Perceptions of House Officers Who Use Physician Order Entry

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Objective: Describe the perceptions of house staff physicians about their experience using computerized physician order entry (POE) in hospitals.

Methods: Qualitative study using data from participant observation, focus groups, and both formal and informal interviews. Data were analyzed by three researchers using a grounded approach to identify patterns and themes in the texts.

Results: Six themes were identified, including house staff education, benefits of POE, problems, feelings about POE, implementation strategies, and the future of POE.

Conclusion: House officers felt that POE both assists and undermines the educational process. It needs to fit the workflow and be personalized. Implementation strategies should include mechanisms for gaining house staff input.

INTRODUCTION

Computerized physician order entry (POE) is defined as a process which allows a physician to directly enter orders for patient care into a computerized system. POE gives the physician one-on-one contact with a system which can offer the proven benefits of computerized reminders and alerts [1,2], remote access to patient data [3], and a decrease in errors of omission [4]. POE can also provide immediate access to decision support systems, knowledge bases, and prewritten sets of orders for specific conditions.

Many of the problems encountered in implementing POE are organizational and behavioral. Massaro's early papers [5,6] and Sittig and Stead's summary of the state of the art of POE up to 1994 [7] provide valuable background for considering these issues. Our aim in the present study is to identify success factors in implementing POE. In Phase I we investigated how many hospitals have implemented POE and how heavily it is used where it does exist [8]. Results indicated that POE is available at only a third of U.S. hospitals, that few physicians use it where it is available, and only a small proportion of orders are entered this way. The aim of Phase II, reported here, is to study physician attitudes and perceptions at sites where POE is heavily used. Initially, we sent a mail survey to 490 physicians at five sites known to have POE, but the return rate was so low and the data so incomplete that another approach was required. For example, some responses from one site denied that POE was available there. Handwritten comments from all five sites indicated that house officers were the actual users. We chose to revise our approach and use qualitative rather than quantitative techniques. Qualitative methods are particularly useful for studying causation and answering the "why" questions. In the spirit of allowing the research question to determine the methodology [9], a multimethod qualitative approach was taken. The research question for this segment of the study is "What are the perceptions of house officers who use POE"?

METHODS

Selection of Sites

We contacted experts in informatics by electronic mail and asked for suggestions of sites where POE is used with success. Two sites were chosen to increase the validity of conclusions about patterns. For this initial study, two were selected that span a spectrum: one an academic institution and the other a VA hospital; one on the East coast and the other on the West coast; and one with well-established POE use and the other with a more recent implementation. The first site, the University of Virginia Medical Center, began implementation of the TDS (now Eclipsys Corp.) system in 1988, so when this study was conducted in August of 1998, it had been in use for ten years. The second, the Seattle Division of the VA Puget Sound Health Care System, is a major teaching hospital of the University of Washington and a VA hospital. At the time of this investigation in the fall of 1998, POE had been implemented

within the past two years in four units using the predecessor to the VA's present Computerized Patient Record System (CPRS) [10].

Data Collection

Three data collection methods were used. Participant observation is the most unobtrusive method. Observation "produces detailed descriptive accounts of what [is] going on (including verbal interaction)" [11] and has been used effectively in informatics studies [12,13]. Two trained qualitative researchers accompanied house officers in the course of typical daily tasks in the hospital. Data were also collected using focus groups. Focus groups provide an efficient way to gather information from a group with the benefit of synergy among participants [14]. Finally, formal tape recorded oral history interviews of key informants provided the opportunity to ask open-ended questions and also probe for more specific answers [15].

To increase validity of the data, two researchers shadowed the same people, one moderated the focus groups while the other assisted, and one conducted the oral history interviews while the other observed. The research team included two qualitative researchers with nursing backgrounds, two physicians, and an organizational behavior researcher with a medical library background. The different but complementary skills of team members enhanced the research process by providing a range of perspectives which further improve validity. The goal was to use multiple, complementary methods to capture the richness and complexity of the phenomena. Additional details about the methodology, including planning, informant selection, recording and photography equipment, development of focus group and oral history questions, field notes, and transcription are available from the authors.

Gaining Entry

A faculty contact person at each of the two sites agreed to help with selection and scheduling of informants. The methods are relatively unobtrusive and were therefore acceptable to the site contacts.

The Data

At the University of Virginia, we shadowed an intern-resident pair on the critical care unit, a similar pair in labor and delivery, a surgical intern, and a medical intern. Interns had less than two months experience with POE. At the VA, we observed an attending in an outpatient primary care clinic, an attending in a nursing home unit, and a medical student/intern/resident team in medicine. House staff had varying experience with POE depending on which of the five teaching hospitals of the University of Washington they had rotated through. Informal interviews were held with each individual plus two nurses and a clinical pharmacist each at each site. Oral history interviews were held primarily at the University of Virginia: the chief information officer, a clinical systems specialist with a nursing background, two administrators who are M.D.'s, two faculty who had used the system when they were residents ten years earlier, and two other faculty with M.D.'s. At the VA, only the chief information officer was interviewed formally. Two focus groups were held in Virginia following regularly scheduled meetings of pediatrics and medicine residents. We held one at the VA with a ward team including a medical student, intern, and three residents in medicine.

