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Strategizing EHR use to achieve patient-centered care in exam rooms: a qualitative study on primary care providers

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ABSTRACT

Objective Electronic health records (EHRs) have great potential to improve quality of care. However, their use may diminish "patient-centeredness" in exam rooms by distracting the healthcare provider from focusing on direct patient interaction. The authors conducted a qualitative interview study to understand the magnitude of this issue, and the strategies that primary care providers devised to mitigate the unintended adverse effect associated with EHR use.

Methods and Materials Semi-structured interviews were conducted with 21 healthcare providers at 4 Veterans Affairs (VAs) outpatient primary care clinics in San Diego County. Data analysis was performed using the grounded theory approach.

Results The results show that providers face demands from both patients and the EHR system. To cope with these demands, and to provide patient-centered care, providers attempt to perform EHR work outside of patient encounters and create templates to streamline documentation work. Providers also attempt to use the EHR to engage patients, establish patient buy-in for EHR use, and multitask between communicating with patients and using the EHR.

Discussion and Conclusion This study has uncovered the challenges that primary care providers face in integrating the EHR into their work practice, and the strategies they use to overcome these challenges in order to maintain patient-centered care. These findings illuminate the importance of developing "best" practices to improve patient-centered care in today's highly "wired" health environment. These findings also show that more user-centered EHR design is needed to improve system usability.

Keywords: electronic health records; patient-centered care; communication; doctor patient relations

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BACKGROUND AND SIGNIFICANCE

The adoption rate of electronic health records (EHRs) in the United States for office-based physicians increased from 18% in 2001 to 78% in 2013.[1] As EHRs become ubiquitous in the exam room, patient-provider interactions are shifting from a two-way to a three-way paradigm that consists of the patient, provider, and EHR system. According to the Centers for Medicare and Medicaid Services, EHRs can potentially streamline clinical workflow, support evidence-based decisions, improve quality management, and facilitate outcomes reporting.[2]

Appropriate use of EHRs plays an important role in patient-centered care.[3,4] The Institute of Medicine defines patient-centered care as being "respectful of and responsive to individual patient preferences, needs, and values, and ensuring that patient values guide all clinical decisions."[5] Patient-centeredness is built on fostering a healing relationship with strong trust and communication between the provider and the patient.[6] The use of EHRs can enhance patient trust by allowing healthcare providers to access more patient information in real time;[7,8] it can also facilitate patient-centered communication through electronic messaging and increased patient access to their records.[4] Therefore, EHRs have the potential to enhance patient-centered care.

However, with the perceived benefits of EHRs, their use may associate with some unintended consequences to patient care. For example, the use of EHRs. can diminish eye-contact,[9] which is critical for healthcare providers to establish rapport and trust with their patients.[10] Moreover, EHR use can also be disruptive to patient-provider relationships[11] by lessening psychosocial and emotional communication.[12]

Previous research focused on the characterization of physicians' EHR usage styles[12–19] and the impact of EHR use on patient-provider relationship.[20–30] While it is important to identify strategies for integrating EHRs into clinical practice,[15] few studies have investigated the strategies physicians deploy in mitigating the negative impact of EHRs on providing patient-centered care.[20,31] One study identified a number of strategies to overcome doctor-patient communication problems.[20] Another study developed a skill-based approach to incorporate EHRs into the medical interview.[31] However, these prior studies either focused on the communication aspect of patient care, or derived their findings from literature review. Our study was to empirically examine the impact of technology on various aspects of patient-provider interaction, and the strategies providers developed to achieve patient-centered care. We focused on the aspect of patient-centeredness regarding how clinicians maintain rapport and effective communication with their patients to meet their individual needs, while managing EHR demands during patient visits. Patient centeredness requires the building of rapport and effective communication.[6] When there is

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effective patient-provider communication, the needs and preferences of patients will be both understood and addressed, and the patients will be more likely to participate in their own care.[32]

METHODS AND MATERIALS

To identify the strategies that primary care providers use to facilitate patient-centered care, we conducted semi-structured interviews with primary care providers (physicians and nurse practitioners) at 4 VA outpatient primary care clinics located in San Diego County, California. This interview study is part of a larger study, Patient Centered Evaluation of EHR Use (PACE), which aimed to investigate the effect of EHRs on patient-provider communication and patient-centered care.

