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Impact of a brief faculty training to improve patient-centered communication while using electronic health records

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ABSTRACT

Objective: Despite rapid EHR adoption, few faculty receive training in how to implement patient-centered communication skills while using computers in exam rooms. We piloted a patient-centered EHR use training to address this issue.
Methods: Faculty received four hours of training at Cleveland Clinic and a condensed 90-minute version at the University of Chicago. Both included a lecture and a Group-Objective Structured Clinical Exam (GOSCE) experience. Direct observations of 10 faculty in their clinical practices were performed pre- and post-workshop.
Results: Thirty participants (94%) completed a post-workshop evaluation assessing knowledge, attitude, and skills. Faculty reported that training was important, relevant, and should be required for all providers; no differences were found between longer versus shorter training. Participants in the longer training reported higher GOSCE efficacy, however shorter workshop participants agreed more with the statement that they had gained new knowledge. Faculty improved their patient-centered EHR use skills in clinical practice on post- versus pre-workshop ratings using a validated direct-observation rating tool.
Conclusion: A brief lecture and GOSCE can be effective in training busy faculty on patient-centered EHR use skills.
Practice Implications: Faculty training on patient-centered EHR skills can enhance patient-doctor communication and promotes positive role modeling of these skills to learners.

1. Introduction

As clinicians increasingly integrate Electronic Health Records (EHRs) into clinical practice, it is important to consider the impact of EHR use on patient-doctor communication. While benefits of computerization in health care are well described, important drawbacks exist [1]. Some studies found that EHR use can prevent doctors from focusing on patients, impede communication, and be detrimental to the patient–doctor communication [2–5]. When providers use the EHR, negative behaviors such as poor eye contact, prolonged screen gazing, and typing during sensitive discussions can emerge and have been found to undermine the patient-doctor relationship [6,7].

In the digital age, physicians need to be mindful of their "computer-side manner" as they adapt to accommodate the computer as the third party in the room. The reality of this situation is that physicians are managing competing demands as they try to remain focused on the patient while attending to the demands of the EHR. A recent study found that physicians spend 53% of their time on direct face to face care and 37% on EHR work and documentation while in the exam room [8]. One proposed strategy to address this issue of "distracted doctoring" is to integrate scribes or team based documentation assistants (e.g. Medical Assistants with expanded roles) into the clinical care team. While these interventions have shown promise for

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improving patient-doctor communication by minimizing EHR distraction, hiring scribes or expanding the role of existing team members may not be financially or logistically feasible for resource–tight academic practices [9–11]. In addition, other studies have looked at strategies to improve patient-doctor-EHR communication through enhanced exam room layouts, workflow improvements, and the use of decision aids, all with mixed results [12,13].

An alternate approach to improve patient-doctor-EHR communication may be to train physicians to utilize patient-centered communication skills. Studies have found that implementing patient-centered communication strategies can improve patient satisfaction and understanding, in addition to adherence to treatment and cost utilization [14]. Integrating patient-centered strategies may allow the EHR to be used as a tool to engage patients in meaningful discussions, enhance the therapeutic relationship and positively impact patient outcomes [15–18]. Several communication behaviors have been found to promote patient-centered communication when EHRs are used in the exam room. Specific behaviors include: screen sharing; starting the visit technology free; maximizing eye contact; disengaging with the EHR during sensitive discussions, and using the EHR for patient education and shared decision making [16,19–27]. In recent years, medical educators have called for curricula to teach these EHR-related communication skills and some have emerged for students and residents [28–30].

Despite the existence of best practices and calls for enhanced training on this topic, few faculty receive formal training on these key patient-centered EHR communication behaviors. As a result, they may be ill equipped to teach trainees [19,20,23,29,31–33]. To address this gap an, we piloted a Patient-Centered EHR Use training for primary care faculty at two academic institutions: The University of Chicago (UC) and The Cleveland Clinic (CC).

