

Doctors and Psychosocial Information: Records and Reuse in Inpatient Care

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ABSTRACT

We conducted a field-based study at a large teaching hospital to examine doctors' use and documentation of patient care information, with a special focus on a patient's psychosocial information. We were particularly interested in the gaps between the medical work and any representations of the patient. The paper describes how doctors record this information for immediate and long-term use. We found that doctors documented a considerable amount of psychosocial information in their electronic health records (EHR) system. Yet, we also observed that such information was recorded selectively, and a medicalized view-point is a key contributing factor. Our study shows how missing or problematic representations of a patient affect work activities and patient care. We accordingly suggest that EHR systems could be made more usable and useful in the long run, by supporting both representations of medical processes *and* of patients.

Author Keywords

Medical records, electronic patient records, organizational memory, physician information needs, EHR, psychosocial information, CSCW, health informatics.

ACM Classification Keywords

H.0 [information systems]; K.4.3 [organizational impacts]: Computer-supported cooperative work.

INTRODUCTION

The strategic role that health information technology (HIT) plays in enabling the healthcare reform in the U.S., combined with the ongoing national debate on how HIT should be used 'meaningfully' to achieve the desirable transformative change, has created a critical need for research studies that contribute to a better understanding of how to utilize electronically available data for constructive, cooperative use and reuse. While electronic health records (EHR) systems provide tremendous promise for improving quality of care and controlling soaring costs, a large body of literature has noted the cumbersome usability of these systems, including numerous unintended adverse work-related and care-related consequences (e.g. [10]).

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Further, increasingly, doctors have to cope with patients' chronic illnesses, which affect a patient personally and socially overtime beyond the disease-specific medical symptoms and treatments [11]. For example, there has been an increasing number of patients who demonstrate various kinds of pain issues, many of which are caused by, or contribute to, serious psychosocial problems they bear in life. This trend requires doctors to acquire a complete view of a patient's history in order to make informed treatment decisions.

Unfortunately, it has been shown that a patient's history can be poorly documented in an EHR system [10]. Through this field-based study, we aimed to explore how information is used and documented to support medical work, how it is reused across a patient's multiple care episodes, and how an improved understanding of doctors' information practices could inform more accommodating and usable EHR designs. The findings of this study contribute to HCI/CSCW by explicating the dichotomized purpose of medical records –as both a representation of medical work to facilitate real-time activities (i.e. practice-centered) and a representation of the patient to support long-term information reuse (i.e. patient-centered). In addition, this study contributes to health informatics research and practice by highlighting several key functionalities that have been missing from the current designs of healthcare information systems.

Our field data were collected at a large teaching hospital by shadowing the routine patient care practice of over 24 physicians and residents. An in-house developed EHR system, eCare, has been deployed and used in the hospital for over a decade. Approximately 14,000 users in the hospital system use eCare to generate or retrieve patient records on a daily basis.

In this paper, we examine how doctors acquire, document, and use information across multiple episodes of patient care with special attention paid to how they cope with a patient's psychosocial experience. In this study, we define *psychosocial information* as a patient's psychological and social issues in her illness experience. With this focus, we explored (1) under what circumstances doctors choose to document psychosocial information and what kinds of psychosocial information they choose to document and (2) how this information, or its absence, affects a patient's

treatment plan and subsequently the effectiveness of care. This is not trivial. For instance, according to the U.S. Substance Abuse and Mental Health Service Administration, 9% of the U.S. population aged 12 or older, or 22.3 million people, were classified with substance dependence or abuse issues in 2007. Such issues could be more effectively treated by making full use of psychosocial information.

In the remaining sections of this paper, we first review the relevant literature which serves as the guiding framework for our research. Next, we describe our field site and data collection, followed by several representative patient cases describing doctors' information practice. We conclude with a discussion of insights that this research helps generate into medical professionals' information behavior as well as the implications for improving the design of current HIT systems to support a better representation of medical work.

LITERATURE REVIEW

A hallmark of HCI/CSCW and health informatics research has been the analysis of the gap between representations of work and the work they represent (e.g., [16]). In healthcare, for example, Bossen [3] studied a prototype EHR system constructed according to a Danish national EHR standard. The system was found to only partially support clinical work which was largely attributable to the model used in the standard deviating from how clinical work is actually performed. Similarly, Niazkhani et al. [13] reported that the overly simplistic representation models underlying current medication ordering systems led to severe interference with, rather than facilitation of, the actual medical work. Further, Fitzpatrick [5] showed that in reality, clinicians often tailor, re-present, and augment clinical information according to their roles and preferences, which is not adequately supported in the current EHR design. Finally, researchers have demonstrated that the flexibility that allows patient records to be provisional, informal, or private could facilitate care delivery [9] and patient hand-off processes [4, 19]. Such 'informality' of documentation is generally not available in the HIT systems seen to date.

A separate but related stream of HCI/CSCW research attempts to understand the function of medical records in supporting medical work. Berg [1] referred to medical records as a formal tool or system that embed representations describing medical workplace and activities. He argued that through clinicians' reading and writing in their patient care activities, medical records play a fundamental and constitutive role in supporting medical practice [2]. In studying e-prescribing applications, Gorman et al. [8] argued that HIT systems are useful only when their designs accommodate and facilitate clinical activities as a multidisciplinary collaboration effort and fit better into the larger system of patient care.

