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Electronic Health Records and the Changing Roles of Health Care Professionals: A Social Informatics Perspective

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ABSTRACT

Our longitudinal study examines the changing roles of health care professionals (physicians, nurses, medical assistants, practice managers, and secretaries) before and after an EHR implementation in a large, multi-location group practice. We take a social informatics perspective and focus on the changing social identities of health care professionals as they adapt to their EHR-enabled roles. A year after go-live, a few professionals were still in reactive mode, trying to cope with the new system, but many others were actively shaping the technology and their roles in a variety of ways. A few went beyond shaping to find ways to provide additional value to themselves and to patients in ways that became possible only because of the EHR. In this paper, we explore these responses to the EHR as a basis for building theory about the potential for EHR systems to improve health care delivery, and the mechanisms by which that potential is realized.

Keywords

Health Information Technology (HIT), Electronic Health Records (EHR), Social Informatics, Social Identity, Grounded Theory

INTRODUCTION

Physicians in the U.S. long resisted IT in care delivery (as compared to IT for billing and financial management), e.g., in 2001-02, only 17% of U.S. physicians used electronic health records (EHR) (Bates, Ebell, Gotlieb, Zapp and Mullins, 2003; Swartz, 2004). With the growing recognition that applying IT and other process design tools can dramatically increase the efficiency and quality of health care (HC) delivery processes (Reid, Compton and Grossman, 2005), adoption has accelerated. Spurred by the increased capabilities of current health IT (HIT) and EHRs and the financial incentives provided by insurance companies and various governmental agencies, EHR use by physician offices has increased by 22% and 60% since 2005 and 2001 respectively (Hing, Burt and Woodwell, 2007). Adoption alone is not, however, sufficient to realize the potential benefits of the technology. Interest is now turning to understanding how to support HC professionals' assimilation of the technology and to revising HC delivery processes to unlock these systems' potential to significantly improve HC quality and efficiency (Davidson and Heslinga, 2007; Ovretveit, Scott, Rundall, Shortell and Brommels, 2007).

While U.S. physicians and other HC professionals are now accepting (sometimes with resignation) that EHRs and other HIT will become part of how they perform their jobs, many of the reasons for their earlier reluctance to work with EHRs, particularly the perception that their productivity will be negatively affected (Bates et al., 2003; Scott, Rundall, Vogt and Hsu, 2005), have not been eliminated. These systems will change how physicians deliver care, sometimes in unwelcome ways. The broad purpose of our research is to understand how EHRs can best be used to improve the quality and efficiency of HC delivery processes. To that end we embarked on a multi-year grounded theory study of an EHR implementation in a large multi-site group medical practice. A core theme that emerged during data analysis was the effect of the EHR on the social identity and roles of HC professionals. In this paper we report our findings with respect to three research questions:

1. How does EHR introduction in a HC organization affect the social identity of HC professionals?
2. How does EHR introduction in a HC organization affect the roles of, and interactions among, HC professionals?
3. What opportunities does EHR introduction in a HC organization provide for enhancing the roles and satisfaction of HC professionals?

A grounded theory study does not start from the literature. Rather, we allow the data to inform us about the core issues, and only then turn to the literature to discover how our findings fit with, add to, or contradict what others have found. That said, to provide a context for the reader, we start with a summary of literature related to our findings.

BACKGROUND

In recent years, researchers have responded enthusiastically to calls to employ theoretically informed socio-technical approaches to the study of HIT (Berg, Aarts and van der Lei, 2003; Chiasson, Reddy, Kaplan and Davidson, 2007; LeRouge, Mantzana and Wilson, 2007). Some researchers examining how and why users did or did not adopt HIT to perform clinical tasks employed traditional IS theories such as TAM, but included additional constructs in recognition that HIT is used in an organizational rather than an individual context. These additions included perceived threat or loss of control (Bhattacherjee and Hikmet, 2007), team influence (Ke, Xue, Liang and Wei, 2006), level of psychological ownership of the system (Pare, Sicotte and Jacques, 2006), work values and subjective norms (Seeman, Gibson and Rosenthal, 2005), work system compatibility (Tulu, Burkhard and Horan, 2006) or, more generally, social influence and facilitating conditions (Hennington and Janz, 2007). Other researchers have directly examined changes to social structures arising from a combination of institutional and technological factors (Davidson and Chismar, 2007) to explore barriers to adoption and assimilation such as learning capacity (Reardon and Davidson, 2007), contextual influences (Davidson and Chiasson, 2005), or resistance arising from the HIT's incompatibility with existing work systems and power structures (Lapointe and Rivard, 2005).

