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Gains, losses, and uncertainties from computerizing referrals and consultations

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Abstract

Consultations entail transitions in care between referrers and consultants, as patients visit different clinicians and care sites. This complex process has been consistently prone to communication breakdowns. Despite expectations and benefits of electronic health records (EHRs), incomplete, vague, or inappropriate referrals continue to hinder consultations; referrals can be sent to the wrong specialty service; and consultation findings frequently fail to reach referrers. Due to the inadequate support of interpersonal communication afforded by EHRs, these issues persist. Important aspects of ergonomics and human factors engineering frequently appear overlooked during the design and implementation of EHRs. Usability issues have contributed to delays in medical diagnosis, treatment, and follow-up. Some of these delays contribute to patient harms. Our multidisciplinary team of clinicians and ergonomics professionals reflects on referral and consultation. We describe how computerization in healthcare should benefit from approaches informed and developed through applied ergonomics and human factors.

Keywords

Referral and Consultation; Human Factors and Ergonomics; Electronic Health Records

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Declaration of interests

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1. Introduction

More than one-third of patients are referred to a specialist each year in the U.S.[1] In our current era of electronic health record (EHR) systems, these clinical handoffs among clinicians are accompanied by care transitions among patients, requiring not only clinical evaluation and management, but completion and transmission of electronic documents[1] Unfortunately, important aspects of ergonomics and human factors engineering (HFE) are not evident in EHR designs and implementation strategies that we have seen. These aspects are needed to provide acceptable usability, minimize risk, aid efficiency, and improve outcomes.[2] As a result, an important consultation can be hindered by a referral that is incomplete, too vague to be useful, or inappropriate. In other cases, referrals are sent to the wrong specialty service, or the consultation findings that eventually emerge do not reach the referring clinician.[3] Although interoperability is a goal, standards for exchanging health information about referrals and consultations have been slow to develop. Needed interpersonal communication surrounding referrals has also suffered. These socio-technical barriers have decreased the efficiency and effectiveness of the referral process. Furthermore, patients and clinicians have experienced adverse outcomes as a result of systems that process referrals and consultations.[4,5] Based on the clinical experiences of and research conducted by our team and others, we describe how the process of integrating health information technology into referrals and consultations via EHRs has led to certain gains as well as losses and uncertainties, and how sociotechnical approaches for design and implementation could be leveraged to improve the process of referral and consultation.

2. Anatomy of a referral: the clinical perspective

Although the term "consultation" is broadly used to mean the entire process of both referral and consultation, we refer to "referral" separately from "consultation", because these are different activities that occur in sequence.[2] Referral is a process whereby a referring clinician formally requests that a consultant evaluate a patient, after deciding that the patient should undergo such an evaluation. Effective referrals provide all pertinent medical history, potentially including medication listings, findings upon physical examination, and diagnostic test results. The consultation is what the consultant does after accepting the referral and arranging to meet with the patient. Consultation includes evaluation, findings, recommendations, and any procedures that may also be directly conducted by the consultant. A primary-care response process occurs following consultation. Steps are shown in the Figure.

EHRs did not alter the importance of transmitting the key details of referral and consultation, and communicating, person to person, about the transmitted information. Pre-EHR reports indicated that referrers should always identify a question to be answered, and establish the urgency of the issue; consultants should address contingency plans for anticipated clinical problems, and include a teaching function so that referrers can engage in continuous learning .[3] The required communication surrounding the multitude of steps in referral and consultation (Figure) requires more time and planning than often occur. The EHR, however, seems to have altered actual practice: there now appears to be a habit

whereby transmission of information replaces, instead of supports, communication. Some differences observed before and after the advent of EHR systems are described below.

Before EHRs.

Aside from communicating with the patient about a referral, a referrer would often speak with a consultant before the referral, to discuss the patient, clarify the clinical question, and reach agreement about next steps. Similarly, consultants would often contact referrers following consultation, to review findings, recommendations, and follow-up plans directly. These discussions were based on a relationship between a referrer and a consultant. In addition, “curbside consultations”—informal discussions outside medical records and without a referral—were frequent. The curbside discussion could address a straightforward question or an issue that a potential referrer could handle directly, provided that the consultant could provide some timely and concise advice without evaluating the patient. Thus, curbside questions have often referred to medical knowledge at large, or a hypothetical patient who is like the real patient.

After EHRs.

