Working with an Electronic Medical Record in Ambulatory Care: A Study of Patient Perceptions of Intrusiveness

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Abstract

Objective: To assess patient perceptions of electronic medical record (EMR) intrusiveness during ambulatory visits to clinics associated with a large academic medical center.

Methods: We conducted a survey of patients seen at any of 98 academic medical center clinics. The survey assessed demographics, visit satisfaction, computer use, and perceived intrusiveness of the computer.

Results: Of 7,058 patients, slightly more than 80 percent reported that the physician had used the computer while in the room, but only 24 percent were shown results in the EMR. Most patients were very satisfied or satisfied with their visit and did not find the computer intrusive (83 percent). Younger respondents, those shown results, and those who reported that the physician used the computer were more likely to perceive the computer as intrusive. Qualitative comments suggest different perceptions related to computer intrusiveness than to EMR use more generally.

Discussion: Patients were generally accepting of EMRs and therefore use of computers in the exam room. However, subgroups of patients may require greater study to better understand patient perceptions related to EMR use and intrusiveness.

Conclusion: Results suggest the need for greater focus on how physicians use computers in the exam room in a manner that facilitates maintaining good rapport with patients.

Keywords: electronic medical records, patient assessment, academic medical center, medical education, ambulatory

Introduction

The rate of electronic medical record (EMR) adoption by office-based providers continues to rise in response to federal legislation.[1,2] EMR technology can have a positive impact on the quality, cost, and efficiency of health care;[3-5] however, this proliferation is not without consequence. Accessing the EMR during a patient visit has the potential to alter the clinical encounter: the computer takes the role of a "third party" in the room,[6] potentially diminishing rapport and engagement with the patient.[7,8]

Frankel et al. identified four areas in which the computer in the exam room may have an impact: organization of the visit, verbal/nonverbal behavior, provider ease of computer navigation, and the layout of the exam room itself.[9] Use of the computer can organize the data collection element of a visit, but providers must still adapt when a patient's concerns do not follow the discussion trajectory of the EMR. The verbal and nonverbal behavior of providers, including when and how they utilize the computer, can influence their interaction with the patient. Relatedly, provider comfort and skill with use of the computer can have an effect. Finally, the computer should be positioned in the exam room so that the provider can face the patient and share the screen as appropriate to facilitate more effective communication.

In addition, Duke et al. document that physicians spend up to 55 percent of the visit looking at the computer screen and not at the patient.[10] This time may have a significant effect on the patient's perception of the visit because patients report lower satisfaction with providers who spend a significant portion of the visit facing the computer.[11] Further, physician-computer interaction may reduce dialogue with the patient because the physician appears busy and patients may be reluctant to

interrupt.[12] Studies of physician-patient communication suggest that excellent communicators have higher patient and provider satisfaction ratings, better symptom resolution, improved functioning, greater efficiency, and fewer malpractice suits.[13-15] The American Medical Association recognized the importance of this issue by providing their members with advice on effective computer use as well as suggesting measures to assess their effect.[16] However, current approaches to EMR training for physicians typically focus primarily on the technical aspects of utilization, and little on incorporating use of the computer into the visit.[17-19]

The intersection of EMR use and provider communication skills is an important area for understanding how patients feel about EMR and computer use during the visit. While studies have examined satisfaction with the visit, our review of the literature revealed no post-visit studies evaluating patients' assessments of intrusiveness of the EMR in the physician-patient interaction during an office visit. We believe this distinction is important because satisfaction can be influenced by a variety of factors. To address this issue and assess the extent to which patients believe EMR use is intrusive to the physician-patient interaction during an office visit, our study examines patients' reports of their experiences directly following an encounter in which the EMR is used.

Methods

Study Design

This study was conducted at 98 ambulatory clinics affiliated with a major academic medical center that had implemented an ambulatory EMR system prior to the study. Participants included patients seen by a provider at one of the ambulatory clinics, responding to an anonymous survey immediately following the clinic visit. Participants were at least 18 years of age, demonstrated the ability to speak and read English, and were able to give voluntary informed consent. This study was deemed exempt from review by the center's Institutional Review Board.

