Published in final edited form as:

J Healthc Qual. 2018 ; 40(5): 283–291. doi:10.1097/JHQ.000000000000115.

Promoting Secure Provider-to-Provider Communication with Electronic Health Record Messaging: An Educational Outreach Study

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Abstract

Introduction—With increasing electronic health record (EHR) use, providers are talking with one another less. Now, many rely on EHRs, informal emails, or texts, introducing fragmentation and new data security challenges with new communication strategies.

We aimed to examine the impact of a physician champion educational outreach intervention to promote electronic provider-to-provider communication in a large academic multispecialty group.

Methods—Physician champions provided educational outreach to 16 academic departments, using 10-minute case-based presentations. Online surveys assessed communication preferences and practices. EHR queries counted EHR messaging use before and after intervention. Descriptive statistics compared responses by specialty (z-test). Paired responses with pre-post data were compared using Chi-square tests. Time series analysis assessed EHR messaging rates pre vs. post-intervention.

Results—517 providers responded to the post-outreach survey. 86% were familiar with and 78% knew how to use the EHR messaging tool post-intervention. Among practitioner groups, Family Medicine preferred EHR messaging most (62%). Groups who declined outreach preferred it least (26%). Among 88 respondents with paired pre-post intervention surveys, familiarity rose (79 to 96%), and self-reported use increased (66 to 88%).

Conclusions—Physician champion educational outreach increased use of the secure provider-to-provider EHR messaging tool.

Keywords

communication; medical record system/electronic health record (EHR); organizational change; physician education-educational outreach

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Conflicts of Interest: All other authors have no financial interests or potential conflict of interest or the appearance of a conflict of interest with regard to the work.

INTRODUCTION

Specialty visits outnumbered primary care visits in 2013, and the average Medicare patient now sees seven providers annually, making provider-to-provider communication essential.^{1,2} However, in the era of electronic health records [EHRs], many believe that physicians are actually talking with one another less.³ While traditional conversations and phone calls may be declining, newer secure EHR email-like exchanges between providers are becoming more popular to reduce care fragmentation. Despite obvious advantages, ways to promote and optimize use of such EHR messaging tools remain largely unstudied.

Healthcare reform championed care coordination and electronic health records to improve care quality and efficiency.^{4,5} Care coordination is a key strategy to reduce fragmentation, yet very few standards encourage coordination among practices in routine EHR use.⁶ Further complicating the actions of well-intentioned providers are issues of EHR informational overload, complex physician networks,⁷⁻⁹ and numerous competing formats for physician communication. Email or text messages have become a common method of communication in healthcare; however, there can be serious ethical and legal implications when providers exchange unsecured emails or texts containing patient information.¹⁰ Additional methods of communication including paging, fax, calls, and routing visit note copies (e.g. chart “carbon copies” from provider visits) can also have inherent disadvantages.^{11,12}

A secure provider-to-provider EHR messaging tool offers the opportunity to reduce fragmentation and create efficiencies. These include reducing unnecessary interruptions or consults, and preventing emergency care or hospitalizations through concise provider driven care coordination communication.¹³⁻¹⁷

Studies have shown that when physicians communicate, collaborate,¹⁸⁻²⁰ or share networks, unnecessary health care declines and clinical decision-making improves.^{8,21} Deficiencies in communicating patient information between acute care facilities (e.g. emergency department or urgent care), specialists, and primary care providers contribute to breakdowns in care coordination.^{22,23} Such breakdowns contribute to delayed diagnoses, adverse outcomes^{24,25}, duplication of testing, fragmented care,²⁶ ambiguous expectations, and physician dissatisfaction²⁷.

To date, the few studies examining EHR communication have focused on patient to provider EHR messaging,²⁸⁻³³ e-referral,^{13-17,34} or handoffs³⁵⁻³⁷ with hospitalizations or emergency visits. Little is known about provider-to-provider EHR messaging or how to promote it.

Educational outreach, sometimes called academic detailing, refers to face to face outreach to professionals in their own setting.³⁸ This project originated as a quality improvement project spearheaded by physician champions from a physician leadership program at an academic center. Physician leaders, perceiving high variability in communication methods, sought to educate peers to standardize and increase use of an EHR messaging tool for semi-urgent provider-to-provider communication. These actively practicing physician leaders intentionally selected educational outreach, face to face outreach to professionals in their own setting,³⁸ to gain broad buy-in from peers. Objectives for this project were to examine

communication preferences and measure provider-to-provider EHR communication before and after the educational outreach intervention in this large academic multispecialty group.