Research Setting

This study was conducted at the VA San Diego Healthcare System. The outpatient clinics at VA San Diego have 65 primary care providers serving demographically diverse patient populations across San Diego County. Since 2002, all VA medical centers and clinics have used an EHR system that includes clinical decision-support tools, clinical reminders for health and disease management, hospital formulary, provider chart notes, laboratory and pharmacy data, radiology reports, and patient demographic data. The end-user hardware at the VA San Diego consists of a PC workstation with a 17–19 in LCD monitor in every patient exam room (Figures 1 and 2).

Data Collection

Participant recruitment was open to all of the VA San Diego outpatient clinics to ensure diversity. The Principal Investigator and Co-investigators used staff meetings, face-to-face meetings, and phone calls to make contact with potential providers at each clinic site. The meetings were used to provide information and to answer research related questions. Providers who participated after the meetings were provided with research details. This study was covered by the VA San Diego Healthcare System's institutional review board (IRB). Research-informed consent was obtained by a trained research assistant. Twenty-three providers enrolled in the study (21 physicians and 2 nurse practitioners). Two physicians dropped out of the study. One withdrew due to time commitment and the other relocated. Interviews of 21 providers were included in the final results (see Table 1). Saturation was used as a guiding principle during data collection. We reviewed the collected data until data saturation was reached, meaning no new information was heard in the interviews. All providers have more than 1 year of established practice at the VA and have been using the VA's EHR system for over a year.

The qualitative study was conducted using a semi-structured interview approach. The interview questions, which are found in the appendix, focused on providers' EHR usage style, how much time providers spend on EHRs, how providers manage the interaction with EHRs and their patients during clinical visits, as well as any issues they experience with the technology. Interviews ranged from ∼30 min to 1 h in length. All interviews were audio-recorded and then transcribed verbatim into text.

Data Analysis

We used the grounded theory approach[33] to identify salient and recurring themes from the interview data. The interview transcriptions were coded using the qualitative data analysis software Dedoose.[34] Memos were created to document the researchers' self-reflection on the data. Specifically, one third of the interviews were randomly chosen for

Figure 1: The patient exam room. Photo credit: VA San Diego Healthcare System.
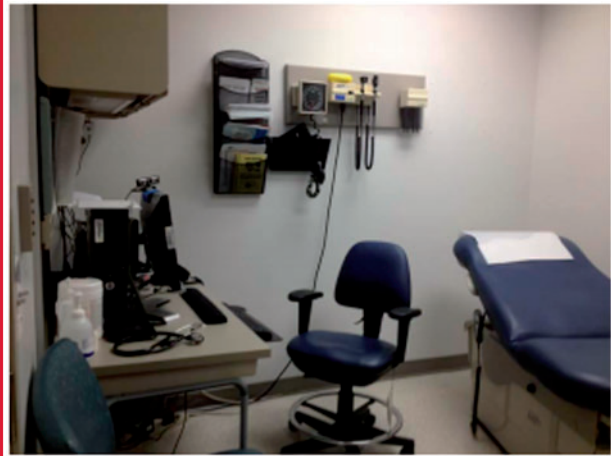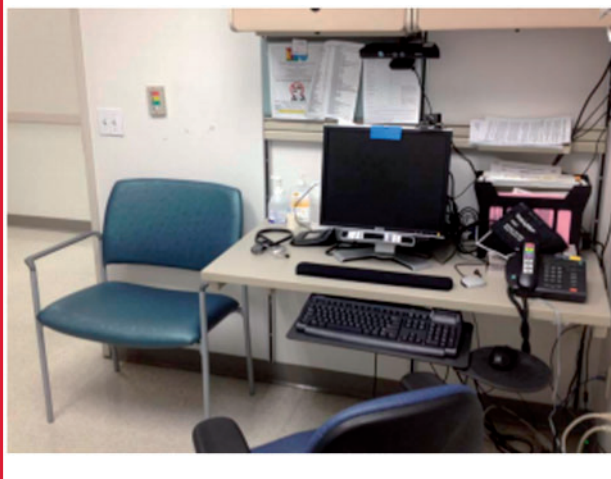

