable patients to share health information with many stakeholders, including providers, caregivers, and other patients. An information architecture that integrates personal health record and mHealth applications, with HIEs that combine the electronic health records of multiple healthcare systems will create a rich, dynamic ecosystem for patient collaboration.

Keywords

Informatics, Public health

INTRODUCTION

Coordination of care for individuals and populations is an imperative for modern medicine. This is especially important in the U.S. healthcare system that, relative to international comparisons, is characterized by high subspecialization [1] so that the need for coordination among many different types and levels of provider services is substantial. Evidence shows that patients seek care from a variety of providers, whether or not those providers are part of the same organized network [2]. For example, the Veterans Health Administration (VHA) spends 10 per cent of its total health care dollars on care delivered to Veterans outside of the VHA's network of providers [3]. Moreover, many individuals now manage their health using a growing array of interventions in their homes or non-traditional "care" settings such as the Internet [4]. Given the mobility of individuals and populations, delivering high quality care requires that providers be able to access, manage, and share information efficiently.

Retrieving, managing, and sharing health information for care coordination, however, are challenging for both providers and patients. In a survey of non-VHA providers who were participants in a practice-based research network [5], respondents reported poor communication with VHA colleagues, and their interactions were perceived to be with a "system" rather than a colleague. From the patient perspective, respondents from the USA in a care coordination survey reported that their test results were not available, or that duplicate tests were ordered during a medical appointment, and 17 per cent reported that information was not shared among their multiple care providers [6]. A quarter of Canadian and a fifth of Australian, French, Dutch, and Norwegian respondents indicated similar gaps in the availability of test results, or duplicate testing during a medical appointment [6].

To facilitate and enhance care coordination, providers and patients seek to leverage health information technologies, including the electronic health record (EHR) and patient-centered technologies. Health information technology (IT) systems are designed to provide access, manage, and share information about individuals and populations. Health IT components are conceived as a core infrastructure for the chronic care model [7], integrated care [8], and other organized care delivery models [9, 10].

The promise of health IT applications to improve care coordination depends upon providers adopting them into their practices and patients using the applications. With respect to providers, more than 80 per cent of hospitals [11] and more than 70 per cent of physician offices [12] have at least a basic EHR system. With respect to patients, one-third of patients were offered access to, and just under 30 per cent accessed, online health information according to the Health Information National Trends Survey [13].

In this commentary, we describe the progress made, and remaining challenges, with respect to how health information technologies are used to facilitate care coordination for individuals and populations. We examine the perspectives of both providers and patients, because both groups play essential roles in generating, storing, managing, and sharing health information.

PROVIDER PERSPECTIVES

There exist a range of health IT applications available to providers to facilitate care coordination. Emphasis in recent years focused on EHR systems,

primarily because the federal government incentivized their adoption and use in practice [14]. Yet, EHR systems serve as a mechanism to generate, manage, and access information within a provider's practice or hospital system. Access to information beyond one's own network requires health information exchange (HIE) technologies that interoperate with a provider's EHR and connect the provider's EHR to other health IT applications.

HIE technologies help gather, aggregate, and share information about a patient or population from multiple sources. For example, some HIE technologies enable providers to send "e-mail like" messages in the context of a referral or consult. For example, Direct Secure Messaging is a technology that can enable Dr. Jones, a primary care provider (PCP), to submit a consult request to Dr. Landry, a dermatologist, for a patient with suspicious skin lesions. After examining the patient, Dr. Landry can send some photos and his expert opinion back to Dr. Jones. This conversation might continue through additional messages clarifying questions or developing a care plan for the patient.

Another promising HIE technology is Event Notification Services (ENS). An ENS is typically a subscription service that alerts a provider, care coordinator, or payer when an event occurs involving a patient or population. For example, if Mrs. Smith were to be admitted to a hospital, her PCP can receive an ENS alert with details on the admission. The alert might prompt the provider to contact the hospital and coordinate follow-up care as part of the discharge planning process. Similarly, a care coordinator might receive information about 20 people who recently visited the emergency department as part of an effort to manage "high utilizers."