The term “consultation order” became a synonymous term for referrals, because an electronic referral is typically created in the form of an order in the EHR system. With an EHR in a "closed system" (typically a single institution) that includes both referrer and consultant, “transmitting” (conveying) the information is handled by the EHR system itself: it sends the information, or a link to it, to the appropriate target, such as the consulting service in the case of the referral, or the referring service in the case of the consultation. A helpful consultation variant emerged in the form of e-consultation.[6] Although some use this term to refer to real-time technologies such as live videoconferencing, we instead refer to asynchronous activities of reading and writing, whereby the consultant responds to a referral by reviewing the medical record and documenting an opinion without evaluating the patient directly. This formal medical-record review and documentation does not occur with curbside consultations, which persist as an informal but useful mechanism for providing interprofessional advice. E-consultations can be useful to answer questions about indications for medications, diagnostic testing, or therapeutic procedures (for example), based on medical history but not physical examination. In “open systems” where referrals are made to other institutions, transmission requires electronic interoperability or some degree of manual work, to get the information from its source to its target. Curbsides and e-consultations tend to be less common in these settings. Despite certain benefits of EHRs, such as the facilitation of e-consultations, many patients continue to experience delays in care, and periodic harms as a result.[7]

3. Gains and Losses

The computerization of referrals and consultations through the dissemination and adoption of EHR products has led to many improvements in care and outcomes. Unfortunately, the things that could go wrong often do, at any step of the entire process. Thus, EHRs have led to certain gains, losses, and unrealized potential. Categorized examples are provided below.

Electronic documentation and automation.

Potential has been created to integrate, automatically, information from the medical record into a referral or consultation. This might pertain to symptoms, prescribed medications, vital signs, medical orders, or procedures. Targets of electronic routing could be changed dynamically according to any number of work schedules, teams, shifts, and sites of care. In short, the work of routing and tracking information as it flows across sites and points of care can now be handled more quickly, efficiently, and safely. Despite the potential, these forms of automation are currently rudimentary or uncommon, partly because the surrounding workflows and presentation of data have been insufficiently investigated and detailed. In many cases, documentation of care simply occurs too slowly or superficially[8] to be considered a promoter of safe and effective care.[9] Berg and colleagues pointed out that the EHR needs to use empirical knowledge of clinical practice to produce needed but not excessive structure, and that free text—as opposed to EHR templates—is a core element of clinical documentation.[10] Templates for referral and consultation need refinements consistent with these recommendations.[11,12]

Electronic transmission of documents.

This speeds delivery of information and so has the potential to decrease time to diagnosis and time to treatment. Steps in the processes of referral and consultation can now be tracked electronically,[13] leading to the capability to generate automated signals to multiple recipients regarding the initial request, questions requiring answers, interruptions in the timeliness of the stepwise activities, and availability of results. New challenges that accompany such systems include timeliness of responding to tracked events, such as scheduling or requests for additional information; and efficiently coordinating the electronic information flows with the corresponding conversations.[8] Both referrers and consultants have reported a frequent lack of information needed from each other.[14]

Usability.

Professional care managers have cited usability as an important technological barrier to coordinating the care of chronically ill patients.[15] Although attention to usability of EHR systems appears to be increasing, physicians still overwhelmingly assign poor ratings to EHR usability, which is also associated with professional burnout.[16] Many referrals are incomplete or even target the wrong consulting service, often based on inadequate understanding, as gained from the EHR, about differences among consulting services and the clinical issues that they handle. This leads not only to backtracking and duplication of work to correct the problem, but delays in diagnosis or treatment, and prolonged waiting times relating to inefficiencies and errors in referral.[9] Urgency of issues can be miscommunicated. Checkboxes and text fields in user interfaces can be easily missed, or can be so numerous as to overburden the user or obscure the most important information. Information can fail to arrive at its destination, or can fail to be addressed, tracked, and followed up properly. Paper-based workarounds have persisted even in the past decade.[17]

Interpersonal communication.

EHRs have provided a more robust communication network, with more opportunities and methods to connect to others. Whether the potential is being realized in the most useful ways is uncertain. Of paramount importance is the finding that the interpersonal communication activities that accompany the steps have suffered too much: Gandhi and colleagues, for example, described shortcomings of both timeliness and content of communication surrounding referrals.[14] Interpersonal communication has especially concerned primary care providers and influenced their choices of referral partners.[18] The availability of electronic ordering and documentation seemingly (but not really) obviates any absolute need for referrer and consultant to talk directly. Instead, thoughts, findings, and recommendations tend to flow, now with the EHR, only through the electronic documentation. Conversations that might have preceded or accompanied the activities in pre-EHR days have often been abandoned. This frequently leads to misunderstandings, uncertainty about how to proceed, and even medical errors when electronic documentation may be inadequate to convey all of the important dimensions of a case that are needed to provide the most appropriate care.

4. Uncertainties and ongoing research needs

Clinical interpersonal communication.

Although EHR systems and communications technologies have multiplied and evolved rapidly, leading to certain technical changes in procedures as well as consequences, our fundamental need for interpersonal communication in formulating and answering questions about referrals and consultations, and troubleshooting them, has remained constant since the first referral ever occurred.