Figure 2: The exam room computer workstation with the EHR system. Photo credit: VA San Diego Healthcare System.

analysis using microanalysis.[33] First, open coding was conducted on the sample data to identify key concepts, their properties, and dimensions. As a result, an initial set of codes were generated inductively and then grouped into higher-level themes. Upon the identification of the core themes, axial coding was performed to explore and identify the relationships between the themes. The themes were then reviewed and discussed between the first two authors until agreement was reached. The sample interview results guided the next stage of coding, during which one author coded the remaining data using the coding scheme previously developed. This second stage of analysis produced consistent themes identified in the initial stage. The qualitative results were evaluated for validity through member checking. The interviewers reinstated information during interviews to confirm accuracy. Preliminary findings from the interviews were presented at project meetings for feedback from VA clinicians.

Table 1: Characteristics of the Participating Primary Care Providers	
Primary care providers[a]	
Physicians	21
Nurse practitioners	2
Gender	
Female	17
Male	6
Location	
La Jolla	12
Oceanside	4
Mission Valley	6
Chula Vista	1

[a]One male physician and one female physician dropped out the study, thus no interviews were conducted with them.

RESULTS

Our analysis revealed the challenges that primary care providers face while using EHR systems during patient encounters and the strategies they developed to cope with these challenges. In this section, we elaborate on the challenges resulting from patient demands, EHR demands, the tensions between the two, and the strategies that providers use in order to maintain patient-centered care.

The Challenges Providers Face in EHR Use

We identified two types of challenges that providers face during exam room visits where EHRs are used. As summarized in Table 2, the challenges arise from patient and EHR demands.

Demands from Patients
Providers expressed that meeting patient demands is a challenge they strive to meet. Patient demands are composed of two dimensions: communicational and psychosocial. Effective communication with patients, such as through verbal communication and eye contact, is important for information exchange, patient engagement, and relationship building. Even though communicational demands require providers' time and attention, providers have to verbally communicate and make sufficient eye contact to build trust and rapport with patients. As a provider stated, *"I do make a conscious effort to look at the patient . . . multiple times during the visit so they know that I'm hearing what they are say . . . And then the eye contact when we are talking about them and about their issues . . . .".* As eye contact is related to increased patient satisfaction,[35] one provider expressed concern that without enough eye contact, the patients will be upset and may seek care from other providers.

In addition to the communicational demands from patients, providers also need to work with patients' psychosocial demands, as being sensitive toward patient needs is a goal that providers strive to achieve amidst the use of the EHR. The VA, in particular, has a higher prevalence of psychosocial problems among its patients, such as Post-Traumatic Stress Disorder (PTSD).[36] When interacting with patients with mental health needs, a higher level of sensitivity is required. A provider mentioned that he would not rush his patients and often extends the scheduled visit length to ensure patients get the

"whole amount of time that they need." Procedurally, providers also have to perform a series of additional tasks in response to those demands. For instance, one provider explained: *" . . . we have patients who are chronically depressed or they are followed in mental health or it's a known disorder, so we have to go through this drill and there are 9 questions. You have to go through the PHQ-9 . . . ."*

Meeting patient needs is essential to providing appropriate care and building rapport. However, many providers are constrained by time and attention. Patient-centered care is built on communication and trust,[6] but the realization of it is challenged by the competing demands from the EHR, as detailed in the next section.

