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A survey of chiropractic intern experiences learning and using an electronic health record system

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Objective: Previous research has discussed various challenges to introducing an electronic health record (EHR) to first-time health professional students. Chiropractic interns face similar challenges. Interns' perceptions about learning and using an EHR were assessed.
Methods: An anonymous electronic survey was sent to interns of our outpatient chiropractic clinic requesting their relative agreement or disagreement to statements in nine domains. Since perceptions of EHR have been shown to change with increased time spent using an EHR, the survey also sought to compare more experienced users (8th semester) to novices (7th semester). Data were analyzed for relative agreement to statements related to learning the use of the EHR. Interns also provided other written comments.
Results: There was a 51% overall response rate, evenly divided between 7th and 8th semester interns. Interns generally concurred that they were adept at using the current EHR and those with more experience responded they were more adept than those with less EHR familiarity. Interns strongly agreed that the EHR facilitated gathering information about patients through the ability to review previous clinical notes, tests, and medication lists. Experienced interns were more likely to enter data after the encounter was over and novice users more commonly entered data during the encounter.
Conclusion: This information regarding interns' EHR experiences may provide strategies that lead to improvements in intern EHR education. Having insight into learners' experiences can provide important input to the EHR features that should be considered carefully by institutions and individual purchasers alike.

Key Indexing Terms: Chiropractic; Education; Electronic Health Records; Surveys and Questionnaires

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INTRODUCTION

Electronic health records (EHR) are used commonly in health care.[1] How an EHR is selected, which features should be included, and how it is introduced to first-time users are important issues to address. Several barriers must be overcome when learning to use a complex EHR.[2] New users have been recorded as spending longer hours for an average of 1 month while becoming familiar with a system.[3] McGinn et al.[4] noted decreased productivity and poorer job performance during the transition to EHR as well as worker dissatisfaction with slow system speed and certain features. Experienced providers, such as physicians, have reported decreased work efficiency, need for more data, less time for patient interaction, and tedious standardized formats as problems with some EHRs.[5]

Other studies have shown that systems that can be learned quickly, require few clicks, and facilitate rapid completion of work are favorable and facilitate implementation of and satisfaction with EHRs.[6,7] Better productivity has been cited as being associated with EHRs, since patient information is readily available and organized.[8] Satisfied EHR users like systems that help them to improve quality of clinical decisions, delivery of long-term and preventive care, and communication with other providers.[9]

As a clinical educator who supervised some of our 4th year chiropractic interns, it became apparent that some readily learned and adapted to the EHR, while others had considerable difficulty. Some interns found shortcuts and shared them with classmates. Others voiced frustration with system functions and features. Studies in other health care settings have shown such perceptions vary between novice and more experienced users.[3,10] Thus, chiropractic interns were surveyed regarding their preferences or dislikes in learning and using our EHR, so that analysis could possibly lead to improvements in intern education regarding the EHR. It was hoped that findings also would provide insight into clinical educators who advise interns

considering an EHR for their own future practices. This study fills a gap in the literature, as to our knowledge no other studies have reported the preferences of chiropractic interns, about EHRs, reported in chiropractic in the literature. The hypothesis tested was that 8th semester interns would perceive some aspects of the system to be easier to use and be more satisfied with some of its features, since they had more experience and adapted to the system, compared to 7th semester interns.

METHODS

The Alteer EHR system (CompuGroup Medical, Phoenix, AZ) was used at our clinic. Thus, the survey was designed to capture intern observations regarding its features and ease of use, and to compare the perceptions of 7th semester interns, who had 6 weeks of experience with the EHR, to those of 8th semester interns with 24 weeks of experience. The interns also were asked to reflect on their perceived proficiency, how they generally experienced using the EHR, and how well they felt the system worked. Survey statements were selected based on similar ones used in other EHR surveys regarding system features and learning preferences[9,11–14] as well as recurring issues the author faced while interacting with and helping interns learn the system. The survey was not piloted, but it was reviewed by the dean of the college who made suggestions regarding sequencing statements in domains.

