Preparing residents for future practice: report of a curriculum for electronic patient–doctor communication

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ABSTRACT

Objectives Patients frequently use secure web portals to access their medical record and communicate with their doctors, though few institutions currently train residents for electronic communication. We sought to develop a curriculum for secure messaging between patients and resident physicians, and to assess resident attitudes before and after the curriculum.

Methods In 2011, we developed a curriculum for patient–doctor secure messaging using a web-based patient portal within an internal medicine residency programme. We asked all residents to perform a self-assessment of skills, and report attitudes toward electronic communication at the beginning and end of the experience (9 months apart). We enrolled residents who practiced at the hospital-based clinic site into the patient portal, and recorded usage statistics.

Results The completed survey response rate was 108/159 (68%). At baseline, 57% of residents had used traditional email with patients, and most residents felt that the portal would increase work for providers but benefit patients. Postintervention questionnaires demonstrated no significant changes among all respondents, but residents who used the portal perceived improvements in care. Most residents were comfortable writing electronic messages to patients after the curriculum (80% to 91%, p=0.01).

Conclusions Implementing a patient web portal and secure messaging in a residency clinic is feasible and may improve the work and educational experience of trainees. Residents were initially skeptical of secure messaging being an additional burden to their work, but this was not realised among residents who used the portal.

INTRODUCTION

Over the past decade, patients and doctors have increasingly supplemented their office visits with electronic communication via e-mail or patient portals.1 2 Many electronic health records (EHRs) allow patients to view parts of their medical record, to request appointments and prescription refills, and to send secure messages to their physicians.3 4 5 Physicians have been reluctant to offer these services in part because of the time commitment and lack of reimbursement under the current fee-for-service reimbursement system. Despite physician hesitancy, patients and health systems increasingly expect providers to offer this service, and electronic access is part of the criteria for the patient-centred medical home.6 7

In the USA, passage of the Health Information Technology for Economic and Clinical Health (HITECH) Act of 2009 has led to accelerated adoption of these systems by offering incentive payments to practices that meet criteria for the ‘meaningful use’ of EHRs. These criteria include providing patients with timely electronic access to their health information and allowing for secure messaging between patients and physicians.8 Recent studies have shown an improvement in care process measures, patient engagement, and health outcomes with patient portals and clinical messaging.9–11

Despite the rise in EHRs and patient portal adoption, few institutions provide formal training to medical students and residents related to electronic communication.12 13 In many practices, physicians are expected to use secure messaging with patients outside of visits, and must learn best practices ‘on the job’. The majority of communication skills training throughout medical education emphasises synchronous communication modalities, not the asynchronous communication of electronic messaging.14 15 To prepare residents for future practice, medical educators should integrate electronic communication into resident practices and ambulatory medicine curricula.

We sought to develop a curriculum for teaching secure messaging within a large US-based internal medicine residency training programme. Our assessment included evaluation of attitudes toward electronic communication with patients before and after the curriculum, which included experiential learning on the patient portal. We hypothesised that current residents who are ‘digital natives’, meaning, they grew up with e-mail and the internet, would be more embracing of secure messaging with patients than older faculty have historically been,16 and that the portal would be an efficient means of patient–doctor communication for residents. In this paper, we describe the curriculum, present portal usage data, and examine the effect on resident attitudes (boxes 1 and 2).

METHODS

Needs assessment and preintervention survey

This educational project and study occurred during the July 2011–June 2012 academic year. We administered a preintervention questionnaire (see online supplementary appendix) to assess residents’ needs and baseline attitudes toward patient portals. The questionnaire asked residents to self-report their usage of email with patients and to perform a brief self-assessment of communication skills.
Box 1 Setting