Demands from the EHR
Many providers complained about how the increasing demands from EHRs make it difficult to engage in patient-centered care. Our analysis shows that EHR demands manifest themselves in two aspects: functionality and usability. EHR demands stem first from the functionality of the system, since providers document in detail the patient encounter in the EHR. Besides clinical documentation, other tasks introduced by the EHR, such as View Alerts (notifications about new orders, test results, unsigned documents, etc.) and clinical reminders (produced by decision support tools) are also time consuming and can pull providers' attention away from patients. The demands of functionality further progress as the completion of View Alerts and reminders is tied to providers' performance reviews.

Secondly, EHR demands arise from system usability. The difficulties in navigating EHR systems demand more time and efforts during patient visits. The interviews revealed a set of usability problems including excessive mouse activity, unresponsive software user interface, lack of shortcuts, non-optimal information organization, and the lack of end-user involvement in the design process. These usability issues escalate the challenges associated with EHR use and cause frustration and stress among providers. As an example of the usability problem, a provider stated: *" . . . a lot of the consults have 20 or 30 point and clicks to them . . . it creates a huge burden while you're talking to a patient . . . "*

Tensions between Patient and EHR Demands
The majority of the providers interviewed reported that more than half of their time during patient visits was spent on using the EHR system. Since operational efficiency requires that patient visits be completed in a timely manner with allocated time for visits, the increased amount of time spent on EHRs has resulted in a struggle for providers to give adequate time to direct patient care, which was best described by a provider: *"Time is struggling."*

In addition to time, patients and EHRs also compete for providers' attention. Unlike paper records, which offer flexibility, EHRs are currently situated in a fixed computer between the provider and the patient. Thus, the spatial organization of the system can hinder how attention is given to the patient, and consequently jeopardize the quality of patient-centered care.[37] As one provider stated: *" . . . there are probably moments where . . . I'm not hearing [patients] as well as I should but I try to pay attention to them and not to let the computer dominate the visit . . . but on the other hand I am by necessity I have to interact with it."*

Strategies Providers Develop to Meet the Challenges

To manage the increasing demands in computerized exam rooms, the providers we studied developed a number of strategies. Most providers spent a significant amount of time outside of patient visits fulfilling EHR-related tasks in order to alleviate patient and EHR

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Table 2: Challenges Providers Face in EHR Use	
Demands	**Representative Quotations**
Patient Demands	
Communicational	• I tend to talk with my patients a lot and explain things and talk to them about potential side effects they might experience with the medications I'm trying to start them on. And you know, talking with them about trying to you know help them understand the plan of care . . . • I think eye contact is probably one of the main things . . . the eye contact when we are talking about them and about their issues.
Psychosocial	• if the nature of the issue is depression, suicide things that I'm not going to be doing this (use the EHR) you know I'm going to pull away and engage completely so I use my common sense . . . • . . . I find that the veterans really appreciate if I ask them some, when where you in the service and they sort of open up and they like telling me what year they were and oh so you were in Vietnam or where were you . . .
EHR Demands	
Functionality	• It really is a challenge to stay on top of all of the various responsibilities that [providers] have within the electronic medical record . . . in fact the more time that you're demanding that we spend clicking and interacting with this is probably going to make it less likely that we actually having a meaningful conversation with the patient about blood pressure. • [Providers' annual reviews and privilege renewals] all done from our notes . . . our job performance is linked to our notes.
Usability	• you'd have to do a lot of clicking and a lot of typing and I feel like, you know, I want to get that done during the visit so that the patient can have a timely consult and not have to come back, but also it takes away from the time with the patient, because I'm clicking and looking . . . • . . . so it's very point and click and very heavy in terms of and that and you have to be staring at the screen while you do so it kind of limits your interaction with the patient . . .