2. Methods

2.1. Setting and participants

General Internal Medicine and Family Medicine Faculty with student and/or resident precepting responsibilities were invited via email to participate in this optional training at both the Cleveland Clinic and at the University of Chicago.

2.1.1. Cleveland clinic

Cleveland Clinic faculty who precept medical students in clinics participate in regular Continuing Medical Education (CME) supported faculty development sessions. The authors secured one of these sessions for the workshop and targeted Family Medicine and General Internal Medicine (GIM) preceptors. The 4-hour training was held in a conference room using laptops and included a 75 min lecture and 100 min Group Objective Structured Clinical Exam (GOSCE) in breakout rooms in which each faculty member had 20 min to interact with the standardized patient (SP), with 5 min of feedback and 25 min of large group debriefing.

2.1.2. University of Chicago

The authors targeted GIM faculty who precept residents. Institutional support was attained and faculty were permitted to block 30 min of clinic time to attend a 90 min training session during the lunch hour. Lunch and CME credit were provided. GOSCEs took place in actual clinic rooms and faculty used their personal logins, and quick text phrases on the desktop computers they normally use for patient care. Training consisted of a 20 min lecture and 60 min GOSCE in which each faculty member had 10 min to interact with the SP with 5 min of feedback and 10 min of large group debriefing (Table 1).

Table 1
Comparison of Training at Cleveland Clinic and University of Chicago.

	Cleveland Clinic	University of Chicago
Lecture	75 min	25 min
GOSCE	100 min	60 min
Session Feedback	25 min	10 min
Total Time	240 min	90 min
Setting	Conference Room	Clinic Rooms
Computer	Laptops	Clinic desktop

2.2. Program description

In 2015, the authors adapted a student curriculum on patient-centered EHR use to meet the needs of faculty providers [20–22]. The faculty workshop consisted of a lecture and a GOSCE. The curriculum was based on best practices derived from a literature review, which was condensed into the 'HUMAN LEVEL' mnemonic to highlight key skills such as, "Honoring the golden minute" to ensure that the first minute of the visit is technology-free, and "Using the 'triangle of trust'" to position the screen where the patient and provider can see it (Appendix 1) [20,22]. Direct observations (DOs) were used to assess the participants' patient-centered EHR use skills in clinical practice. Based on best practices, the authors developed and validated the electronic-Clinical Evaluation Exercise (e-CEX) instrument to assess patient-centered EHR use during DOs (Appendix 1) [19,23]. Faculty training was tailored to meet the demands of their clinical schedules, existing institutional infrastructure, and expectations for CME. The Institutional Review Boards at both institutions approved the study.

2.2.1. Curricular implementation

The voluntary workshop targeted primary care faculty who precept students and residents in continuity clinics. The lecture reviewed how the EHR impacts patient-doctor communication and summarized best practices. During the GOSCE, faculty practiced their EHR-based communication skills with the SP by taking a focused history, reviewing data in the EHR, discussing assessment and plans, and documenting a portion of the visit (i.e., History of Present Illness or Assessment and Plan).

The SP received 4 h of training to provide feedback on patient-centered EHR utilization. The GOSCE consisted of 3–4 faculty, 1 GOSCE facilitator (WL, MA, RF, JI, or MM) and 1 SP per group. Faculty logged into the simulated EHR, interacted with the SP, and received feedback from faculty peers, the GOSCE facilitator, and SP. The GOSCE depicted a straightforward diagnosis of acid reflux to allow participants to focus on their communication skills.

Key resources in developing the GOSCE included institutional support to provide time and CME credit, and resources to train SPs. Both institutions used the EPIC EHR system (© 2014, Epic Systems Corporation, Verona, Wisconsin), and the investigators partnered with EHR trainers to develop simulated charts in the training environment to mirror EHR use in actual patient care. Additional resources included access to internet-enabled laptops or desktops with EHR software and access to clinic rooms for the GOSCEs.

