

A Framework for Clinical Communication Supporting Healthcare Delivery

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ABSTRACT

Interpersonal communications related to healthcare delivery, called clinical communications, take up a considerable amount of time. Nonetheless, there exist few tools in electronic health record systems that support clinical communications. We describe a framework for clinical communications and describe our experiences implementing tools to manage and document them within an electronic health record system. Categories of clinical communications include communications between patients and healthcare providers, among healthcare providers on a single clinical team, between healthcare providers in different clinical teams and different institutions, and between healthcare providers and individuals who can provide additional educational or evidence based materials to support care delivery.

INTRODUCTION

While Electronic Health Record (EHR) systems are increasingly being advocated throughout the United States healthcare system, overall adoption remains low. (1, 2) Coiera has established the lack of tools managing interpersonal communications among healthcare providers and with patients as a major obstacle to EHR adoption. (3) Such interpersonal communications, which have been termed "Clinical Communications", (4) make up between 50% and 90% of the clinical information flow in healthcare settings. (3, 5, 6) Clinical communications occur as healthcare providers request or share information with patients, other healthcare providers, ancillary personnel, or third parties (such as payors, guardians or employers). Reasons for clinical communications include transmitting the results of testing, requests for continued or additional care, authorization for services, sharing impressions and recommendations from consultation, and direct questions related to healthcare delivery. Improperly managed clinical communications have been shown to impact negatively on

provider satisfaction and patient care delivery. (7, 8)

Since 2001, we have developed and implemented in an EHR system a framework for supporting clinical communications. The framework was designed to inform the development of EHR system-based tools that allow healthcare providers to communicate with each other both in the context of their clinical workflow and of pertinent clinical data. The tools developed from this framework manage clinical communications within a given clinic, among discrete clinics, and between providers and patients. To inform EHR system users, researchers and developers, we present a case report that illustrates how information may flow through a clinic, and then outline the framework for clinical communications. With each category, we also discuss aspects of the implementation in our local EHR system.

CASE REPORT

A 65 year old male with a history of diabetes and seasonal allergies needed a refill on his allergy medications. The patient sees both a primary care provider (PCP) and a diabetes specialist; each has a clinic at different sites within the same medical center. The patient called his PCP's office to request a refill on his medications and left a message with the phone receptionist, who summarized the patient's request on a piece of paper. The phone receptionist then retrieved the patient's chart and placed it with the message in a nurse's wire message basket. Two hours later, the nurse reviewed the message and the chart to ensure that the patient's medication request was appropriate. Within the patient's chart, the nurse found a photocopy of a year-old letter from the consulting diabetes specialist recommending a followup appointment to occur six months later. The nurse found no evidence that the appointment had been made or that the patient had been seen. The nurse then located the PCP's last clinic note outlining the patient's treatment regimen for his allergies.

The nurse documented at the end of the original message the specific prescription requested, and then placed the message and chart in the PCP's message basket. At the end of the day in clinic, the PCP went through his messages. Upon reviewing the phone message, the nurse's notes and the chart, the PCP agreed with the recommended therapy and signed off on the nurse's note. Upon receiving the signed message from the PCP, the nurse then called a pharmacy to fill the prescribed medication, and then called the patient to tell him that his request had been completed. The nurse then documented at the end of the message that the medication had been filled at a pharmacy and that the patient had been informed. The final message, containing the phone receptionist's initial notes, the nurse's follow-up notes, the PCP's final signature, and the nurse's acknowledgement that the pharmacy and the patient had been called, was placed in the patient's chart.