Table 3: Strategies Providers Develop to Meet the Challenges	
Strategies	**Representative Quotations**
Charting Beyond Patient Visits	• I feel that preparation ahead of the visit is the key. • I do a lot of my preparation before and a lot of my work after. • When the patients (are) here I try to really just focus on the patients. And then do the work when they're already gone or some pre work before they get there.
The Use of Templates	• I have a template for new patients and I always follow the template because it keeps me organized and it keeps me on track otherwise if I just do a free form I've tried then I forgot this, I forgot that, oh I didn't ask about allergies or something and so when I follow my template it's very good because it has a rhythm to it and I never forget anything and so I like it that way. • I always have a template. I have a follow-up patient template or a new patient template. I did not get trained formally on templates, informally like residents would say, here's the template I use or a colleague would say oh I use this template to write letters for patients so informally I was trained but I adapted it myself to what I needed.
EHR for Patient Engagement	• I try to use it in a way that engages the patient . . . I'll show them the historical trends as to whether their control is improving or not so I try to engage them in that. • I think one of the helpful functions is being able to show the patient a graph of something like their weight.
The Practice of Multitasking	• So when I'm interviewing a patient I probably use the EMR pretty frequently . . . when I'm getting the patient complaint or the history I typically am typing to some degree while I'm talking to the patient. • So when I'm with the patient it's multitasking within CPRS to be able to hear them, converse with them but also be able to finish my note and document all of that.
Establishing Patient Buy-in for EHR Use	• I always tell them remember we are computerized based now so we are looking at the computer pretty much but that doesn't mean I'm ignoring you. • When I see new patients, one of the first things that I tell them is I need to type and look at the computer while I talk to you because that's how I can make sure that the information here is the most accurate and how I can provide you with the best care possible.

demands, such as charting beyond patient visits and using templates to structure documentation. During visits, providers used the EHR as an educational tool to engage patients, multitasked to meet efficiency requirements, and lastly, established patient buy-in for anticipated EHR work.

Charting Beyond Patient Visits
Given the limited time and cognitive capacity of providers, coupled with increasing demands, many providers found that they were unable to complete all tasks during the designated encounter time. In our interviews, the majority of providers performed EHR work outside of

patient visits to alleviate time pressure. These outside-of-visit EHR activities include previewing, documenting, reviewing, and finishing notes. Based on their priorities, schedule and work habits, some providers spent more time previewing patients' notes before visits. Similarly, some providers manage the competing demands in the exam-room by documenting in their notes after the visits.

Working outside of visits inevitably takes time from providers' already busy schedules. Some routinely forego their lunchtime and some may have to sacrifice their personal time in order to ensure patient-centered care in the exam-room. As one provider said, "*I also log in from home . . . I work straight through lunch, I get there early, I don't take a break . . . Sometimes on weekends too.*"

The Use of Templates
Approximately half of the providers interviewed used prefilled templates to help meet EHR and patient demands. Templates are frequently used to save time and to help with the structure and completeness of clinical documentation. For example, one provider detailed template creation: "*So I have new patient templates and I have follow-up templates . . . I'll usually cut and paste that from the prior note, because the past medical history will be the past medical history and then I'll add to it if new things have happened that are pertinent, and usually the assessment and plan, I'll copy and paste from the last note as a trigger to me during the visit, of the problems that occurred at the last visit that I want to follow-up with the patient . . .*" Other providers also mentioned how templates serve as a critical checklist for them to document information at the point of care.

EHR for Patient Engagement
In our study, we found that many providers used EHRs to concurrently meet patient demands and EHR demands. They do this by engaging patients visually and providing education, especially when it comes to their weight, blood pressure, cholesterol, etc. This strategy makes use of the graphing capabilities of EHRs and shifts patients' attentional demand on the providers to EHRs. Specifically, providers shared the EHR screen with their patients when relevant topics came up or when patients showed interest. Viewing EHRs has been suggested in previous literature to be an effective mechanism for patient engagement during the visit.[4,38] Resultantly providers perceived that patients are more engaged by having an opportunity to view the EHR.

