Impact of a tailored training on advanced electronic medical records use for providers in a Veterans Health Administration Medical System

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ABSTRACT
This quality improvement project evaluated the impact of a tailored, evidence-based training strategy on advanced electronic medical record (EMR) use for Veterans Administration (VA) clinicians experienced in using the EMR. After developing the curriculum, an online needs assessment tool evaluated 20 clinicians’ competency gaps. Responses were used to prioritize clinicians’ training needs. Clinician informaticists then provided 2–4 h of tailored training to groups of 1–5 clinicians. Compared with baseline scores (M = 3.59), scores on EMR Task Comfort showed a large improvement in the week following training (M = 4.60; t = 5.41; P <.000, r = 0.58) regardless of baseline level of computer anxiety. Assessment and tailored training methods can help maximize the benefits of resources for EMR training. This formative evaluation suggests that tailored, hands-on training led by clinician informaticists effectively improved clinicians’ EMR comfort and confidence in only 2–4 h.

Key words: electronic health records, electronic medical records, tailored training, personalized training, clinicians, providers

INTRODUCTION
Electronic medical records (EMRs) and its systematized collection of patient and population digital health information can improve patient care in many ways.1–4 The Veterans Health Administration’s (VA’s) EMR is considered one of the best in the world.5–8 However, its power is untapped by most clinical users because time dedicated to learning the system, and its packages has not been a priority. Clinical duties take precedence over training, and new clinicians typically receive only basic EMR training prior to seeing patients.

When EMR training is inadequate, clinicians frequently make avoidable errors.2,9 Encounter forms and orders for labs, imaging, and consults may be incomplete, incorrect, or missing. Historical patient information may not be reviewed, and tests/consults may be unnecessarily repeated. Clinicians may spend valuable time going back to review, redo, or finish EMR tasks. As a result, these inefficiencies can leave clinicians with insufficient “face time” for patients. At worst, clinicians have entered data that are incomplete or incorrect, placing the patients’ wellbeing at risk.10,11 Ultimately, more episodes of care are required, substantially decreasing patients’ access to care.

Countering the risks of undertrained clinicians is the high cost of resources (including clinician time) needed for EMR training.12 Regardless of the expense, the U.S. Office of the National Coordinator for Health Information Technology maintains that investment in EMR training is crucial to maximize EMR’s potential.13 To minimize costs, training that judiciously allocates limited resources is needed.

The sensible solution, making the most of limited resources, is to develop a training curriculum that can be tailored, or personalized, to meet the unique needs of users. Clinicians in different settings (ie, primary care, specialty care) have markedly different EMR training needs.14 Training interventions that are personalized have content...
and/or modalities adapted to meet the unique needs of recipients. Research shows that educational content that is tailored is more likely to be understood, recalled, and rated as credible than content that is not. However, information on the impact of tailored EMR training programs is lacking. The objective of this project was to evaluate an innovative tailored program for experienced VA clinicians designed to increase comfort and confidence in using the VA’s EMR.

METHODS

Setting

The EMR used by the VA is called the Veterans Health Information Systems and Technology Architecture (VISTA). Its graphical interface is the Computerized Patient Record System (known as CPRS). CPRS’ integrated inpatient and outpatient EMR along with its associated decision tools have received top scores by providers nationwide. Customized menus and templates facilitate CPRS’ order entry and documentation. Health summaries and personalization of views expedite data review, and clinical reminders and alerts are intended to ensure safe care is provided. However, CPRS’ tools are not intuitive and require higher-level training that varies by specialty and site.

Usual training

When new clinicians begin a position at the VA, they attend a group overview on basic CPRS after which they must demonstrate a minimum competency to obtain access to the EMR. Within the next 2 weeks, a CPRS trainer provides additional, basic training specific to the user’s role (such as setting favorite note titles, clinic schedules, and managing consults). Subject matter experts from the service are then expected to provide more specialized training that is specific to the user’s field; however, there is no standard for competency.

Training development

Generalized steps to develop a tailored training program are summarized in Supplemental Material S1. Two Physician Informaticists (C.L. and R.O.), each considered EMR “super users” (ie, having extensive EMR experience and the skill set to mentor others on using CPRS) developed the curriculum. Named the Personalized Informatics Educational Clinic for Efficient Solutions (PIECES), this training draws from constructivism, which considers the context of trainees’ larger body of existing information when building new knowledge. During training, clinicians are encouraged to demonstrate difficult clinical scenarios which present opportunities for teaching additional short-cuts and processes. The trainees are then taught to apply EMR solutions into their workflow.

