

Implementing Computers in Ambulatory Care: Implications of Physician Practice Patterns for System Design

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This paper presents pre-implementation data from the internal medicine division of a large physician group practice scheduled to implement an electronic medical record (EMR). Data were gathered through short-term participant observation and interviews. Findings indicate that (1) most physicians anticipate enough benefits to be willing to use the system; (2) computers must be accessible, easy to log into, and provide for physician movement and interrupted sessions; (3) many physicians are concerned about losing eye contact with patients; (4) it is unrealistic to expect even good typists to enter their own long notes; (5) staged implementation, with order entry introduced first, may help physicians adapt gradually; and (6) training should include protected time for instructional sessions for physicians, simulated patient encounters to help physicians adapt their practice patterns, and tutors available to answer questions in the clinical setting.

INTRODUCTION

Research on computer use by physicians has begun to extend beyond informatics in hospitals and specialty medicine to include computing in outpatient settings.^{1,2,3} Studies from the UK reveal concerns over depersonalization of the patient encounter and that additional time is required to gather more explicit data.¹ Most US projects, however, have focused on identifying specific data needs and on workstation design. Little attention has been paid to how computers might be integrated into physicians' actual work patterns in the consulting room.

This paper presents pre-implementation data collected in the internal medicine division of a large physician group practice scheduled to implement an Electronic Medical Record (EMR). The EMR, developed in a collaboration between Hewlett Packard and the clinic, will integrate internal and external modular applications for clinical notes, order entry, test results, etc.; and provide a secure, single log-on, visually integrated environment for outpatient care customized to the needs of the clinic. The evaluation plan for the project included using

qualitative methods to help system designers:

1. Understand the specific clinic setting and the ways in which the new system will fit into the everyday work patterns of those who will use it;
2. Understand users' perspectives on the system and how it might impact their daily work; and
3. Make recommendations concerning system design, implementation, training, and support.

Since many patients come from outside the clinic's immediate area, the practice has a particular need to ensure the timely flow of information to facilitate a diagnosis and treatment plan during the few days the patient is in town. While the clinic's paper record system is more efficient than most, recent projects include computerized lab results reporting, an order entry pilot, and telephone dictation in which clinical notes are transcribed into the computer by clerical staff. Direct physician entry of notes is also available, but only used by a limited number of physicians. The EMR will provide physicians with Episode and Problem Managers and will integrate all elements of the electronic medical record, including order entry, results reporting, clinical notes, and patient provided information.

METHOD

Participant observation is one of the ethnographic data gathering methods used by anthropologists and qualitative sociologists. In contrast to the use of observation to quantify the time spent in various tasks,² we used participant observation to investigate individuals' perspectives on their own work through systematic observation and conversation with them as they engaged in their daily activities.³⁻⁷

In the present study, 13 of the 19 physicians practicing in the first department scheduled for implementation were observed during consultations with patients. Observation of each physician ranged from 1 to 4 hours. In each case, the physician would enter the examining room, explain the study, and ask the patient's permission for an observer to be present. The researcher would then be introduced and remain in the exam room to observe and take notes, stepping out during the physical examination

when asked to do so. The researcher also talked to physicians and other clinic staff about the EMR, including practice changes they anticipated or had already made with results reporting and clinical notes dictation. The study took place in February and May 1996, before scheduled implementation.

FINDINGS

While study findings addressed a number of topics, this paper focuses on two of the most important: (1) the implications of physician movement and interrupted work sessions for design, and (2) parallels between the implementation of the clinical notes dictation system and the EMR.

Physician Movement and Interrupted Sessions

The “information work” of physicians and other health care professionals is distinct in that it is not restricted to one time or one place. Rather, they move from room to room, completing their notes and organizing information as they go, with frequent interruptions. For example, one physician first reviewed the chart very briefly outside of the room where the patient was waiting, then ushered the patient to his office/exam room where he interviewed the patient and made notes. Then, while the patient changed clothes, the physician took his paperwork and crossed the hall to another exam room to organize his thoughts and begin a working list of patient problems. The physician then returned to the first room to examine the patient and, after the patient left, organize the problem list, generate orders, and dictate his report.

