

Patient Satisfaction With Electronic Health Record Use by Primary Care Nurse Practitioners

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The purpose of this research study was to determine if satisfaction and communication between the patient and the nurse practitioner are affected by allowing patients to view their electronic health records during the history portion of the primary care office visit compared with patients who do not view their records. A cross-sectional, experimental design was utilized for this study. The intervention group was shown several components of the electronic health record during the history portion of the nurse practitioner assessment. This group's scores on a patient satisfaction survey were compared with those of the control group, who were not shown the electronic health record. The study findings suggest that the introduction of the electronic health record does not affect patients' satisfaction related to the office visit by the nurse practitioner.

KEY WORDS: Communication, Electronic health record, Nurse practitioner, Patient satisfaction

The electronic health record (EHR) is an important tool in improving quality and lowering costs of healthcare in the United States. There are many advantages to the implementation and use of EHRs by primary care nurse practitioners including electronic prescribing of medication and improved patient safety.¹ Electronic health records provide built-in evidence-based decision support to assist nurse practitioners in providing high-quality care.¹ Electronic health records also allow nurse practitioners greater access to research findings, real-time data review, and improved patient data collection at the point of care, which promote patient safety, efficiency, and evidence-based healthcare.²

Despite the established benefits, there are a variety of barriers to the adoption of the EHR including cost, time to learn new functions, lost productivity during implementation, complexity of EHR functions, and system issues.³ Furthermore, the introduction of the EHR into the examination room may

make it more difficult to focus on relationship-oriented aspects of communication such as exploring psychosocial and emotional issues and nonverbal aspects of communication such as eye contact.⁴ Communication between the healthcare provider and the patient has been shown to have a positive relationship on patient outcomes such as satisfaction and adherence to treatment.⁵ There is a perception among healthcare providers that therapeutic communication suffers when introducing the computer into the relationship between the patient and the provider, negatively affecting patient satisfaction.

Strategies for overcoming the communication concerns associated with EHR use may include taking breaks from working on the computer to focus on the patient, considering the spatial arrangement of the room to make it more "open," positioning the nurse practitioner closer to the patient to allow more eye contact, and allowing patients to view their own records on the computer.⁴ While these strategies have been suggested in the literature, there is little specific research to ascertain whether implementation of these approaches to communication actually improves patient satisfaction with the interaction.

LITERATURE REVIEW

A review of the literature related to the effect of the EHR on patient satisfaction and patient-provider communication during implementation of the EHR in primary care was performed from 2005 to 2014. Few research studies focused on this topic were found, and of these the findings varied related to patient satisfaction and communication and the use of EHR.

A correlational path analysis study by Tejero⁶ investigated the association between the nurse-patient relationship and patient satisfaction. The Nurse Patient Bonding Instrument was used to measure interactions between nurse and patient. Results of this study indicate that nurse-patient bonding directly affects patient satisfaction. Frankel et al⁷ evaluated the impact of EHRs in the examination room on the communication between the clinician and the patient. The clinicians included physicians, nurse practitioners, and one physician's assistant. The research team identified basic communication concepts from the Four Habits Communication Model (4HCM). The 4HCM is used to teach communication skills

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The authors have disclosed that they have no significant relationship with, or financial interest in, any commercial companies pertaining to this article.

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to clinicians at Kaiser Permanente.⁸ The 4HCM includes investing in the beginning, eliciting the patient's perspective, demonstrating empathy, and investing in the end.⁸ The results of the study of Frankel et al⁷ indicated that the introduction of the EHR into the examination room amplified the baseline communication skills of the clinician. Introducing the EHR into the examination room affected clinician-patient communication by changing the verbal, visual, and postural connection between patients and clinicians. Duffy et al⁹ studied the impact of EHRs on nurse-patient interaction to determine whether nurses using EHRs had less eye contact or communicated less with patients than did nurses using paper documentation. The results of this study indicated that the nurses using the EHR did have less eye contact with their patients than nurses documenting on paper. Furthermore, there were longer periods of silence between nurses using the EHR and patients. The results also indicated increased patient satisfaction with the nurses who documented on paper.⁹

Nagy and Kanter¹⁰ performed an experimental study in which patient satisfaction surveys were administered to randomly selected patients who had recent interactions with physicians. The surveys were divided into three categories relative to when the physicians "went live" with the EHR. The categories included pre 1 to 3 months, post 1 to 3 months, and post 4 to 6 months in which the patient interacted with the physician after the implementation of the EHR.