2.3. Program evaluation

2.3.1. Post-workshop survey

All participants received a 23 item post-workshop survey immediately after the session. Given limitations of faculty schedules, the survey enabled faculty to self-report post-workshop

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Table 2
Comparison of Direct Observation Pre and Post Workshop using e-CEX Tool.

	Pre-Workshop	Post-Workshop	Mean Change (Post-Pre)	P value
Overall Total Score (n = 10)	49.3 (8.5)	62.8 (10.3)	13.5 (4.6)	<0.001
CC (n = 5)	45.4 (9.2)	59.0 (8.9)	13.6 (3.0)	
UC (n = 5)	53.2 (6.4)	66.6 (11.1)	13.4 (6.2)	
e-CEX question				
2. Arrange provider, patient, and computer screen in a 'triangle of trust' to allow shared viewing	4.6 (1.3)	7.1 (1.2)	2.5 (1.3)	<0.001
3. Honor the Golden Minute. Allow patient to start with their concerns	5.6 (1.4)	7.2 (1.5)	1.6 (1.5)	0.01
4. While maintaining conversational flow, explain actions with EHR	4.0 (2.1)	6.5 (1.5)	2.5 (1.9)	0.002
5. Use EHR in natural flow of visit and integrate patient needs. Disengage during sensitive discussions	5.7 (1.6)	7.3 (1.2)	1.6 (1.2)	0.002
6. Maximize eye contact, open body language, and other nonverbal actions to convey listening and understanding	6.8 (0.9)	7.4 (1.2)	0.6 (1.2)	0.14
7. Encourage patient interaction with technology by showing results etc. while explaining & discussing care	4.3 (1.9)	6.4 (1.8)	2.1 (1.0)	<0.001
8. Proficient in technology use. Adept typist, easily navigates EHR screens and tabs to facilitate flow of visit. Logs off at end of visit.	6.1 (1.5)	7.3 (1.9)	1.2 (1.0)	0.01
9. While integrating EHR into clinic visit, effectively documents note.	5.9 (1.3)	6.3 (1.5)	0.4 (0.8)	0.17
10. Utilizes EHR to promote individualized and collaborative care.	6.3 (1.3)	7.3 (1.3)	1.0 (1.2)	0.03

Values in table are mean (SD). P values are from paired t-tests.

knowledge, attitude, and skills and asked them to retrospectively rate these domains pre-workshop. Responses to Likert items were dichotomized at the high end of the scale to denote agreement (i.e., agree/strongly agree). Descriptive statistics (i.e., mean [SD] or percentages) were used to summarize demographics and responses and two-sample t-tests, Wilcoxon rank-sum tests, or chi-square tests were used for comparisons between the two sites. Overall changes pre- vs. post-workshop were assessed using paired t-tests. Immediately following the training at both sites, feedback sessions were led by investigators (WWL and MLA) to assess for areas of strength and opportunities for improvement.

2.3.2. Direct observation

Ten faculty (5 from CC and 5 from UC) were randomly selected to participate in direct observations (DO) while seeing real patients to assess EHR communication skills. Each of these ten faculty members had one twenty minute observation in their clinic pre-workshop and a second observation three months post-workshop.

The validated e-CEX tool was used to evaluate patient-centered EHR use during the direct observations and is based on the Accreditation Council for Graduate Medical Education's Mini CEX tool [23,36]. The e-CEX consists of 10 items related to best practices for patient-centered EHR use in the clinic setting identified from a systematic literature review and each item is scored on a 9 point Likert scale to assess a provider's EHR specific communication skills (Fig. 1) [19,23]. Behavioral anchors were used to define the behaviors associated with a particular score, for example for item 2 on the e-CEX assessing screen sharing, a rating of 1–3 was anchored as 'screen not visible to patient, provider's back to patient', 3–6 was anchored as "screen partly visible, occasionally with back to patient', and 6–9 was 'triangle set up optimal, verifies patient can see screen, faces patient.'