Nonetheless, medical practices and institutions have not kept pace with those needs. EHR vendors have done too little to integrate and accommodate the social and technical needs relating to referrals and consultations. In turn, medical institutions' increased need to focus on implementation and adoption of EHR systems has detracted from their attention to bringing clinicians together in the productive dialogue that needs to occur during the key clinical activities. “Service agreements” between specialties do often exist, but dialogue surrounding them tends to be sporadic, and these agreements cannot replace individual conversations about specific patients. Some consensus has been generated through conferences and public reports, but far more action is needed. Furthermore, roles and responsibilities require clarification and discussion.[19] We agree with Eason and colleagues when they asserted that, although standards of care and technology may be established at a national level, maximally supporting the sharing of information will require most systems development to occur at the level of local communities and institutions.[20]

In many of today’s medical institutions, we need sociotechnical frameworks to guide research that addresses uncertainties related to referrals in academic settings or large practices.[21,22] In many of today’s medical institutions, especially in academic settings or large practices, referrers and consultants do not know each other, shifts lead to frequent changes of work schedules, and increasing distance and dispersion among clinicians lowers the chance that people will connect with each other through unplanned but useful

interactions. Insufficient evidence is available to inform the best ways to overcome these challenges. Even the task of remotely determining whether a clinician is available or unavailable to discuss a patient at a particular moment is difficult. As economics drive shorter visits and larger patient loads, fostering the human connection is more difficult and needs more help than ever. The decrease in flexibility and predictability of available time heightens the need, currently unfulfilled, for technology to assist in building interpersonal networks, as well as better methods of real-time communication. The need to identify communication opportunities while minimizing disruptions might be met by creative uses of contextual cues, information from daily schedules, and perhaps wearable devices. Even the selection of a consulting specialty service is problematic in itself: a recent survey of one of our local medical centers revealed that referrers could choose from more than 500 consulting services, all without any robust method to search for a service by name or key word, or to understand easily what specific services were provided by any given specialty, as opposed to the others. With many individual clinicians practicing in multiple settings and being required to use multiple EHR systems, relying on memory alone to recall all of the needed information about referrals in every setting is no longer a reasonable approach.

Health information technology leveraging interoperability.

Many of today's mobile smartphone applications provide examples of technologies, tools, and solutions that have yet to be applied to EHR systems. These apps connect people and information, together. They allow users to access documents and each other at the same time, even through live human conversations via the phones. They provide efficient means of processing and submitting forms and requests. EHR vendors and other developers should improve agility and innovation in their products, in building upon what other industries have already learned and implemented. In medical settings, privacy laws, regulations, and policies sometimes stand in the way of progress, but these are frequently misunderstood, and are not insurmountable. Additional research is needed to measure and understand communication, technical development, efficiency, implementation, usability, workflow, optimization, and outcomes.

The rise of cross-institutional or “open” systems promotes transitions of care for patients but also raises the bar for effective transmission and communication of referrals and consultations. Progress in coordinating cross-institutional consultations has not kept up with the demand. The U.S. Department of Veterans Affairs is a prime example: although the Maintaining Internal Systems and Strengthening Integrated Outside Networks (MISSION) Act enables Veterans to receive many health services outside the network, workflow, data formats, and data exchange procedures do not fully support coordination or assessment of care. Electronic consultation systems have begun to be developed and studied with greater attention to details[13,23]. Our work has yielded knowledge about cognitive requirements and potential usability and usefulness of new HFE-informed approaches to referrals,[24] but much more science and engineering are needed to expand and apply such knowledge.

Patient-oriented Metrics.

The genesis of the "pathologies" presented here began at the moment when the EHR captured its first piece of health care data. There was no easy way to organize consultations

until we started capturing them in digitized form. There was no easy way to count consultations until we started capturing them as electronic documents. We couldn't establish metrics for evaluating them until we started counting them. There were no competing pressures from performance expectations and metrics until we started tracking metrics more systematically. When we were working on referrals and consultations face to face, there were few templates to misconstrue. We could not misunderstand prerequisites on the referring end or misunderstand the information on the consulting end. There were no canceled consultations to puzzle providers until we were canceling them electronically and without discussions. Thus, our innovations have also created new potential to measure failures, but we can likely manage these and prevent harms if we use ergonomics and HFE to attend to many of the contributing factors.