Students were asked to rate their agreement to 42 statements that were grouped into nine domains. Each respondent indicated their relative agreement to each statement by choosing 1 of the following: strongly agree, agree, neutral, disagree, or strongly disagree. Participants also were provided free text space to type in what they liked best about the EHR, what they liked least, what they think could be improved, and other comments. An e-mail message was sent to all 4th year interns (24 in 7th and 23 in 8th semesters) containing information regarding the survey and a link to it. The survey was hosted by SurveyMonkey (SurveyMonkey, San Mateo, CA). All responses were anonymous and not tracked. The University of Bridgeport institutional review board approved this research.

RESULTS

Of 47 possible surveys, 24 were completed (51% response rate; 54% male/46% female respondents), with 13 of 24 (54%) and 11 of 23 (49%) completed by 7th and 8th semester interns, respectively. Table 1 provides the percentage relative agreement for statements in each domain. Free text comments, organized by theme regarding EHR likes, dislikes, recommendations, and other comments are presented in Table 2. Many comments about the system were centered on network issues.

DISCUSSION

When faced with learning an EHR system, interns found challenges, learned some solutions, and were left with wishes for certain system features. A summary of findings and discussion relating to each domain follows.

Please Rate Your Satisfaction With the Training Received in Using the EHR

Most indicated they learned the EHR by trial and error and with help from observing their same semester peers and upper semester interns. A 2-hour training session was offered in a computer simulation laboratory before first use of the system. Respondents were divided on how helpful that was. One student wrote: "...I feel that organized training in use of the EHR should begin earlier, preferably in the student clinic environment, and focused on utilizing the face sheet to effectively communicate patient status in a meaningful and quick way..." Borycki et al.[15] found research was lacking on EHR integration in health care professional education, and introduced an educational portal for health care students to familiarize themselves with differing EHR in a simulated environment with no real patient data used. Educators should consider various teaching and learning methods, including experienced user and peer-to-peer instruction and simulations. Ample practice time should be provided when introducing the EHR to students.

Please Indicate How You Most Frequently Interact With the EHR and Other Persons

Most data were not entered during the encounter, possibly indicating difficulty with the system, the amount of time it took, or interns having difficulty doing so in front of the patient. In fact, 69.23% of 7th and 100% of 8th semester interns agreed or strongly agreed with the statement: "I enter most patient data after the encounter is over." More experienced interns may have stopped trying to enter data during the encounter, possibly due to difficulties entering data while maintaining patient rapport or good clinical flow.

Ventres et al.[16] observed practitioners' EHR use in the presence of patients. The physical location of the EHR affected interaction with patients. For example, flat screens on a mobile cart gave providers more options to maintain eye contact with patients. They noted that most providers alternated between talking to a patient and typing, and the ability to relate to a patient decreased as more time was spent typing during the encounter. The authors identified three types of providers with differing EHR use characteristics. Informationally-focused providers generally positioned themselves at the computer and used computer-guided questions to focus on the patient's problem. Interpersonally-focused providers generally sat or stood away from the computer and faced the patient, entering data later. Those practitioners having a managerial style, alternated interviewing patients with defined intervals for data entry. Resident physicians voiced concerns about developing a patient communication style while simultaneously trying to enter findings and recommendations in the EHR. Most found it difficult to do both. Since interpersonal skill development is so important for patient-centered care, the authors suggested EHR training should be part of general medical education. Fredericks et al.[17]

Table 1 - Seventh and Eighth Semester Intern Responses to the Electronic Health Records (EHR) Survey