The first question from the e-CEX was excluded from the DO because it pertained to preparation for the visit outside the exam room; thus the 9 item tool had a maximum score of 81 points. Prior to the DOs, three faculty authors (WWL, MLA, MM) and two additional CC faculty members received a 2 h training during which they individually watched standardized videos, used the e-CEX to rate performance, compared their ratings with an answer key, and came together to discuss discrepancies and address questions. Faculty e-CEX scores from pre- versus post-workshop DOs were compared using paired t-tests and repeated measures ANOVA. Comparison of pre-workshop scores between sites was performed using two-sample t-tests. Mean (SD) scores are reported.

3. Results

3.1. Outcomes

Thirty-two academic primary care faculty completed the voluntary workshop, consisting of 13 CC faculty (5 FM and 8 GIM) and 19 UC GIM faculty, and 94% (30/32) completed the post-workshop evaluation. During feedback sessions, faculty reported the GOSCEs were the most valuable part of the workshop and allowed them to learn from observing peers.

3.2. Post-workshop survey results

3.2.1. Demographics

The majority (63%, 19/30) of respondents were female (CC 50% vs. UC 72%, p = 0.22), with mean age of 46 (SD = 10) years (range 31–65) (CC 47 [SD = 9] vs. UC 45 [SD = 11], p = 0.59). Faculty at CC had more years of EHR experience with an average of 9.5 (SD = 3.9) years vs. 5.7 (SD = 6.2) at UC (p = 0.02).

3.2.2. Participant knowledge, attitude and skills

All (30/30, 100%) faculty agreed it was 'important to receive training,' 'relevant to their practice,' and enabled them 'to better teach and role model patient-centered care for trainees,' with no difference in mean ratings between CC and UC faculty (4.8 [SD = 0.5] vs. 4.7 [SD = 0.5], 4.6 [SD = 0.5] vs. 4.9 [SD = 0.3], 4.4 [SD = 0.5] vs. 4.5 [SD = 0.5], p > 0.05 for all). Importantly, 97% (29/30) agreed that the workshop should be 'required for all health care providers' with no difference between CC and UC (4.8 [SD = 0.5] vs. 4.6 [SD = 0.6], p = 0.40).

When compared to retrospective recollections of pre-workshop knowledge, attitude and skills, there were significant post-workshop increases in mean scores of 'awareness of barriers' and 'knowledge of best practices' (pre vs. post; 3.7 [SD = 1.1] vs. 4.5 [SD = 0.8] and 3.1 [SD = 0.8] vs. 4.3 [SD = 0.5], respectively, p < 0.001 for both) with no site differences in the magnitude of these changes (p = 0.25 and p = 0.92). Additionally, there was a significant post-workshop increase in mean ratings on ability to 'implement best practices' and 'teach trainees how to implement best practices' (3.3 [SD = 0.6] vs. 4.2 [SD = 0.6] and 2.9 [SD = 0.7] vs. 4.1 [SD = 0.7], respectively, p < 0.001 for both) with no site differences (p = 0.19 and p = 0.17).

While almost all faculty (29/30, 97%) agreed the GOSCE was an 'effective way to practice skills,' CC mean ratings were significantly higher than UC (4.6 [SD = 0.5] vs. 4.2 [SD = 0.5], p = 0.04). However,

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more UC faculty agreed the workshop was 'informative and effective' and that they 'gained new knowledge' (4.5 [SD = 0.5] vs. 4.8 [SD = 0.4], p = 0.04 and 4.2 [SD = 0.6] vs. 4.7 [SD = 0.5], p = 0.02).

3.3. Direct observations results

The 9 items on the e-CEX were scored on a 9 point Likert scale. Ratings of 1–3 represent unsatisfactory performance, 4–6 represent satisfactory performance and 7–9 represent superior performance (Appendix 1). Overall, the mean pre-training scores ranged from 4.3 to 6.8 (Table 2). Pre-training, faculty were rated lowest on the following three skills: maintaining a conversational flow and explain what you are doing in the EHR (mean 4.0), encouraging patient interaction with the computer (mean 4.3) and optimal positioning for shared screen viewing (mean 4.6); while they were rated highest on maximizing eye contact and maintaining an open body language (mean 6.8), utilizing the EHR to promote individualized and collaborative care (mean 6.3) and proficiency in technology use, navigating EHR, typing etc. (mean 6.1).