METHODS

Setting and participants

The setting was a large multi-specialty academic clinician group where more than 1,100 faculty provide 2.2 million ambulatory visits annually. In total, 46 clinics have been linked through a shared EHR since 2004. This EHR contains a provider-to-provider messaging tool for secure patient-related communication (Trade name: Healthlink RE: Patient [EPIC]). The physician leaders designed and implemented the provider-to-provider EHR messaging project over a two-year period (2012-13). Pre-post-EHR data review included April 2011 through June 2015. This project was determined by our institutional IRB to not require research approval for publication given that it constituted education targeted at physician practice improvement.

Outreach Intervention

The physician educational outreach intervention aimed to increase knowledge and promote use of the standard electronic health record tool for communication between providers regarding patient care. Outreach included a 10-minute case-based PowerPoint presentation customized for each specific clinical division audience. Presentations were intentionally brief to fit within busy departmental meeting agendas. Pairs of physician champions representing various medical specialties conducted the presentations. The team included nominated leaders in surgery, internal medicine, emergency medicine and family medicine. When possible, the presenting team included a specialist and a primary care provider and/or a resident trainee (Surgery or Emergency Medicine). The presentation covered a description of the tool, organizational goals, standards of use, navigation tips, and case examples of communication between providers, specifically created for each target audience specialty (See Appendix for materials). An example EHR message from an emergency medicine provider to primary care was: *"I saw Mr. P in the ED for dyspnea and low grade fever. +D-dimer. CT chest negative for PE; found left upper lobe opacity (pneumonia vs. mass) started on antibiotics - will need close follow-up."* An example of EHR messaging from primary care to a surgical subspecialist includes *"Ms. R pre-op evaluation revealed need for stress test. Need to hold surgery for now; will update."* Presentations were followed by a 10-minute question and answer session. Organizationally, the EHR messaging tool was encouraged as a preferred practice for semi-urgent communication with anticipated turnaround of approximately 48 hours. In total, 16 departmental meeting presentations, reaching 31 divisions, were conducted between March and December 2012.

Surveys

As part of this project, two on-line provider surveys assessed provider-to-provider communication at baseline (2012) and 1-year follow-up (2013). These brief five-item surveys assessed communication preferences and practices before and after the educational outreach intervention. Surveys were e-mailed to health care providers, including physicians, nurse practitioners and physician assistants within the academic multispecialty group

system. Permission to contact providers was obtained from the provider group employee database, and the project and surveys were deemed exempt from our institutional IRB as a quality improvement initiative.

In the pre-outreach survey, e-mail invitations were sent to 293 primary care providers (including Family Medicine, Internal Medicine, Geriatric Medicine and General Pediatrics). Four weeks after this initial request, a reminder email was sent to those providers who had not yet completed the survey. For the post-outreach survey, all network providers with direct patient contact (primary care and specialties, excluding only pathology) were invited to respond. Requests were sent to a total of 1509 clinicians. Two email reminders were sent.

Outcome Measures and Analysis

The post-outreach survey assessed provider-to-provider communication preferences and practices following delivery of all educational outreach sessions. Responding providers were asked to self-identify their clinical specialty. Descriptive statistics compared responses by specialty using statistical z-tests. Paired responses on the subset of providers as matched by email addresses on pre and post-outreach survey data offered internal comparisons tested using Chi-square tests. Repeated measures statistics were applied to the subsample of respondents with paired pre and post intervention responses.

Objective counts of discrete provider-to-provider EHR messages were also assessed. Messages between physicians and/or advanced practice practitioners (nurse practitioners and physician assistants) that included a specific patient in the subject field were included. Monthly counts were performed for the period before, during and after the outreach intervention (4/2011-5/2015), to compare rates of change. The pre and post intervention surveys were used to define the time periods before and after the intervention. Interrupted time series analysis was used to analyze these trends. Time series analyses were performed using STATA 13.0.

RESULTS

In the post-outreach survey, requests were sent to 1509 providers representing 16 departments and 63 specialties. In total, 517 clinicians responded (34%). Table 1 shows the response rates for the follow-up survey classified into six broad practice categories.

After outreach, 86% of responding providers (range 64%-100%) indicated that they were familiar with the EHR messaging tool and 78% (54% to 88%) knew how to use the tool to send messages after the outreach intervention. While most specialties (60%-85%) responded that they were both familiar with the EHR messaging tool and knew how to use it, Radiology, Anesthesia and others reported significantly lower knowledge and use (Figure 1). These groups declined outreach presentations. Pediatrics reported appreciably higher rates for both knowledge and use ($p < 0.05$).

When indicating a preference for communication modes, practitioner groups differed considerably (Pearson chi-square $p = 0.042$) as shown in Figure 2. Family Medicine

preferred EHR messaging the most (62%). Radiology, Anesthesia, and other preferred other methods (e.g. phone call) and preferred EHR messaging the least (26%).