Another physician went from one exam room to another rather than using her own office to see patients. She also spent considerable time in the corridor reviewing the chart before seeing each patient. She made notes throughout patient visits and then re-read her notes, organized her orders, and summarized the visit after the patient left. She did not use the dictation system, but completed her notes using pen and paper.

In both examples, the physicians moved from room to room, each time taking up the information management and note taking process where they had left off in the previous location. In order to integrate the EMR into their current practice patterns, these physicians will probably need to log-on to several work stations in sequence. The Problem Manager, for example, is designed to help physicians organize their thoughts and work through the patient’s problems while recording the information in the

computerized patient record, generating orders linked to each problem at the same time. If a work station is not readily available on which they can easily log in and out of unfinished sessions, however, they may be compelled to complete the problem list on paper during the course of their normal work, entering the information in the computer later (a largely clerical task). Since physicians and nurses tend to “know” their patients by their ailments and their medical history, most stated that they would want to review information about the patient at least briefly before entering the room. Thus, terminals need to be easily accessible and log-on/log-off functions need to be both simple and fast. Physicians should also be able to interrupt a work session and resume it easily from another work station without each time having to go through an entire log-on/patient selection process.

Changing Practice Patterns: The Example of Clinical Notes Management

The most significant practice change at the time of observation was the implementation of Clinical Notes Management. Secretaries, nurses, and physicians all interact in some way with the Clinical Notes system. The system is designed to allow physicians or transcriptionists to enter a clinical note into the database. Physicians use the telephone to enter multiple codes and then follow one of several templates to dictate notes or letters. The dictation is then transcribed into the computer by transcription pools set up to relieve the added burden on secretaries created by the new system. While no one expressed strong negative feelings, the transition to dictation is having costs as well as benefits. Both secretaries and physicians commented that the dictation system has slowed some tasks.

The timing of the observation periods allowed us to observe physicians in different stages of learning the clinical notes system and to both observe and discuss with them how their practice patterns had been affected. By the second observation period, all but three of the department’s physicians were dictating clinical notes, although some had just begun. These observations, detailed below, provide important clues to the ways in which physicians may adapt to the fully implemented EMR.

Learning to Use the Dictation System.

Although all but three physicians were using the dictation system by May 1996, most did not log on to the computer to read or edit their notes. Physicians who were just beginning to dictate commented that the phone-based dictation system

had slowed them down in some ways. Several physicians commented that while dictation reduced documentation time for long notes, it is slower for short notes than writing in the chart. One added that he kept forgetting to include the diagnosis and discharge instructions at the end, as prescribed by the protocol, and thus had to call back repeatedly. Others suggested that people create longer messages when dictating than when writing by hand, which may have also slowed them down. Physicians experienced with the system were observed dictating rapidly, however, saving time especially on long notes.

Time and Logistical Issues. Secretaries commented that with dictation, “turn-around” time could be slower. Physicians may do more elaborate short notes now (half a page instead of a scribbled 2-3 lines) and may feel less secure about what they’re doing (since they are required to dictate according to a standard protocol). Slower “turn-around” time may also affect the work of secretaries and others who need the patient charts as well.

These staff comments were corroborated by observation of physicians. One said that she dictates notes between patients if she has time, but (as with handwritten notes) won’t do so if it keeps other patients waiting. While observed, however, she was able to dictate on several patients between appointments; although at least three other patients were waiting, their charts were not yet back from the consultant visits, delaying the schedule. Full implementation of the Clinical Notes system throughout the practice should relieve this current bottleneck created by the paper-based system, ensuring that consultant notes are available to other clinicians electronically as soon as they are completed.