When comparing overall pre- and post-workshop scores for the 10 faculty members, there was a significant increase in mean post-workshop total scores (pre 49.3 [SD = 8.5] vs. post 62.8 [SD = 10.3], $p < 0.001$; maximum total score 81) and all subjects had an improvement in total score between pre vs. post scores (mean change = 13.5 [SD = 4.6], range 3–19). There was no significant difference between sites in the total pre-workshop scores or in the magnitude of the pre-post change (UC Pre 53.2 [SD = 6.4] vs. CC Pre 45.4 [SD = 9.2], p = 0.16; UC change 13.4 [SD = 6.2] vs. CC change 13.6 [SD = 3.0], p = 0.95).

Faculty showed significant improvement one-month post-training on 7 of the 9 skills assessed by the e-CEX. Of these seven skills, the largest mean change was seen in the following, listed from largest to smallest change: (1) optimal positioning for shared screen viewing; (2) maintaining a conversational flow and explain what you are doing in the EHR; (3) encouraging patient interaction with the computer; (4) Integrating EHR use into natural flow of visit and integrating patient need; (5) honoring the golden minute and allowing patients to start with their concerns before introducing the computer; (6) proficiency in EHR use; and, (7) utilizing the EHR to promote individualized and collaborative care (Table 2). There was no significant change in maximizing eye contact/maintaining an open body language and effectively documenting notes in patient centered manner.

4. Discussion and conclusion

4.1. Discussion

Our study demonstrated the feasibility and efficacy of implementing a short training and GOSCE to teach faculty how to use the EHR to promote patient-centered communication at two academic medical centers. We found that a 90-minute training was as effective as a 4-hour training and may be a feasible way to train faculty at other institutions. Faculty who were directly observed after the workshops were more likely to share the screen, demonstrate patient-centered body language, and use the EHR to promote patient-engagement and education compared to their pre-workshop performance.

In the EHR era, providers must learn to improve their "computer-side" manner and find ways to nurture relationships with patients while managing the demands of the EHR. While other interventions like scribes, or improving the physical workspace may also help in improving patient-doctor-EHR communication, teaching EHR communication skills to providers is central to this initiative. Given the focus on patient experience in healthcare, and research showing improved outcomes with patient-centered communication strategies, implementing training in patient-centered EHR use should be a priority in medical education and continuing medical education. As institutions and health systems consider how to approach this issue, they may consider integrating key components of our workshop into institutionally mandated EHR training to ensure providers are being equipped to use the EHR as a communication- enhancing tool with their patients.

Our findings also suggest that specific EHR behaviors may be targeted for maximal impact of training. We found that providers retained and integrated several behaviors into their clinical practice three months after the training, including encouraging patient interaction with the EHR and starting the visit with the patient's concerns. Importantly, screen sharing improved significantly post-training and studies exploring patient perceptions of EHR use found that they want transparency and patients identified screen sharing as an important communication building tool [21].

Our study also identified effective patient-centered documentation in the exam room as an area in need of further training. This is important to consider in the context of research showing that increasing EHR documentation burden and the resultant work-life interference has been linked to physician burnout [37–39]. Training providers to complete their documentation in the exam room while meaningfully interacting with their patients can improve patient satisfaction and physician quality of life by reducing the amount of EHR work they bring home at the end of the day. Furthermore, studies have shown that patients expressed dissatisfaction with physicians who did not engage the EHR to discuss their health or provide education and our short training showed that it is feasible to improve on these skills with a short intervention [21].