We have created immense potential for improvement, but we still need to attend to the most basic and constant needs. In 2008, Abraham Verghese referred to the “iPatient” as the electronic representation of the patient inside the EHR.[25] The iPatient requires attention but competes with the real patient, for the clinician’s time. He asserted that the patient is the center of attention, but “more as an icon for another entity clothed in binary garments”. We consider what we view as an EHR-fostered depersonalization of sociotechnical processes to represent "*passive segregation*", the result of current but often dysfunctional human-computer interactions. The problem, as Verghese pointed out, is that the real patient needs the bulk of the attention and dialogue. In studying referrals and consultation, we have observed a gap between the introduction of new technology and the development of social systems to handle their unintended consequences. We call this phenomenon *culture lag*. The need to bring people together in focusing on patients’ needs has amplified the opportunities for ergonomics and HFE. For example, EHRs should embed into their referral systems functions that synchronously connect the involved healthcare professionals—think of an enhanced form of instant messaging—and patients, too. We must reduce, rather than increase, social distance among patients, clinicians, and other types of caregivers.

Training.

As noted by Liran Levin, "referral practice is a learned skill".[26] We need to identify the best ways to train all clinicians about how to generate referrals and conduct consultations effectively. Research has identified education’s effects on satisfaction and frequency of referral[27], but the extent to which the referral and consultation processes themselves are working has received inadequate attention. At the same time, we must balance the need for basic consultation training with the need to avoid extensive time requirements, while accommodating the reality that the clinical work force changes every day, and clinicians work with multiple health systems and information systems. Training must be able to adapt to these changes, including evolution in professional roles, patients’ health status, and new medical procedures.

5. Conclusion

In summary, the computerization of referrals and consultations has led to many gains and capacities to improve quality and outcomes of care, but adverse effects have occurred, and

too much potential remains unrealized. The good news is that there is little disagreement about whether the system is broken (it is). Comparing to the pre-EHR socio-technical environment yields lessons, but the main work ahead is bringing people together and applying ergonomics and HFE to overcome passive segregation and improve the environment, products, and work system. We especially need ergonomics and HFE to decrease time requirements, increase accessibility of clinical information, and improve interoperability, reliability, and interpersonal communication in delivering care.

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HIGHLIGHTS

1. Specialty consultation corresponds to a transition in care for a patient.
2. Inadequate usability of user interfaces can lead to harms and delays in care.
3. Ergonomic change could help efficiency, information accessibility, and communication.

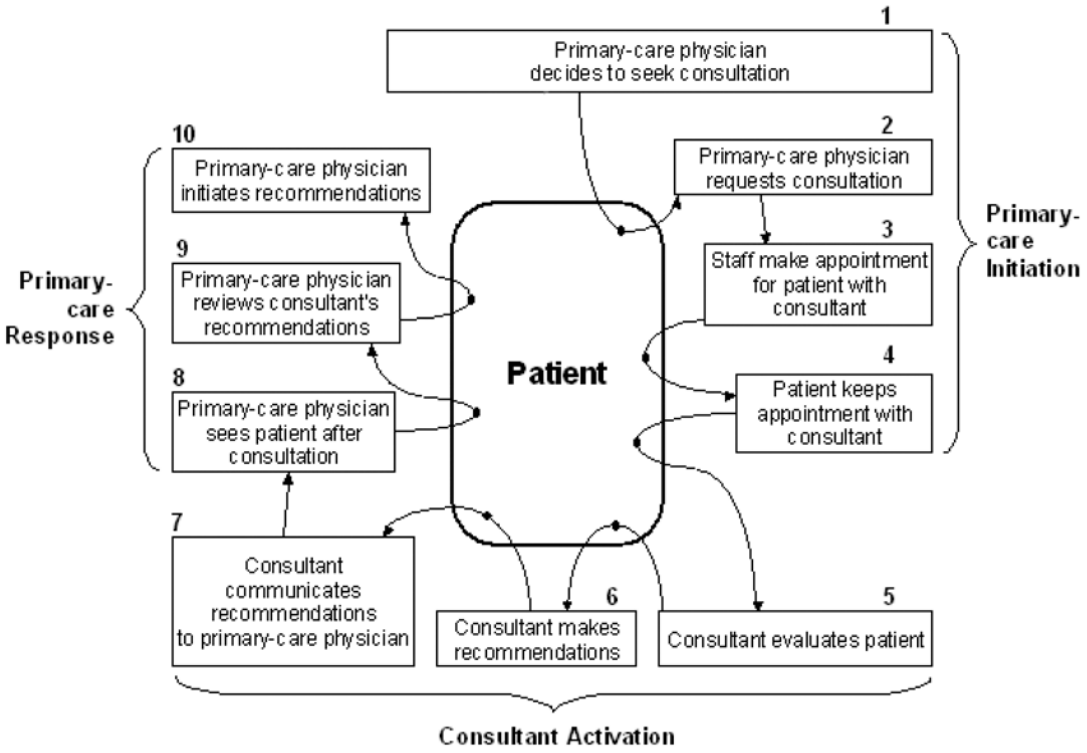

Figure. Steps in referral and consultation.

The process is characterized, sequentially, by primary-care initiation, consultant activation, and primary-care response.