“Public” vs. “Private” Clinical Notes. Handwritten clinical notes, while often illegible, also seem to feel much less “public,” as though they “belong” to the individual physician and his or her patient. Dictated notes are not only more legible and easily accessible, they are also read by more people, both because they are easier to read and because transcription adds another person to the process. Thus a physician’s practice becomes, in some sense, more exposed, or “public.” While the physicians observed did not put the difference in these terms, several made relevant comments. One physician confided that she really didn’t know how other physicians practice and envied the researcher her opportunity to observe. Several others seemed

insecure about their own dictation, remarking that they “probably wrote too much.” Some commented on the rigid conventions of the dictation system. When discussing the idea of dictating in the presence of patients, one physician noted that her colleague had recommended the practice. Although very comfortable with the dictation system, however, she herself had not tried dictating with patients in the room and was unsure how it would work. These observations reflect a shift from the “private” practice of medicine to something more public, in which not only the clinical note, but also the problem list that reflects the physician’s thought process, may become more visible or legible to others in the patient record. It may also be dictated for the patient to hear.

Changing Practice Patterns. We observed physicians in various stages of adapting their practice to Clinical Notes dictation. Handwritten notes had always been the norm in this clinic. Physicians who had spent their entire careers there and had never had the experience of dictating seemed to find the change more difficult than those who had dictated elsewhere. Furthermore, physicians who used to complete all of their notes during the patient visit initially felt that the dictation system took extra time. This seemed particularly true of those who had been in the habit of remaining in the exam room to finalize the chart after the departure of the patient. While it seems quite possible to follow the same routine using the dictation system, at least one physician new at dictating took the chart back to his own office to dictate. He confided, however, that he found this interruption in his routine a problem because it disrupted his customary train of thought and he was afraid he would forget things. He now takes scratch notes when with the patient, then goes directly to the desk to complete his orders. Later, when he goes to dictate and do a problem list, however, he finds he may have forgotten an order because his thought processes and problem list were not complete at the end of the patient encounter. He commented: “Maybe I need to take more organized notes when with a patient.....”

Another physician new to dictation appeared quite competent and comfortable with the system, but confided that she disliked it. She said another physician had demonstrated how to dictate, using parts of the chart as reference materials, but she still feels as though she fumbles around when she dictates. She also indicated that it works well when she can keep up between patients, but if she is

running late and cannot dictate between patients, she hand writes her information so she can remember it later when she dictates. Since physicians spend much of their time examining and sifting information to arrive at a diagnosis and treatment plan, ensuring that all functions of the EMR contribute to, rather than interrupt, this process is essential if the system is to enhance, rather than interfere with, practice.

Patient Presence. Physicians who hand write their notes frequently do so during the clinical encounter with the patient present. They simply stop the conversation at the end of a particular set of questions regarding a specific patient complaint or problem, making their notes while the patient waits. Others, however, do not stop the flow of the encounter. Instead they make short notes on scratch paper to cue themselves and depend upon remembering the rest of what they will need later to write the long note. Some physicians (possibly those who make a point of not stopping the flow of the conversation) worry about turning away from the patient to use the computer: "You noticed I sat across from her? I'm wondering if patients will feel they're buying airline tickets. You know, you're clicking away like this....." (pantomiming typing while demonstratively turning his head away from the observer to indicate loss of eye contact).

Some physicians were observed using the dictation system while the patient was present. They saw this as enhancing patient education and reducing patient anxiety that the physician might be keeping something from them. Rather than stopping periodically during the exam (and then completing a long note at the end of the exam--usually after the patient leaves), these physicians dictated a long note while the patient was still present. They made specific efforts to involve the patients in the dictation process by explaining what they were going to do, maintaining eye contact with the patient and occasionally stopping the dictation to verify a point in the patient history with the patient. They emphasized what the patient had agreed to do (e.g., instead of indicating doubt that a patient would comply with an order, the physician would dictate: "Mrs. X has agreed to....."). One physician involved the patient by saying, "You can tell me if I'm saying anything wrong." While dictating with the patient present seemed to work well during our observations, it would not always be appropriate. As with computer use in the exam room, dictation in the presence of patients requires that the physician be secure with the system.