Part of this stream concerns the question whether medical records should be conceptualized as process-centered (i.e., organized around a medical facility's work processes) or as

patient-centered (i.e., organized around the patient's disease descriptors and health conditions). For instance, Østerlund [14] depicted medical records acting like a "map and itinerary to guide clinicians' work," and thus he favored the process-centered organization. As we will see, this distinction is critical to the design of medical record systems.

Finally, to examine the appropriateness (accuracy and comprehensiveness) of representations of medical work in the context of medical records design, we found the concept of *trajectory*, a term that Strauss and colleagues [7, 17, 18] first coined, useful in our analysis. According to Strauss, a 'clinical course' differs from an 'illness trajectory.' The clinical course describes what has happened since the patient's admission, such as reasons for the admission, medically meaningful symptoms, and diagnostic results and treatment plans; whereas an illness trajectory refers "not only to the physiological unfolding of a patient's disease but to the total organization of work done over the course, plus the impact on those involved with that work and its organization" ([18], p. 8). The difference between a specific clinical course and an illness trajectory, as we show in the later sections of this paper, is useful in understanding doctors' information practices and the role of medical records in supporting (or hindering) such practices.

ABOUT THE STUDY

We collected the field data by observing a general internal medicine team. This team was selected because its work is in line with our primary research interest –long-term use of medical information. The team provides service to patients who often have chronic episodes of their illness across their adult life-span and come to the hospital when they experience a flare-up or other acute situations. Observing this service's work would thus provide rich data on information reuse issues from a long-term perspective.

Participants

The team, called the Medicine Howard (MH)¹ service, is one of four general medicine services in the department of internal medicine. It usually consists of one attending physician (referred to as an *attending* in this paper), one or two second-year residents (*residents*), and two first-year residents (*interns*). Occasionally, the team hosts one medical school student. Each month, one of the four senior physicians who belong to the MH service supervises the residents and interns. For the educational and training purposes, the rotation runs monthly, i.e., the residents and interns stay on one service for one month and then move to another. During our nine months of observation, three attendings, nine residents, twelve interns, and two medical students participated in our study. In addition, we observed the work of another team periodically in order to gain a broader understanding of doctors' work.

¹ All names in this paper, including the EHR, team, patient, and clinical personnel names are pseudonyms.

Data and Data Collection

This study consists of largely field-based observations augmented by the examination of patients' medical records in the EHR system, in this context, eCare. The first author performed the field observations. She shadowed doctors' overall work, typically from three to five hours each time. On two occasions, she shadowed the team throughout their on-call day, i.e. 30 consecutive hours in the hospital. The observational activities involved following the teams' patient care activities, asking clarification questions, tracking critical incidents, and taking field notes. Between observations, the researcher reviewed patients records and working documents. In addition, whenever appropriate, the researcher also asked to look at personal rounding sheets in order to understand how the attendings, residents, and interns assembled information. She also attended the educational meetings and lectures organized by the attendings. She was even invited to the team social events, such as the dinner party when a rotation ended.

The first author was also granted access to the eCare system, so she could conduct an in-depth analysis of relevant research issues captured in the medical records. The eCare system is a web-based medical records application providing authorized users real-time access to patient data. It integrates, to a limited extent, information residing in other electronic systems of the hospital, such as Emergency Department (ED) diary notes, medication orders, lab work, and data from radiology, cardiology, neurology, registration, and other special care units. It includes clinical notes from doctors, nurses, and other clinical personnel (e.g. admission notes, progress notes, nursing notes, discharge summaries, social worker notes).

Our investigation began with an examination of the overall work of the MH team, which spans a wide range of activities including patient admission, initial diagnostic interviews, morning rounds, post-rounds group discussions, generating notes, providing medications, team meetings, sign-out process, and so on. Our attention was soon attracted to the information assembling process, particularly when the team admitted new patients, and to the morning rounds immediately after an on-call day, when diagnoses and treatments were intensively discussed among the team members. The first author observed a total of 260 patient room visits during morning rounds, among which 104 were the first visit after the patients were admitted. Additionally, over 70 patients' records (30 with substantial psychosocial issues) were reviewed with a special focus on the doctors' comprehensive assessments of each of the patient cases.

For the study reported in this paper, we extracted the portions from our field observational notes related to information seeking and assembling activities that occurred immediately following patient admission. We identified information use issues from a social/symbolic interactionism perspective [7, 17] and paid close attention to the occurrence of psychosocial issues in the work of care. We then investigated whether the psychosocial information

was, or was not, documented in eCare by reviewing the corresponding patient records. Field notes and medical records were used to corroborate one another during the data analysis process.

DOCTORS' WORK

Over 80% of the patients on the MH service are transferred from the ED at the hospital. The remaining patients are referred from ambulatory care. Patients usually stay on this service for three to four days on average, with a wide range from a one-day stay to over a month-long hospitalization. MH takes patients whose symptoms do not fit into any of the clearly defined special service teams (e.g. cardiovascular, gastroenterology, hematology, oncology); thus, the MH patient pool covers a range of profiles including arthritis, asthma, diabetes, hypertension and heart disease. Many patients who have chronic nonmalignant pain issues are also often assigned to this service.

This situation requires the MH team to deal with a mixture of complicated issues. The residents of this team usually arrive at the hospital early enough to conduct individual visits with their patients and prepare for the morning rounds. Morning rounds start between 7 AM and 8 AM, and they usually last two to three hours depending on how many new patients have been admitted. After morning rounds, the residents always talk with each intern again in order to make sure that the treatment and entire care plan will be carried out and done on schedule. Doctors then spend the rest of the day working on their own. They spend a lot of time working on computers, interpreting new radiology and lab results, searching for information, generating notes, and so on. Interacting (via phone) with specialty teams, family members, primary care doctors, social workers, discharge planners, and nurses also constitutes a large part of their work. It is very normal to see all four telephone lines in use at the same time in the conference room.