Data Analysis

Sixty person-hours of observation were conducted, half at each site. Field notes were transcribed from the handwritten notes. Transcripts of interview and focus group sessions were produced from the audiotapes, resulting in 236 pages of transcribed data. A grounded theory approach was used to identify emergent themes. Grounded means "based on and connected to the context-dependent observations and perceptions of the social scene" [16]. The informants' own words guided development of codes. Three researchers independently reviewed the field notes and transcripts, coding important themes. Each then identified patterns and higher level themes. Qualitative data analysis software (QSR NUD*IST 4, Sage Publications, Berkeley, CA) assisted in developing themes agreed on by all three researchers during iterative and ongoing discussion.

RESULTS

Emergent Themes

Six themes were identified concerning house staff perceptions: (1) house staff education; (2) benefits of POE; (3) problems with POE; (4) feelings about POE; (5) implementation strategies; and (6) the future of POE. See quotations in Table 1.

House Staff Education

Writing of orders is traditionally performed by interns as a matter of educational policy in many institutions. More senior physicians, including residents and attending physicians, attributed non-use of the system to this policy rather than avoidance of the system *per se*. Interns were the primary users of POE and indicated a sense of ownership of the patients and pride in being able to master POE in their insecure worlds. Because POE is more time consuming than manually entering orders, some time

tradeoffs have been made which impact education. For example, medical students, who on some units used to write orders to be reviewed by physician supervisors, no longer do so and therefore lose the opportunity to gain feedback. Also, interns no longer write histories and physicals, foregoing the process of formulating knowledge of the patient. Both processes have been used as teaching opportunities in the past. Some informants perceived order sets as undermining the educational process because thinking and reasoning may not be necessary.

Both house staff and attendings felt that house officers are exploited and they blame this on hospital administration. There is a tension between getting the work of the hospital done and at the same time educating physicians. POE may be symbolic of a longstanding labor-management issue concerning use of house officers to accomplish technical tasks that could be performed by other staff. Phrases used included: "cheap labor", "learn on the job", "clerical work", "not really related to being a doctor", "element of insult", "the hospital's the place that you make money for", and "little drone".

Benefits of POE

Users were pleased with many aspects of POE. Personal order sets, groups of prewritten orders, were viewed by surgical residents as helpful for straightforward situations. Termed "cookbook medicine" by some who saw them as undermining the educational process, order sets were valued as time savers by others. Drug interaction alerts were also viewed as helpful, as was the shorter turnaround time for delivery of medication to the floors. The ability to enter orders from any location, graphical display that can reveal temporal patterns in data, access to knowledge sources, legibility, and access to laboratory data were all cited multiple times as definite positives. Of greatest use was "having everybody reading off the same page." Anyone viewing a patient record was able to see the current status of that patient's orders.

Problems With POE

Many problems with POE were observed during the study. Some related to system installation and maintenance: printing problems and the short supply of printers, delays in replacing or servicing computers, and the lack of space around workstations. Others related to unexpected impacts of the system, such as an increase rather than a decrease in paper usage. Many problems related to poor usability, such as using the wrong patient record because the patient name was not easily seen, excessive screens required to enter information, inflexibility of the systems, inadequate word processing functionality, and inadequate space for notes. Finally, many problems related to consistency of the user experience, including periodic changes in the logon process or user password, changing system features requiring constant relearning by users, switching between different information systems with different interfaces at one hospital, and rotating between hospitals with different systems.

Table 1: Quotes

House staff education
"working probably an average of 80 hours a week anyway and are now, in addition, being asked to take on several hours of clerical work"
"order sets. . .you're really not forced to sort of think through your choices"
"it's a mixed blessing because one of the beauties of not having a paper chart is you can do it anywhere and you can do it on the fly. . . but it's changed the entire teaching exchange"
Benefits of POE
"it helps you practice better medicine and reduces the errors"
"I can, you know, immediately access discharge summaries. That's, that's wonderful"
"the orders need to be done by the people who are making the decisions"
Problems with POE
"other thing kind of bothers me. . .depresses me, the amount of paper they generate"
"driving me crazy... 8 or 10 screens in order to order a single drug"
"in an emergency situation it's just barbaric to have to go through a system when there should be another kind of mechanism"
Feelings about POE
"frustrating... you just have to use it a lot and sort of figure out little quirks and how to get around it"
"it really is better for the patient"
"the level of stress is tremendous not only because it's a new learning experience for you but now you're responsible for patients' lives"
Implementation strategies
"you've gotta integrate the technology piece into the workflow"
"staff trained to assist in this. . .would be highly advisable"
"ownership became an issue and so now you can construct your own personal order set"
Future of POE
"integrating all this into one user friendly system makes sense"
"I'm thinking about going into practice next year in a community hospital. I think it would be a wonderful tool to have"