Responses to the question: “What would increase your use of the EHR messaging tool” are shown in Figure 3. The most frequent response (57%) was a reliable alert notifying the sender if the intended recipient who received the message did or did not participate in EHR messaging (i.e. was unlikely to respond). Other suggestions include easier interface for EHR messaging tool, more training on how to use the tool, and clarification regarding if EHR messaging is officially part of medical record.

Paired Pre-Post Subgroup Comparisons

A subset of 88 survey respondents completed both the pre-outreach survey and the post-outreach survey. Table 2 shows paired pre-post-intervention data on this subset. There was a statistically significant increase (17%) in clinicians who knew how to send messages with the tool post-outreach. The proportion of providers who identified that the EHR communication tool was their preferred mode of communication for semi-urgent patient issues increased by 22%. The increase in EHR messaging tool preference accompanied a trend in lower preference for text messaging, phone, and voicemail.

EHR Messaging Count Trends Before and After Outreach

During the pre-intervention period, there was a gradual increase of EHR messaging tool messages sent of 167 per month (See Figure 3). The total number of monthly messages during this time increased from approximately 2,300 to 4,000 per month. During the outreach intervention period, the rate of EHR messaging tool messages increased from 167 to 271 per month. The number of total messages increased from 4,000 to 8,400 per month during this period. Finally, during the post-intervention two-year period, there was a brief plateau in the rate of increased use of EHR messaging tool use immediately after the intervention period. This was later followed by a return to near pre intervention growth with less robust increases of 140 messages per month. Still, most recently we note ~11,000 provider-to-provider EHR messages per month, a substantial increase from the initial 2,300 monthly in early 2011 (See Figure 3).

LIMITATIONS

Strengths of our study were the inclusion of a large number of multispecialty clinicians in this intervention project, yet this study also has limitations. A main limitation is that the pre-survey targeted only primary care and did not include all specialties, limiting our ability to make full pre-post comparisons. Our overall response rate of 34% on the second survey was also a limitation, although consistent with usual online or email surveys.³⁹⁻⁴¹ Still, this represented >500 physicians from many specialties. Likewise, we do not know which survey recipients and respondents attended outreach presentations, yet diffusion of innovation suggests that delivery to a specialty division should reach most associated individuals over time. Another limitation is that EHR messaging volume was self-reported and was not quantitatively compared to other forms of communication (i.e., text, phone calls), although data were shown for the number of monthly EHR messages. Likewise, we could not

ascertain the content or outcomes of electronic messaging between clinicians. Furthermore, these data represent one health center. Future research is needed to see if provider communication via electronic messaging improves actual patient outcomes such as healthcare utilization, adverse events, and patient and provider satisfaction.

DISCUSSION

Overall, we found increased self-reported and observed use of the EHR messaging tool after the physician outreach intervention to promote secure provider-to-provider communication. We believe this success reflects strengths of including (1) a tailored clinical outreach presentation with (2) practical tool training,^{42,43} and (3) a variety of physician champions.⁴⁴ By including physicians from pediatrics, primary care, surgery, and subspecialists, physician champions were able to leverage local connections to teach peers how and when to use the tool.

Research shows that educational outreach is more effective for changing provider practices than continuing medication education (CME) conferences, reminders, or general education material. Outreach including opinion leaders and face to face education for academic detailing are particularly effective. In addition, representation by a variety of professionals during educational outreach sessions can provide valuable concordance between participants. Likewise, presentations by a dyad of outreach providers, who were often discordant in specialty, also likely enriched the discussion and further enhanced use of the EHR messages for interdisciplinary collaboration. For example, outreach surgeons shared with medical groups that they preferred non-urgent curbside consultation via EHR messages versus being paged in the operating room. Interestingly, knowledge and preferred use of the EHR messaging tool were both highest among primary care. These findings fit with prior reports that the typical US primary care provider must coordinate care with 229 physicians in 117 practices.⁹ These dynamics could motivate adopting and supporting streamlined communication practices. Use was lowest among radiology and anesthesiology. This might reflect workflow and cultural differences, including the absence of a provider EHR “inbasket”, and less direct patient contact. Notably, these two groups declined outreach presentations but were still invited to participate in the survey. Low EHR messaging tool use in these groups serves as an internal control, further affirming the conclusion that the outreach intervention improved self-reported use.

At baseline, we found that a relatively high percentage of physicians were familiar with the EHR messaging tool but were not using it. Educational outreach by physician champions using case-based presentations correlated with a significant increase in the use of the EHR messaging tool. Rogers’ theory of innovation identifies five attributes influencing adoption of innovation: (1) *relative advantage*, (2) *compatibility* with needs of adopters, (3) *complexity/ease*, (4) *trialability*, and (5) *observability* of results (eg. quick replies using the tool). This innovation theory is useful for conceptualizing how the outreach strategy worked to increase adoption of the EHR messaging tool.⁴⁵ We suspect that the later plateau in EHR messaging was possibly due to (a) diffusion reaching all early adopters, (b) decay of the brief intervention over time or (c) growth and turnover in the provider network, including new physicians who were not present at the departmental outreach meetings.