The MH team admits eight new patients during their on-call day, which occurs on every fourth day. In the meantime, they still need to take care of three to five remaining patients from previous on-call days. For first-year residents, i.e., interns, an on-call day means that they must stay in the hospital for 30 hours straight, during which they not only admit new patients and generate comprehensive admission notes, but also cover 20–24 patients individually over night for other teams. They sometimes can take a nap at night, but that is not guaranteed. They are often called up by nurses for various issues arising from any of their patients.

During the post on-call day, the attendings usually arrive at their office before 5 AM to have enough time to review the patient admission notes generated by the interns during their on-call nights. The attendings often identify any issues that the interns may have missed or were not addressed clearly in the records, and then bring these issues up during morning rounds. The morning rounds on post on-call days are the most intensive work activity because the team has to discuss each new patient in great detail and come up with a

treatment and care plan. Sadly, the interns are often exhausted after working overnight. In this situation, the attendings often try to end the morning rounds before 11 AM so the interns have enough time to work on new issues and sign-out their patients to the residents at noon. Then they can go home to catch up on sleep.

In the remaining part of this section, we use illness trajectory as a guiding analytical concept to describe and interpret our findings along two major lines: *information use* and *documentation*. First, we present briefly how medical information is acquired, assembled, and used in a general illness trajectory (Case 1). Then, we describe how doctors process psychosocial information with three illustrative cases: (a) where a psychosocial issue occurred in a trajectory but was not documented by doctors (Case 2); (b) where a psychosocial issue, supported by definitive evidence, was communicated among doctors (and with other medical professionals) and was subsequently documented in eCare (Case 3); and (c) where in certain circumstances psychosocial information was judiciously documented and used (Case 4). While presenting these cases, we highlight how the absence of psychosocial information (i.e. the missing representation) may have had an impact on quality of patient care and costs.

Information acquiring and assembling

Information seeking and assembling takes place simultaneously in the process when MH admits new patients, conducts diagnostic interviews, and evaluates a patient during morning rounds. The most intensive information seeking and assembling occurs right after admitting a patient.

The work starts with a paging text from the ED or the admitting unit to the resident, which includes the patient's registration number and name, along with possible diagnosis. The resident immediately makes a quick assessment based on the ED diary notes in eCare in order to decide whether this patient is appropriate for the MH service. Next, the resident may briefly talk with the ED doctor and then assign this patient to one of the interns. When a patient is referred to the hospital by her primary care physician, the resident often expects the primary care physician's note in the eCare system. Both the attending and the resident(s) supervise the interns, but ultimately it is the interns who are responsible for generating the medical records (admission notes, progress notes, treatment plan, discharge document, and so on), which will be subsequently reviewed by the residents and revised (if necessary) and signed by the attending doctor.

A doctor rarely goes to see a patient for a diagnostic interview without careful preparation. She needs to have a relatively convincing idea of what is going on (e.g. several possible causes) with this patient. In some cases, a patient comes to the hospital for a chronic illness flare-up that has been treated before in this hospital. If the lab results, vital signs, and other measures are very consistent with what has

been observed before, the anticipated trajectory can be very routine and predictable. For other patients, however, the resident and interns may not be able to make sense of the case based on the patient's symptoms and performance and their possible causes. In such cases, the doctors use additional information sources. The following case demonstrates this:

Case 1²: A patient was transferred from another hospital as an emergency case. He has past medical history with post kidney transplant and hypertension. Recently he took a vacation to Honduras for a scuba diving trip. After he flew back, he developed nausea with vomiting. In another hospital, his situation improved, but he was found to be hypoxic (i.e. low oxygen in his blood). Based on a concern for him as a kidney transplant patient, the patient was transferred to this hospital for further evaluation.

The intern reviewed the ED diary notes, laboratory test results, and the medical records sent from the outside hospital in order to prepare for meeting with the patient. She could not understand why the patient had developed decreased oxygen saturation with all vital signs and other descriptors appearing fine. She first searched Google and found 'hypoxic' was listed as a possible symptom after scuba diving. She discussed this with the supervising resident and interns from other services. While possible, the trip had been completed several days ago, so the intern then searched an online clinical information database. After gaining an understanding of 'hypoxic' causes, she started to examine this patient's previous records one by one in eCare. Eventually, the intern discovered the patient had experienced a similar condition two years ago, but later recovered without further medical intervention. After this effort, the intern became very confident and conducted the diagnostic interview. This case highlights the intense informational activities during the preparation for a diagnostic interview.

Diagnostic interviews often take place shortly after a patient is admitted to the MH service. The resident and the intern conduct independent interviews with the patient. During an interview, fourteen categories of questions will be asked, each relating to one part of the human body system. The interview usually goes in a matter-of-fact style, Q&A fashion, and at fast speed. However, because the doctors want to investigate information about not only symptoms but also about the patient's past medical history, family and social history, and life style (i.e. the entire context of the illness experience, which often includes sensitive psychosocial information), a diagnostic interview may lead to a very emotional reaction. For instance, when one female patient was asked about her pregnancy history, a previous miscarriage caused her to burst into tears.

² All cases described in this paper are summarized from the field notes and examination of patient records retrieved from eCare.