Entering or Editing Notes On-line. Several physicians addressed trade-offs between dictation and entering or editing notes on-line. According to one experienced user, she only enters notes on-line when it is faster to type them than to dictate them. Another physician said, "I can talk a lot faster than I type...I edit my own notes sometimes, but I don't type them." He felt that learning to type was a poor use of his time. None of the physicians could envision entering long notes on-line. One, however, pointed out that with a repeat patient, one could edit a previous long note to create a new one. It seems reasonable to infer that, even with maximum use of the clinical notes application by physicians, some dictation will continue to be the best option for long notes on patients new to the practice.

Changes in Clinical Notes. In summary, observation and interviews indicated that the new dictated electronic clinical notes are longer and more structured than handwritten notes. Physicians also noted that they seldom take time to edit their notes, either on line or by indicating changes to their secretaries. One physician noted that when he had been trained, it had seemed hard to edit notes on line, but it may be easier now--he hadn't tried again, indicating the importance of having applications be easy to use. He also wondered when he would find time in his day to do the extra work of going back to edit notes. However, physicians no longer need to dictate final letters sent to patients and referring physicians; these are generated automatically from computerized notes and lab reports.

DISCUSSION

Implementation of the EMR will result in change processes similar to those described for the dictation of clinical notes. One of the most significant EMR functions for clinical practice is the development of a problem list. While not required to do so, most physicians at the clinic already use problem lists. The structure and "rules" they use vary according to their experience and education. Development of the problem list appears to be an integral part of practice at this clinic, as physicians organize materials they have gathered on the patient, most of which will eventually be available on-line.

The problem list is logically generated before physician orders are entered. In this practice, however, it is essential that physician orders be completed immediately following the visit, since the patient is immediately sent to other areas for tests and consultations. Physicians complete their orders

in the exam room and take them directly to the desk. Thus, if the EMR is to be of maximum use to the physician, he/she must be comfortable enough with the system to use it in the patient's presence or immediately after the patient leaves, i.e., before orders are generated. This sequence of events implies a major change in physician practice. If the physician actually uses the EMR to organize information and generate the problem list, he or she will not be able to delay or batch the task to complete at the end of the day, as many do with their dictation of clinical notes, especially when they are behind. Based upon observed practice, however, the temptation will be to wait and deal with the new and perhaps challenging system later. The result will be that physicians use the system merely to record a problem list developed earlier in order to generate the necessary orders.

If physicians are entering their orders on-line, and if the system requires them to link each order with a problem in the problem list, they will be forced to use the EMR as intended. This change in practice will require extensive support as physicians become familiar with the system and begin to use it. As with the dictation of long notes, however, once a "critical mass" is reached (perhaps after about 1 year), most continuing patients will already have problem lists that simply need to be updated and the biggest issue will be developing problem lists for new patients. Because of the major change in practice patterns required to get maximum use of the system, however, a substantial institutional commitment to training and support will be essential.

SUMMARY AND RECOMMENDATIONS

Physicians' information-related practice patterns vary, even within the same clinical setting. EMR implementation is likely to exert constraints upon at least some individuals' practice patterns. Including ethnography in the evaluation plan can help us understand how normal practice patterns may be affected, allowing informed inferences on how best to support implementation. Results for this clinic indicate that:

- Most physicians anticipate enough benefits from the EMR to be willing to use it; others said "when they make me do it, I will;"
- To accommodate physician movement, computers must be accessible, easy to log into, and have provisions for interrupted sessions;
- Many were concerned about losing eye contact with patients, although research has shown this issue resolves as users become proficient;¹

- It is unrealistic to expect even good typists to enter their own long notes;
- Staged implementation introducing order entry before the Episode and Problem Managers may help physicians adapt gradually, and
- Comprehensive training should include (1) provisions for physicians to see fewer patients during the learning period, allowing protected time for instruction, (2) simulated patient encounters to help physicians adapt their own practice patterns, and (3) tutors available on-site to answer questions in the clinical setting.

Note: Physician gender was changed randomly to provide anonymity to informants.

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