Feelings About POE

During the focus groups in particular, emotions ran high both for and against POE. While informants acknowledged the value of POE, they were frustrated by problems with the systems. The greatest frustration was the additional time required to use the system in an already busy workday. Working through multiple screens to order a medication, especially an out- of-the-ordinary order, took more time than writing it by hand. Workarounds to fool the system into submission were clever, common, and shared with pride. During one pressure-filled situation, an intern struggled with the system to order a topical application of mineral oil. Because the system only included oral preparations and doses, this process required much more time and effort than manual entry.

Implementation Strategies

Most of the success factors described were organizational and interpersonal. Faculty, administrators, and former residents all talked about various selection and implementation committees they had been on which, when discontinued, created a sense of loss. Other positive organizational factors included the presence of clinician champions and house staff committees, support by department chairs, good faculty-resident relations, listening to house staff, good communication, and excellent leadership at the institutional and house staff levels. System related strategies discussed multiple times included designing a system to fit the workflow, including value added capabilities, and providing a user friendly system. Informants described numerous strategies related to POE training such as minimizing up front training in favor of on-the-job, just-in- time training and support, and specialty-specific training.

The Future of POE

Despite all the problems, the residents hope to have POE available when they enter practice. Some feel they cannot live without it. They want comprehensive systems available in community hospitals and desire systems that will allow tailoring to meet individual and specialty-specific needs. The ideal systems will provide tools for evidence based medicine and the ability to track outcomes and trends. Consistent user interfaces will be available for both outpatient and inpatient care. Above all, the systems will fit the practice pattern workflow.

CONCLUSION

Constraints of the study

This is an initial study done at two hospitals. The results are indicative but not necessarily generalizable. The results describe patterns that are similar at both sites. Although participant observation time at the sites was comparable, oral history interviews were primarily at the University of Virginia because key informants at the VA were not available the week we were there. Interns and residents varied a great deal in familiarity with POE depending on their medical school training and prior rotations.

Discussion

The major issues related to house staff use of POE focus on the educational process. Medical students may be missing the opportunity to write orders altogether. Attendings do not use POE because the traditional view is that there is educational value for interns when they write orders. However, efficiencies such as personal order sets may be undermining this traditional pattern. There is a perception that house staff miss out on some of the cognitive aspects of writing orders when they can send a group of orders without thinking about each one.

Because house officers differed in computer, clinical systems, and POE experience, it is difficult to make generalizations about whether length of time using a particular POE system colors perceptions of POE. Individuals who had used what they perceived as superior POE systems elsewhere seemed most frustrated, presumably because they had a standard against which to judge.

Residents have a sense that POE interrupts rather than expedites workflow. They are particularly chagrined that they are spending time entering orders when that time could be used for patient care.

The desire for personalization and customization was evident in discussion of order sets in particular. While departmental order sets are well liked because they save time, personal order sets developed by individuals are a way house staff physicians can, if they learn how, have their very own piece of the system. Finally, it should be of interest to those implementing POE systems to know that the social aspects of preparing for implementation are important. It should also be noted that house staff are eager to be heard. They cannot find the time to actively participate in the decision making process concerning implementation details of POE, so other methods for gaining their input need to be pursued.

Recommendations

We believe there are three key take home points from our study of POE at two teaching institutions. First,

successful implemention of POE requires full appreciation of the goals and objectives of the intended users. In the case of academic institutions, the educational goals of the attendings, housestaff, and medical students must be understood: to the extent that POE impedes these objectives, it will be resisted; to the extent that it facilitates them, it will be embraced. Second, although clinical users in these settings expressed a desire for consistency across systems to reduce complexity and learning/relearning cost, this does not imply a need for a single, monolithic system. Equally important is the opportunity for physicians to be involved in the design of highly task-specific solutions that fit or enhance their workflow, and that allow for individual choice in specifying how the patient care for which they are responsible will be delivered. Third, we found that common assumptions or beliefs about barriers and success factors to implementation of POE (or other elements of the computer based patient record) may not be accurate, at least in a given institution. Careful evaluation prior to implementation, perhaps employing qualitative methods, is required to verify these assumptions and explore the hows and whys of the process at a local level. In future work, we plan to verify and expand upon these findings by examining the implementation of POE in nonacademic and outpatient settings.

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