

First-year Medical Students Can Demonstrate EHR-specific Communication Skills: A Control-group Study

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Background and Objectives: *Graduating medical students will universally use electronic health records (EHRs), yet a June 2007 literature search revealed no descriptions of EHR-specific communication skills curricula in US medical schools. We designed and tested methods to teach first-year medical students to optimally integrate EHRs into physician-patient communication in ambulatory encounters.*
Methods: *We randomly assigned 17 volunteer students to control (n=8) and intervention (n=9) groups. Both groups learned the mechanics of documenting patient histories using the EHR. Additionally, we taught the intervention group EHR-specific communications skills using guided discovery, brief didactics, and practice role plays. We compared both groups' general and EHR-specific communication skills using a standardized patient (SP) case.*
Results: *Students receiving EHR communication skills training performed significantly better than controls in six of 10 EHR communication skills. In 10 of 11 general communication skills, there were no significant differences between groups.*
Conclusions: *First-year medical students can demonstrate EHR communication skills early in their medical training. However, in our setting, students did not spontaneously demonstrate EHR skills without instruction, and such skills did not correlate with general communication skills.*

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National governmental agencies, including the Institute of Medicine, have called for the widespread adoption of electronic health records (EHRs).¹⁻³ In response to this call, US medical schools are increasingly introducing EHRs into teaching settings. As more medical schools adopt EHRs, medical students are learning to conduct and document ambulatory encounters using the EHR.

Despite this widespread use of EHRs by students, a June 2007 Medline search revealed no reports describing teaching methods or curricular interventions for teaching EHR-specific communication skills. Establishing such teaching methods is important because of documented concern regarding potential negative influence of the EHR on physician-patient communication.^{4,5}

Medical students have expressed concerns about their ability to integrate the EHR into patient encounters. In a 2007 study, Rouf and colleagues reported that of 33 third-year medical students conducting electronic ambulatory encounters, only 64% were satisfied or very satisfied with doctor-patient communication when using an EHR.⁶ Further, only 24% thought the EHR improved their ability to establish rapport with patients, and only 21% believed that their patients liked them using the EHR. In addition, 48% of students reported they spent less time looking at the patient because of the EHR, and 34% reported spending less time talking to the patient.

The purpose of this preliminary pilot study was to establish the feasibility and practicality of teaching EHR-specific communication skills to early first-year medical students. Our questions were: (1) Do first-year medical students spontaneously demonstrate EHR-specific communication skills? and (2) If not, can they be taught such skills in the first semester of their medical training? Our hypothesis was that there would be no difference between an intervention group (that received

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instruction on communication when using an EHR) and control group (that did not) scores on a general communication skills checklist but that intervention students would score higher for EHR-specific skills.

Methods

Settings and Subjects

The University of Texas Southwestern Medical Center at Dallas (UT Southwestern) is a 4-year state medical school that enrolls 240 students per year. In the fall semester of academic year 2006–2007, we recruited 20 first-year medical student volunteers from the class of 2011. Participating students were recruited by faculty mentors and class e-mails, and they received no remuneration except pizza and soda. Three students were lost to follow-up over the course of the study, yielding a final sample size of 17 students. Students signed consent forms agreeing that their data could be included in the analysis. UT Southwestern’s Institutional Review Board awarded the study exempt status. The study was funded by a 2007 grant from the University of Texas Academy of Health Science Education.