The Practice of Multitasking
A great number of the providers interviewed multitasked as a way to address the demands from patients and the EHR simultaneously. As some providers indicated, they often documented in the EHR while engaging in a conversation with patients. The common multitasking behaviors revealed in our study include quickly switching attention between the patients and the EHR and starting small talk with patients while entering information on the EHR. Multitasking alleviated patient and EHR demands, allowing providers to address both needs at the same time.

Establishing Patient Buy-in for EHR Use
Despite the critical role that EHRs play in today's medical practices, patients may not understand why providers perform so much EHR work, seem more distracted, and why the time engaging in dialogue with the providers may be shortened due to the use of EHRs. Thus, some providers articulated EHR activities with the patients to gain their understanding and buy-in for EHR use during visits. This transparency in communication helps alleviate demands from patients. Most providers feel that once they establish patient buy-in of anticipated EHR activities, both providers and patients are more at ease with EHR use.

DISCUSSION
Performing Patient-Centered Care in the EHR Era
Patient-centered care in the EHR era is challenged by the interplay of the three-way relationship involving the patient, the provider, and the EHR. The use of the EHR in the exam room can distract providers from focusing on patients.[3] These distractions include heavy keyboarding, typing while patients talk about intimate concerns, as well as excessive screen gazing, which negatively correlates to providers' engagement in psychosocial interviews and emotional responsiveness.[29] Consequently, EHR demands may be prioritized over the needs of patients,[25] resulting in failure to address patient-initiated concerns, and inhibiting opportunities for patient contributions.[3] Despite previous work that has studied the impact of EHRs on patient-provider interactions, little is known regarding how healthcare providers strive to maintain patient-centered care. This study examined the demands from both patients and EHRs and revealed the competing nature of these demands under time constraints. We then identified a set of strategies that providers use to alleviate the tensions between demands. These strategies are important in terms of adapting user behaviors to achieve patient-centered care. Built upon these strategies, we make the following suggestions centered on provider training (short-term and behavioral level changes), workload reorganization (mid-term and organizational level changes), and EHR design and functionality (long-term and design level changes).

Provider Training
The strategies uncovered in this study can be utilized to train providers to maintain patient-centeredness. Provider training can take place in the following three stages:

1. *Training in EHR use*: Appropriate training can promote the effective use of EHR systems to enhance patient-centeredness. Most of the providers in our study received limited and rudimentary training to navigate the EHR. They learned to use the EHR through trial and error, or through colleagues. There is a lack of systematic training to share, learn, and discuss EHR usage skills. These skills may include constructing templates for efficient documentation, knowing how to best multitask, as well as the ability to touch-type. Additionally, training to incorporate the EHR into patient visits is also critical for patient-centeredness, which will be discussed next.

2. *Developing patient-centered interview skills in the computerized exam room*: EHRs can potentially enhance communication, if used strategically. This can be achieved through developing better patient-centered interviews and EHR usage skills, such as reviewing patient charts prior to visits.[3,31] Our study demonstrates that previewing patient charts to familiarize with a patient's situation before entering the exam room can help providers focus more on patients. In addition, providers can also introduce the EHR to patients and make use of its graphing capabilities. This step is important in promoting patient understanding of the role the EHR will play during the visit.[31] Communication training that focuses on being sensitive to a patient's needs while effectively prioritizing tasks on the EHR system will also be beneficial.

3. *Engaging patients through the EHR*: Once the EHR has been introduced to patients, providers can take advantage of its information access and visualization capacities to turn patient demands into opportunities for patient engagement. Previous research has

looked into the potential of the EHR as a patient education and engagement tool.[4,38] For instance, a collaborative reading of the EHR screen can lead to improved care quality, informed patient decision-making, and patient engagement.[4] Providers in our study employed screen sharing with patients when visual information was available and appropriate to share. If used appropriately, the EHR can turn into an effective educational tool with which to engage patients while diminishing the amount of challenges encountered by providers.