A final class of HIE technologies can be referred to as Transfer of Care (TOC) services. These services gather information about the care provided to a patient at one provider and transfer them to the next provider as a summary document. For example, when Mr. Doe is discharged from an emergency department visit for exacerbation of asthma, the information about that visit is summarized for electronic transfer to his PCP's EHR system. The PCP may then view the document or incorporate information from it into the patient's EHR.

Direct messages and TOC services most readily fit with a practice's meaningful use strategy in compliance with the EHR incentive program sponsored by the federal government. Stage 2 meaningful use criteria, for example, require that providers generate and send a TOC document for at least 10 per cent of transitions in care [15]. Health systems are further interested in ENS as a mechanism to learn about patients and populations that access providers outside of a given accountable care organization (ACO) network. However, little data exist on the adoption rates of these HIE technologies. Therefore, it is difficult to assess how pervasive they are in hospitals, clinics, payers, or health systems. Moreover, few best practices for how to implement these technologies in various settings exist.

Another challenge with HIE technologies is the lack of a robust evidence base demonstrating impact on health outcomes, the cost of care, or efficiency of care delivery. A recent study by Unruh et al. [16] examined ENS using a longitudinal panel (N = 2,259) of Medicare patients who lived in The Bronx. Having an active ENS alert during a hospital admission was associated with a 2.9 per cent reduction in the probability of readmission. While encouraging, more studies in multiple health systems are needed to examine the impact of ENS on a broader set of outcomes. Similarly, studies are needed to examine the impact of Direct messaging and TOC services on care coordination.

PATIENT PERSPECTIVES

Patient-centered health IT applications also offer several ways to facilitate care coordination, both inside and outside of the traditional healthcare context. The field of consumer health informatics (CHI), the study of consumer information needs and healthcare technologies as well as the implementation of methods to make information accessible to consumers, organizes a significant and growing volume of scholarship [4, 17].

One key technology is the personal health record (PHR), which can be considered an extension of the patient health record, or its contemporary equivalent, the EHR. But unlike the EHR, the PHR is a patient-facing record of care that can archive, for view by the patient, encounters with the healthcare system, such as physician visits; medications prescribed and ordered; allergies; immunizations; and test results, including laboratory, radiology, and procedures. The terms personal health records (PHRs) and patient portals are commonly used interchangeably, with a portal being defined as "a secure online website that gives patients convenient 24-hour access to personal health information from anywhere with an Internet connection" [18]. PHRs or portals can be tethered or linked to a patient's electronic health record; this configuration is of greater coordination value to the patient than stand-alone systems wherein patients need to self-enter information about their own medical care [19].

Like HIE, patient-controlled data are a component of Stage 2 Meaningful Use criteria, as part of a requirement that patients be able to view online or download their health information [20]. Based on a population-based survey, less than 20 per cent of patients access their personal health information online [21]. A systematic literature review of the impact of patients' requests for additional information via patient portals found improved medication adherence, disease awareness, self-management of disease, an increase in preventive care, a decrease in office visits, and an increase in extended office

visits. The results also showed an increase in quality in terms of patient satisfaction, but relatively little was reported about medical outcomes [22].

Sharing healthcare data directly with the patient clearly facilitate the coordination of medical information and may serve as the foundation for other coordination activities. Additional functions can ideally be layered upon PHRs, or operate as free-standing applications, including evidence-based disease management and monitoring, nonurgent appointment scheduling (linking patients with clinic front-offices), prescription refills (linking patients with pharmacies), and secure messaging (linking patients with their provider team). Other emerging applications may rarely be integrated with PHR or EHR platforms, including activity trackers or other remote monitoring devices that can capture observations of daily living; challenges of these rapidly proliferating technologies include how, or even if, the data may be shared with the healthcare providers or systems caring for patients.