FRAMEWORK FOR COMMUNICATION

This case illustrates the multiple steps and handoffs that may occur as a patient attempts to communicate with a healthcare provider. Steps that individuals took to achieve the medication refill included 1) the patient's call, 2) the receptionist writing down the message, 3) the receptionist retrieving the patient's chart, 4) the receptionist placing the document in the nurse's wire basket, 5) the nurse reviewing the message and chart, 6) the nurse making a clinical decision related to the patient's treatment, 7) the nurse placing the message and chart in the PCP's message basket, 8) the PCP reviewing the message and chart, 9) the PCP reviewing and approving the nurse's clinical decision, 10) the PCP placing the signed message back in the nurse's basket, 11) the nurse calling the pharmacy, 12) the nurse calling the patient, and, 13) the nurse documenting the phone calls. In addition, handoffs occurred between the patient and the receptionist, the receptionist and the nurse, the nurse and the PCP, the PCP and the nurse, the nurse and the pharmacy, and the nurse and the patient. Each step increased the total amount of work required to accomplish a task, and each handoff could increase the chance for error introduction.⁽⁹⁾ Because of the inefficient nature of these multiple steps, the nurse was unable to take the opportunity to investigate the patient's potentially missed follow-up appointment with the diabetes specialist.

We have identified five general categories of information flow to and from the healthcare provider. These include:

1. Between Healthcare Providers and Patients

The first category of clinical communication occurs between the healthcare provider and the patient. Major goals for supporting this category of communication in an EHR system include allowing patients easy access to their healthcare provider, reducing patients' reliance on telephone or potentially unsecured email systems, allowing them to communicate using their own words, and empowering them to interact directly with their medical record. Tools that support clinical communications between patients and providers may also allow much more time flexibility for patients and may reduce the number of phone calls to the provider's office.

In our institution's EHR system, patients are able to log on and authenticate to a secure patient portal website. Once logged on, they can ask questions about their health, receive test results, request medication refills, confirm appointments and report back on their health status. Patients are also able to complete specific patient intake forms in anticipation of a visit (health screenings, preoperative screenings, etc.) that may be necessary at subsequent visits. Messages from patients are then routed to the healthcare provider or a representative, to be handled during business hours. Any responses back to the patient send alerts to the patient's email that there is a message waiting for them on the portal; the contents of the message are not emailed directly. As a safety measure, messages to patients that have not been addressed within 96 hours are returned to the sender, along with the original message content and a note that the patient has not received the message. This returned message can be routed to a nurse or secretary, who can then contact the patient by another means. The entire communication with the patient and among the healthcare provider team is then automatically stored in the EHR system.

Two major challenges we have faced in designing a tool to support clinical communications between the patient and healthcare provider included determining a) how to enroll patients and b) how to ensure that the patient's messages go to the correct healthcare provider. To enroll patients, we developed a system that allows them

to sign up directly on the portal website from a home computer, without the assistance of staff. There patients can select usernames and passwords for immediate access and can link their username to their medical record with their institutional medical record number. Patients can augment their access level by coming to the institution and presenting a photo identification card that can confirm their identity. We anticipate that with advanced access level, patients will ultimately be able to view components of their medical record directly (e.g., lab and radiology testing results, appointment schedules, billing and paying, and preventive recommendations) directly.

We have implemented two mechanisms to ensure that patient messages reach the correct healthcare provider. First, patients generating the messages can select healthcare providers from a list that is automatically generated based on past and future appointments; this reduces the likelihood that they will select ambiguous names. Second, sent messages are first directed to the secretary or nurse who normally triages telephone calls for the provider who the patient intended to contact. The person who manages incoming messages is likely to understand the clinic workflow, and can involve the correct provider (in the case of the intended recipient's absence) or a nurse or other staff member, depending on the content of the message (e.g., an appointment request can generally be managed without involving the healthcare provider). This approach mimics telephone-based communications, where calls are generally taken and triage by staff members other than the care provider.

2. Within a Healthcare Provider's Clinic

The second category of clinical communication occurs among providers within an individual clinic. The major goal for communication within a clinic is sharing clinical or didactic information among members of a team caring for a patient. This type of communication is analogous to a traditional wire "message basket" into which documents requiring review are placed. Examples of the types of materials that are commonly placed in the message basket include notations of phoned-in requests for medication refills, laboratory testing results needing review, questions about clinical care, and educational materials.