	% SA/A		% N		% D/SD	
	7th Semester	8th Semester	7th Semester	8th Semester	7th Semester	8th Semester
Please rate your satisfaction with the training received in using the EHR.						
1. The initial training I received in using the EHR was helpful.	38.5	27.3	23.1	45.5	38.5	27.3
2. I learned to use the EHR by trial and error.	84.6	90.9	15.4	0	0	9.1
3. I learned to use the EHR with help from own semester peers.	76.9	45.5	7.7	27.3	15.4	27.3
4. I learned to use the EHR with help from upper semester students.	100	72.7	0	9.1	0	18.2
5. It was easy to learn to use the EHR.	38.5	45.5	53.9	45.5	7.7	9.1
6. Using paper record system in the Student Clinic prepared me to use EHR.	0	18.2	15.4	9.1	84.6	72.7
7. I am adept at using the EHR.	61.5	72.7	30.8	27.3	7.7	0
8. Staff are helpful when I have problems with the EHR.	53.9	45.5	23.1	36.4	23.1	18.2
Please indicate how you most frequently interact with the EHR and other persons.						
9. I collect most patient data on paper and then transfer to the EHR.	61.5	45.5	7.7	9.1	30.8	45.5
10. I enter most patient data after the encounter is over.	69.2	100	7.7	0	23.1	0
11. I enter most patient data during the encounter.	30.8	18.2	0	9.1	69.2	72.7
12. Using the EHR has helped me improve my communication skills.	15.4	9.1	30.8	45.5	53.9	45.5
13. The EHR helps facilitate post-encounter feedback from my clinician.	53.9	36.4	38.5	36.4	7.7	27.3
14. I find it difficult to maintain rapport with my patients while I use EHR.	53.9	18.2	15.4	36.4	30.8	45.5
15. Patients seem to like having their clinical information entered into EHR.	0	0	84.6	100	15.4	0
Please rate the following characteristics of the EHR.						
16. The EHR maintains an organized patient record.	76.9	45.5	15.4	27.3	7.7	27.3
17. The EHR identifies significant information, such as contraindications, precautions and alerts in an easily accessible fashion.	30.8	18.2	38.5	36.4	30.8	45.5
18. The EHR is reliable.	23.1	18.2	46.2	27.3	30.8	54.6
Please rate the ease of use of the EHR in the following areas.						
19. I have easy access to patient information through the EHR.	76.9	63.6	15.4	18.2	7.7	18.2
20. The EHR helps me manage problem lists well.	38.5	27.3	23.1	18.2	38.5	54.6
21. The EHR helps me manage medications/ supplementation lists well.	30.8	36.4	46.2	18.2	23.1	45.5
22. The EHR helps me manage patient history and examination findings well.	69.2	63.6	0	18.2	30.8	18.2
23. The EHR helps me manage daily notes well.	76.9	63.5	7.7	9.1	15.4	27.3
24. The EHR effectively captures external clinical notes and reports.	38.5	36.4	38.5	36.4	23.1	27.3
25. The EHR presents patient-specific treatment/ management plans well.	23.1	36.4	46.2	27.3	30.8	36.4
26. The EHR facilitates ordering and documenting preventative screening and services.	15.4	18.2	53.9	45.5	30.8	36.4
27. The EHR facilitates ordering and documenting rehabilitative screening and services.	15.4	27.3	46.2	36.4	38.5	36.4
28. The EHR facilitates integration of patient care with the different UB Clinic disciplines.	46.2	18.2	30.8	54.6	23.1	27.3
29. The EHR facilitates easy documentation and tracking of patient compliance to treatment and reasons for noncompliance.	30.8	36.4	30.8	18.2	38.5	45.5

Table 1 - Continued.