In addition, doctors often have to learn skills to deal with patients who present with problematic behaviors. For instance, the interns and residents often share tricks, which they name ‘distractible components,’ to discover whether a patient is truly suffering pain or just demanding a controlled substance. Patients with substance abuse histories often present at the ED complaining of severe “abdominal pain,” since it is expensive to screen out all potential causes. Inconsistent reactions to each physical assessment are considered to be faking the symptoms. The team members often share information among themselves verbally about those patients who are likely to fake their symptoms. This observation is similar to Strauss’ that moral judgments are very frequent and severe in emergency rooms [18].

In order to acquire the most recent medical information about a patient, the team runs morning rounds every day including weekends and holidays. Before they go as a team to see a patient, they discuss various potential causes based on the symptoms observed. The attending often asks the residents and interns questions as an instructional way to train them in how to think and look at the problem more deeply and broadly. In addition, the attending often introduces the most recent research literature and the better treatments pertinent to the patient case at hand. It is a process of information sharing, sense-making, decision-making, education, and training. For instance, patients often tell different doctors different stories or stories of more or less depth about their illness experience, particularly about the psychosocial issues in their lives. The team members often respond to each other - “Oh really? He did not tell me that.” Morning rounds provide an opportunity for the team to piece together the information and gain a better understanding of their patients.

In a patient’s room during a morning rounds, it is usually the attending who takes the lead in making the assessment. It is often observed that the family members contribute much valuable information that may have been missed otherwise by only talking with the patient. In particular, psychosocial information is often acquired through talking with family members individually and with other caregivers, such as home visiting nurses.

As searching and acquiring information develops along a trajectory, assembling the information takes place simultaneously. Each doctor has her version of the rounding sheet, whether a structured template or a piece of blank paper. Each patient gets one sheet. This rounding sheet appears to be the most important working document for doctors to carry around in their pockets. The rounding sheet will be manually filled in with a patient’s demographic information, registration number, emergency contact, code status, history of present illness, past medical/surgery history, allergies, on-going medication, family/social history, medical problem list, newest radiology/lab results, and a to-do list. Figure 1 shows an example of a rounding sheet.

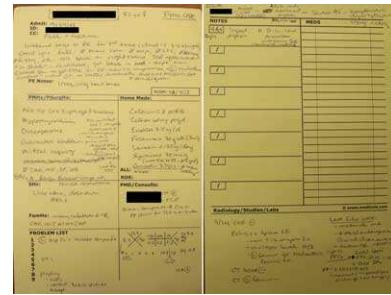


Figure 1. An example of a rounding sheet

Documenting healthcare information

A great deal of information is generated during the process of a developing trajectory. What information do doctors document? How do they write a patient’s information, especially psychosocial, into the medical records?

The eCare electronic patient records system used in the study hospital is a web-based application that allows doctors, nurses, and other clinicians to generate free-text notes, including admission notes, progress notes, discharge documents, nursing notes, social worker notes, and special consulting notes. All documents are arranged chronologically (see Figure 2). Although there is a filter that may help locate a certain type of note, there is no keyword search, which is considered to be the biggest usability problem by clinicians.

An admission note includes pre-defined categories of information such as a patient’s chief complaint, detailed history of present illness, past medical and surgery history, allergies, medications, family and social history, the results from the physical exam and review of the body systems, vital signs and other lab/radiology data, assessment and the plan. Among the various notes, the admission note contains the most comprehensive information about a patient and is the first document that the service team provides. It is used throughout the trajectory not only by the team itself but also by nurses and other clinicians as both a source of baseline information and a guide for the work of care.

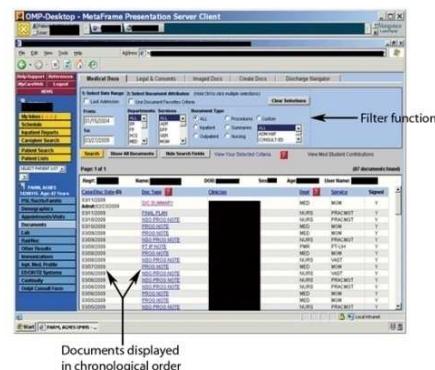


Figure 2. Documents displayed chronologically in eCare

Among various categories of information in an admission note, several are matter-of-fact and straightforward, but others can be questionable and sometimes require careful wording. (See later cases in this paper.) For instance, ‘family history’ usually records whether family members have a similar or related disease; ‘social history’ should include any information about the patient’s living situation, occupation, or any other aspects of the patient’s life that may be clinically significant to the patient’s problem. ‘Social history’ is supposed to contain information such as where and with whom the patient lives, employment, social support, activities, habits, insurance coverage, feelings of anxiety or depression, visits to psychiatry or social workers, and ability to care for oneself (if elderly). All of this information will tell a doctor how a patient manages her illness in her social situation. However, according to one attending doctor, in practice, the ‘social history’ has deteriorated to include only habits such as smoking, drinking, and illegal drug use.

In the ‘history of present illness’ section, doctors write in free-text how a patient presents at the hospital, various symptoms, and other phenomena they observed or stories they investigated via a diagnostic interview with the patient and discussion with her family members. At the end of an admission note, the ‘assessment and plan’ should document a doctor’s rational thinking, i.e. their interpretation of the patient case and why this patient should receive this particular treatment. A good admission note should address the issues clearly and provide a convincing rationale for the treatment plan. However, the critical thinking or supporting evidence is often missing, leaving later doctors to wonder why the patient received an intervention during the previous episode. Psychosocial issues (if documented) often appear in the ‘history of present illness’ and the ‘assessment and plan’ sections.