In our system, we have implemented "virtual message baskets" to support communication within a clinic. Due to the dynamic nature of the care environment, by which individuals may fill different roles in clinic settings, the message baskets are generally defined by care team members' roles (i.e., physician, nurse, secretary, manager, etc). Healthcare team members can initiate new messages from multiple "locations" in the EHR system user interface; links to create new messages are displayed adjacent to lists of laboratory results, completed notes, the patient's name, and other areas of the EHR.

When messages are initiated from a contextual link (such as those present adjacent to laboratory or radiology testing results), the recipient receives both the message and the pertinent document or result. For example, a message asking about a patient's diabetes control can be linked to the most recent blood sugar testing results. In this way, healthcare providers can review laboratory results and respond immediately to abnormalities by sending a message to a nurse to call the patient for further testing or medication changes. In addition, the message author can set the priority of the message to one of three levels (routine, reply, or priority). Once received, messages can be displayed according to priority, sender, patient, and recency to allow recipients to focus on more time-sensitive work first. Completed messages are easily filed in the patient's medical record with a single mouse click.

One unique aspect of the virtual message basket tool is that it permits any user to access another user's basket and alter its contents. In this regard, it truly is an analog of the wire basket from the paper-based system, wherein any member of a care team can walk up to a basket and check its contents. This type of open access allows easy workload distribution; if one provider notices that another has a box full of messages requiring action, he or she can redistribute this load of orders among providers to share the burden of responsibility more equitably. In practical use, administrative access is required to enable a group of users to have permanent access to each other's message basket; this ensures a level of filtering, so only individuals who have a legitimate reason may view another basket.

3. Among Healthcare Providers - Using the Same EHR System

The third category of clinical communication occurs between two healthcare providers in different clinics. Major goals for communication across clinics within the same institution are to support healthcare providers' collaboration and consultation about specific patients, alerting others of the availability of clinical information about a patient, or to coordinate the delivery of testing and treatment.

Because of the level of subspecialist interaction with patients at our institution, there is substantial demand among system users to communicate with each other across clinic boundaries. We have recently implemented into the EHR system an ability to access message baskets across the institution. Because system users in one clinic may not fully know the workflow of users in another, we have emulated the functionality used to identify the correct recipient for clinical communications from patients; messages sent across clinics are generally sent to baskets defined by roles, and are triaged by nurses or secretaries. This way, messages can always be received and appropriately routed to the correct member of the clinic team, even during the intended recipient's absences and vacations.

4. Among Healthcare Providers not Using the Same EHR System.

The fourth category of clinical communications involves interactions with healthcare providers outside our institution who either may access a different EHR system or not use an EHR system at all. The most common communication needs of this type involve referrals to or from outside providers. Major goals for communicating with healthcare providers outside our institution include timely and clear sharing (i.e., sending and receiving) of relevant electronic health records using secure means with authenticated individuals when appropriate permissions are in place.

We have not yet implemented a toolset in our EHR system to allow healthcare providers from outside our institution to access components of our electronic health records. Our initial plans are to develop a provider portal system similar to the patient portal. The provider portal system, like the existing messaging systems, would allow bidirectional communication, would allow secure transmission of documents or testing results, and

would store a record of the entire communication in the EHR system. Additional development will be necessary to restrict outside providers in terms of which patients and which records they can access.

5. Collaboration with knowledge-based resources

The fifth category of clinical communications involves collaborating with local resources that provide additional educational materials for healthcare providers and patients. The major goals for communication serving clinical education needs are to create convenient tools that allow providers to request or access information as part of their normal workflow. Securely transmitting patient information to the providers of educational information can help them tailor the materials to the specific patient case.

We have worked with clinical informationists from the institutional medical library to develop a service with which healthcare providers can pose clinical questions. Providers use a messaging system that is integrated with the other clinical communication tools described above. In response to clinical questions, the informationists research the medical literature and respond with a summary of the evidence. Using this tool, healthcare providers can pose questions through the standard messaging system directly to the medical library, day or night, upon receiving clinical test results or other clinical information.