The delivery methodology of the training program integrates current best practices, including: (1) assessing and matching user needs; (2) employing active learning via observation and hands-on application of practices; (3) utilizing fellow clinicians as instructors; and (4) building on past training to optimize use.

Project protocol

Clinicians were referred by their service or self-referred to training. Sessions were held for groups of 1–5 clinician trainees (depending on specialty group and locale) and lasted 2–4 h. Sessions were led by one physician/trainer (either C.L. or R.O.). The trainer presented to the clinic areas, which at times required air travel. Four Category 1 Continuing Medical Education credits are awarded to those who completed the course. The protocol was approved by the VA’s Evidence Based Practice Council. Clinician performance was kept confidential.

Measures

A 30-item online training needs assessment tool was completed prior to the training, consisting mainly of the EMR Task Comfort Scale, which assesses the completion of 24 EMR tasks. Following the sentence stem, “I am comfortable in my ability to…” tasks are evaluated. For example, “I can create a shortcut for ordering medications” (see Supplementary Material S2). Response options ranged from 1-5 (“strongly agree” to “strongly disagree”). The scale score was derived by calculating the mean score of the 24 individual items and thus ranged from 1 to 5. Other items measured relevant sociocultural factors (such as computer anxiety) and the ability to use decision support tools (as a proxy assessment of perceived knowledge/confidence).

In the week following training, clinicians completed a post-training assessment tool, evaluating the same 24 EMR tasks assessed at baseline. Additionally, we assessed satisfaction with training, change in perceived knowledge/confidence, and key effective training components.

Statistical analysis

Pre-post training data were analyzed using PSPIRE (https://www.gnu.org/software/spss/; GNU pspp 0.10.4-g50f7b7, 2017). Descriptive summary statistics (eg, Χ² analyses, Pearson r correlations) were computed to compare clinicians based on basic factors and to examine the association between variables. Group EMR Task Comfort Scale scores were compared longitudinally using a paired samples t-test.

RESULTS

Twenty prescribing medical providers completed the measures. The majority (90.0%) had been employed by the VA for over 1 year (see Table 1). At baseline, there was no relationship between longer length of time providing care in VA and responses to “I understand and use the clinical decision support tools embedded in CPRS”
However, users who had been providing care in the VA for over 10 years were least likely to report: (1) that they “have the information [they] need to effectively perform [their] job tasks that rely on CPRS” ($X^2 = 12.18$, $P = .058$), or (2) that they received CPRS training in the past 10 years ($X^2 = 19.00$, $P = .025$).

**Impact of training**

Compared with baseline scores (Mean = 3.59, standard deviation [SD] = 0.81), scores on the EMR Task Comfort Scale showed a large improvement following training (Mean = 4.60, SD = 0.57; $t = 5.41$; $P < .000, r = .58$). On perceived knowledge/confidence, the response with the greatest frequency (i.e., modal score) increased from 2 (“disagree”) to 5 (“strongly agree”) following training.

To test if these results were impacted by other variables, we calculated Pearson r correlations between Time 2 EMR Task Comfort and (1) length of time providing patient care in the VA, (2) length of time to last CPRS Training, (3) computer anxiety levels, and (4) Time 1 EMR Task Comfort scores. None of the correlations were significant. However, computer anxiety level was associated with the Time 1 EMR Task Comfort score.

All clinicians agreed that the training was useful and could be applied to their clinical practice. Responses to an open-ended item requesting “any feedback about the training” identified five key themes (see Table 2).

**DISCUSSION**

The PIECES training was developed to efficiently train clinicians to better utilize tools available in CPRS using minimal resources. Our findings suggest that, regardless of clinicians’ length of time delivering care in the VA, their comfort and confidence using the EMR substantially improved following training. Furthermore, clinicians’ comfort using CPRS improved regardless of their level of computer anxiety.

All clinicians agreed that training content was useful and could be applied to their clinical practice. Examination of written comments from the trainees identified four main components that contributed to the training’s success:

1. Instruction was on-site and face-to-face.
2. Training involved hands-on application of practices.
3. Trainers were practicing providers and thus familiar with work flow demands.
4. Training topics were tailored to trainees’ needs.

These identified training themes are consistent with those identified in research on best practice training conducted with other clinical populations.\(^2,9,14,19–23\)

Of note, clinicians who had been providing patient care the longest were (1) the least likely to report any EMR training in the past 10 years, and (2) the least likely to report they could effectively perform job tasks that rely on the EMR. Results highlight the need for refresher training for experienced clinicians, who likely have more advanced, specialized needs compared with beginning employees.