A growing number of researchers, like us, have identified organizational roles, role networks, and social identity as central to the challenges of implementing HIT. For example, Davidson and Chismar (2007) noted that both institutionally and technology-triggered changes were enacted either through clinical roles, role dyads, or role networks. Jensen and Aanestad (2007) explored the way clinicians make sense of new technology through their interactions, and how this process shapes their identity. Lanham and McDaniel (2008) identified physicians' values and areas of expertise as central to explaining heterogeneity of EHR use. Finally, Van Akkeren and Rowlands (2007) used social actor theory (Lamb and Kling, 2003) to explore the social and institutional forces influencing HIT assimilation. We extend this work on HIT's effects on roles, role networks and social identity, first by examining explicitly which new roles and identities emerge, and then by identifying four "stages" that characterize different time periods in the EHR assimilation "journey". Our goal is not just to understand role identities in the context of adoption, but to examine how changing role identities might allow organizations to develop new capabilities, enabled by the EHR, leading to better quality and efficiency.

Users as Social Actors

Physicians and nurses strongly identify with their professions. These professions, however, are not strongly identified with IT, nor are their members trained in IT use. A critical part of a HC professional's journey to becoming an effective EHR user is adjusting his/her professional identity to encompass EHR use. To understand how the implementation of EHR affects the roles of HC professionals, we employed a social informatics perspective. While traditional IS research often focuses on the role of the user, a key insight of social informatics is that while individuals may use systems, that use does not constitute their primary identity, even within the organization where the use occurs. Instead that identity arises from their organizational role; from their role's place in the network of roles; from organizational institutions such as goals and processes; and from ongoing interactions. Thus viewing a person as a social actor means examining his/her affiliations, environment, interactions and identity (Lamb and Kling, 2003), and it demands data collected over time and from multiple sources to understand the social structures undergoing change and the processes through which that change occurs (Klein and Myers, 1999). In this spirit, we framed our research questions, and designed our study.

This social informatics perspective provides a good explanation of current IT use in HC. HC professionals, especially physicians, nurses, and medical assistants (MAs), view themselves primarily as providers of medical care. The social identity of a physician is tied to providing good patient care, but also in being the ultimate decision-maker for care issues. The social identity of nurses involves using their expertise to directly help patients, but also supporting physicians. These providers of medical care, for the most part, do not see themselves as IT users even after introduction of EHR (although a few people do take on such a role). For most HC professionals, IT user and medical professional are not consistent or compatible identities, a view consistent with the low IT usage in HC delivery processes. To change this view, the appropriate approach is to change the view of the HC industry. This change is currently underway – through insurance incentives, through government funding for EHR implementations, and through current national conversations about the need for IT in HC. This industry-level change, however, does require that individual HC providers adjust their social identity to include their EHR user role. From our data, we examine how HC professionals respond to this need to change their social identity.

METHOD

We are using **grounded theory methodology**, well suited for generating mid-level theories about technology-enabled

organizational change in HC (Glaser, 1978; Glaser and Strauss, 1967; Locke, 2001). We are interviewing HC providers and associated staff at multiple ambulatory clinics, and are coding these interviews using grounded theory techniques.

The **field site** is a large group medical practice in central Massachusetts, with about 250 physicians and 1,500 other employees spread across nearly 30 clinic locations. It serves approximately 200,000 patients with over one million patient visits per year. Each clinic location is responsible for its own performance and operates independently, but there is also strong central control and regular communication and coordination across clinics. This group practice is implementing a well-respected commercial EHR across all its clinics, in several phases. Phase 3, the phase we observed, implemented computers in the exam room, where HC providers enter data into each patient's electronic health record and generate orders for prescriptions and lab tests. Phase 2, already complete, implemented electronic messaging to support communication among providers and to record phone interactions with patients.