Study Design

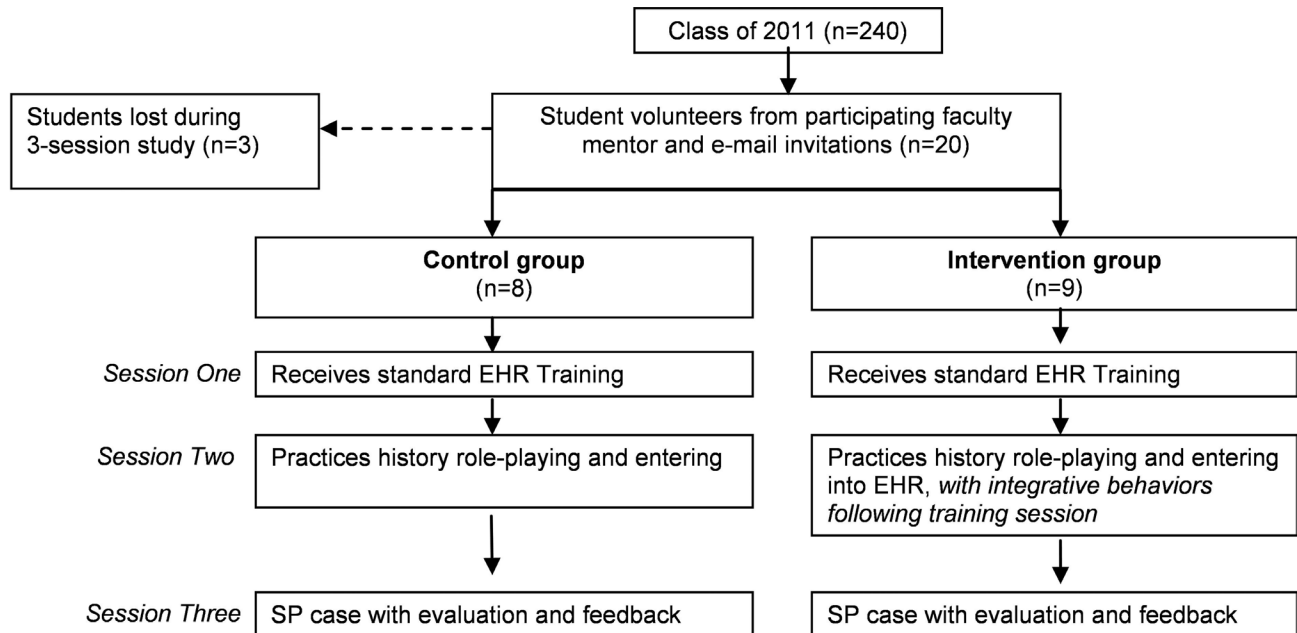
We randomly assigned students to control (n=8) or intervention (n=9) groups (Figure 1).⁷ Both groups received EHR training, but the intervention group received extra EHR-specific communication skills training. We evaluated both groups’ general and EHR-specific communication skills using an identical standardized patient (SP) case. We held our EHR-specific training sessions concurrently with students’ regular history-taking and communication skills curriculum (Figure 1).

Our intervention comprised three 90-minute sessions. We conducted two 90-minute training sessions, 2 weeks apart, from 3 to 4:30 pm, after students’ regular Wednesday afternoon classes. Two weeks later, in our third session, we evaluated students’ learning using our SP case.

Session Descriptions

Session 1. Control and intervention groups both received EHR training using test patients on the Epic EHR system. One author designed an Epic test patient

Figure 1
Study Design



EHR—electronic health record
SP—standardized patient

specifically for students' learning needs during this study. Students learned the mechanics of documenting a chief complaint and history of the present illness, looking up lab results, and checking medication lists.

Session 2. Control and intervention groups both received more instruction on and practice in documenting a patient's history in the EHR. Both control and intervention groups participated in 45 minutes of role plays and practical exercises using the Epic test patient. The intervention group received an additional 45 minutes of EHR-specific communication skills training.

One author role-played two ambulatory encounters demonstrating good and poor EHR-specific communication skills (Table 1). Poor skills included actions such as physicians turning their back to the patient and typing for long periods without looking at or talking to the patient (Figure 2). Two authors then engaged students in guided discovery in which students spontaneously generated the EHR-specific communication skills they observed in the "good" and "bad" encounters.

Finally, in a mini lecture, faculty discussed Ventres' four thematic areas affecting EHR communication⁸ and prompted students to categorize the skills they generated into one of the four areas. Students then practiced role plays with peers and computers. The control group received no training on EHR-specific communication skills.

Session 3/Evaluation. Control and intervention groups participated in an evaluation-and-feedback session using an SP visit. Students used the EHR to document a history from an SP who expressed a desire to lose weight. The first-year students required minimal medical content knowledge to discuss weight loss strategies, and the case worked well. Standardized patients evaluated students' general communication skills using the institution's standard communication skills check list. They evaluated EHR-specific communication skills using a check list developed specifically for the case, as described below.

Developing the EHR-specific Communications Skills Checklist

A panel of experienced clinician educators developed the EHR-specific communication skills check list from their educational, clinical, and EHR experience and from the literature. Panel members, all members of UT Southwestern's educational research group, included a department chair, three associate deans, and four course directors from six medical school departments.