Patient secure messaging refers to an e-mail program embedded within the electronic, online platform offered to the patients seen within a health practice or system. For example, Mr. Howard may communicate with his PCP Dr. Welby about a bothersome side effect that he believes a new medication is causing; Dr. Welby could then provide guidance about steps to take right away and arrange appropriate follow-up if needed. Of course, it is possible for healthcare providers to exchange e-mail with patients through other platforms (e.g., Microsoft, Google), texts, or even instant messaging. But privacy and security concerns may discourage routine use of these ubiquitous utilities, even though missed coordination opportunities may arise from avoiding the use of technologies through which patients most commonly communicate. In a position statement, the American College of Physicians recommended that providers establish guidelines with patients about what issues are appropriate for digital communication and reserve such communication for patients who maintain face-to-face relationships [23].

Less controversy accompanies the delivery of automatically generated, tailored text messages to patients for disease management or health promotion. A systematic review of reviews found that the majority of text-messaging interventions were effective when addressing diabetes self-management, weight loss, physical activity, smoking cessation, and medication adherence for antiretroviral therapy [24]. Text messaging for health can be considered part of the larger strategy of mobile health (mHealth), which may be defined as the application of mobile technologies, including phones, tablets, telemonitoring, and tracking devices, to support the delivery of healthcare.

Most of the information technologies discussed so far have considered how patients can coordinate in new ways with their healthcare information and medical providers. Another wide range of opportunities opens up when one considers how patients may not only receive information from the healthcare provider, but deliver patient-reported outcomes to the provider, including information about symptoms and quality-of-life [25]. Innovative technologies may also be used to connect patients with their caregivers, and with one another. For example, the CaringBridge application has connected hospitalized patients with their families, and new computerized platforms have considered how elderly patients living with dementia can be better cared for at home through remote technologies [26]. Social media forums can serve as virtual support groups that provide both information and emotional support for patients [27]. Research in the area of patient-centered health IT may include better defining the healthcare and community participants who are best to include in online social networks, as well as how to optimally implement and spread effective interventions.

CONCLUSIONS

Health IT holds obvious promise in promoting care coordination. The adoption of provider-centered EHR systems is fairly well-progressed; remaining strategies need to target late adopters [28], as well as how best to facilitate EHR sharing across healthcare systems through HIE [29]. Uptake of patient-centered technologies, and patient portals in particular, is lower. Approaches to more widely disseminate and promote the use of PHRs and mHealth should be a focus of future evaluation and research. Although free-standing approaches may offer many benefits in terms of self-monitoring and self-management, coordination will not be complete without integration with the healthcare system.

Consumer health approaches may offer the greatest opportunities for innovation [30]. A rapidly multiplying set of devices and technologies can be interconnected to facilitate the identification, tracking, and management of a broad range of health and clinical goals. As they evolve, new technologies must account for multiple potential users beyond the physician and patient. At the provider level, healthcare teams may function at a higher level when not only physicians, but nurses, medical assistants, social workers, and other nonmedical professionals are connected effectively through EHRs. Similarly, patients with chronic and serious illnesses may have an extensive social network with the need to know at least some of their health information—including formal and informal caregivers, and patient communities with shared healthcare needs or goals.

Imagining the future, an information architecture that integrates PHR and mHealth applications directed toward patients, with HIEs that combine the EHRs of multiple healthcare systems will create a rich, dynamic ecosystem for collaboration at the patient, provider, and community levels. Although

information technologies have historically evolved along parallel provider and patient pathways, the design of new information technologies should be more unified and, if anywhere, locate the hub of the network with the patient. The information belongs to the patient, and it should therefore be accessible when and where it is needed by patients, caregivers, providers, and the broader health ecosystem.

Compliance with Ethical Standards

Conflict of Interest: There are no conflicts of interest or competing financial interests associated with this paper.

Ethical Approval: Because this is an commentary, ethical approval, informed consent, and welfare statements do not apply.

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