DISCUSSION

Healthcare provider's daily workflow generally involves a multitude of interpersonal communications with patients, staff and other providers. Managing and recording such clinical communications often generate interruptions that can introduce inefficiency. (8) Many of the communication events that occur may be served by EHR-based tools, which permit easy access at all times, routing of information to the most appropriate person, linking messages with relevant documents or testing results, and automatic storage of completed messages. Designing and integrating into an EHR system tools that explicitly serve each of the types of clinical communication may improve users' ability to interact with each other and with the information contained in the record.

Tools for managing clinical communications outside of EHR systems, such as telephone,

electronic mail, and handwritten notes placed in wire baskets, all have strengths and weaknesses. While telephones are ubiquitous and most patients and healthcare providers are able to use them, telephone call participants may need to spend time coordinating schedules to conclude the communication and to document the conversation. Electronic mail (e-mail) between healthcare providers and patients or other providers is generally well regarded and is "self documenting" (i.e., the e-mail can be directly stored in a patient record). However not all patients and providers have adopted e-mail, recognize the potential for a delay between the time the message has been sent and when it is received, or understand and manage the security risks inherent in e-mail. The practical use of unsecured e-mail is fundamentally ending with the advent of HIPAA regulations. Handwritten notes are flexible and easy to distribute within a clinic, but can be illegible, incomplete, and impermanent (i.e., they may not ultimately be stored in the medical record). In addition, all these forms of clinical communication may require that clinical information be duplicated as it is distributed. As a result, messages may become lost or misdirected, and providers may later be required to make clinical decisions based upon an incomplete set of information.

Using an EHR system to manage clinical communications can overcome some of the limitations of these more traditional communication tools. First, patients using a messaging system do not need to call during standard work hours, do not need to make direct contact with an individual in real time, and do not need to rely on somebody to interpret and transcribe their message. Second, the risk that messages be misdirected, deleted, lost, or sent to a person who is away is reduced. Third, healthcare providers can access messages and relevant clinical information in an EHR system from different physical locations. Fourth, messages sent using EHR system-based tools can be automatically stored in the medical record when completed. Fifth, using messaging systems, clinic managers can monitor the numbers of messages in baskets, and thus can better match workforce capacity with demand; messages in overburdened baskets can be redistributed to others.

Clinical communications may also represent an opportunity for healthcare providers to catch incomplete or incorrect medical care. A patient calling to request a refill of an allergy medication,

for example, may prompt the healthcare provider to review the medical record and recognize that the patient is overdue for diabetes monitoring. In this example, the healthcare provider may be more likely to review the patient's record if it is delivered simultaneously with the medication request. Healthcare providers who are relatively unfamiliar with a patient's case, such as cross-covering providers, are especially likely to benefit from integration of messaging tools with an EHR system.

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REFERENCES

1. Ash JS, Gorman PN, Seshadri V, Hersh WR. Computerized physician order entry in u.s. Hospitals: results of a 2002 survey. *J Am Med Inform Assoc* 2004;11(2):95-9.
2. McDonald CJ. The barriers to electronic medical record systems and how to overcome them. *J Am Med Inform Assoc* 1997;4(3):213-21.
3. Coiera E. When conversation is better than computation. *J Am Med Inform Assoc* 2000;7(3):277-86.
4. Coiera E. Clinical communication: a new informatics paradigm. *Proc AMIA Annu Fall Symp* 1996:17-21.
5. Covell DG, Uman GC, Manning PR. Information needs in office practice: are they being met? *Ann Intern Med* 1985;103(4):596-9.
6. Safran C, Sands DZ, Rind DM. Online medical records: a decade of experience. *Methods Inf Med* 1999;38(4-5):308-12.
7. Gandhi TK, Sittig DF, Franklin M, Sussman AJ, Fairchild DG, Bates DW. Communication breakdown in the outpatient referral process. *J Gen Intern Med* 2000;15(9):626-31.
8. Coiera E, Tombs V. Communication behaviours in a hospital setting: an observational study. *Bmj* 1998;316(7132):673-6.
9. Gandhi TK. Fumbled handoffs: one dropped ball after another. *Ann Intern Med* 2005;142(5):352-8.