- Beth Israel Deaconess Medical Center (BIDMC) is an academic medical centre affiliated with Harvard Medical School, and located in Boston, Massachusetts. The Internal Medicine Residency Program has 159 residents, 130 of whom train in ambulatory medicine at a hospital-based practice. Residents serve as primary care providers to patients empanelled in their continuity clinic, with patient panels estimated to be 100 patients at the time of graduation.
- PatientSite (http://www.patientsite.org) is a BIDMC-based secure patient portal that provides patients with an online view of their medical record, including a problem list, their medications, laboratory results, pathology and radiology reports, and summaries of recent visits. The portal also provides patients with the means to electronically request prescription refills and appointments, and to communicate via secure messaging directly with their physician.17

We assessed resident attitudes toward the portal by asking for their response to a series of statements concerning physician workflow, patient empowerment and satisfaction, and professional liability resulting from messaging. Residents took the initial questionnaire after the 1 h lecture, but before either case-based small group session or use of PatientSite. Respondents used 4-point Likert scales for agreement with the statements (strongly agree, agree, disagree, strongly disagree), which were dichotomised to agree or disagree for analysis.

Box 2 Curriculum components

- We organised the curriculum around four domains: patients, the patient experience, the physician experience, and systems-based practice. We created the curriculum based on literature reviews of best practices for patient–physician electronic communication,18 19 studies of patient satisfaction and usage of electronic messaging, and local expert opinion. The curriculum consisted of:
  - A 1 h lecture given as part of the ambulatory lecture series for all medical residents who were able to attend. The lecture discusses a brief history of personal health records, an overview of the medical literature and survey data regarding patient preferences and uses of electronic messaging, the impact of electronic messaging on clinical productivity and health outcomes, and logistical information to use the patient portal.
  - A case-based (see online supplementary appendix) 1 h small group session held within the ambulatory portion of the internal medicine curriculum. The cases include themes of unequal access to online resources, health literacy and patient-centred communication, and patient empowerment. Residents were guided through a discussion focusing on how to choose the appropriate medium of communication for a given concern. Attention was paid to expectations for professional behaviour and to strategies for handling different patient requests and ‘red flag’ complaints, such as chest pain.
  - Experiential learning using PatientSite for those residents at the hospital-based primary care clinic.

Postintervention survey

A postintervention questionnaire was administered at the end of the academic year, roughly 9 months after enrolment began. This questionnaire repeated questions from the original survey in addition to asking for self-reported attendance at the lecture and small group session. Of those respondents who used the portal, we also asked about any missed or emergent messages sent by patients, and missing data (n=2) were considered negative. The surveys were administered electronically, and were linked with the preintervention survey.

Data analysis

We performed a matched pairs analysis for the preintervention and postintervention data using McNemar’s exact test. In a posthoc exploratory subgroup, we stratified responses to the questionnaire by whether or not residents reported using PatientSite to communicate with patients during the intervention. We also recorded PatientSite usage statistics for resident empanelled patients, and also looked at response turnaround time for patient-initiated messages to residents. Because surveys were anonymous, we did not link survey responses to usage statistics. To determine whether prior experience with e-mail or with the curriculum predicted usage of the portal, we performed multivariable logistic regression, including prior email experience, training level and curriculum participation in the model. Residents who were not based at the participating clinic site were excluded from the regression analysis. Statistical analysis was performed using SAS V9.2 (SAS Institute, Cary, North Carolina, USA).

This project received an educational exemption by the Institutional Review Board of Beth Israel Deaconess Medical Center.

RESULTS

Participants

Of the 159 residents in the programme, 133 completed the baseline survey, and 122 completed the postintervention survey (figure 1 and table 1). One-hundred and eight residents completed both and were included in the comparative analysis. Of these, 27 (25%) reported attending the 1 h lecture, and 62 (62%) reported participating in the case-based curriculum.
Seventy-seven of 108 (71%) participated in either the lecture or the case-based curriculum. Instructional materials were posted to the residency intranet for those who were unable to attend.