Data collection involved three rounds of interviews: (1) base-line interviews shortly before EHR go-live for Phase 3, (2) follow-up interviews shortly after go-live, and (3) final interviews approximately one year after go-live. Interviews were recorded and transcribed. For rounds 1 and 2, six primary care physicians were selected to cover large and small locations, long established and newer physician practices, the three medical areas that comprise primary care (internal medicine, family medicine and pediatrics), and EHR supporters and doubters. These selection criteria provided the theoretical sampling required for grounded theory development. We also interviewed associated staff working with each physician (a practice manager, nurse, medical assistant, and check-out secretary), that is, five interviews at each of six locations. With few exceptions, the same individuals were interviewed during every round. With new funding from the National Science Foundation, we expanded round 3 to include four additional physicians and their staff. Interviewees were given a small stipend for participating in round 3. Currently, all interviews are complete (a total of 110 interviews). Round 1 and 2 interviews have been coded; Round 3 coding and analyses are still in progress.

We conduct **data analysis** in accordance with grounded theory methodology. The basic analysis process is as follows. Using codes the data suggest, we code transcripts to identify broad themes, e.g., role changes. We use the NVivo software package to support this coding. For each major theme that emerges, we perform detailed coding, and through a process of constant comparison across interviews, we identify theoretical patterns. These data-driven patterns are then related to existing literature to show how they represent either a new theoretical interpretation or an extension of existing theory. Although analysis is still underway, a number of interesting themes have emerged. Specifically, the research questions at the beginning of this paper came from our early analysis. A comparison of these findings to the literature indicated that theory about social identity might provide a theoretical foundation for understanding our findings.

FINDINGS

Overlapping in time with the EHR implementation, our field site was making other changes to roles. Such changes were enabled and facilitated by the EHR, although not required for its use. One change was moving away from "primary nursing", where a nurse was assigned directly to a physician. Nurses were taking on three different roles, as a floor nurse supporting several doctors, as a provider seeing patients not needing a physician, and as a call center operator doing phone triage. In some clinics nurses focused primarily on one of these roles, whereas in others, a nurse might spend three days on the phone and two days as a floor nurse. MAs took on the role of directly supporting physicians by rooming patients and measuring vitals. As social informatics research notes, one cannot clearly distinguish between direct IT effects and other concurrent changes that may or may not be attributable to IT. In fact, what is theoretically interesting is how changes directly attributable to an EHR and the other changes it enables interact to produce new organizational capabilities.

Our findings take the form of a preliminary process model. This model involves four stages that capture the dynamic reshaping of identities directly and indirectly attributable to the EHR. First, interviewees develop early impressions about how their roles are likely to change with the EHR. After go-live, providers have immediate reactions to how their work changed due to the new EHR. Finally, our findings provide two ways in which medical professionals proactively responded to these changes, first by making sense of their changed professional identities and, second by finding new value in their EHR-enabled roles. Because we have not yet completed data analysis, these are preliminary findings that will be refined as we continue our analysis.

Anticipating HC Role Changes

The baseline interviews (Round 1) gathered information about the responsibilities and daily activities of interviewees, as well as what each expected from the new EHR. Physicians were primarily concerned about taking on work they viewed as secretarial. For example, they would be required to enter orders for various tests and prescriptions, activities performed by secretaries at the time of our initial interviews. They believed this would take valuable time they should be spending with

patients. Furthermore, some physicians had never learned to type. The following quote from a physician captures the concerns of a number of physicians:

> I did not go to medical school to become a typist. (Physician)

Secretaries were concerned about how this shift in responsibilities would affect them, especially the part of their role in which they assisted patients at the end of a visit.

