Multiple Perspectives on Physician Order Entry

Joan S. Ash, Ph.D., M.L.S., M.B.A., Paul N. Gorman, M.D.,
Mary Lavelle, R.N., M.S., and Jason Lyman, M.D.

Division of Medical Informatics and Outcomes Research, School of Medicine
Oregon Health Sciences University, Portland, Oregon

Objective: Describe the complex interplay of perspectives of physicians, administrators, and information technology staff regarding computerized physician order entry (POE) in hospitals.

Methods: Linstone's Multiple Perspectives Model provided a framework for organizing the results of a qualitative study done at four sites. Data from observation, focus groups, and formal and informal interviews were analyzed by four researchers using a grounded approach.

Results: It is not a simple matter of physicians hating POE and others loving it. The issues involved are both complex and emotional. All groups see both positive and negative aspects of POE.

Conclusion: The Multiple Perspectives Model was useful for organizing a description to aid in understanding all points of view. It is imperative that those implementing POE understand all views and plan implementation strategies accordingly.

INTRODUCTION

The recent Institute of Medicine study, To Err is Human, and subsequent White House actions clearly indicate that medical error reduction in hospitals is an emerging mandate [1]. Most hospitals will have to implement physician order entry (POE), defined as a process which allows a physician to use a computer to directly enter medical orders. A good deal has been published about the benefits of POE [2-4], but enthusiasm has been tempered by reports of problems as well [5, 6]. In fact, few hospitals in the U.S. make it available, and it is not heavily used by physicians even when it is available [7]. With increasing pressure for 6,000 hospitals to implement POE, a deeper understanding of the issues is needed to guide decision makers. The present study was designed to assist this effort by offering an accurate description of the perceptions of physicians, information technology professionals, and health care administrators regarding POE at both teaching and non-teaching hospitals.

A basic assumption underlying this study is that there are multiple perspectives on POE and that all are valuable. House officer perceptions, described in a prior publication, are a complex mix of favorable and otherwise [8]. A recent letter to JAMA states "It seems axiomatic that the medical profession needs to assume much more leadership in health care IT. Simultaneously, those in health care IT need to learn more about the training, lives, and culture of medical professionals [9]. It is important to gain perspectives from all stakeholder groups when considering implementation of POE, both to foster acceptance and to help plan the process.

The Multiple Perspectives Model outlined by Linstone defines three systems that are important to look at: the Technical, Organizational, and Personal (T, O, and P respectively). The T system is data driven, with a focus on hardware and software. The O system includes the policies, procedures, and interpersonal aspects of an organization. The Personal system includes the political implications and individual behavior of key players [10]. Any large and complex set of issues can be analyzed by selecting important stakeholder groups and gaining their perspectives on these three systems.

Figure 1 shows the model which will provide a framework for this study. The perspectives are looking in from the periphery. We have selected three perspectives for our model: that of the physician, the administration, and the information technology leadership. The perspectives look at three overlapping circles, representing the three systems: Technical, Organizational, and Personal. The perspectives and the systems often overlap and intersect. This is a particularly appropriate model for qualitative work because of the complexity and interrelatedness of perspectives.