Workload Reorganization

Our study revealed an increased workload that primary care providers face with EHR use. While increasing overall EHR work time might not be feasible based on the clinicians' already time-pressed schedule, providing clinicians with focused time for EHR work can be achievable. Additionally, EHR-related workload can be redistributed among healthcare providers based on availability and clinical credentials, such as bringing in other healthcare professionals (i.e., medical assistants) to take on some parts of the EHR work, before or after the patient visit. As suggested in our interviews, not all clinical reminders have to be attended by physicians.

EHR Design and Functionality

Our study revealed a set of system level issues that escalate the challenges providers deal with while treating patients. To alleviate EHR demands, we propose three EHR design suggestions based on the study findings. 1) Enhance usability by optimizing information organization and navigation. Understanding clinicians' behaviors and EHR usage patterns led us to believe that better usability of the EHR is needed. As witnessed in our study, clinicians are overwhelmed by the amount of keyboard and mouse activities. As a result, the system should allow providers to create customized views, shortcuts, and hotkeys for frequently performed tasks. Doing so can save providers' time and eliminate unnecessary mouse activities, thus reducing system-induced workload and improving clinician experience. 2) Incorporate patient views in the EHR. Since the majority of the providers in this study share the EHR screen with patients during visits, EHR design can extend its functionalities to incorporate appropriate patient views, so that the visual information can be used to better facilitate patient engagement, education, and patient-centered care. 3) Support multitasking. Multitasking was discovered to be a common practice among providers to meet the demands from patients and the EHR at the same time. For example, clinicians in this study documented or made orders in the EHR while interacting with patients. A consequence of multitasking is the frequent switching of tasks, which can lead to distraction or errors. We believe that it would be helpful for EHRs to have built-in functionalities to provide visual cues to clinicians, such as highlights of active or unfinished EHR tasks. These functionalities can help clinicians recall and keep track of interrupted EHR work, thus potentially easing clinicians' cognitive load during multitasking.

Limitations

Since all of our participants were from VA San Diego outpatient clinics, there might have been a bias due to only one clinical setting in one geographic location being studied. In addition, only one EHR system was studied. Another factor that might limit the generalizability of the study is the higher prevalence of PTSD among patients, which is unique to our study population. Providers may have to pay extra attention to patients' psychosocial issues and the use of EHRs may have a more significant impact on our participating providers than those at other healthcare organizations. Lastly, in this study, we employed

qualitative interview methods to solicit providers' opinions, attitudes, and practices, thus the findings are based on self-reported behaviors. For more in-depth understanding, further studies are needed in the exam-room using the ethnographic observation approach.

CONCLUSIONS

Patient-centeredness is a goal providers strive to achieve, however it is often difficult to maintain given the realities of limited provider resources, such as their time and attention. By identifying the challenges providers have encountered with the use of the EHR, and strategies they use to overcome these challenges, we were able to gain a better understanding of the providers' behaviors in exam rooms, thus providing more concrete suggestions to balance the demands. We believe that, if used strategically, EHRs can have the potential to facilitate patient-provider interaction and patient engagement.

Our study also extended to the experience of providers outside of the exam room and revealed that they took on additional workload as a result of the EHR. Further research is called for to examine the workload induced by the EHR, as well as how to redesign and optimize work allocation. Additionally, providers in the study multitasked to engage in a variety of activities required during the patient visit. While multitasking may enhance work efficiency, the impact of such behavior is unclear. Future studies should look into how to measure and quantify multitasking with the EHR in the exam room, as well as its effect on patient satisfaction and care quality.

CONTRIBUTORS

J.Z. and Y.C. conducted data analysis and led the writing of the manuscript. The PACE team developed the research plan and performed the research, data collection, management, data cleaning and the initial analysis under IRB approval, and reviewed the manuscript.

COMPETING INTERESTS

The authors declare no potential conflict of interest.

ETHICS APPROVAL

VA San Diego Healthcare System IRB.

PROVENANCE AND PEER REVIEW

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