Measures

The survey developed for this study (see Table 1) asked about patient sociodemographics and about visit characteristics including a patient's history with the provider, visit satisfaction, computer and EMR use during the visit, and perceived intrusiveness of the computer. An open-ended item was included at the end of the survey in which the respondent was asked to share any additional thoughts regarding use of an EMR.

Table 1: Respondent Characteristics and Perceptions of Ambulatory Visit *N*=7,058)

Patient Characteristics	***N* (%)**
Gender	
Male	2,763 (39/4)
Female	4,242 (60.6)
Hispanic or Latino	
No	6,401 (97.3)
Yes	176 (2.7)
Race	
African American	1,187 (17.3)
Caucasian	5,350 (78.0)
Other	321 (4.7)

Insurance	
Medicaid/CareSource/Molina	1,009 (14.5)
Medicare	1,550 (22.3)
Private insurance/commercial	3,437 (49.5)
Self-pay/no insurance/other	951 (13.7)
Education	
Some high school or high school graduate/GED	1,680 (24.1)
Some college/technical school or college graduate	3,596 (51.6)
Some graduate school or graduate/professional degree	1,692 (24.3)
Income	
Less than $14,000	931 (14.4)
$14,001 to $21,200	498 (7.7)
$21,201 to $28,400	408 (6.3)
$28,401 to $35,600	523 (8.1)
$35,601 to $50,000	911 (14.0)
$50,001 to $75,000	1,132 (17.5)
More than $75,000	2,081 (32.1)
Employment	
Employed	3,700 (53.6)
Unemployed	701 (10.2)
Disabled	947 (13.7)
Retired	1,556 (22.5)
Visit Characteristics	***N* (%)**
History with provider	
Is this your first visit with the doctor you saw today?	5,046 (72.2)
No	1,940 (27.8)
Yes	
Visit satisfaction	
How satisfied were you with your visit?	58 (0.8)
Very dissatisfied	36 (0.5)
Dissatisfied	137 (2.0)
Neither satisfied nor dissatisfied	1,422 (20.3)
Satisfied	5,365 (76.4)
Very satisfied	
Computer/electronic medical record use	
Did your doctor use the computer while in the exam room with you?	1,352 (19.4)
No	5,607 (80.6)
Yes	
Did your doctor show you anything in your electronic medical record with the computer?	5,233 (76.3)
No	1,627 (23.7)
Yes	
Computer/electronic medical record intrusiveness	
How intrusive did you find the computer to your visit?	5,564 (82.9)
Not intrusive	625 (9.3)
Somewhat intrusive	524 (7.8)
Very intrusive	

Quantitative Analysis

Univariate analyses explored associations between survey items and patient demographics and responses to the question about intrusiveness of the exam room computer, using ANOVA or the nonparametric equivalent Kruskal-Wallis tests (continuous variables) and the Pearson chi-square or Fisher exact tests (categorical variables). Multinomial logit models were used to examine adjusted associations (odds ratios) between patient ratings of computer intrusiveness and each of the remaining survey items. The models represent the log odds of each category compared to the "not intrusive" category. All statistical analyses were conducted in SAS version 9.2.

Qualitative Analysis

Verbatim comments from the open-ended portion of the survey were analyzed using the constant comparative analytic approach using both inductive and deductive methods.[20] The coding team reviewed comments to identify broad themes and developed a preliminary coding dictionary. We then coded the data into broad theme categories, and discussed potential subthemes as they emerged,[21] meeting regularly throughout the process to clarify coding decisions and ensure that we reached consensus about themes and subthemes in the data.

