Physician Order Entry in U.S. Hospitals

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ABSTRACT

Objective: Determine the percent of U.S. hospitals where computerized physician order entry (POE) is available and the extent of its use.

Methods: A survey was sent to a systematic sample of 1,000 U.S. hospitals asking about availability of POE, whether usage is required, percent of physicians using it, and percent of orders entered by computer.

Results: About 66% do not have POE available. Of the 32.1% that have it completely or partially available, 4.9% require its usage, over half report usage by under 10% of physicians, and over half report that fewer than 10% of orders are entered this way. Analysis of comments showed that many hospitals have POE available for use by non-physicians only, but that they hope to offer it to physicians after careful planning.

Conclusion: Most U.S. hospitals have not yet implemented POE. Complete availability throughout the hospital is rare, very few require its use, low percentages of physicians are actual users, and low percentages of orders are entered this way. On a national basis, computerized order entry by physicians is not yet widespread.

INTRODUCTION

Computerized physician order entry (POE) is defined as a process which allows a physician to use a computer to directly enter medical orders. The process eliminates the need for an intermediary to respond to written or verbal orders given by a physician by transferring them to the lab or elsewhere. While the informatics literature includes numerous articles outlining the benefits of POE [1-3] and others discussing the problems encountered in implementing it [4-6], there is little information about how widespread its use really is and how satisfactory its performance.

It is important to consider different points of view about POE. The hospital administrative staff is concerned about cost effectiveness. Eliminating the intermediary can save the hospital dollars even though it costs the physician time. The physician, on the other hand, is usually an intern or resident, and on a busy service the individual can spend twice as much time using POE as other ordering methods [7], or up to four additional hours per day [8]. From the intermediary's point of view (often a nurse), legibility is an important advantage of POE [9]. Overall, much of the value of POE is in its potential, however. It gives the physician one-on-one contact with the system which can offer the proven benefits of reminders and alerts [10,11], remote access [12], and a decrease in errors of omission [13]. POE can also provide fast access to decision support systems, knowledge databases, and order sets (prewritten collections of orders).

Many of the problems encountered in implementing POE are organizational and behavioral. Massaro's early papers about difficulties in implementing POE at the University of Virginia have provided guidance for more recent installations and are probably the most widely quoted in the literature. It was not until the level of mandatoriness (the extent to which usage is required) was increased and an effort was made to improve communication and involvement that residents began using POE there. Prior to that, there were threats of a strike [14,15]. Sittig and Stead have published an excellent summary of the state of the art of POE up to 1994 [16]. Others have verified the importance of broad involvement of users in decision making and a high level of communication [17,18]. Authors have stated that users need to understand that POE will basically change the way they work [19,20] but that there can be benefits for them as well as other staff, the hospital, and patients. In a recent report of the Kaiser Permanente implementation of POE, Krall states "our experience is that a more realistic goal is to achieve sufficient time savings in some tasks such that the total impact on a clinician's day is favorable [21]." Users need to understand that there are tradeoffs. Otherwise, POE can create negative emotional responses [22,23]. In addition, planners must think beyond standard ordering and provide

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for exceptions and special cases in order to enhance the workflow for the physician's benefit [24].

The studies accomplished to this point are primarily case studies or results of user surveys at one hospital. The ultimate aim of the present study is to identify success factors in implementing POE. Because no prior published research provides estimates of the prevalence of POE, however, the study was planned in two phases. The first phase, reported here, was designed to investigate how many hospitals have implemented POE and how heavily it is used where it does exist. The second phase will study physician attitudes and perceptions at successful sites identified by means of the survey results of the first phase and identification of sites by a panel of experts. The questions to be addressed in the first phase are: how widespread is the implementation of POE in hospitals across the U.S. and, where it is available, how much is it used?

METHOD

Survey Development

The survey was designed so that it could fit on a postcard. Although this limitation circumscribed the number of questions, it was necessary in order to maximize the response rate. Physician order entry was defined as: "direct entry of patient orders into a computer by the physician, whether using a keyboard, light pen, voice entry, mouse, or other device. This does not include entry by a surrogate or intermediary." There were four questions requiring an answer on either a Likert scale or a visual analog scale (from 0% to 100% marked in quarters):

1. Availability: Computerized order entry by physicians is (please circle letter)
   a. Not available at all (no system in place for use by physicians)
   b. Partially available (offered in some form or in some locations)
   c. Completely available (all orders can be entered in all locations)
   d. Was formerly available (system previously in place was abandoned)

2. Inducement: Computerized order entry by physicians is (please circle letter)
   a. Optional (available, and there is no active program to increase use)
   b. Encouraged (program in place to encourage use; other options are discouraged)
   c. Required (no other option exists except in emergencies)

3. Participation: Please estimate the percent of physicians using computerized order entry (place an X anywhere on line). [A visual analog scale was given]

4. Saturation: Please estimate the percent of orders by physicians using a computer (place an X anywhere on line). [A visual analog scale was given]

The job titles of respondents were requested and they were asked if they would like to receive results. The cover letter on university letterhead explained the purpose of the study and that those sending the survey belong to a research group with no commercial interests. The recipient was asked to forward the survey to the appropriate individual within the hospital.

The sample

The objective was to identify the percent of hospitals in the U.S. which have POE. Therefore, a random sample of 1,000 accredited hospitals was selected from among those listed in the American Hospital Association Guide [25], a directory of all accredited hospitals in the U.S. This sample size is more than adequate for estimating the proportion with order entry to within plus or minus 5% with 95% confidence. Data concerning the names and addresses of contact people listed in the guide were entered into a database for generation of personalized letters and mailing labels. The usual contact person listed was the Chief Executive Officer.