The patient-centered EHR use training and GOSCE is a novel and useful way for faculty to improve their EHR communication skills and better equips them to teach and role-model them with learners. Interestingly, despite the fact that faculty do not regularly participate in GOSCEs, they reported that the experience of watching their peers interact with the SP, and being able to observe some of their communication and workflow strategies, as well as receiving feedback from their peers was the most valuable part of the training and should be required for all providers.

Our study has several limitations. Our training was optional for faculty which introduces selection bias. In addition, while we included two sites in our study the study samples were small which limits our generalizability. Another potential limitation is that we were unable to collect a pre-survey on knowledge, attitude and skills and relied on the retrospective post-workshop survey which asked faculty to assess their knowledge, attitude and skills on patient centered EHR use prior to and after the training. As well, we were unable to conduct direct observations of all faculty pre and post training and relied on a sample of ten physicians to assess impact of the training on behaviors three months after the workshop. Lastly, the direct observations were not blinded to training status which may introduce bias.

We will continue to follow-up with faculty to assess for the durability of skills one year post- workshop and aim to assess patient satisfaction with faculty EHR communication. In addition, we will continue to train medical students and expand our training to include residents, subspecialty faculty, and allied health providers. Lastly, we will continue to test validity of the e-CEX tool for a variety of situations and learners.

There were some differences between the shorter and longer training. Faculty participating in the longer training reported somewhat higher GOSCE efficacy, which may be related to a longer amount of time allotted for the GOSCE in the 4 h training.

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Interestingly, faculty who participated in the shorter workshop reported the training to be more informative and effective, which may be related to the UC faculty having fewer years of EHR experience compared with CC faculty. Despite these differences, faculty who participated in both versions of the training thought it was important and should be required.

4.2. Conclusion

Faculty training is critical to the success of student and resident EHR curricula. In order to improve patient-centered EHR use during clinical encounters, faculty should be trained to teach, role-model and give feedback on these skills. The lecture and GOSCE provides a practical way to train busy faculty to implement EHR skills to enhance patient-doctor communication. As national standards for EHR training emerge, it will be important to ensure that both trainee and faculty training initiatives are included in the form of curricula and policies.

Practice implications

In summary, we found that a short lecture and GOSCE was an effective way to train faculty in patient-centered EHR use skills. Importantly, three months post-training, providers who participated in the workshop were found to have maintained improvements in their patient-centered EHR use skills in real clinical settings. The short 90 min training is feasible to implement in busy academic practices and can be adapted for other clinical settings. Future work should assess the long-term integration of best practices, solicit feedback from patients on their provider's patient-centered EHR use skills and assess the faculty's ability to teach and give feedback on these skills to their learners. Faculty training on patient-centered EHR skills has the potential to enhance patient-doctor communication and promotes positive role modeling of these skills to learners.

Conflict of Interest

The authors report no conflicts of interest.

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Prior Presentations: This research was presented as oral presentations at the 2016 AAMC Medical Education Meeting in Seattle, WA on November 2016 and at the 2015 Society of General Internal Medicine (SGIM) Midwest Regional Meeting in Cleveland, OH on August 2015.

Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:https://doi.org/10.1016/j.pec.2018.06.020.

