Are Patients Pleased with Computer Use in the Examination Room?

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Background. As computer hardware becomes less expensive and computer software more sophisticated and easy to use, more physicians are using computers to take notes and keep records. Although computer use offers many benefits, there is concern about whether the use of computers in the examination room will interfere with the patient-physician relationship. This experiment surveyed patient satisfaction following examination by either of two physicians, one using pen-and-pencil note-taking, the other taking notes on a computer.

Methods. Sixty patients consented to participate in this prospective, randomized, crossover study. In the first phase, 15 randomly selected patients were examined by Physician A, who made a written record, and 15 by Physician B, who made a computer record. In the second phase, the physicians switched roles. After the examination, patients completed a questionnaire to assess their degree of satisfaction.

Results. There were no significant differences in satisfaction between the group whose physician made a handwritten record as compared with those whose physician used a computer, nor was there an interaction between type of note-taking and physician. There was also no correlation between patient satisfaction and previous patient exposure to and use of computers.

Conclusions. This study demonstrated no decrease in patient satisfaction when a computerized patient record was introduced.

Key words. Medical records systems, computerized; physician-patient relations; patient satisfaction.
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Currently, fewer than 1% of US physicians use a computerized patient record (CPR), but enthusiasm for its use is growing. With the potential to reduce paperwork and staff time, even the federal government is interested. The Institute of Medicine called for automated medical records in its 1991 report.[1] The following year, Congress considered mandating automated recordkeeping for hospitals receiving federal funds.[2]

Although physicians are beginning to adopt the new technology, there continues to be concern regarding whether the introduction of a computer into the examination room could adversely affect patient-physician in-

teractions. In a recent review by Legler,[3] the following questions about computer use were formulated: (1) Do patients feel that the quality of medical care is changed? (2) Will the encounter become more impersonal with use of a computer? (3) Will the physician divert attention from the patient to the computer? and (4) Do patients feel that the computer will reduce the confidentiality of their medical records?

Several early studies surveyed patients about how they would feel if their physicians were to use computers in the examination room. In one study, more than 50% of patients expressed the opinion that the personal touch of the physician would be lost with the introduction of a computer,[4] but in a second study, only 15% of patients thought that the consultation would be less personal.[5]

Europeans were the first to use computers in the examination room and to study the effects on the patient-physician relationship. Four studies surveyed patient satisfaction before and after computers were introduced.

The results of these studies were mixed. Two studies demonstrated no significant difference in satisfaction with computer use.[6,7] However, a third study found an increase in self-reported patient stress,[8] and the fourth study found lower rates of patient satisfaction with physicians following introduction of the computer.[9]

In the first study in the United States,[10] patients from one physician's practice were randomized into a paper chart group, a keyboard entry group, or a computer voice group. No decline in the perceived quality of the patient-physician relationship was found when a computer was used by the physician during clinical encounters. In a more recent study,[11] 16 patients of 8 different physicians were interviewed about the physicians' use of a CPR system. Positive, supportive attitudes about use of the CPR system were reported. These studies did not use notebook computers (which are smaller than the desktop systems used previously) and did not randomize subjects between two physicians.

The current study was conceived as a result of our concern that patients might be upset if a computer was used during the patient encounter, even if only for note-taking. We designed this prospective, crossover study to compare patient satisfaction between two physicians using either written or computerized note-taking.

Methods

The study site was a two-physician family practice office in a residential, middle-class suburb of a large metropolitan area. For 2 years, Physician B had used a word-processing program to record progress notes on his notebook computer. These notes were printed and pasted in each patient's medical chart as a preliminary step to implementing a computerized patient record. Physician A had not used a computer previously but did know how to type.

Approximately 600 new patients were seen during the 6-month study period. Of these, 120 new adult patients consented to participate. All 120 patients completed both pre- and postexamination questionnaires, from which 60 (15 from each of four groups) were randomly selected for analysis. The office manager was instructed to select study days on which she would approach all new patients about participating in the study. The investigators were not aware of which days were chosen, nor did they know which patients had agreed to participate. Patients were aware of the study but not informed of its purpose.