Mailings

A mailing was sent to each selected hospital including a cover letter outlining the purpose of the study and a self-addressed stamped postcard asking the four questions. A follow-up mailing was sent to those not responding to the first mailing. To verify that respondents were not significantly different from non-respondents, a random sample of hospitals not returning surveys was taken. Contact people representing 52 non-responding hospitals were called and asked the survey questions verbally.

Analysis

Respondents were compared with non-respondents to verify generalizability. Data from answers to the four questions were analyzed descriptively, with simple proportions calculated for each question.

RESULTS

Responses to the mail survey numbered 324; 983 of the 1,000 addresses were correct, so the response rate was 33%. The random sample of 52 non-respondents was called and the investigators were able to talk to people in 40 organizations representing 41 hospitals. Including the phone call responses, the response rate was 37%. Chi-square tests were done to determine if there were differences between respondents and non-respondents for the Availability and Inducement variables: the groups did not differ significantly. Analysis of variance tests were done comparing these groups on the Participation and Saturation variables. The phone call sample was too small for a

comparison on the Participation variable. There was no significant difference for the Saturation variable. On the whole, respondents were representative of the population.

Results for each question are shown in Table 1. In response to the Availability question, two thirds of the hospitals responded that they do not have computerized order entry available for use by physicians. Seventeen percent have it available in some locations and only 14.8% provide it completely (in all locations). The second question concerned Inducement. Of the hospitals that have physician order entry available, 22.5% consider its usage optional, 8.5% encourage it, and only about 4.9% require its use.

The third question asked respondents for a percentage estimate of how many physicians use computerized order entry. For the majority of those that have it available, participation is 10% or below, meaning that fewer than 10% of the physicians in each hospital use it. Only 11.7% of these hospitals report that 90% or more physicians use it. The results for Saturation (the percent of orders entered by physicians using a computer vs. other mechanisms) indicate that 57.7% of those who responded to this question have 10% or fewer total orders entered this way. Only 9% report 90% or greater saturation. Only seven hospitals reported a high level of both saturation and participation, so these six sites will be considered for further study.

Samples of comments on the returned postcards and from the phone calls are given in Table 2. They follow two themes. First, many hospitals have computerized order entry available, but not for physicians. A number of respondents said that they were in the process of getting physicians ready. Others stated that they wanted to build in a capability for alerts and other added value functions before asking physicians to use computerized order entry. Second, many respondents indicated that their hospitals are actively planning to make POE available in the near future.

Table 3 gives the breakdown of job titles or categories of respondents. Most are Chief Executive Officers, Chief Information Officers, Vice Presidents, Chief Operating Officers, Chief Financial Officers, or Chief Medical Officers. Asking the recipient of the survey mailing to transmit the survey to the appropriate person in the organization was therefore a successful strategy. Over two-thirds of the respondents requested a copy of the results of the survey. This large number is indicative that there is great interest in the topic among high level decision makers in hospitals.

TABLE 1

Survey Results

Availability of POE

Extent	Responses	% of Total Responses
Complete availability	54	14.8%
Partial availability	63	17.3%
Not available	241	66.0%
Unknown	7	1.9%

Inducement of POE

Extent	Responses	% of Total Responses
Required	18	4.9%
Encouraged	31	8.5%
Optional	82	22.5%
not applicable	234	64.1%

Participation by Medical Staff (percent of staff using system)

Extent	Responses	% of Total Responses
10% or less	58	52.2%
11-50%	31	28.0%
51-90%	9	8.1%
over 90%	13	11.7%

Saturation of POE (percent of orders entered on system)

Extent	Responses	% of Total Responses
10% or less	64	57.7%
11-50%	25	22.5%
51-90%	12	10.8%
over 90%	10	9.0%

Table 2
Survey Comments

Non-Physician Users (10 similar comments)
"have order entry but not for physicians"

"not available for physicians, but others can order labs"

"order entry is usually performed by nursing/unit coordinators"

"determined that for accuracy reasons orders need to be entered by nursing"

Future Plans (12 similar comments)
"will make it available to physicians when meds can be done online"

"have it but no M.D.'s use it. Hoping results reporting will get them moving"

"have it for others, no M.D.'s use it now but hope they will eventually"

"available in 1 year"

"we are just finished with a pilot and starting to implement"

Physician Users
"we have classes for all physicians"

"only residents use it"

"it is available and is used by M.D.'s but can't judge how much"

"physicians are coming along"

Not available (six similar comments)
"system was formerly available, not acceptable to physicians at that time, is not available now"

"we are currently reviewing systems"

Table 3
Respondents

Job Title or Category	Number
CEO or President	130
Information systems	78
Chief Information Officer	26
Vice President	26
M.D.	21
Admin.Asst./Officer	17
Chief Financial Officer	9
Nursing	9
Chief Operating Officer	5
Marketing, Public Affairs	5
Medical Staff Coordinator	4
Unspecified	94
Total	364

IV. CONCLUSION

The hospital study results indicate that computerized physician order entry does not enjoy widespread implementation across the U.S. In those hospitals that have POE, it is generally not required that physicians use it and indeed they tend to not use it: only 20% have over half the physicians using POE. Many hospitals that have computerized order entry available do not offer it to physicians, so it is not a matter of unavailable technology. Comments from respondents indicate that hospital information technology leaders are looking forward to implementing POE but are hesitant to do so because of perceived barriers to use by physicians. A second phase of this research, now underway, includes in depth observational studies of organizations which have successfully implemented POE with the goal of determining how such barriers can be overcome.

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