Survey responses

At the intervention outset, 62 of the 108 residents who completed both the prequestionnaire and postquestionnaire (57%) had already communicated with patients outside of the patient portal using traditional non-secure e-mail. The initial questionnaire also showed that residents were already comfortable with writing letters to patients 98/100 (98%), managing chronic disease outside of face-to-face visits 78/100 (78%), and writing in non-technical language to patients over e-mail 79/99 (80%). After the curriculum, the number of residents reported comfort in writing to patients in non-technical language over email increased (pre 79/99, 80%; post 90/99, 91%; p=0.01), while other aspects of the self-assessment were not significantly changed.

The matched prequestionnaires and postquestionnaires revealed that only 46/101 residents (46%) initially agreed with the statement that PatientSite would make patient care easier for them as providers (table 2). This increased marginally in the postintervention survey, however, as the majority 53/101 (52%) agreed that patient care would be made easier with the portal (p=0.28 for the difference). Most agreed that PatientSite would make receiving care easier for their patients (pre 79/101, 78%; post 79/101, 78%). Additionally, residents felt that PatientSite would empower patients to improve their own care of chronic conditions both before and after the intervention (pre 71/101, 70%; post 77/101, 76%; p=0.33).

Forty-three of 108 residents who completed the surveys reported communicating with patients using PatientSite. In multivariable logistic regression, residents who had already communicated with patients using traditional email were more likely to

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### Table 1

<table>
<thead>
<tr>
<th>PGY1 (%)</th>
<th>PGY2 (%)</th>
<th>PGY3 (%)</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residents in programme</td>
<td>61</td>
<td>50</td>
<td>48</td>
</tr>
<tr>
<td>Completed pretest</td>
<td>44 (72)</td>
<td>46 (92)</td>
<td>39 (81)</td>
</tr>
<tr>
<td>Completed posttest</td>
<td>48 (79)</td>
<td>41 (82)</td>
<td>33 (69)</td>
</tr>
<tr>
<td>Included in matched analysis</td>
<td>38 (62)</td>
<td>40 (80)</td>
<td>30 (63)</td>
</tr>
<tr>
<td>Enrolled in PatientSite</td>
<td>40 (82)</td>
<td>44 (92)</td>
<td>41 (81)</td>
</tr>
<tr>
<td>Patients registered</td>
<td>99</td>
<td>202</td>
<td>123</td>
</tr>
<tr>
<td>% of Enrolled residents with Enrolled patients</td>
<td>75</td>
<td>91</td>
<td>88</td>
</tr>
<tr>
<td>% of Enrolled residents messaged by patients</td>
<td>40</td>
<td>68</td>
<td>46</td>
</tr>
</tbody>
</table>

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Figure 1 Flowchart of the PatientSite Educational Project Evaluation.
use PatientSite than their counterparts (OR 4.1, CI 1.4 to 12.2 p = 0.01). Upper-level residents were more likely to participate compared with interns (postgraduate year 2 (PGY2) OR 6.9, CI 2.0 to 23.5, p = 0.02; and PGY3 3.2, CI 0.9 to 11.1, p = 0.07). Last, those who recalled participating in the curriculum were not significantly more likely to use PatientSite (OR 1.8, CI 0.5 to 5.7, p = 0.32).

When asked about risk and liability, most residents were initially concerned that patients would send emergent messages by secure messaging, with no appreciable change in the postintervention questionnaire (pre 87/103, 84%; post 88/103, 85%; p = 1). The majority of residents also felt that they might be held liable if a patient sent an emergent concern by secure messaging that they could not address in a timely fashion (pre 80/103, 78%; post 82/103, 80%; p = 0.84). In the postintervention survey for those who had used PatientSite, 4/43 (9.3%) perceived that they had received an inappropriately urgent message. Six of 43 (14.0%) reported that they had missed or delayed responding to a patient’s message, noting that they were out of the country (n = 1), technical problems (n = 1), lacked familiarity with the tool (n = 2), or did not want to reply without consulting a faculty preceptor (n = 1).