References

[1] B. Chaudhry, J. Wang, S. Wu, M. Maglione, W. Mojica, E. Roth, S.C. Morton, P.G. Shekelle, Systematic review: impact of health information technology on quality, efficiency, and costs of medical care, Ann. Intern. Med. 144 (10) (2006) 742–752.
[2] J. Hsu, J. Huang, V. Fung, et al., Health information technology and physician–patient reactions: impact of computers on communication during outpatient primary care visits, J. Am. Med. Inf. Assoc. 12 (2005) 474–480.
[3] R.J. Doyle, N. Wang, D. Anthony, et al., Computers in the examination room and the electronic health record: physicians' perceived impact on clinical encounters before and after full installation and implementation, Fam. Pract. 5 (2012) 601–608.
[4] W. Ventres, S. Kooienga, R. Marlin, et al., Clinician style and examination room computers: a video ethnography, Fam. Med. 37 (4) (2005) 276–281.
[5] W. Ventres, S. Kooienga, N. Vuckovic, et al., Physicians, patients, and the electronic health record: an ethnographic analysis, Ann. Fam. Med. 4 (2) (2006) 124–131.
[6] R. Frankel, Altschule Rr, S. George, et al., Effects of exam-room computing on clinician-patient communication: a longitudinal qualitative study, J. Gen. Intern. Med. 20 (2005) 677–682.
[7] R.S. Margalit, D. Roter, M.A. Dunevant, et al., Electronic medical record use and physician-patient communication: an observational study of Israeli primary care encounters, Patient Edu. Couns. 61 (1) (2006) 134–141.
[8] C. Sinsky, L. Colligan, L. Li, M. Prgomet, S. Reynolds, L. Goeders, et al., Allocation of physician time in ambulatory practice: a time and motion study in 4 specialties, Ann. Intern. Med. 165 (11) (2016) 753–760.
[9] C. Yan, S. Rose, M.B. Rothberg, M.B. Mercer, K. Goodman, A.D. Misra-Hebert, Physician, scribe, and patient perspectives on clinical scribes in primary care, J. Gen. Intern. Med. 31 (9) (2016) 990–995.
[10] D.B. Reuben, J. Knudsen, W. Senelick, E. Glazier, B.K. Koretz, The effect of a physician partner program on physician efficiency and patient satisfaction, JAMA Intern. Med. 174 (7) (2014) 1190–1193.
[11] B.H. Imdieke, M.L. Martel, Integration of medical scribes in the primary care setting: improving satisfaction, J. Ambul. Care Manage. 40 (1) (2017) 17–25.
[12] P. Kumarapeli, S. de Lusignan, Using the computer in the clinical consultation; setting the stage, reviewing, recording, and taking actions: multi-channel video study, J. Am. Med. Inf. Assoc. 20 (e1) (2013) e67–e75.
[13] J.R. Almquist, C. Kelly, J. Bromberg, et al., Consultation room design and the clinical encounter: the space and interaction randomized trial, HERD 3 (1) (2009) 41–78.
[14] W. Levinson, D.L. Roter, J.P. Mullooly, et al., Physician–patient communication. The relationship with malpractice claims among primary care physicians and surgeons, J. Am. Med. Assoc. 277 (7) (1997) 553–559.
[15] G. Makoul, R.H. Curry, P.C. Tang, The use of electronic medical records: communication pat- terns in outpatient encounters, J. Am. Med. Inf. Assoc. 8 (6) (2001) 610–615.
[16] N. Booth, P. Robinson, J. Kohannejad, Identi cation of high-quality consultation practice in primary care: the effects of computer use on doctor-patient rapport, Inf. Prim. Care 12 (2) (2004) 75–83.
[17] N.H. Arar, L. Wen, J. McGrath, et al., Communicating about emotions during primary care out- patient visits: the role of electronic medical records, Inf. Prim. Care 13 (1) (2005) 13–22.
[18] K.B. Johnson, J.R. Serwint, L.A. Fagan, et al., Computer-based documentation: effects on patient-provider communication during pediatric health maintenance encounters, Pediatrics 122 (3) (2008) 509–518.
[19] M.A. Alkureishi, W.W. Lee, M. Lyons, et al., Impact of electronic medical record use on the patient-doctor relationship and communication: a systematic review, J. Gen. Intern. Med. 31 (2016) 548–560.
[20] M. Alkureishi, W.W. Lee, J. Farnan, et al., Breaking Away from the Ipatient to Care for the Real Patient: Implementing a Patient-Centered EHR Use Curriculum, MedEdPORTAL Publications, 2014, pp. 9953 10.
[21] W.W. Lee, M.A. Alkureishi, O. Ukabiala, et al., Patient perceptions of electronic medical record use by faculty and resident physicians: a mixed methods study, J. Gen. Intern. Med. 31 (2016) 1315–1322.
[22] W.W. Lee, M.L. Alkureishi, K. Wroblewski, J.M. Farnan, V.M. Arora, Incorporating the human touch: piloting a curriculum for patient-centered electronic health record use, Med. Edu. Online 22 (1) (2017) 1396171.
[23] M.A. Alkureishi, W.W. Lee, M. Lyons, J. Wroblewski, J.M. Farnan, V.M. Arora, Electronic-clinical evaluation exercise (e-CEX): a new patient-centered EHR use tool, Patient Edu. Counsel. (October) (2017). Epub ahead of print http://www.pec-journal.com/article/S0738-3991(17)30560-8/fulltext.
[24] S. Ross, S. Forgie, Distracted doctoring: smartphones before patients? CMAJ 184 (12) (2012) 1440.
[25] A. Shachak, S. Reis, The impact of electronic medical records on patient– doctor communication during consultation: a narrative literature review, J. Eval. Clin. Pract. 15 (4) (2009) 641–649.
[26] J.M. McGrath, N.H. Arar, J.A. Pugh, The influence of electronic medical record usage on nonverbal communication in the medical interview, Health Inf. J. 13 (2) (2007) 105–118.
[27] J.J. Saleem, M.E. Flanagan, A.L. Russ, C.K. McMullen, L. Elli, S.A. Russell, K.J. Bennett, M.S. Matthias, S.U. Rehman, M.D. Schwartz, R.M. Frankel, You and me and the computer makes three: variations in exam room use of the electronic health record, J. Am. Med. Inf. Assoc. 21 (e1) (2014) e147–e151.