Results

A total of 7,058 patients responded to the survey (see Table 1). Respondents were mostly female and white, with a mean age of 51.1 years (SD, 15.7; range, 18–99 years; 6,944 respondents). Most were returning patients who had an existing relationship with the provider. Slightly more than 80 percent reported that the physician had used the computer while in the room with them, and 24 percent had been shown results in the EMR. Most patients were very satisfied or satisfied (76 percent and 20 percent respectively) with their office visit. The majority (83 percent) did not find the computer in the exam room to be intrusive.

Table 2 presents odds ratios and frequencies for the three variables significantly associated with perceived computer intrusiveness in the multivariate model. Younger respondents, those who were shown results during the visit, and those who reported that the physician used the computer while in the room were significantly more likely to perceive the computer as intrusive ($p < .0001$).

Table 2: Patient Perceptions of EMR Intrusiveness by Patient and Visit Characteristics

Patient Age				
Age category	EMR Not Intrusive *N* (%)	EMR Somewhat/ Very Intrusive *N* (%)	Total *N* (%)	*p*
18–34	894 (77)	264 (23)	1,158 (18)	
35–45	1,141 (84)	204 (16)	1,345 (20)	
46–64	2,386 (84)	466 (16)	2,852 (43)	
65+	1,070 (85)	196 (15)	1,266 (19)	
Odds ratio (95% CI)	0.87 (.808, .943)			<.0001
Shown Results in EMR During Visit				
Whether shown results during visit	EMR Not Intrusive *N* (%)	EMR Somewhat/ Very Intrusive *N* (%)	Total *N* (%)	*p*
No	4,237 (85)	724 (15)	4,961 (76)	
Yes	1,231 (77)	375 (23)	1,606 (24)	
Odds ratio (95% CI)	1.56 (1.318, 1.849)			<.0001
Computer Used While in Exam Room				

Whether the physician used the computer in the exam room	EMR Not Intrusive *N* (%)	EMR Somewhat/ Very Intrusive *N* (%)	Total *N* (%)	*p*
No	1,036 (89)	125 (11)	1,161 (16)	
Yes	4,478 (81)	1,017 (19)	5,495 (84)	
Odds ratio (95% CI)	1.67 (1.306, 2.219)			<.0001

EMR = electronic medical record.
Notes: Descriptive data are presented only for variables significantly associated with the outcome in the logistic regression model. The model included these variables: age, gender, race, insurance status, education, income, satisfaction with visit, use of computer during the visit, and having been shown results in the EMR during the visit.

Patients' comments from the open-ended survey (n = 2,245) suggested different thoughts about the presence of the computer than about the use of the EMR more generally (see Table 3). Those who reported greater computer intrusiveness also discussed positive EMR factors including increased efficiency, convenience of a unified record, data sharing among providers, and improved care. Patients' negative comments related to data security, suggesting acceptance of EMRs generally, but lingering concerns about data storage, accuracy, and privacy. The few comments related to interaction with the physician or medical staff and the computer noted benefits of an EMR but also reflected respondents' perceptions that patient-provider interaction without the computer was important.

Table 3: Representative Written Comments from Survey Respondents

Topic (Frequency)	**Examples of Verbatim Comments**
Positively focused comments, by topic	
Benefits of electronic medical record (1,370)	"It is much easier for me. I appreciate having the complete list of medications available to me. It is much less confusing and more efficient for everyone involved."
Better coordination/sharing of data (356)	"I think it is a good idea so that all the different doctors I have can keep up with what is going on. This way no one is left out of the loop. There can be uniformity in treatment."
More efficient (321)	"Computers in room makes things convenient, look-up results and other things so time isn't wasted."
Improved care (210)	"I feel that electronic medical records are a step towards preventing medical errors and help to provide and ensure patient safety."
Negatively focused comments, by topic	
Security concerns (191)	"I worry about the loss of records should something happen such as a virus/electronic failure of equipment, etc." "My only concern is the possibility of hackers getting into the system. So my question is: How good is your encryption and what would happen if it is compromised?"
Distracting (84)	"I think [electronic medical records] make it much easier to coordinate care across multiple doctors. However, having the physician working on the computer during the visit can be distracting and make it difficult to feel like you have the doctor's attention." "Convenient to have info accessible, but decreases some personal interaction with physician. He focuses more on computer and is somewhat distracted from patient."
Privacy (41)	"I have no problem with the medical staff having access to my records as long as other people are not allowed to see them."
Accuracy concerns (19)	"It's nice to be able to access info from home, but some info was able to be seen by myself during my visit that didn't pertain to me. Not sure if proper log offs are done in each room."