	% SA/A		% N		% D/SD	
	7th Semester	8th Semester	7th Semester	8th Semester	7th Semester	8th Semester
Please compare the EHR to paper records.						
30. Using the EHR is easier than paper notes.	61.5	72.7	15.4	0	23.1	27.3
31. The EHR saves time when compared to paper notes.	61.5	63.6	7.7	0	30.8	36.4
32. The EHR is more thorough than paper notes.	46.2	54.6	38.5	18.2	15.4	27.3
Please rate the following items relating to the flow of patient care.						
33. The EHR templates remind me how to proceed with history and examination.	38.5	54.6	38.5	9.1	23.1	36.4
34. The EHR templates help me improve my history and taking and documentation.	7.7	45.5	53.9	18.2	38.5	36.4
35. The EHR templates help me improve physical examination performance and documentation.	53.9	45.5	23.1	18.2	23.1	36.4
36. The EHR helps me with clinical workflow.	15.4	36.4	38.5	18.2	46.2	45.5
Please rate the following items relating to outcomes of patient care.						
37. The EHR makes it easy for me to track outcomes of care.	38.5	45.5	38.5	9.1	23.1	45.5
38. The EHR facilitates ready access to the information I need to assess and document quality of patient care and perform quality assurance.	53.9	45.5	23.1	18.2	23.1	36.4
39. Using the EHR improves the overall quality of patient care.	30.8	18.2	38.5	54.6	30.8	27.3
Please rate your agreement to the statement:						
40. "Using our EHR helps me understand which features I should look for when considering an EHR for my future practice."	76.9	40	15.4	50	7.7	10
For 8th semester students only, please rate the use of the EHR this semester compared to the previous semester.						
41. After using the EHR over the previous semester, I was able to improve the accuracy of my documentation. **(8th sem. only)**		63.6		18.2		18.2
42. After using the EHR over the previous semester, I was able to reduce the time it took to complete the patient encounter documentation. **(8th sem. only)**		54.6		27.3		18.2

SA/A: strongly agree/agree; N: Neutral; D/SD: disagree/strongly disagree.

also discussed the importance of eye contact and how reducing it may diminish patient trust. They further suggested that educators should train future practitioners regarding communication styles while using the EHR and make sure screen and body positioning are optimized. The significance of establishing a style of interaction with patients while using EHR should be discussed with novice users.

Please Rate the Following Characteristics of the EHR

Respondents indicated the system was not reliable but maintained an organized record overall. They generally disagreed that the system permitted easy access to precautions, contraindications, or alerts. In a user satisfaction survey,[11] respondents favored EHR with the ability to rapidly find information. Systems should be selected that facilitate easy access to significant information and training should emphasize how to find it.

Please Rate the Ease of Use of the EHR in the Following Areas

There was strong consensus that the EHR allowed easy access to general patient information and managed daily notes well, but was not good for documenting and tracking patient compliance to treatment recommendations, rehabilitation, or wellness advice. Interns felt the EHR did not allow easy access to treatment plans and problem lists. Russ et al.[18] reflected on interviews with EHR users in a Veterans Administration Medical Center. Some respondents stated they were frustrated trying to locate particular information imbedded in the EHR. The authors raised the question as to how EHR design could prioritize critical information and make it more easily accessed and sorted. Again, the ability to rapidly access key information should be emphasized when choosing a system and training users.

Table 2 - Respondents' Likes, Dislikes, Suggestions and Other Comments Regarding the Electronic Health Record (EHR)

Likes (16 individual responses)	• Access to previous visit and old notes, clinical information, medication lists (3) • Organized schedule, reason for visit, history, and physical exam (3) • SOAP note format/separate sections for history, examination (2) • Face sheet gives snapshot of patients scheduled that day (2) • Each clinic can access any encounter the patient has in the system (2) • Nothing (2) • Easy check-off boxes for normal history and examination findings • Easier than paper notes
Dislikes (18 individual responses, 4 with 3 different themes each; 26 total)	• Not user-friendly, cumbersome (8) • Slow system speed, unreliable (5) • Templates not appropriate for chiropractic practice (4) • Difficult access to certain patient information, such as radiological reports (2) • Automatically logs off too quickly • Must scan many documents into system • No cut/paste feature • Too many features not used • Not chiropractic-specific • Awkward trying to enter data with patient in room • Everything
Suggestions for improvement (16 individual responses, 1 with 2 different themes and 1 with 3 different themes; 19 total)	• More user-friendly (6) - redundant clicking (2); better access to treatment plans; preview and finishing notes cumbersome; need multiple window capacity; excess features not used • More chiropractic-specific templates (3) – treatment plans; data entry for daily visit; diagnosis lists • Increased operating speed (2) • Spelling check feature (2) • Better training (2) – available features; interfacing with patient and EHR • Standardization (2) – of templates among the clinics (chiropractic, naturopathic and acupuncture); of note content between chiropractic clinicians • Use tablets rather than desktop computers for data entry/viewing • Correct the multiple misspellings found in templates
Other Comments (6 individual responses, 2 with 2 different themes each; 8 total)	• System too slow (2) • Would not purchase or use in practice (2) • Useless features for chiropractic clinic • Waste of money • Need earlier training in student clinic • Tablets would be improvement over desktops

Numbers in parentheses indicate multiple responses on a theme.