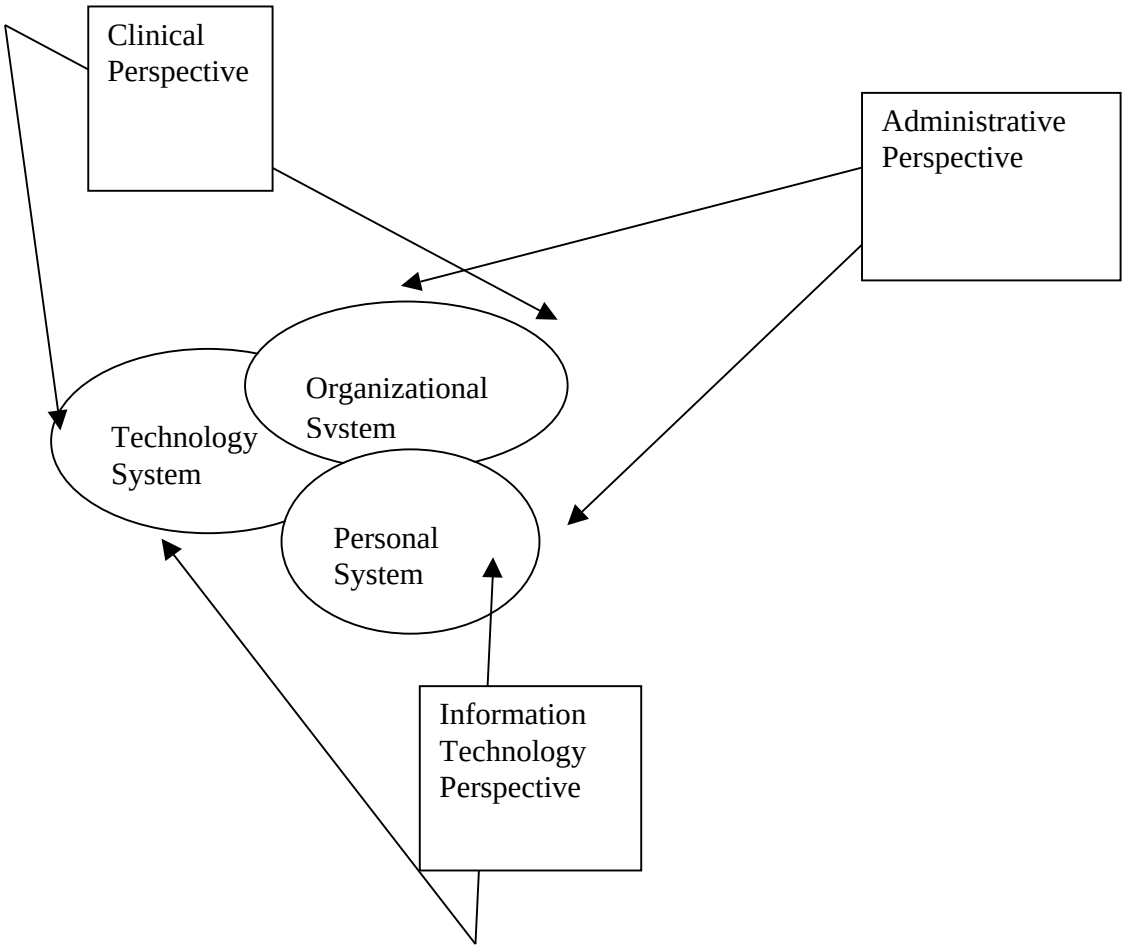

Figure 1. Multiple Perspectives Model of Physician Order Entry

The purpose of this study is to identify perceptions of POE held by diverse professionals at sites where POE has been successfully implemented. Success is defined as heavy use (over 80% of orders are entered electronically) by a large number of physician users. The reason for studying successful sites is that they can serve as models. While there are a number of successful sites with systems developed internally, the focus of this study is "off the shelf" systems which have the potential for being widely adopted.

The present study is designed as a cross-site study so that the perceptions of diverse professionals can be compared both within organizations and among different settings. The field investigators were an external, multidisciplinary team unaffiliated with any of the selected sites.

METHODS

Selection of Sites

Hospitals are either teaching hospitals, defined here as inpatient facilities where internship and residency programs for physicians are present, or non-teaching hospitals, which do not have such programs. Four sites were selected to represent differences in teaching status, geography, and length of system use. The first institution was the University of Virginia in Charlottesville, VA, which has used POE since 1989. The Veterans Affairs Puget Sound Health Care System campuses in Seattle and American Lake comprised the second and third sites, and El Camino Hospital in Mountain View, California was the fourth. The Virginia and VA hospital POE implementation efforts have been described in several publications [5, 6, 11]. El Camino has not been the subject of any recent publications, but its history as the first POE site anywhere made it an appealing choice. Beginning in 1966, El Camino became the first development site for the medical information system originally developed by Lockheed and purchased by Technicon and it was selected by the National Center for Health Services

Research in 1971 as the first demonstration site of a total hospital information system [12].

Data Collection

Three data collection methods were used: observation, oral history interviews, and focus groups. Participant observation offered the most unobtrusive method. Trained qualitative researchers accompanied clinicians in the course of typical daily tasks in the hospital and generally followed such shadowing with informal interviews. Additional observation included watching all activities on certain hospital units. 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. 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.

The Data

At the University of Virginia, we shadowed intern-resident pairs in the critical care unit and in labor and delivery, a surgical intern, and a medical intern. Because we visited in August, the interns had only one month's experience with POE. We observed an attending in an outpatient primary care clinic, an attending in a nursing home unit, and a medical student/intern/resident team on a general medicine unit at the VA in November. Informal interviews were held with each of these eleven individuals plus four nurses and a clinical pharmacist at each hospital. Non-physician clinicians were included because they help clarify the physician perspective. Formal oral history interviews were held with nine individuals: the chief clinical information officer at each place and a clinical systems specialist with a nursing background, two administrators who are M.D.s, two faculty who used the system as residents, and two other faculty with M.D.s at the University of Virginia. Three focus groups were held, two in Virginia and one in Seattle, with groups of pediatrics and medicine residents.