> If you've got the doctors booking appointments, booking labs, booking appointments in their exam room, wow. How many secretaries do you need? ... We are the finishing touch to the customer service. We're the look of the ribbon on the package. (Secretary)

As compared to physicians, nurses had similar, but somewhat different concerns, summarized by the following quote:

> I did not go to nursing school to become a call center operator. (Nurse)

While switching nurses to phone triage could be viewed as independent of the EHR, the change was made possible by the EHR, because nurses used the EHR's messaging functionality as they answered phones.

Before the EHR, which would eliminate paper medical charts, a responsibility of MAs was preparing paper charts for patient visits, e.g., by inserting lab tests. One MA commented:

> I don't know what we're going to do after the charts are gone, because the charts are mainly what we've focused on all the time. (MA)

One Practice Manager anticipates a shift in the MA's responsibilities from preparing charts prior to patient visits to spending time with patients in the exam room entering data into the computer.

> The MAs are going to, I believe, have a lot more responsibility putting a patient into the room. Right now they do the weight, height, blood pressure and why they're in. But now it's going to be, again, pulled up on the computer, the person saying the weight, height, blood pressure, review the medications that they're on, if they're still on them. A review of their allergies, that's any change in them. And that's something they don't do now. So it is going to take a little longer in the rooms for them. (Practice Manager)

Reacting to EHR-enabled HC Role Requirements

Our second round interviews, about 6 weeks after the go-live that put computers in the exam rooms, asked interviewees about how the EHR changed the way they did their work. These interviews provided a sense of initial reactions to their changed roles, including a number of examples of frustration and non-acceptance of their roles as EHR users.

The physicians reacted to spending time with the computer rather than patients. With all the electronic messaging, they also felt isolated from their colleagues and their staff, as evidenced by the following quotes.

> We're spending a lot of time looking at that computer, setting up labs and things, and I'm not doing the patient care. (Physician)

> I don't have human contact. (Physician)

The nurses reacted to their new roles by expressing loss of their role as a primary nurse which allowed them to know a physician's patients and by expressing their dislike for their new telephone triage role, as evidenced by the following quotes.

> I miss the continuity, the patient contact, because I'm a nurse…when we were primary, we knew our patients a little better (Nurse)

> Glued to a chair, staring at a computer, and it is dissatisfying. I love to be on my feet and using my hands and being clinical. (Nurse)

A practice manager at one location confirmed the EHR's isolating effects. This effect was more pronounced because messages went to pools, e.g., the nursing pool, rather than an individual nurse, so that whoever was available could process the message ensuring efficient handling of messages.

> The one thing that I find with the pools is people forget that they can speak to one another [LAUGHTER]. (Practice Manager)

Shaping EHR-enabled HC Role Identities

Gradually, many HC professionals moved beyond reacting to the system and started to shape their roles around the system's capabilities. A few providers were already shaping their roles at the six-weeks-after interviews. Most, but not all, were doing or had done some form of shaping of their EHR-enabled roles when we interviewed them one year after implementation. They had adjusted to their EHR-enabled roles, and had adopted a positive way to think about their revised social identity. An example of the early shapers, one physician reported:

> I, within a week, was not dictating any notes any longer, which for me was a major goal for the system to not have that there. I'd say within the first week, I'd look back. I didn't like some of the notes, so things have gotten tuned up. I like the notes I'm seeing now better, but I was determined that I was not going, once this was in, that I was not going to dictate. So, that's the way it's gone. (Physician)

He shared how the system aids his ability to deliver quality care:

> With the old system, you could not be sure that what went from your brain to the note actually went to an order somewhere. With this system, you can't close unless you actually see the orders, or at least it will tell you, there are no orders. So, if you are intending to do a blood test or an x-ray, or a referral or something, and you look down and see that's not there before you close it, you have an opportunity to do that. So, it's much better from that standpoint. (Physician)

Physicians have started to view the system as contributing to what they value in their social identity as physicians – providing good care and ensuring that patients actually receive the care selected by the physician.

Some physicians, however, found the system incompatible with another core value of their social identity – that of interacting with patients.