During the first phase, Physician A took traditional written records and Physician B continued using the word-processing program on his 3.5-lb notebook computer. During the second phase, the physicians changed their methods of note-taking. Physician A began using a notebook computer on the examination table, his lap, or the examination room counter to record progress notes, and Physician B returned to written records.

Each patient completed pre- and postexamination questionnaires. The preexamination questionnaire used 5-point Likert-type scales to assess variables such as patient familiarity with use of computers (1=not at all to 5=very familiar) and frequency of use of computers (1=not at all to 5=very frequent). The postexamination questionnaire assessed satisfaction with various aspects of the patient-physician interaction using items selected and modified from the Service Evaluation Questionnaire (SEQ)[12] and the Family Practice Clinic Questionnaire.[13] The first was used because it was developed specifically to measure patient satisfaction, and the second because it was previously used to measure satisfaction in a family practice setting. Seventeen items were selected to assess the technical and expressive attributes of the physician and to serve as a general evaluation of the visit. An additional question asked: "If, during your visit, the doctor used a computer to record his/her notes, . . . to what extent did your doctor's use of the computer affect your physical examination?" Responses were solicited using a 5-point Likert-type scale ranging from 1 (strong positive effect) to 5 (strong negative effect).

With 30 subjects in each group, the study had .80 power to detect a 6% to 7% change in response, eg, between satisfaction averages of 4.25 in the written group and 4.00 in the computer group with a within-cell standard deviation of .50 at alpha .05.

Possible demographic differences between the written and computer groups were sought using chi-square or an analysis of variance (ANOVA) as appropriate. The primary analysis was a two-way, between-subjects ANOVA in which type of record, physician seen, and interaction between the two were studied for effects on global satisfaction. The relation between global satisfaction and familiarity with use of computers was studied using Pearson r. Multivariate ANOVA was used to examine possible differences between the written and computer groups on a particularly relevant subset of global satisfaction questions. A .05 alpha level was used for significance throughout.

Results

There were no differences between the written and computerized groups with regard to sex, level of education, age, or marital status. There was a difference in race with a higher percentage of people who identified themselves as nonwhite randomly selected into the computer group.

Table. Patient Responses to Questionnaire Items About Personal Experience with Computers and Physician Use of Handwritten and Computer-Assisted Note-Taking During Patient-Physician Encounters

Variables	Patient Responses, Mean (SD)				
	Handwritten Note-taking Group	Computer-Assisted Note-taking Group	Overall	F	P Value*
Patient experience with computers†					
Familiarity	3.7 (1.25)	3.8 (1.16)	3.7 (1.35)	0.08	NS
Frequency of use	3.8 (1.37)	3.8 (1.38)	3.8 (1.35)	0.01	NS
Effect of computer use on physician					
Seemed distracted‡	1.4 (0.69)	1.4 (0.68)	1.4 (0.67)	0.14	NS
Degree of listening§	1.4 (0.64)	1.6 (0.73)	1.5 (0.70)	0.54	NS
Eye contact satisfaction ‖	4.1 (0.67)	4.1 (0.76)	4.1 (0.72)	0.04	NS
Global satisfaction ‖	4.1 (0.43)	4.2 (0.50)	4.1 (0.46)	0.09	NS
Global satisfaction for physicians ‖					
Physician A	4.1 (0.52)	4.3 (0.54)	4.2 (0.53)		
Physician B	4.1 (0.33)	4.0 (0.45)	4.1 (0.39)		

NOTE: Patients responded to questionnaire items on a 5-point Likert-type scale.
*Significance level present at α=.05.
†Patients rated their familiarity with computers and frequency of computer use from 1 (not at all) to 5 (very familiar/frequently).
‡Patients rated the physician's level of distraction from 1 (not at all) to 5 (extremely).
§Patients rated how well the physician listened from 1 (listened) to 5 (did not listen).
‖Patients rated their level of satisfaction with the physician's eye contact, global satisfaction, and global satisfaction for physicians from 1 (very dissatisfied) to 5 (very satisfied).

(P<.05). However, as tested with ANOVA, race differences were not associated with patient satisfaction, and thus did not compromise the results of the main analysis.