We used a framework described by Ventres and colleagues with four thematic areas that influence EHR use in physician-patient encounters.⁸ These four areas are geographical, relational, educational, and structural. We developed the first three of these areas into constructs and wrote three to five sample behaviors

Table 1

Constructs of EHR-specific Behaviors

Adjust the geography
1. Student did not have their back to me during the exam.
2. Student adjusted the chair to be at eye level with me.
3. Student adjusted the screen so I could see it easily.
4. Student moved close enough for me to read the screen to construct a triangle between student/patient/computer (Signals like "Can you read the screen OK?")
Triad: doctor-patient-EHR relationship
1. Student introduced him/herself before turning to computer.
2. Student introduced the computer into the triad.
3. Student visually shared EHR information on the screen during the exam to bring me into the triad, rather than keeping me outside of his/her computer work.
4. Student maintained good eye contact with me during the encounter.
5. Student alerted me verbally when turning attention from me to the computer.
Using the computer to teach/enhance the quality of care
1. Student showed me my vital signs.
2. Student graphed my vital signs or showed flowsheets or showed trends about my health.
3. Student asked if I'd like a copy of my data.
4. Student accessed other online patient education materials for me.

EHR—electronic health record

for each construct. We did not include the fourth area, "structure," because structural and organizational change was beyond the scope of this pilot. Sample EHR-specific communication behaviors included physicians introducing the EHR to patients upon entering an exam room, turning the screen toward patients to share information during a visit, and queuing patients when they turned their attention to electronic documentation.⁹ (Table 1)

Developing the Standardized Patient Case

Two authors wrote the SP script for the test patient and developed an EHR communication skills checklist that reflected our three constructs and their associated behaviors. We embedded the constructs within a 15-minute history-only SP case suitable for first-year medical students with limited medical knowledge. Students were instructed to take and document electronically a history from a patient who desired to lose weight.

Conducting the SP Session

All 17 students completed the 15-minute SP case in random order. Four SPs evaluated communication skills for four-five students using both their standard communication check list and the new EHR-specific

Figure 2

EHR-specific Communication Skills (poor left, good right)



EHR—electronic health record

communications skills check list. SPs were blinded as to which students had received EHR-specific communications skills training and which had not. Two authors reviewed all 17 SP videos to confirm the accuracy of the SPs' scoring.

Evaluation of Outcomes

We compared control and intervention group scores for each of the 22 general and EHR-specific checklist items. We conducted chi square 2 x 2 tests with Fisher's Exact and Yates' correction to assess differences in performance between control and intervention groups for individual checklist items. We used Yates' correction for the chi square 2 x 2 tests to adjust for our small sample size and expected frequencies less than five.

Results

General Communication Skills Differences

The communication skills checklists, with their associated results, are shown in Table 2. On general communication skills, both groups generally scored highly, with no significant differences demonstrated on 10 of 11 items. With the exception of questions 9 and 10, there were minimal percentage differences in performance of general communication skills, as evaluated by SPs using our communication skills checklist.

EHR-specific Communication Skills Differences

Intervention group students performed significantly better on six of 10 EHR-specific communication skills, as evaluated by SPs using our communication skills checklist (Table 2). We excluded question 21, "Asked if I'd like a copy of my data," from our conclusions, since no printer was available in the SP exam area.

SP written evaluations of our intervention group consistently included positive comments such as "Good balance between technology and people skills," "I did not even notice that a computer was being used," "Adjusting your screen was considerate."

Discussion

Despite our small sample size, and despite that fact that our study's purpose was mainly to test the practicality, feasibility, and acceptability of our model and teaching methods, and despite that fact that we applied the Yates correction in our statistical analysis, which can over-adjust and lead to Type II error—which in our case would mean failing to demonstrate that our teaching of EHR communication skills positively affected student performance—our study nonetheless yielded both clinically and statistically significant findings.

We found that first-year medical students can learn EHR-specific communication skills early in their medical training. However, our students did not spontaneously demonstrate these EHR-specific skills without instruction. In addition, while both groups demonstrated excellent general communication skills, general communication skills did not correlate with the ability to integrate the EHR into the encounter. That ability improved with instruction.

Our results suggest that first-year medical students can learn EHR-specific communication skills early in their medical education in a brief educational intervention. These students had only beginner-level experience in history-taking and learned EHR skills during two 90-minute sessions. Because we relied on eager student volunteers, we purposefully included a 2-week lag period between each of the three sessions to further blunt any intervention effect.