As psychosocial information is often considered to be subjective and is often vaguely defined or perceived differently by different care providers, the handling of such information magnifies the gap between the work, the patient, and the representation (i.e. medical record). In the following sections, we describe three cases that illustrate how doctors cope with patients’ psychosocial issues; how they interpret, use, and document psychosocial information; and, how the breakdown in the representation can potentially affect clinician performance, quality of care, and costs.

Psychosocial information, but only in ‘talk’

Consider the example below:

Case 2: A 36-year-old female patient with history of hypertension and anxiety disorder presented at the ED with complaint of chest pain. She was assigned to MH and was waiting for a bed. Upon arriving at the ED, Kristine, the MH resident, overheard a nurse say that this patient showed up at the ED every few days. Often, the patient received an IV infusion (with a controlled substance) and then was discharged. On several occasions she was hospitalized for further evaluation, so

she could get more pain medications. The lab/radiological data did not reveal anything clinically significant. When Kristine communicated this case to her attending, the attending became outraged and immediately led the entire team to the ED. The attending speculated that the patient was manipulating her symptoms to gain access to a controlled substance. The attending confronted the ED doctor. Eventually, the patient was discharged from the ED as requested by the MH service.

This was a problematic care trajectory which ended with the attending’s interaction with the ED doctor. However, the record did not document the conflicting understandings of the attending and the ED doctor nor any of the patient’s problematic behavior. It may be speculated that when this patient arrives at the hospital again, she may be admitted to a different service or even to the same service when the attending, residents, and interns are different (due to periodical rotations). For this case, even though the psychosocial issue emerged as a main concern, it still did not seem legitimate enough to be documented in the record. As one resident stated, “You never know for sure.”

Patients demonstrating pain symptoms are prevalent in this study site. Yet, eCare does not provide a systematic means for the medical teams to formally capture this information as part of a patient’s record or perhaps better, in informal documentation (as noted in [9]), so that this information can be noted down and shared across care episodes. This points to missing technical capability for supporting this type of long-term information reuse. Whether or not to record this sensitive information and how to record it is largely left up to each individual doctor. Many other psychosocial issues critical to understanding a patient’s needs and motives are also shared only verbally without being documented. This leaves the next care team in an information vacuum and requires the repetition of time-consuming investigations in complicated patient conditions.

Psychosocial information in the record, but when?

Under certain circumstances, psychosocial information may be documented in the formal representation. However, its importance may not be immediately recognized by every member of the medical team. The psychosocial information is largely passed along orally in the beginning of a patient’s illness. Perhaps it will be eventually captured in eCare, but this may not occur for a long time. In the following case, it happens a patient resorts to violent behavior, and doctors have “hard evidence” to note in the record.

Case 3 (All quotes are from doctors’ notes in eCare.) A 23-year-old woman with a history of sickle cell disease comes to the hospital ED every few days complaining of chest pain. During the last hospitalization, the patient had “significant issues with behavior.” When she was told she could not have IV Benadryl (an abusable substance), “she became quite frustrated and ripped up all of her paperwork. ...She physically threatened numerous staff members and required security presence on more than one occasion.” The MH service ordered full tests, then noted, “there was no evidence of acute chest syndrome demonstrated. ...It was not felt that the patient was exhibiting evidence of serious sequelae of sickle cell crisis.”

The attending talked with the patient's primary care physician to put her on a chronic pain management program, which might eventually help the patient stop the drug abuse. They jointly made it very clear in the patient's discharge notes, she "should no longer get IV Benadryl and she was abusing this."

Although this case was of a similar nature to Case 2, details were recorded in the eCare system to inform others about this patient's conditions, which, if used properly, could prevent these issues from happening again.

As an aside, there is no guarantee that such information would be re-examined, since reuse is subject to visibility, incentives, and the power relationships between doctors. The next ED doctor missed the information written in the discharge notes in eCare:

After only a few days, the patient showed up at the ED complaining of nausea, vomiting, and severe pain in her legs and back. She again demonstrated questionable behavior, refusing a chest X-ray when she did not receive IV narcotics. Then the ED doctor gave her one dose of IV Benadryl, which violated her on-going pain management program that the attending and her primary care physician set up.

The ED routinely uses another electronic system, which records a patient's vital signs and other medically critical information but does not have a patient's detailed past medical history. If the ED doctors want, they can login to eCare to find out a patient's past episodes, but this requires extra effort. As well, there are distinct differences in the priorities between ED doctors and floor doctors (those doctors such as the MH team). ED doctors' priorities are in treating the immediate symptoms and moving patients to floor units as quickly as possible. Floor doctors, on the other hand, not only deal with acute conditions but also need to plan for long-term care. It is not necessarily in an ED doctor's interest to face down drug abuse, as this could considerably slow down the interaction with a patient. Floor doctors, on the other hand, must do a great deal of unnecessary work for patients seeking drugs. Accordingly, there is a tension between floor doctors' desire to have ED doctors to carefully read prior records and the ED doctors' incentives to ignore prior information. The lack of visibility does not help. We will return to this issue in the design implications.

So far, we have described cases where the psychosocial information was never recorded and where it was recorded late in a patient's history. Next, we examine a case where it was recorded appropriately.

Detailing psychosocial information in the record
Some trajectories may be dominated by the psychosocial factors to such an extent that without those issues being in the patient's record, the necessary work cannot be accomplished. Below is a case that illustrates psychosocial information being systematically captured in the medical records from the very beginning of a trajectory (as compared to Case 2 and 3, where the psychosocial issue was never recorded or recorded only after severe events had occurred).