In an exploratory subgroup analysing only data from the residents who reported using PatientSite to communicate with their patients (n = 43), the baseline responses were very similar to the total group (table 2). However, after the intervention, a higher percentage agreed that PatientSite made care easier for the doctor (pre 17/39, 43%; post 24/39, 60%; p = 0.07). Also, in this subgroup, a larger increase was observed in residents perceiving that PatientSite improved the care provided to patients (pre 20/40, 50%; post 35/40, 88%; change p < 0.01). Residents who participated in PatientSite also had higher levels of agreement that PatientSite empowers patients to improve their chronic care.

**PatientSite usage**

We enrolled 125 of the 130 residents at the on-site academic primary care practice in PatientSite. Usage data indicated that by the end of the academic year (approximately 1 month after the completion of the postsurvey), 106 (85%) of these residents had at least one patient enrolled in PatientSite and 65 (52%) had been emailed at least once by a patient (table 1). In total, the residents accrued 424 patients on PatientSite, 26% of whom had emailed their resident at least once. The majority of enrolled patients reviewed their record at least once (table 3).

One hundred and eleven patients sent at least one message to their resident physician, accounting for a total of 532 messages to residents; of these, residents replied to 299 (56%) using PatientSite. The median response time was 5 h, with an IQR of 2–42 h.

**DISCUSSION**

In this educational project, we sought to assess baseline needs and attitudes towards electronic messaging between resident physicians and patients, to develop and implement an educational curriculum, and to assess usage and the change in attitudes over time. We found that it was feasible to implement the patient web portal and secure messaging within the resident clinic, and that portal use may improve the work and educational experience of trainees. Despite growing up with email, we initially found residents to be sceptical of the technology for use with patients, and to be concerned about liability. Residents who used the portal perceived that the portal improved care for patients, empowered patients, and trended towards being able to improve workflow for residents themselves.

Despite no formal training, 57% of residents were already using traditional email to communicate with a subset of their patients. The majority of residents were already comfortable managing patients outside of traditional visits, and in communicating with patients using non-technical language. The intervention increased the number of residents who felt comfortable communicating with patients over email and secure messaging.

Initially, residents felt that communicating with patients through a patient portal would add to their already busy workloads, and would ultimately make their jobs harder. Despite these concerns, we found that the majority of residents who did communicate with patients using the patient portal perceived that it improved their work, and felt that it improved the care that they provided to their patients. These findings are not surprising. Residents spend considerable stretches of time away from the practice and do not always have access to mail or other forms of communication. Additionally, busy inpatient schedules

### Table 2

<table>
<thead>
<tr>
<th>Agreed or strongly agreed with statement</th>
<th>All respondents (n=108)</th>
<th>PatientSite Users (n=43)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>Pre (%)</td>
</tr>
<tr>
<td>PatientSite (or a patient portal) will make patient care easier for me</td>
<td>101</td>
<td>46</td>
</tr>
<tr>
<td>PatientSite will make receiving care easier for my patients</td>
<td>101</td>
<td>78</td>
</tr>
<tr>
<td>PatientSite will improve the care I provide to my patients</td>
<td>101</td>
<td>53</td>
</tr>
<tr>
<td>PatientSite will empower patients to improve their own care of chronic conditions</td>
<td>102</td>
<td>70</td>
</tr>
<tr>
<td>I am concerned that patients will send emergent concerns by email</td>
<td>103</td>
<td>84</td>
</tr>
<tr>
<td>I am concerned that I may be held liable for a patient sending an emergent concern by email</td>
<td>103</td>
<td>78</td>
</tr>
</tbody>
</table>

### Table 3

<table>
<thead>
<tr>
<th>Domain</th>
<th>Portal feature</th>
<th>Patient usage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication</td>
<td>Secure messaging with resident</td>
<td>26</td>
</tr>
<tr>
<td>Health data review</td>
<td>Medication list</td>
<td>66</td>
</tr>
<tr>
<td></td>
<td>Laboratory data</td>
<td>56</td>
</tr>
<tr>
<td></td>
<td>Microbiology results</td>
<td>62</td>
</tr>
<tr>
<td></td>
<td>Radiology reports</td>
<td>55</td>
</tr>
<tr>
<td></td>
<td>Other reports</td>
<td>66</td>
</tr>
</tbody>
</table>
make it difficult to return phone calls. The asynchronous nature of email is easier to fit into residents’ schedules and likely represents a more efficient way for them to communicate with patients that is built into standard workflow.