Nagy and Kanter¹⁰ found no significant difference between the scores on the patient satisfaction surveys from any of the three groups. The authors concluded that the introduction of EHR in the examination room had neither a negative nor a positive effect on patient satisfaction. McGrath et al⁴ performed a qualitative, observational study that examined nonverbal communication when using the EHR during the medical interview. The researchers observed that the participants in the study had reduced eye contact when using the computer. The researchers also observed a decrease in gestures between the patient and the physician and an increase in the amount and length of pauses during interactions. Furthermore, the observers described some of the physicians as "fixated on" or "glued to" the EHR, which may have had a negative effect on patient interest during the interview. Freeman et al¹⁰ explored patient satisfaction with EHRs in a specialty headache clinic. The researchers administered a patient satisfaction survey and found that patients actually favored the use of the EHR. Most of the patients surveyed (78%) indicated that the EHR did not "...come between the provider and me. . ."^{11(p213)}

The research varied regarding patient satisfaction related to the use of EHR during interactions with physicians and nurse practitioners. Limited studies investigating specific strategies for improving patient satisfaction with the nurse

practitioner office visit while the EHR is used have been completed, supporting the need for further research in this area. The purpose of this study is to determine whether satisfaction and communication between the patient and the nurse practitioner are different in patients who view their EHR during the history portion of the primary care office visit compared with those who do not view their records during the visit.

METHODS

Design

Institutional review board approval was obtained from a local university for this research as an exempt study. A cross-sectional, experimental design was utilized. Participants were given an informational letter explaining the purpose of the study when they checked in for their appointments. The actual encounter with the patient was the same for both the control and intervention groups, except that one group was shown their EHR information, and the other group was not. The intervention group was shown several components of their EHR during the history portion of the nurse practitioner assessment. These components included medication and allergy lists for verification, laboratory results, and vital signs, whereas the control group did not view this information. After the intervention, the participants were asked to complete a satisfaction survey. Completion of the satisfaction survey implied consent to participate in the study.

Sample and Setting

The setting for the study was a primary care clinic in Southeast Michigan. The practice provides primary healthcare services for patients of all ages, different races, and from a variety of socioeconomic backgrounds. Two full-time physicians and one part-time nurse practitioner provide services. On average, the nurse practitioner sees 104 to 120 patients per month. For the purposes of this study, the population included patients scheduled with the nurse practitioner attending the clinic during the data collection phase of the study. Minors younger than 18 years, subjects who were unable to read and write English, and those who were cognitively impaired were excluded from the study.

Intervention

The intervention group was randomly selected, using systematic sampling. In order to prevent selection bias, the interval at which subjects were selected for the intervention was randomly selected by an office assistant. The assistant was asked to randomly select a number from 1 through 5, and selected number 3. As such, every third participant was assigned to the intervention group. According to Hertzog,¹¹ pilot studies should have a sample size of 10 to 40 participants per group. This sample size represents at least 10% of the

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typical size of a clinical trial. The systematic sampling process for this study continued until 20 participants were randomly selected for the intervention group, and 20 participants were included in the control group (total of 40 participants).

Instruments

The Patient Satisfaction With Electronic Health Records Survey used in this study was adapted from a previous study related to patient satisfaction with the EHR.¹¹ The study aimed to assess patient satisfaction with the EHR system in a specialty headache clinic. The survey of Freeman et al¹¹ included 15 statements regarding perceptions of the EHR covering service, access, efficiency and reliability, personal preferences, and general opinion. For the purpose of our study, survey questions related to service, personal preference, and general opinion were used. The questions related to access, efficiency, and reliability were regarding access to computerized records and efficiency of the headache clinic specifically. As such, these survey items were excluded from this study. The Patient Satisfaction With Electronic Health Records Survey included 10 statements regarding perceptions of EHR, communication with the nurse practitioner during the office visit, and overall patient satisfaction with the office

visit (Table 1). These statements were formatted using a 5-point Likert scale, with possible responses ranging from “strongly disagree” to “strongly agree.”

Additional questions for the Patient Satisfaction With Electronic Health Records Survey were adapted from the Consumer Assessment of Healthcare Provider and Systems (CAHPS) Clinician & Group Visit Survey,¹³ as well as the CAHPS supplemental health information technology item set.¹⁴ The Visit Survey was developed by a CAHPS team based on feedback from stakeholders and field tested to assess validity and reliability of the survey.¹³ The CAHPS Consortium developed the health information technology survey items. A psychometric analysis was conducted to ensure reliability and validity of the survey questions.¹⁴

Freeman et al¹¹ did not address reliability and validity of the patient satisfaction survey in their research report. Furthermore, no other study has used this tool for measurement of patient satisfaction with the EHR. For this reason, validity and reliability of the Patient Satisfaction With Electronic Health Records Survey were assessed. Prior to the data collection phase, a pilot test was conducted to establish content validity. The survey was administered to a small group of 10 randomly selected patients to ensure that the instructions