Improving communication and care coordination is important given that the Joint Commission estimates that up to 80 percent of serious preventable adverse events are due to poor provider communication. Negative consequences include delayed diagnosis or treatment, duplicate testing, polypharmacy, avoidable hospitalizations, malpractice suits, and increased medical costs.^{26,46} It has been shown that contact between primary care physicians and specialist providers improves communication and care quality,^{47,48} but little is known on how to promote this in the EHR era. Historically, physicians would cross paths with colleagues in hallways, physician lounges, or stop by their offices to discuss shared patients. Now, the average clinician spends from 4 hours per week⁴⁹ to 3 hours per day⁵⁰ with additional EHR work making informal hallway interactions less frequent. A recent publication found that primary care physicians logged an average of 3.08 hours on face-to-face office visits and 3.17 hours on EHR desktop medicine per day.⁵⁰ In this environment, use of a concise EHR messaging tool holds strong potential to improve care coordination and decrease information overload⁵¹ and adverse outcomes of poor communication. The study also suggests the need to consider teaching about optimal use of communication tools in medical school curriculums. The inter-professional collaboration competency addressed in medical school curriculums could include the strategic use of communication strategies to improve efficiency and patient outcomes.

The acceleration in Electronic Health Records (EHR) systems followed the passage of the Health Information Technology for Economic and Clinical Health (HITECH) ACT in 2009. EHR adoption rates among hospitals have risen from 48 percent in 2008 to 77 percent in 2011.⁵²

Despite the surge in the use of EHR's, there is limited evidence of how this technology may impact patient care and productivity.^{53–55} This study provides a glimpse into the potential benefits a secure provider to provider communication messaging system. Future work should investigate relationships between EHR communication and patient outcomes. Specifically, a future mixed methods study could include qualitative research to analyze EHR communication content and processes and their impact on patient outcomes.

CONCLUSION

The physician champion educational outreach intervention effectively increased familiarity and accelerated use of the secure provider-to-provider EHR messaging tool at this academic institution. Future research should examine this strategy at other centers and investigate relationships between provider-to-provider communication and actual patient outcomes including preventable adverse events.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

Source of Funding: Bartels received time support from National Institutes of Health National Institute of Arthritis, Musculoskeletal and Skin Diseases (NIAMS) (K23 #AR062381) and has a research grant through the University of Wisconsin from Independent Grants for Learning and Change (Pfizer). Matsumura has research grant support

through the University of Wisconsin from Abbott, Cook, Covidien, Endologix, and Gore. This study was funded, in part by the Division of Vascular Surgery. Dr. Schwarze was funded by a Greenwall Faculty Scholars Award and a Training Award KL2TR000428 and from the Clinical and Translational Science Award program, through National Institutes of Health National Center for Advancing Translational Sciences Grant UL1 TR000427. Additional statistical support was from NIH-NCATS 9U54TR000021 (the Health Innovation Program/Community-Academic Partnerships core of UW ICTR-CTSA).

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IMPLICATIONS

This project demonstrates that educational outreach can change physician communication practices to encourage secure EHR messaging. Future research should examine relationships between EHR messaging and actual patient outcomes and the efficacy of similar outreach strategies at other health centers.

Figure 1.
Percent by practice specialty indicating that they are familiar with and can use the EHR messaging tool post-outreach

Figure 2.
Preferred communication mode post-outreach by specialty

Figure 3.
Time series analysis of monthly counts of EHR messaging tool exchanges between providers pre-outreach, during the outreach (intervention period), and post-outreach.

Table 1

Post-outreach survey responses by practice specialty

Practice Specialty	Invited (n)	Responded (n, %)	
Family medicine	202	83	41%
Internal medicine	155	76	49%
Pediatrics	61	34	56%
Pediatric subspecialty (incl. surgery)	100	48	48%
Adult subspecialty (incl. radiology, anesthesia)	824	165	20%
Adult surgical subspecialty	167	96	57%
Unknown		15	
Total	1509	517	34%

Table 2

Comparison of paired pre-post survey responses (n=88)

	Pre-survey	Post-survey	Test of change (p)
Familiar with EHR messaging tool	90%	97%	0.070
Know how to send messages with EHR messaging tool	79%	96%	<0.001
Communication methods used *			
EHR messaging tool	66%	88%	<0.001
Email	31%	22%	0.17
Note Copy	18%	11%	0.20
Text page, phone, voicemail	48%	40%	0.29

* Totals are greater than 100% given that multiple responses were allowed.