The generalized steps an organization can take to develop an advanced EMR training were delineated in this work. In this program, we sought to train clinicians individually or within small groups with similar functions (such as clinicians from the same specialty area). Ideally, trainees would also be grouped according to the identified training gaps. However, this situation is not realistic due to cost and logistical limitations. At minimum, we recommend that

| Theme | Quote |
|-------|-------|
| On sight, face-to-face training | • Really excellent training that the CBOCs (VA Primary Care Clinics) need more of. We need in person training, V-tel is not reliable or relatable. |
| Active learning and hands-on application | • Excellent training, Dr “X”! Thanks for taking the time to come out to (clinic “Y”) and understand our limitations. |
| Utilizing fellow clinicians as instructors | • Thank you, wish there was more opportunity to have sessions/classes like this. Hands on sessions are really helpful for me to learn these things! |
| Informative personalized training | • It would be beneficial to have regular hands on training in CPRS |
| Suggestions/future directions | • Super helpful to have clinician showing good shortcuts and tricks. thanks for coming! |
| “X” was very personable. I wish, we were allowed more time with him, as I learned a lot in the short time we met. | • “X” was very knowledgeable and helpful. It was great being able to sit with him for a few hours and figure out how to do things on CPRS. |
| This course was fantastic. It is the first time I have received formal training beyond the basics. And I think it just touched the iceberg of what CPRS is capable of in terms of gaining greater efficiency, making progress in quality of care, and ultimately patient access. Please make this an ongoing, on site, face to face course. Every 3 mo in the beginning would be optimal in order to ensure continued building of skills and assessment of process efficiency. |

**Table 2. Key training themes based upon trainees’ responses to an open-ended question: “please list any feedback about the training here”**

| Theme | Quote |
|-------|-------|
| On sight, face-to-face training | • Really excellent training that the CBOCs (VA Primary Care Clinics) need more of. We need in person training, V-tel is not reliable or relatable. |
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| Suggestions/future directions | • Super helpful to have clinician showing good shortcuts and tricks. thanks for coming! |

**Table 1. Clinician characteristics (n = 20)**

| Item | Frequency (%) |
|------|---------------|
| Time providing VA patient care | |
| <1 year | 2 (10) |
| Between 1 and 10 years | 10 (50) |
| Over 10 years | 8 (40) |
| Last training on VISTA/CPRS | |
| <1 year | 6 (30) |
| Between 1 and 10 years | 11 (55) |
| I have never had training | 3 (15) |

VA: Veterans Administration; VISTA: Veterans Health Information System and Technology Architecture; CPRS: Computerized Patient Record System.
trainees be grouped by their experience level (ie, beginner vs advanced) and, when possible, by similar profession/functional role.

Although the PIECES training was designed to minimize use of training resources via its tailored approach, time and financial capital remain challenges to scaling this strategy. Use continuing education credits; however, proved useful for offsetting clinicians’ time demands. Regardless of cost, we maintain that investment in EMR training is critical to maximize competence and ultimately, the quality of patient care. For sustainment at this facility, the PIECES training has become standard practice. Clinicians receive a referral once they begin clinical work, and experienced clinicians needing refresher training are referred by their service chiefs.

The program, we describe was a quality improvement project and so, by definition, results are not generalizable. Rather, this project was performed in the context of one EMR with a limited number of trainers/trainees. A variety of usability metrics exist beyond subjective comfort and user satisfaction, such as completion rate (or error rate) and time on task.24 Conducting a study that employs objective measures of the users’ interactions with the EMR before and after the training experience will be necessary to demonstrate the impact of such a program on clinician behavior/efficiency, cost-savings, and collective gain of productivity.

CONCLUSION
Investment in EMR training is crucial to maximize EMR potential.13 To minimize costs, a proven training method that judiciously accommodates limited resources (ie, limited trainers, limited dedicated training time) is needed.12 The findings from this quality improvement project provide formative evidence that tailored, hands-on training effectively improved clinicians’ comfort and confidence with CPRS in only 2–4 h.

CONTRIBUTORS
C.L. made substantial contributions to the conception/design of this project, interpretation of the data, revision, and editing of the drafts for important intellectual content, provided final approval of the published version and agrees to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. R.O. made substantial contributions to the conception/design of this project, interpretation of the data, revision, and editing of the drafts for important intellectual content, provided final approval of the published version and agrees to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. J.W. made substantial contributions to the conception and design of this work and the acquisition, analysis, and interpretation of data; drafted and edited the work for important intellectual content; provided final approval of the version to be published; and agrees to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Conflict of interest statement. None declared.

SUPPLEMENTARY MATERIAL
Supplementary material is available at Journal of the American Medical Informatics Association online.

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