Table 1. Descriptive and Inferential Statistics of Survey Responses

	Combined (Intervention and Control)					Group				P ^c
	Range ^a	Minimum ^a	Maximum ^a	Mean ^a	SD	Control ^b		Intervention ^b		
						Mean	SD	Mean	SD	
1. The computer comes between my provider and me.	4	1	5	4.20	1.06	4.25	1.11	4.15	1.04	.77
2. I have less eye contact with my provider because of the computer.	4	1	5	4.27	1.03	4.35	1.04	4.20	1.05	.65
3. My provider pays more attention to the computer than to me.	2	3	5	4.55	0.59	4.55	0.60	4.55	0.60	1
4. My provider ignored what I told him/her.	1	1	2	1.25	0.43	4.70	0.47	4.80	0.41	.48
5. My provider's use of the computer makes it harder to talk to him/her.	4	1	5	1.42	0.78	4.70	0.47	4.45	0.99	.32
6. My provider listens carefully to me.	4	1	5	4.45	1.10	4.40	1.23	4.50	1.00	.78
7. My provider shows respect for what I have to say.	4	1	5	4.43	1.10	4.35	1.22	4.50	1	.67
8. My provider listens to the reasons for my visit.	4	1	5	1.55	1.08	4.35	1.22	4.55	0.94	.57
9. My provider shows interest in my questions or concerns.	4	1	5	1.53	1.08	4.40	1.23	4.55	0.94	.67
10. My provider's use of the computer is helpful to me.	4	1	5	3.80	1.26	3.95	1.23	3.65	1.30	.46

^an = 40.

^bn = 20.

^cP < .05.

were clearly understood and that the survey items would produce the desired results and to ensure added information was clear. Reliability was assessed using Cronbach's α , with a result of .77.

Data Collection Procedure

Patients who were scheduled to see the nurse practitioner during the data collection phase of the study received an information sheet when they checked in for their appointment. Each patient who agreed to participate was randomly assigned to either the control group or the experimental group at the beginning of a scheduled appointment. For the experimental group, during the history-taking portion of the office visit, the patient was shown his/her medication and allergy list in the EHR. The patient was asked to read and verify that these lists were accurate. Second, the nurse practitioner presented the patient his/her vital signs and laboratory report. Patients who were randomly selected for the control group were not shown this information. The nurse practitioner did discuss the information without physically showing the patient the information in the EHR, as is the normal procedure during an office visit. Following their appointment with the nurse practitioner, participants in both groups were asked to complete the patient satisfaction survey by the nurse practitioner when the visit was complete. Patients were asked not to put their names on the form. Once completed, the survey was collected by the receptionist and securely stored until data collection was complete. Data collection was complete when both the control and the intervention groups had 20 participants. At that time, the receptionist returned the data to the researcher to begin analysis. Institutional review board approval was obtained from McLaren Health Care, as well as from Oakland University.

Data Analysis Procedure

SPSS Statistics for Windows Version 19.0 (IBM Corp, Armonk, NY) was utilized to code and measure the data collected from the survey. Inferential statistics were obtained using a *t* test for differences between groups. This test allowed the comparison of the patient satisfaction scores of the control group to those of the group who received the intervention. The results of the *t* test permit us to determine if sharing the content of the EHR with the patient has a statistically significant effect on patient satisfaction. The α level was set at $P \leq .05$ for all analyses.

RESULTS

The sample ($N = 40$) consisted of adult patients at a family practice in a Midwestern state during spring 2014. Analyses focus on participants' answers to questions on the Patient Satisfaction With Electronic Health Records Survey. Questions 1, 2, 3, 4, and 5 were reverse coded. There was no

statistically significant difference in the results on the survey between the control group and the intervention group. Table 1 shows further details.

The majority of the survey respondents (82.5%), regardless of whether they were in the control group or the intervention group, did not believe that the EHR was a barrier between them and the nurse practitioner. Nor did the majority of participants (82.5%) believe that the EHR had a negative effect on eye contact between them and the nurse practitioner. Similarly, 85% of the participants, regardless of their group, disagreed or strongly disagreed with the statement "My provider pays more attention to the computer than to me." In fact, all of the participants (100%) indicated that they disagreed or strongly disagreed to the statement "My provider ignored what I told him/her," and almost all of the respondents (95%) disagreed or strongly disagreed that the EHR made it more difficult to talk with the nurse practitioner.

The majority of the study participants, irrespective of their group, felt that the nurse practitioner listened carefully to them (90%), showed respect for what they had to say (90%), listened to the reason for their visit (92.5%), and felt that the nurse practitioner was interested in their questions or concerns (92.5%).

The final question on the survey concentrated on the participants' perception of the helpfulness of the nurse practitioner's use of the EHR. Many of the participants indicated that they strongly agreed that the nurse practitioner's use of the EHR was helpful (40%), regardless of whether they were in the control group or the intervention group. Interestingly, there were also several participants who neither agreed nor disagreed (30%) that the nurse practitioner's use of the computer was helpful to them. Table 2 shows a summary of responses.