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[28] O. Hirsch, H. Keller, T. Krones, N. Donner-Banzhoff, Arriba-lib: association of an evidence- based electronic library of decision aids with communication and decision-making in patients and primary care physicians, Int. J. Evid. Based Healthc. 10 (1) (2012) 68–76.
[29] N.D. Furness, O.J. Bradford, M.P. Paterson, Tablets in trauma: using mobile computing platforms to improve patient understanding and experience, Orthopedics 36 (3) (2013) 205–208.
[30] W.B. Ventres, R.M. Frankel, Patient-centered care and electronic health records: it's still about the relation- ship, Fam. Med. 42 (5) (2010) 364–366.
[31] N.M. Pageler, C.P. Friedman, C.A. Longhurst, Refocusing medical education in the EHR era, J. Am. Med. Assoc. 310 (21) (2013) 2249–2250.
[32] H.S. Wald, P. George, T.J.S. Rei, Electronic health record training in undergraduate medical education: bridging theory to practice with curricula for empowering patient-and relationship-centered care in the computerized setting, Acad. Med. 89 (3) (2014) 380–386.
[33] N.H. Crampton, S. Reis, A. Shachak, et al., Computers in the clinical encounter: a scoping review and thematic analysis, J. Am. Med. Inf. Assoc. 23 (3) (2016) 654–665.
[36] K.E. Hauer, Enhancing feedback to students using the Mini-CEX, Acad. Med. 75 (5) (2000) 524.
[37] S. Babbott, L.B. Manwell, R. Brown, et al., Electronic medical records and physician stress in primary care: results from the MEMO study, J. Am. Med. Inf. Assoc. 21 (e1) (2014) e100–e106.
[38] M.W. Friedberg, P.G. Chen, K.R. Van Busum, et al., Research Report: Factors Affecting Physician Professional Satisfaction and Their Implications for Patient Care, Health Systems, and Health Policy, Rand Corporation, Santa Monica, CA, 2013.
[39] B.G. Arndt, J.W. Beasley, M.D. Watkinson, et al., Tethered to the EHR: primary care physician workload assessment using EHR event log data and time-motion observations, Ann. Fam. Med. 5 (15) (2017) 419–426.

Please cite this article in press as: W.W. Lee, et al., Impact of a brief faculty training to improve patient-centered communication while using electronic health records, Patient Educ Couns (2018), https://doi.org/10.1016/j.pec.2018.06.020