Case 4 (All quotes are from the records in eCare.)

Day 1: Mrs. Smith, an 81-year-old patient with a history of dementia, anemia, depression, and hypertension, presented at the ED with multiple falls. ED doctors noted the patient "had some ecchymosis [skin discoloration caused by blood] over the right side of her face.... The number of falls the patient has had over the last several days is concerning, especially given her living situation." MH team resident Nancy and intern John conducted diagnostic interviews separately and examined the patient carefully. They had serious concerns.

Day 2: Nancy and John reported to the attending that they called the home visiting nurse, who reported that the patient's son who lives nearby said "Dad beats mom." After the attending carefully examined the patient, he noted in the admission note, "It is unclear how one discrete fall could cause the variety of bruises on the patient, including the ... edema, arm bruises, and side bruises. This may be consistent with multiple falls over time because for dementia, however abuse should be considered in this case as well...." The attending pushed for a meeting with the family and to include a social worker.

Day 3-5: Various personnel were called to evaluate Mrs. Smith. Her primary physician was also informed. Diane, a practice management coordinator, phoned Adult Protective Service (APS) and the visiting nurse organization (VNO). She noted in the records that VNO expressed "their concerns of the safety in the home due to Mr. Smith's sexual advances toward the home visiting nurse." Soon, APS became involved in the case.

Surprisingly, Mrs. Smith, who was believed to be non-conversant, became more verbal, mumbling "they are mad at me" and "everyone is yelling and asking me what I am trying to do."

Day 6: A progress note noted "significant bruising over her body, concern for elder abuse. Adult protective services has been contacted, are currently investigating her case. Unsafe to go home."

Day 7-12: While all parties worked hard to investigate the problem, the family was trying to have the patient discharged to her home. Nurses noted in records that the patient had a "crying episode overnight for five hours".

Day 13: The meeting of all parties took place. The APS representative "discussed with the family legal actions against them for their noncooperation."

Day 16: Mrs. Smith was discharged to a nursing facility. Family may not take the patient from the nursing facility without discussing their plan first with the APS agency.

The hint of elder abuse, the psychosocial information, was noted in the records from the very first day. Along the development of the trajectory, details of elder abuse and complicated troublesome family dynamics were increasingly discovered and documented in the records. Compared to other trajectories, in which the explicitness and accountability of the psychosocial issues in the records was limited, psychosocial issues were at the core of this trajectory and this was reflected in the records.

This is a very special trajectory that highlights the complexity of the emotional work in some cases of medical care. Several issues are of note. First, it is stunning that how many details related to psychosocial issues that the MH

team investigated and documented in the record. Furthermore, the attending pushed very hard on this case to get all parties involved; otherwise, Mrs. Smith might have been just treated as a normal “dementia patient fall” case.

Second, as described in the story, there are many clinical personnel (e.g. ED doctors, MH team, nurses, social workers, practice management coordinators, the primary care physician) and several social services (e.g., APS, county sheriff, nursing home) involved in this trajectory. Each of them had their specific role in solving medical issues (perhaps simple in this case) and social issues (extremely complicated). The hospital clinicians described their work and their understanding of the case in eCare in real-time. Information sharing was very intensive, as a coordination to collectively investigate the issue and solve the problem. In this case, the medical work of care was marginal (i.e. treating bruises), but the information work was at the very core of the entire trajectory.

Third, the patient and family members, who were fighting among themselves, were non-cooperative with doctors and social services, and they complicated the trajectory by not being able to provide, or by attempting to hide information. However, the information was pieced together collectively, and the doctors tried to write the consequences of each step in the records. In this case, as mentioned, the eCare system effectively supported information sharing and coordination among various clinical groups in real-time. Indeed, eCare, regardless of other significant usability issues, was able to satisfy the needs of the clinical workflow and work representations in this case.

This case showed how the medical team, when they felt it appropriate, would document the psychosocial information for a patient. Clearly, this case was unusual. It highlights, nonetheless, the emphasis on the doctors’ sense of ‘appropriateness’ in determining when to document. We turn to a discussion of this next, as well as design implications from our study.

DISCUSSION

Situated within a service team of general internal medicine, our field observations reveal the need for additional consideration of psychosocial issues in doctors’ practice. This is partially due to complicated patient profiles, chronic illnesses throughout patients’ lifetimes, or poorly controlled pain issues. These findings contribute to an improved understanding of doctors’ work, building upon what Strauss [18] and studies in HCI/CSCW (e.g., [15]) have reported.

One intriguing finding from this study is that doctors detailed psychosocial information in eCare with little concern about sharing such sensitive information institution-wide, which stands in contrast to our earlier study on nurses’ documentation behavior [19]. In that study, we found nurses had various concerns about documenting patients’ psychosocial information, including the patients’ emotional needs. Instead, we observed in this study, as one doctor stated, “when it needs to be there, it is

there.” However, there remains a puzzling question why they do not *always* document this information, as demonstrated through the differentiated handling of such information in Case 2 and Case 4. So, under what conditions do clinicians choose to (or choose not to) document psychosocial issues in medical records? What are the rationales underlying such choices?

Doctors are trained to look for *symptoms* first, then they think about the *causes* (based on their medical knowledge and their experiences). This is the sense-making stage and also the medical reasoning process that leads to diagnostic judgments. Finally, they need to come up with a *treatment* plan. Therefore, symptoms, possible causes, and treatment and care plans are perhaps the most important three categories of information in medical records to represent their work. These categories of information also constitute valuable information for future reuse when a patient is readmitted to the hospital.