Table 2
Communication Skills Checklist With Statistical Results

<i>MSI History Clinic—October 31, 2007</i> <i>General communication:</i>	<i>Control</i> <i>Frequency</i> <i>YES</i> <i>n=8</i>	<i>Intervention</i> <i>Frequency</i> <i>YES</i> <i>n=9</i>	χ^2* <i>Yates</i>	<i>P Value</i> <i>Fisher</i>	<i>P Value</i> <i>Yates</i>
1. Introduced self	8	9	-	-	._**
2. Established rapport	8	9	-	-	-
3. Open-ended questions at beginning	8	9	-	-	-
4. Maintained good eye contact	7	8	0.563	-	-
5. Seemed supportive and concerned	8	9	-	-	-
6. Used transitional statements	7	9	0.004	-	-
7. Avoided using medical jargon	8	9	-	-	-
8. Allowed me to speak without interruption	8	9	-	-	-
9. Summarized my history	1	8	8	<i>P</i> <.05	<i>P</i> <.05
10. Gave me a chance to ask questions	2	7	2.85	-	-
11. Appeared poised, professional, confident	7	9	0	-	-
<i>EHR Communication Skills:</i>					
12. Introduced self BEFORE turning to computer	2	9	7.41	<i>P</i> <.05	<i>P</i> <.05
13. Adjusted the chair to be at eye level with me	3	8	2.91	<i>P</i> <.05	-
14. Alerted me verbally when turning attention from me to the computer for longer periods of typing	3	8	2.91	<i>P</i> <.05	-
15. Introduced the computer into the doctor/patient/computer triad	0	9	13.22	<i>P</i> <.05	<i>P</i> <.05
16. Moved close enough for me to read the screen and constructed a triangle between doctor/patient/computer	0	9	13.22	<i>P</i> <.05	<i>P</i> <.05
17. Adjusted the screen so I could see it easily	0	8	10.10	<i>P</i> <.05	<i>P</i> <.05
18. Showed me my weight gain and/or vital signs	0	9	13.22	<i>P</i> <.05	<i>P</i> <.05
19. Graphed my weight or showed flowsheets or showed trends about my health	0	2	0.44	-	-
20. Visually shared EHR information on the screen to include me rather than keeping me outside of their computer work	0	7	7.61	<i>P</i> <.05	<i>P</i> <.05
21. Asked if I'd like a copy of my data	0	2	0.443	-	-
22. Accessed other online patient education materials for me	0	0	-	-	-

* Chi square analysis performed using SAS version 9.1.3

** No significant difference between control and intervention groups

Students in both groups performed poorly with EHR-specific items 19, "Showed trends about my health," and 22, "Accessed other online patient resources." No student successfully accessed online resources. We postulate that graphing data trends and accessing online resources may be a test of EHR navigational skills more than communication skills. Also using our dichotomous checklist, we were unable to document if students unsuccessfully attempted to graph data or access resources.

Study Limitations

Although our results are encouraging, there are several limitations to this preliminary study. First, the EHR-specific communication behaviors were based on the Ventres study, taken from the physician and not the

patient perspective. We need more information about patients' perceptions of integrating the EHR into the physician-patient interaction. Second, the EHR communication skills checklist from this pilot is not yet formally validated, but it represents an academic panel's first step in further research in this area.

The third limitation was our small sample size. But, as noted, our statistical analysis used the chi square statistic with Yates' correction to be conservative in our conclusions.

Fourth, we recruited students by e-mail, which likely introduced selection bias in favor of students who were more electronically savvy and positively disposed toward learning the EHR. However, such selection bias would tend to decrease differences between control and intervention groups. We contend that our groups were

equivalent before our intervention, because both groups performed equally well on our general communications skills check list.

A fifth limitation is that, although SPs were blinded to whether students were in the control versus intervention group, they could not be blinded to the nature of the intervention, and therefore their evaluation could have been positively biased to widen the intervention effect. Although the study team tried to limit explanation of the study to SPs, they did ask for clarification of some checklist questions prior to the evaluation session.

Finally, although we successfully taught EHR communication skills in a brief intervention, we do not know if the effects of that teaching will translate into sustained behaviors with real patients in clinical settings. And, our results apply only to first-year medical students. We do not know to what extent more clinically experienced third- and fourth-year students spontaneously acquire EHR-specific communication skills.

Conclusions

Our study adds to the literature by reporting that first-year medical students can learn and demonstrate EHR communication skills early in their medical training. However, in our setting, students did not spontaneously demonstrate the EHR skills without instruction, and EHR-specific skills bore no relation to students' general communication skills.

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