Observation at the non-teaching hospitals amounted to 52 person-hours. At American Lake we shadowed a psychiatrist and held informal interviews with a physician's assistant and nurse. At El Camino, we did 40 hours of observation and shadowed physicians in the emergency room, medicine, oncology, the ICU, and CCU. We conducted four formal oral history interviews with a physician and three information technology staff. Informal interviews were held with nurses, administrators, a care coordinator, clinical pharmacists, and a dietician.

Data Analysis

Field notes from 120 person-hours of observation and audiotapes of 22 hours of formal interview and focus groups were transcribed, resulting in over 400 pages of transcripts. A grounded theory approach was used to identify emergent themes [13]. Rather than starting with a predetermined a priori list of code words, we used the informants' own words to guide development of codes. Two researchers independently reviewed the field notes and transcripts. Qualitative data analysis software was used to review and index these patterns and themes. Two other researchers reviewed the documentation carefully and noted major themes. The team of four met three times to reach consensus on results.

RESULTS

The Physician Perspective

<u>The Technical System</u>

There is a view that POE is valuable for the organization but technically cumbersome and time consuming for the physician. Physicians have little patience for clicking through multiple screens and having to log in and out of multiple systems. Several physicians said they have to think like a computer to use POE. Workarounds are used at all four sites and clever tricks are handed down from "uppers," higher level residents, to interns at the academic sites. The perceived speed of the system is important, with one site reporting that complaints arise when response time slows to .7 seconds or greater. "They had to sit at the computer for hours, i.e. two, three, four hours to, if they had twenty patients to enter orders on to get all this done, whereas they could sit, you know, at a chart rack, and they can do it all in thirty minutes."

<u>The Organizational System</u>

The busy interns, who are the primary users in teaching hospitals, resent POE to some degree and blame having to use it on hospital administration, which they distrust. "It was sort of basically an ultimatum proposition where you had to use it." "There was this feeling that this thing was getting crammed down their throats." The social aspects of clinicians being involved in the implementation process are important to those who have worked together on clinical advisory committees. Order sets, developed at the individual or departmental level, are often cited as making it all worthwhile. The

community hospital has developed a large set of clinical pathways and the development process itself seems to have positive organizational impacts as specialists, nurses, and therapists work together on them. A physician said: "the nice part about it is it's a consensus, most of us have participated in some kind of clinical pathway development in the hospital, nursing staff are involved, pharmacy people."

The Personal System

Individuals enjoy having remote access to order entry. More time is taken out of an individual's home life, however, no matter where they use it. Interns feel more power and control: "Ownership became an issue and so now you can construct, construct your own personal order set." Individuals who helped implement the POE system like to take credit for it. There is pride in mastering the system. "It was very personal for many of the residents because it was their lives that were disrupted and affected."

The Administration's Perspective

The Technical System

The cost of the system and its potential for assisting with quality assurance monitoring are two important aspects of POE from the administration's perspective. Administrators inevitably noted that accreditation agencies see POE as a great advantage. From the administrator's point of view: "It's cost effective." "One of the benefits of the system is I can get great statistics out of it."

The Organizational System

Administrators expressed pride that their organizations are on the cutting edge: "Part of this was an ambitious project from the university and the hospital side to try to put [X] at the forefront in information technology in use." They related various strategies for overcoming physician resistance and warned that you have to involve physicians early and often. At all sites there are histories of early failures or resistance. Administrators worked hard to support POE: "[I said] we will work with you to try to make this less onerous . . . you can make any order sets you want. So we had, I mean, let a thousand flowers bloom. We had order sets coming out of the ceiling."

The Personal System

The administrators take pride in having overcome clinician resistance and in now having successful implementations. They all see potential in better POE systems and in having them more widespread and used in both inpatient and outpatient settings.

The Information Technology Perspective

The Technical System

Information technology staff would love to make the systems more usable and are themselves often frustrated when they cannot. They are commited to training and helping physicians. A trainer said: "I enjoy working with the people [physicians], though sometimes I could just kill them, but it's still fun . . . you have to be very political, and you have to be very patient and you have to just bend over backwards to give doctors what they want and value." They view POE systems as constantly evolving as they provide enhancements at the request of users. They are frustrated that vendors have not yet produced integrated systems: "We're trying to buy a fix for everything and it doesn't exist . . . and so the question is, is where is the institution gonna compromise?" They are also frustrated that the marketplace is so unstable: "All [vendors] seem to be in an evolutionary period . . . they're merging, buying, switching platforms."