DISCUSSION

The differences in scores on the Patient Satisfaction With Electronic Health Records Survey between the intervention group and the control group in this study were not significant. There was no difference in the patient satisfaction with the nurse practitioner's use of the EHR during the visit, regardless of whether the patient was shown the information on the screen. In fact, both the control group and the intervention group were relatively satisfied with the nurse practitioner's use of the EHR. Overall, participants thought that the nurse practitioner was respectful, listened carefully to what they were saying, and showed interest and concern. Interestingly, most of the participants did not view the nurse practitioner's use of the EHR as either helpful or unhelpful.

McGrath et al⁴ indicate that the introduction of the EHR into the examination room may have a negative effect on communication between the patient and the nurse practitioner. They indicate that allowing patients to view their own records

Table 2. Patient Satisfaction with EHR Survey: Frequency (Percentage; n = 40) of Strongly Disagree to Disagree and Strongly Agree to Agree

Question	Strongly Disagree to Disagree	Agree to Strongly Agree
1. The computer comes between my provider and me.	33 (82.5)	3 (7.5)
2. I have less eye contact with my provider because of the computer.	33 (82.5)	2 (5.0)
3. My provider pays more attention to the computer than to me.	38 (95.0)	0 (0.0)
4. My provider ignored what I told him/her.	40 (100.0)	0 (0.0)
5. My provider's use of the computer makes it harder to talk to him/her.	38 (95)	1 (2.5)
6. My provider listens carefully to me.	4 (10)	36 (90.0)
7. My provider shows respect for what I have to say.	4 (10)	36 (90.0)
8. My provider listens to the reasons for my visit.	3 (7.5)	37 (92.5)
9. My provider shows interest in my questions or concerns.	3 (7.5)	36 (90.0)
10. My provider's use of the computer is helpful to me.	4 (10)	24 (60.0)

This is a summary of responses to survey questions. Survey responses have been combined for simplicity.

in the EHR may be one strategy for overcoming the communication concerns associated with EHR use. On the contrary, the results of this study indicate that showing the patient the information contained in his/her EHR had no significant effect on the patient's satisfaction with the communication between nurse practitioner and patient. In fact, the scores on the patient satisfaction surveys were generally high in both the control and the intervention groups. This is an important finding in that concerns regarding negative effects on the relationship between the nurse practitioner and the patient are one barrier to EHR implementation in family practice offices. Our results indicate that there was no negative effect on this relationship. These findings support the research done by Nagy and Kanter,¹⁰ in which the authors concluded that the introduction of EHRs in the examination room had neither a negative nor a positive effect on patient satisfaction.

It is possible that the communicative relationship between the patient and the nurse practitioner is affected more by the nurse practitioner's communication skills and comfort level

with the EHR than the actual use of the EHR. This possibility is supported by the findings from Frankel et al,⁷ who determined that the introduction of the EHR into the examination room amplified the baseline communication skills of the clinician. Furthermore, the baseline computer use of the patient could have an effect on their satisfaction with the EHR use by the nurse practitioner.

Currently, there is a trend toward allowing patients to view their records via secure patient portals from computers outside the office setting. Research has shown that these "open notes" can have a positive impact on patients' recall and understanding of their care plan and an increased level of control over their care.¹⁵ Allowing patients to view their records in the office, during the office visit, may provide an opportunity for the nurse practitioner to verbally review the information that patients will see when they access the "open notes" from home. Verbal communication using plain, nonmedical language can improve health literacy among patients.¹⁶

Limitations

There are limitations to this study including the use of only one nurse practitioner to perform the intervention, but the researchers believed this would offer more consistency for the intervention with participants. Content validity of the instrument has been established, but further construct validity and psychometric evaluation are always desirable. The researchers did not collect demographic information from participants to ensure confidentiality; this information could have served to better understand if there was a difference in age sets, education, and sex related to EHR use and if communication skills and comfort level with the computer could impact outcomes of satisfaction related to the demographic information. The small sample size of participants (N = 40) is a limitation. Ideally, a larger sample size would have yielded more information. However, based on the fact that participants were drawn from a small practice base of approximately 200 patients, the sample reflects 20% of the population.

CONCLUSION

According to Cipriano,¹⁷ it is important to measure the impact of new technology on nursing care, workflow, productivity, and satisfaction in order to redesign practice environments and share best practices. Mastery of the EHR will allow advanced practice nurses to expand their role as primary care practitioners and increase patient satisfaction.¹⁸ Nurses must be able to utilize new technologies without sacrificing patient care relationships and interactions. This study is a step into determining best practices for history taking while utilizing the computer for documentation into the EHR. The results of this study indicate that showing the patient the information on the screen while using the EHR for documentation in primary care has neither a positive nor negative effect

on patient satisfaction with the communication between the nurse practitioner and the patient.

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