Our results suggest that the attitudes of current residents towards patient portals are consistent with prior descriptions of attending physicians. Residents appeared sceptical toward the experience with respect to their workload burdens, but as was shown in prior studies, those who actually participated discovered those fears to be largely unfounded. Byrne et al described in 2009 an experience in the Veterans Administration with their patient web portal, reporting that those who used the portal rated it less burdensome than non-users.

Despite no effort by the practice to recruit patients to use the portal, 424 resident patients enrolled within the intervention period. The patients showed high levels of engagement with the portal, with usage statistics showing that over half of them had reviewed details in their medical record, and a quarter had messaged their physician at least once. This represents a way for patients to become more engaged in their care, and to be more connected with their medical providers who are frequently on the wards or on other education rotations, and not consistently in the clinic.

Interestingly, residents reported being concerned about professional liability. This is of particular concern to residents because of frequent overnight shifts that might delay checking or responding to messages. The management of urgent messages was discussed in both the lecture and the small groups despite their low incidence in the literature. The training programme expected residents to use out-of-office automatic replies when they were away, and faculty members automatically received a copy of messages as backup. Despite these safeguards, medical liability remained a concern in the postintervention surveys, and 9% of residents estimated that they encountered an urgent message. Programmes in countries other than the USA are likely to have different results regarding liability.

Our analysis of this educational project has limitations. First, this was an educational experience at a single large academic medical centre that has a long history with a patient portal. Use statistics, enrolment and attitudes may not be generalisable to other settings, but will likely translate to other large academic medical centres that are gaining experience with patient portals. The results of our exploratory subgroup analysis should be interpreted with appropriate caution. However, preintervention responses for these residents were quite similar to the overall cohort, with the majority disagreeing that the portal will make their workload easier, suggesting that these residents did not have a large bias toward accepting the portal. Our questionnaire was not formally validated. Last, the educational impact of the lecture and small groups was not explicitly tested. The logical next steps for educational research would include the development, validation and implementation of a tool to assist faculty in giving feedback to residents on their electronic communication.

Our experience suggests that resident participation in a patient portal may be beneficial both to patients and to resident education. Residents who used the portal found it to be helpful for both themselves and their patients. However, a substantial number of residents were concerned about medical liability, and remained so at the end of the academic year. Explicit teaching around managing ‘urgent’ with redundancy systems, or a central triage of messages, may be reasonable to ensure that messages are not lost.

Main messages

- After completion of an educational curriculum, 125 US medical residents were enrolled as providers in an established patient portal, and were surveyed before and after the programme.
- Most residents felt that a patient web portal would increase their workload, but that it would be somewhat useful for patients.
- At the end of the experience, residents felt the portal improved their workload, especially among those residents who used the portal.
- Medical residents remain concerned about medicolegal liability, and 9% perceived they received an inappropriately urgent message.

Current research questions

- Do residents perceive that patients who enrol in a patient portal receive higher quality care?
- Does asynchronous communication improve the patient–doctor relationship?
- Does web portal participation lead to higher efficiency in responding to returning patient concerns?

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Contributors

Our manuscript has three authors who approve of the content of the manuscript. BHC contributed to design, curriculum and assessment, as well as manuscript writing. AM contributed to design, assessment and writing. BEL contributed to design and writing. The authors have no conflicts of interest to declare.

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Competing interests

None.

Ethics approval

BIDMC IRB.

Provenance and peer review

Not commissioned; externally peer reviewed.

Data sharing statement

This project does have data available for other researchers. All authors of the manuscript had access to the data.

REFERENCES