The Organizational System

These staff members warn that "you could very easily get defensive." They feel they need to involve the right clinicians in implementation and further development of systems. Identifying champions is a major element: "I don't think anybody knew what was gonna happen when the thing was implemented systemwide and how hard it was gonna be to get everybody on board." They want to get input from house officers but sense that house staff are too busy. On the other hand, house officers want to give input but think they will not be listened to: "It's a perceptual thing and that's where . . . perception becomes so important whether it's real or not is not the point . . . not being heard in terms of input ideas." They believe in working closely with users, "addressing every issue they had, real or not, real or not, we had to address everything." "Now it's not listening to problems, now it's trying to stem back the tide of requests." "We've bent over backwards to make sure that things are ready and we're working very hard to identify every user."

The Personal System

All of the higher level staff in information technology in chief-information-officer-type positions were relatively new, with the longest tenure somewhat over a year. They shared an enthusiasm for the

benefits of POE as well as a perspective much like that of administrators outlined above. One had worked with large scale information technology systems in the military, one had been a laboratory technologist, and one a physician. None had been on site when earlier POE systems were met with resistance, but all knew the histories intimately. Other information technology staff who had been there longer perceived that implementation of POE was difficult and painful but worth it in the long run.

CONCLUSION

Constraints of the Study

This is an initial study done at four hospitals. The results are indicative but not necessarily generalizable.

Discussion

The Multiple Perspectives Model succeeded in offering a structure and format for reporting the results of the analysis of 400 pages of transcripts and field notes. While the perspectives of the three groups differ, they all include a balance of positive and negative aspects of POE. Clinicians view it in a less positive light than administrators and information technology professionals, but at these successful sites, the clinicians use it nevertheless.

RECOMMENDATIONS

Although hospitals that have successfully implemented POE are few, they can serve as examples for the many hospitals which will have to embark on similar projects. The perspectives described above are those of carefully chosen informants at carefully selected sites. The data were gathered and validated using generally accepted qualitative techniques. Issues raised by POE are complex and, because the process impacts users at a personal level, many are emotional. By understanding and predicting how the perspectives of groups differ, those involved in future implementation efforts can be sensitive to other points of view. Sensitivity and understanding should aid in smoothing the implementation process.

ACKNOWLEGEMENTS

This work was supported by Mr. Paul Mongerson and grant DE-FG03-94ER61918 from the Department of Energy. Special thanks go to Tom Massaro, M.D., Ph.D. and Gerri Frantz, M.B.A. at the University of Virginia, Tom Payne, M.D., at the VA Puget Sound Health Care System, and Bart Lally, M.D. at El Camino Hospital for their assistance with the study.

REFERENCES

1. Institute of Medicine. To Err is Human: Building a Safer Health System. Washington, D.C.: National Academy Press; forthcoming.
2. Rind DM et al. Effect of Computer-Based Alerts on the Treatment and Outcomes of Hospitalized Patients. Arch Intern Med 1994;154:1511-1517.
3. Overhage JM, Tierney WM, Zhou XH, McDonald CJ. A Randomized Trial of "Corollary Orders" to Prevent Errors of Omission. J Am Med Informatics Assoc 1997;4:364-375.
4. Lee F, Teich JM, Spurr CD, Bates DW. Implementation of Physician Order Entry: User Satisfaction and Self-reported Usage Patterns. J Am Med Informatics Assoc 1996;3:42-55.
5. Massaro TA. Introducing Physician Order Entry at a Major Academic Medical Center: 1. Impact on Organizational Culture and Behavior. Acad Med 1993;68:20-25.
6. Massaro TA. Introducing Physician Order Entry at a Major Academic Medical Center: 2. Impact on Medical Education. Acad Med 1993;68:25-30.
7. Ash JS, Gorman PN, Hersh WR. Physician Order Entry in U.S. Hospitals. J Am Med Informatics Assoc Symposium Supp 1998;235-239.
8. Ash, JS, Gorman PN, Hersh WR, Poulsen SP. Perceptions of House Officers Who Use Physician Order Entry. J Am Med Informatics Assoc Symposium Supp 1999;471-5.
9. Silverstein S. Barriers to Computerized Prescribing [letter; comment]. JAMA 1998;280:516-17.
10. Linstone HA. Multiple Perspectives for Decision Making: Bridging the Gap Between Analysis and Action. New York: North Holland; 1984.
11. Payne TH. The Transition to Direct Practitioner Order Entry in a Teaching Hospital: The VA Puget Sound Experience. J Am Med Informatics Assoc Symposium Supp 1999:589-593.
12. Barrett JP, Barnum RA et al. Evaluation of a Medical Information System in a Community Hospital. Batelle Columbis Laboratories (NTIS PB 248 340); Dec. 19, 1975.
13. Crabtree BF, Miller WL. Doing Qualitative Research. Newbury Park, Sage, 1992.