> There's a third person in the room; i.e., the computer. So instead of having direct eye contact, we're both looking at the computer when we're going through the various things … What it has done is not allow me maybe to ask as many questions as I would because if I saw you kind of frowning, you know, while I was going over the cholesterol, that I might stop and ask a question, why, you know, and maybe get a bit more information. I think it has limited my ability to draw things out from the patient. (Physician)

This issue is not confined to physicians, but includes other professionals as well, as evidenced in this comment about MAs:

> There's a lot of hands on with the computer, but … there's little time for kibitzing and getting some of the humanisms that are there. … You know, they don't necessarily lay hands upon patients as much. There's not that human interaction with patients. (Physician commenting on MAs)

Other physicians found positive ways to include the system in their interaction with patients, and thus to make their EHR-enabled role consistent with a desirable social identity. As one said,

> Patient acceptance of it is great. They love being able to look at their information right there in the room. It's sort of like a third person in the room. They like being able to see all their data. When they ask me a question, gee what was my, what's my blood sugar been over the last you know, umpteen years. (Physician)

On the other hand, most physicians we interviewed complained about order entry and several other IT activities they viewed as not consistent with their social identity. As one noted:

> On a given day I think there is probably an hour or two that things I'm doing is just not worth spending my time. I'm filling out the form, all the information which is already in the chart… and I'm basically copying that from [the system] to my form, which should not be my job. (Physician)

Nurses, MAs, and secretaries sometimes provided support to physicians who struggled with their EHR-enabled role, and who would, for example, hand-write orders when they were behind.

Adding Value in EHR-enabled HC Role Identities

One year after go-live, some individuals had moved beyond shaping their roles to finding ways to extend or redefine their roles, creating additional value and meaning by taking advantage of the EHR's capabilities. For example, a phone triage nurse reported that she and her colleagues had taken a lead in identifying and codifying the diagnosis and treatment of eighteen very common patient complaints. These complaints had clear tests that could be performed to be certain the condition was present and had clearly defined treatments (which might vary across physicians).

[Physician] preferences are in there. So you punch in their numbers, and their preferences come up for UTI, for a cold, for upper respiratory. It all comes up, and then you can pen the medication for the physician to make it easy for them. So that if they choose to do that, it's already there. We kind of run our own UTI clinic. You know, a patient calls in. We have the urines done downstairs. We look them up. We pen the medication. The doctor signs it, and off it goes. So it's made life a lot easier for the physicians. And a lot more work on us, but it's easy because the computer system is so nice and easy. It does make it better. We're taking a lot back. Like I said, no longer do they have to see a UTI patient. We take care of that issue. All they have to do is sign it, and send it once we get the information.

This reserved physician time for diagnoses and treatments that required their expertise. In addition, these phone triage nurses felt their new roles provided great value and helped patients. As a result, these nurses did not want to go back to being the primary assistant to doctors. Other opportunities for value-added redefinition of roles came from management's initiatives to relieve time pressures on physicians, especially for those still struggling with the EHR. For example, the organization was piloting the use of MAs as scribes for assisting physicians with order entry.

TOWARD GROUNDED THEORY

In conclusion, we have some interesting data about how EHRs change, and facilitate changes in, the roles of HC professionals. Those professionals then react in positive or negative ways. Eventually, many of them find ways to shape their EHR-enabled roles in ways that are compatible with their social identity as care providers. This is our key finding to date. That is, initially providers see the EHR as a barrier to enacting their social identity of providing high quality care efficiently and effectively. During the process of using the system, a shift occurs, so that providers begin to embrace the EHR as a tool for enacting their social identity. The EHR shifts from being a barrier to being an enabler that allows providers to care for patients better than ever. Understanding this shift, and how changes in individual role identities might be harnessed more broadly by the organization to bring about change, is the focus of our continued analysis. Such an understanding will help us develop a better model of the process by which EHRs result in changes to HC organizations. It also has practical value for HC administrators who are attempting to ease the difficulty of EHR implementations.

We still have more coding and analysis to do as part of our process of developing grounded theory. We will have more complete findings to present at AMCIS in August.

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