Regarding experience with computers, 10 patients (17%) were "not" or "barely" familiar with them, 12 (20%) were "somewhat" familiar, and 37 (62%) were "familiar" or "very familiar" with them. Twelve patients (20%) "did not" use computers or "rarely" used computers, 11 (18%) "sometimes" used them, and 37 (62%) used them "frequently" or "very frequently." There were no significant differences between the written and computer groups with regard to familiarity with or frequency of use of computers.

A two-way between-subjects ANOVA revealed no significant mean differences in global satisfaction associated with type of record-taking (P=.77), physician (P=.41), or the interaction of type of record-taking with physician (P=.23). The potential relation between global satisfaction and either familiarity with or frequency of use of computers was tested using Pearson r, and no relationships were found.

There were no significant differences between the two patient groups in response to questions about how distracted the physician was (P=.07), how well the physician listened (P=.47), or how satisfied the patient was with eye contact (P=.85). No combination of variables separated the written from the computer group. Finally, we included the data from the 60 subjects who were randomized out of the study and repeated the analysis, with no difference in our results (Table).

Of 30 patients, 9 (30%) in the written record group

responded to the question regarding computer use during the interview even though no computer was used, and 6 (20%) patients in the computer group failed to respond to the question. Among those in the computer group who appropriately responded to the question about the effect of computer use, 5 (17%) reported a "strong positive effect," 5 (17%) reported "some positive effect," and 14 (47%) reported "no effect." No one reported a "negative" or "very negative" effect.

Discussion

In this study, there was no difference in patient satisfaction associated with written as opposed to computer record-taking by physicians. There were also no differences in patient assessment of physician distraction or the quality of physician listening.

In previous studies, physicians have used computers differently during examinations. Some have typed throughout the visit, whereas others have waited until the end. Cruickshank[9] found significant differences between physician ratings, hypothesizing that the differences may have been related to *how* they used the computer in front of patients. In that study, two of the physicians tried to minimize their use of the computer, and the third used it "conversationally" during the encounter. In our study, there were differences in how each physician used the computer, but there were no significant differences in patient satisfaction ratings.

Investigators in another study[10] were concerned that

their enthusiasm for computer use may have influenced the results. They stated that "the second author has a high degree of interest in the use of computers [and] his enthusiasm was rated significantly higher by patients in the computer input groups." In contrast, this study found no significant differences between Physician A, a computer novice, and Physician B, a computer enthusiast.

This study did not reveal a mean difference between the written record group and the computer record group with regard to patient ratings of physician eye contact, distractibility, or listening. Anecdotally, both physicians confirmed having difficulty handwriting neatly without looking down at the page. They felt they were better able to maintain eye contact when using the computer. They also expressed the belief that the computer enabled them to take complete notes during the examination without losing the personal touch.

There are several limitations to this study. Since we used a previously validated questionnaire, we did not test the question we added about how computer use affected the patient's perception of the visit. Some patients in both groups answered this question inappropriately. Thirty percent of the patients in the written record group gave an answer to this question although no computer had been used in the examination room. It is possible that patients were confused by the receptionist's use of a computer to schedule follow-up visits. Of the patients in the computer group, 20% failed to answer the same question. These subjects may have been unaware of the computer owing to the small size of the notebook computers used in this study. The physician can carry it into the examination room and place it on his or her lap or on the examination table in a manner similar to that of a paper chart. In spite of these discrepant answers, we believe patient awareness of the computer's presence would not have affected their visit satisfaction.

Another possible limitation is that computerized note-taking was the only computer-related task evaluated in this study. With a computerized patient record, physicians also use the computer for other tasks, such as looking up previous notes and laboratory data, entering medications, and printing prescriptions. It is possible that more extensive use of the computer for these tasks may have changed patient responses, although previous studies suggest otherwise.

Finally, our study only involved two physicians. We were aware of only two other physicians in our area using a computer for patient notes, and both were unwilling to return to the paper record for the purposes of a study. The small number of physicians using computers is a major

difficulty with research on computers and the patient-physician relationship. Although only two physicians participated, this study adds to previous data in predicting favorable patient reactions to the larger scale use of computers by physicians.

The pace of practice computerization has accelerated dramatically since we began this study. While it seems intuitive that better recordkeeping improves the quality of the patient-physician relationship, it is reassuring to have data to support this theory, particularly as physicians move toward wider implementation of the CPR.

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