If suspected ‘causes’ match ‘symptoms’ well, a trajectory will be straightforward, even though achieving it may not always be uneventful (as in Case 1). In an internal medicine unit, most patients are admitted because of acute events due to chronic illness, so the ‘cause’ is easily assumed to be medical. In Case 4, the symptoms were bruises, and the cause was a “fall” (according to the family members’ report). However, a single fall was not likely to cause so many bruises on her body (as the attending noted in the records), and if the bruises were caused by multiple falls, how did these falls happen? Doctors needed to provide a convincing diagnosis, so they went further. In this case, the ‘cause’ was psychosocial, but the symptoms were medical. This was reflected in the records, where a great deal of psychosocial information was documented. In addition, the treatment could not address just medical issues. The doctors needed to prevent the abuse from happening again, so they pulled together all sources to find a suitable treatment plan.

In Case 3 however, the pain drug seeking patient had a medical issue, i.e. sickle cell disease. Although she was admitted to the hospital frequently, the doctors still first looked for symptoms. The symptoms were documented in the records as “questionable behaviors,” because they did not match sickle cell disease (i.e. the cause). The doctors speculated that the patient was faking the symptoms. In this scenario, the ‘symptoms’ became psychosocial, or at least a mix of medical and psychosocial. In reviewing previous records of this patient, the doctors did not put appropriate information in her records until the most recent episode in which the patient became violent and threatened others. This became the triggering incident that provided evidence for the doctors’ speculation. Lacking definitive evidence, doctors may hesitate to document such suspicions of “faked symptom” in the medical record. This is reflected in Case 2, where the doctors speculated that the patient was seeking drugs but did not explicate this in the records. This missing representation of psychosocial information may eventually create severe problems, such as the incident described in

Case 3, where the psychosocial issue was finally brought to the medical team's attention and documented in writing. However, it may have been too late for the patient.

This story is not extraordinary: Over the past several decades, there has been a tendency to view *all* patient-presented complaints and symptoms as curable diseases that can and should be treated within the purview of medical professionals [6]. This view, however, often leads to an overly narrow, 'medicalized' lens of health and illness that largely ignores psychosocial causes and other contributing social and economic factors. Smoking and obesity, for example, are increasingly viewed by the medical world and society as diagnosable and curable diseases and treated with nicotine substitutes and obesity drugs. This defocuses their behavioral and socioeconomic root causes [12].

Medicalization is defined as "the expansion of medicine as an institution and the use of a medical lens to view human processes and behavior" [20]. We believe it is largely this medicalized view, not the sensitivity of information, that sets the boundary of what information to be documented and what not to be. It is also this medicalized view that determines the reuse value of information in subsequent care episodes. Medicalization implies clear diagnostic tests and evidence. Oftentimes certain psychosocial information gets lost, as in Case 2, because such information is not yet formally defined in medicalized terms and encompassed in the medicalization view. Such information is relegated to the 'subjective', becoming less than a 'medical fact'.

Case 4 illustrates a rather unique case where the medical team transcended the boundary set by the medicalized view to actively seek help from other parties including social services. In this case, the symptom, "bruise," was clearly disconnected from the suspected medically relevant cause, "fall," which obliged the medical team to think out of the box to find non-medical evidence and seek non-medical interventions. This endeavor, however, does not always take place because such a disconnection is not always readily discernable.

Our findings once again point towards the need for considering the broader context of systems, especially in medical settings. Clearly, the EHR system by itself cannot solve the problem of medicalization. Historically, the practice of medicine has been focused on diagnosis and treatment, by and large neglecting the human side of care. Consequently, information models underlying current EHR systems are mainly organized around storing and managing symptoms and treatments. For example, the Certification Commission for Health Information Technology (CCHIT), the accreditation body for commercial EHR products, places an exclusive emphasis in their certification criteria on whether an EHR system has the capability of capturing and managing discrete, process-oriented, and medicalized data, rather than on the meaningfulness (and cognitively coherent representations) of the data to clinicians in their patient care activities. Our study shows the need to gain

legitimization for psychosocial issues in system construction and include appropriate representations in the record formats.

More importantly, as we have shown, there exists a gap between the work, the patient, and the representation, which may account for the suboptimal outcomes or adverse consequences observed such as repetitive investigations, delayed diagnoses, inappropriate treatments, unnecessary hospitalizations, and increased cost burdens for the hospital.

This broader implication raises the need to re-conceptualize medical records adaptively as *both* a representation of medical processes *and* of the patient. Recognizing the inherent gap between representation and the real world, an extensive body of literature in HCI/CSCW has been devoted to studying the issues related to the representations of work and how they should be designed to support ongoing work activities (e.g., [3, 16]). Our study points to a new perspective that representation of information may need to be constructed in adaptive forms when a singular form cannot adequately support a multiplicity of purposes, changing demands across time, and distinct priorities of the information consumers. In the medical context, while the information representation that supports medical processes – routines and procedures in day-to-day care – remains critical, what needs to be shared across multiple patient care episodes is not only the process-oriented information but also information centered around the patient's life long illness trajectory [18] – her medical conditions and other associated psychological and social experiences. As shown in this paper, the conceptual models underlying current medical records are largely process-centered, which do not accommodate this multifaceted need and hence may adversely affect medical practice and diminish the reuse value of documented patient care information. Our study represents an attempt to examine whether focusing on one model may lead to the missing of critical functionalities for the continuity of care when a patient comes back. It is part of the critically-important examination of long-term information reuse and of work representations in both HCI/CSCW and health informatics.