Please Compare the EHR to Paper Records

Interns agreed the EHR saved time and was easier and more thorough when compared to paper notes. In our college, paper note keeping is used during semester 6 when students examine and treat fellow students in the student clinic. It was not surprising that interns would favor EHR over paper, as was found in a survey of faculty and house physicians that found both groups preferred EHR over paper records.[7] Perhaps our institution's student clinic should adopt the same EHR as used in outpatient clinics to facilitate easier and more consistent implementation by interns.

Please Rate the Following Items Relating to the Flow of Patient Care

Respondents generally did not find the system helpful with clinical workflow, physical examinations, or history taking. However, one intern favored the templates, stating, "I like the boxes that we can check off in the physical exam section. It makes it easier and faster when the patient is in a good condition." Another intern wrote, "It organizes the history and physical exam portions nicely. The text boxes on the bottom are very useful." Bonner et al.[12] found survey respondents were divided regarding their like or dislike of built-in clinical reminders designed to help clinicians ask screening questions. In addition, some respondents valued availability of structured consultation forms and decision support based on best practices.

Please Rate the Following Items Relating To Outcomes of Patient Care

Respondents were neutral about whether the EHR helped them improve patient care, prepare for quality assurance, or track patient outcomes. One intern wrote about a weakness in the system: "Not being able to easily access patient radiographs, meds, problem lists, future appointments, and other provider notes. Some of these are possible to find, but not with ease." EHR selection and

training should emphasize the availability and easy accessibility of these features.

Please Rate Your Agreement to the Statement: "Using our EHR Helps Me Understand Which Features I Should Look For When Considering an EHR for My Future Practice."

Both 7th and 8th semester interns agreed that using the EHR in the outpatient clinic helped them to decide what features to seek if they were to purchase their own system. A future study could investigate preferred features and the systems that have them available.

For 8th Semester Students Only, Please Rate the Use of the EHR This Semester Compared to the Previous Semester

As expected, the more experienced 8th semester interns noted improvements in accuracy and time taken to complete notes. Of 8th semester interns, 63% agreed that the accuracy of their documentation increased after using the EHR over the previous semester, and 54.55% also indicated they were able to reduce the time it took to complete the patient encounter documentation. It appears that novice user's learning could be enhanced if those experienced with the system were formally involved as trainers.

Study Limitations

The survey was not piloted. There was an attempt to use neutral statements in seeking agreement or disagreement to limit potential biases in wording of questions. Since the EHR was unique to the clinic studied, the results were not generalizable outside of the institution, but do provide the institution with valuable data to use in making change in our program. Of possible respondents, 51% participated and many offered helpful comments in the free text fields. Since these responses were anonymous and untraceable, it was hoped that interns would freely provide insights. Perhaps those who chose not to write a comment could provide other valuable information.

CONCLUSION

There may be unintended consequences stemming from the introduction of an EHR, such as difficulties with patient interaction, learning to navigate its features, and entering or extracting data. The EHR requires specific skills and training.[19] Training on our EHR should be improved with the use of simulations and earlier exposure. Interns found a combination of help from more experienced users and their peers as well as trial and error helped them learn the system. Educators should facilitate such peer-to-peer and senior interaction on the system before use. Different interactional styles, as well as provider and patient preferences should be considered in the context of teaching and learning to use an EHR. Strategies also should be sought to optimize good patient rapport while collecting and recording important patient data. Interns wanted easy access to alerts and key patient data, such as precautions and contraindications, problem lists, and management plans. These should be emphasized during training and considered key features when purchasing an EHR.

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Author Contributions

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