Discussion

A main finding of this study is that most patients reported that they did not find the computer to be intrusive. Qualitative comments were also mostly positive. Further, even patients who did perceive the computer to be intrusive were still satisfied with their visit, supporting findings in the literature related to patient satisfaction.[22,23] Nonetheless, some patient subgroups perceived greater levels of intrusiveness than others. For example, patients who were shown elements of the EMR during the visit had 50 percent higher odds of reporting computer intrusiveness. This finding may reflect deficiencies in current teaching approaches that emphasize triangulation of the computer, patient, and physician in the exam room,[24] and provides a reminder for physicians to continue to be attentive to the individual needs of patients through eye contact and touch.

Further, younger patients, specifically millennials aged 18 to 34 years, perceived greater intrusiveness than older patients. Millennials are typically considered to be enthusiastic about technology and comfortable with electronic sharing of information. Their greater sense of intrusiveness may be due to concern about the digital use of their medical information over which they have no control. It is also possible that because millennials themselves are fairly adept at incorporating technology into their regular interactions, they may be more sensitive to providers who are less comfortable with technology in the exam room.

Open-ended comments suggest that patients have somewhat mixed feelings about EMRs and computers. Positive and negative comments focused on very different aspects of technology, with the former noting the value added to the visit and care process and the latter related to fears about data security and privacy. Patients recognized the conveniences associated with EMRs, including having records easily accessible in one location and the ability to quickly look up results during the visit. However, some expressed concerns about the potential loss or theft of electronic data, wanting to understand the security in place to protect their data and to control access only to those who were involved in providing care. Another theme among negative comments centered on interactions with the provider, computer, and patient. A portion of patients, though small in number, commented that they felt the computer distracted the provider's attention away from the patient.

While most patients did not perceive the computer as intrusive, our study identifies potential areas for future research. For example, patients expressed concerns related to the security of the data. Studies comparing methods for presenting the steps health systems take to store and protect patient data may help to identify how patients understand data security and what factors are most important to them. Additionally, studies on the use of medical scribes could provide guidance on alternative methods for entering data into the EMR. Finally, our finding that millennials viewed the computer as more intrusive than did other age groups suggests that more research is needed to understand what factors may lead this age group to view the computer as intrusive.

Practice Implications

This study highlights the need for greater attention to how physicians work with the EMR during the patient visit. In a review of technical training for medical providers, Duke et al. offer some important considerations for more smoothly integrating the computer into the patient interaction,[25] including keeping the patient, not computer entry, as the focus through eye contact, learning to type to allow for greater eye contact with the patient, and beginning each encounter with the patient's concerns even if those do not align with the EMR data entry flow. Further, these authors recommend steps to increase engagement with the patient and the patient's EMR by showing the patient the computer screen, telling the patient what is being entered, and encouraging patients to participate in a review of results and medications. Our results, however, suggest that some patients may prefer not to be shown the computer screen because they see it as an intrusion in their visit, and that some physicians may not incorporate the EMR into the visit in a comfortable manner. These findings thus further emphasize the importance of teaching skills related to appropriate incorporation of EMRs into the patient visit, as well as recognizing patient preferences.

Conclusion

Our results suggest several important considerations for physicians attempting to incorporate EMRs in a way that is engaging to patients. While patients may be generally accepting of EMRs, not all patients feel the same way, and providers need to remain attentive to patients' reactions to their use of the computer. Sensitive attention to these issues may foster greater engagement between the physician and patient, and help to alleviate concerns about technology intrusiveness in healthcare.

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