DESIGN IMPLICATIONS

Our findings may provide valuable insights into redesigning electronic medical records. First, it is clear that the specific problem of pain medicine abuse is acerbated by the ED doctors' tendency to move patients through as quickly as possible. Organizationally, reconsidering their incentives, or creating a program by which they can hand off these patients without admitting them is warranted. Technically, providing all doctors convenient access to critical information is a prerequisite for enabling such organizational change. For example, many U.S. states have now implemented patient registry systems that maintain a comprehensive list of patients' prescriptions. This list is accessible to licensed physicians free of charge; however, it cannot be retrieved without considerable effort (e.g., logging into a separate state-owned system and searching

for the patient). Integrating such information directly into EHRs could help address the issue of information visibility.

Second, this study highlights the need for the technical capability of documenting psychosocial information – which is often perceived as ‘informal’ when definitive evidence is not yet available. The current generation of EHR systems, such as eCare, is not only designed to support care processes but also to focus on the capture of billable, ‘medicalized’ information. The EHR systems lack the ability to document and use ‘informal’ and provisional information, as argued in [9], particularly the information that sheds important light on patients’ psychosocial issues. In our site, because of the inadequate technical capability, such information was then communicated only verbally and therefore not communicated to the next team effectively.

Third, our study also suggests the importance of considering information long-term use more broadly. At this site, understanding the patient from a long-term perspective is too difficult due in part to the technical difficulties of reusing patients’ medical records across multiple episodes. When information reuse occurs within an episode, clinicians need explanatory details to help them understand the current trajectory; when it occurs across episodes, they need to know key issues about the patient. This was reflected in Case 1 when the doctor had to read an immense volume of past records, line by line, in order to identify the information she needed. This reiterates the need for mindful considerations when constructing medical records for multiple purposes. An EHR system should be designed to facilitate the clinical work in a nuanced way (i.e. process-centered representation) while simultaneously preparing information of high value about the patient for long-term reuse (i.e. patient-centered representation).

CONCLUSIONS

This field-based study describes doctors’ use and documentation of medical information, in particular, psychosocial information. We found that doctors documented a considerable amount of psychosocial information in a computerized free-text medical records system. Yet, we also noted that such information was only recorded selectively, with a ‘medicalized’ view of appropriate information being a key contributing factor. As well, our study showed how problematic and missing representations of a patient seriously affect work activities for the medical team and for a patient’s chronic care. We accordingly suggested that electronic systems in healthcare should be designed to support both representations of medical processes *and* of the patients, which may contribute to improved quality of clinical documentation and, consequently, better care and reduced healthcare costs.

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REFERENCES

1. Berg, M. On distribution, drift and the electronic medical record. In *Proc. ECSCW1997*, 141-156.
2. Berg, M. Practices of reading and writing: the constitutive role of the patient record in medical work. *Sociology of Health & Illness*, 18, 4 (1996), 499-524.
3. Bossen, C. Representations at work: A national standard for electronic health records. In *Proc. CSCW2006*, ACM Press (2006), 69-78.
4. Engesmo, J. and Tjora, A. Documenting for whom? *New Technology, Work and Employment*, 21, 2(2006), 176-89.
5. Fitzpatrick, G. Integrated care and the working record. *Health Informatics Journal*, 10, 4(2004), 291-302.
6. Gallagher, E. and Ferrante, J. Medicalization and social justice. *Social Justice Research*, 1, 3(2005), 377-392.
7. Glaser, B. and Strauss, A. *Discovery of Grounded Theory. Strategies for Qualitative Research*, Aldine Publishing, 1967.
8. Gorman, P. et al. Order creation and communication in healthcare. *Methods Inf. Med.*, 42, 4(2003), 376-384.
9. Hardstone, G. et al. Supporting informality. In *Proc. CSCW2004*, ACM Press (2004), 142-151.
10. Heath, C. and Luff, P. Documents and professional practice: ‘Bad’ organisational reasons for ‘good’ clinical records. In *Proc. CSCW 1996*, 354-363.
11. Kutner, J.S. et al. Information needs in terminal illness. *Social Science & Medicine*, 48, 10(1999), 1341-1352.
12. Lantz, P. et al. Health policy approaches to population health. *Health Affairs*, 26, 5(2006), 1253-1257.
13. Niazkhani, Z. et al. The impact of computerized provider order entry (CPOE) systems on inpatient clinical workflow: A literature review. *J Am Med Inform Assoc.*, 16, 4(2009), 539-549.
14. Østerlund, C. Mapping Medical Work: Information practices across multiple medical settings. *Journal for Information Studies*, 3(2004), 35-44.
15. Reddy, M. and Dourish, P. A finger on the pulse: In *Proc. CSCW 2002*, ACM Press (2002), 344-353.
16. Schmidt, K. Of maps and scripts. In *Proc. of GROUP1997*, ACM Press (1997), 138-147.
17. Strauss, A. *Continual Permutations of Action*. New York: Aldine de Gruyter, 1993.
18. Strauss, A. et al. *Social Organization of Medical Work*, Transaction Publishers, 1997.
19. Zhou, X., Ackerman, M., and Zheng, K. I just don’t know why it’s gone: maintaining informal information use in inpatient care. In *Proc. CHI2009*, ACM Press (2009), 2061-2070.
20. Zola, I.K. Medicine as an institution of social control. *Sociological Review*, 20, 3(1972), 487-504.