

Case Report ■

Initial Experience with Patient-Clinician Secure Messaging at a VA Medical Center

JOHN M. BYRNE, DO, SHANE ELLIOTT, BS, ANTHONY FIREK, MD

Abstract The authors implemented what is possibly the first secure messaging system in a VA Medical Center. Since reimbursement for secure messaging is not of great concern and clinical data systems are fully computerized, several evaluation strategies were used to assess clinical adoption. To address known concerns of clinicians, the authors analyzed secure messaging use and performed a content analysis. Message volumes were low and content analysis demonstrated that messages were appropriate. Despite this, a clinician survey showed that clinical adoption was impeded by several factors including the introduction of secure messaging to selected patients, workload concerns, and clinician communication preferences. In addition, the authors believe that clinicians experienced clinical adoption inertia resulting from the overload of information in a highly computerized clinical environment. The authors learned that to promote clinician adoption they must demonstrate workload benefits from secure messaging and more fully analyze the clinical computing workload that clinicians experience.

■ *J Am Med Inform Assoc.* 2009;16:267–270. DOI 10.1197/jamia.M2835.

Introduction

Acceptance of electronic patient-clinician messaging has been slow¹ due to barriers including reimbursement, security issues,^{2–5} clinicians' concerns about workload, appropriate use by patients, and message content.⁶ Several studies have demonstrated that physicians who use patient-clinician electronic messaging are not inundated by messages and that content is appropriate.^{5,7–9} Data on whether secure messaging reduces office visits and telephone contacts is inconclusive.^{3,8,10,11}

The Veterans Health Administration (VHA), the country's largest integrated health care system, is recognized as a leader in clinical informatics.^{12–14} Although a national system is in development, most VHA patients currently do not communicate with their physicians electronically¹⁵ and little is known about clinician adoption in similar healthcare systems.³ The VA Loma Linda Health Care System (VALLHCS) developed the first secure messaging system in VHA, and evaluated the barriers to clinicians' acceptance.

Case Description

The VA Loma Linda Health Care System introduced a patient web portal in Jun 2004. Portal services include medication refill, demographics, appointments, copay status, and periodic healthcare reminders from the Computer-

ized Patient Record System (CPRS). Beginning in 2007, MyHealtheVet, the national VHA patient portal, replaced local services except secure messaging.

Messaging security is achieved using a 128 bit Secure-Socket-Layer (SSL) 3.0 encrypted website and a secure server with a fire wall blocking access to unauthorized users. Messages are permanently stored in an SQL database. New Portal Mail messages generate e-mail alerts without identifying information to providers in Microsoft Outlook and to patients in their personal e-mail accounts.

A Portal Mail patient-user agreement was developed based on guidelines from the American Medical Informatics Association (AMIA).¹⁶ Patients are given a summary of these guidelines and must acknowledge understanding of them. Briefly, the guidelines include appropriate content; avoidance of e-mail for urgent matters; escalation of e-mail for urgent matters or nonresponsiveness; and response time (three working days). Patients attain access to Portal Mail upon signing a user agreement and undergoing in-person authentication. Secure messaging was limited to patients' primary care teams.

One primary care team served as a beta test site. After input from staff for system improvements, training was offered to the remaining four teams. Training was conducted by the authors and the software developer and consisted of background studies on patient-clinician messaging, review of the AMIA guidelines, and hands-on training. Staff access to Portal Mail is granted by the system manager using CPRS usernames and passwords.

Approximately 35,000 patients receive primary care from 5 teams consisting of 7–8 physicians/nurse practitioners (clinicians) (total 39), 4 or 5 licensed vocational nurses (LVN), a registered nurse (RN), a case manager, and 3 patient services assistants. Physicians and nurse practitioners (clinicians), nursing staff, and patients are grouped in Portal Mail according to their primary care clinic assignment using

Affiliations of the authors: VA Loma Linda Healthcare System (JMB, SE, AF), Loma Linda, CA; Loma Linda University School of Medicine (JMB, AF), Loma Linda, CA.

This material is the result of work supported with resources and the use of facilities at the VA Loma Linda Healthcare System.

Correspondence: John M. Byrne, DO, Loma Linda VA Healthcare System, 11201 Benton Street (14A), Loma Linda, CA, 92357; e-mail: <john.byrne@med.va.gov>.

Received for review: 4/18/2008; accepted for publication: 12/04/2008

Primary Care Management Module (PCMM) software that tracks primary care patient panels. Patient messages are forwarded to the primary care team. Two staff members on each team review messages and, based on content, forward messages to appropriate clinic staff.

Analysis

We determined message volumes and usage from the SQL database. A sample of 200 e-mails was selected for content analysis using a random numbers table and message identification numbers in the SQL database. A staff member not involved with the analysis removed all data that might identify the patient or provider. Two of the authors (JMB, SE) independently reviewed each message, evaluating them for compliance with the user agreement and avoidance of urgent matters, and assigning them to appropriate category(s) according to a modified version of a previously published classification system.⁷ Messages were classified as information update, medication renewal, request for referral, health questions, questions about medical tests, or "other" for messages that otherwise did not fit the defined categories. Billing, appointment questions, and information seeking were subsumed in the "other" category. Messages could be assigned more than one category.

A patient-clinician communication survey that included 17 questions for all clinicians and an additional 23 questions for current Portal Mail users was developed by the authors. Clinicians were asked to assess their level of agreement with each statement on a Likert-like scale: 5 = Strongly Agree, 4 = Agree, 3 = neither Agree nor Disagree, 2 = Disagree, 1 = Strongly Disagree.

Mean responses with standard deviations were used for the survey items. Content analysis inter-rater reliability was assessed with the kappa statistic. Differences in e-mail content categorization were resolved by consensus.

Results

As of Jun 30, 2007, 5,613 patients were registered on the web portal and 1976 had signed a Portal Mail user agreement. The number of active Portal Mail patient users, defined as those who sent at least one message, was 340. Five thousand seven hundred thirteen (5,713) messages were transmitted through Portal Mail in 2,921 threads. Patients sent a mean of 54 messages per 100 users/mo with a median of 61 and a range of 31–78 messages (excluding the first five months as outliers). The number of e-mail messages per month averaged 190 and increased steadily to a peak of 425/mo in the first year before reaching steady state at 250/mo (see Appendix/Fig 1, available as an on-line data supplement at <http://www.jamia.org>). The message peak was temporally related to an aggressive marketing campaign and enthusiasm of early adopters.

Of the 39 primary care clinicians, 21 (53%) registered and communicated with a patient at least once, 17 (43%) continued to use Portal Mail through the end of 2006, 15 (38%) continued to use it through Jun 2007, and 6 (15%) stopped using the system.

Registered physicians communicated in a mean of 1.71 message threads (range 0.25–4.34, median 1.27) and 3.35 messages/wk. The sixteen clinicians who used Portal Mail

Table 1 ■ Content Analysis of 200 Portal Mail Messages

E-mail Category	Number of Messages	Percent of Total Messages
Medication renewal	72	33%
Information update	44	19%
Medical tests	30	13%
Health care question	28	12%
Requests for referral	18	8%
Other	34	15%

for at least 1 year averaged 2.20 message threads (range 0.29–4.34) and 4.23 messages/wk.

The content analysis showed substantial agreement on message classification ($k = 0.69$). The most frequent content of patient e-mail was requests for medication renewal (33%) (Table 1). Of the 200 messages, 191 (96%) followed The Medical Center's e-mail guidelines and only 1 message (0.5%) was considered urgent.

All 39 primary care clinicians were asked to complete the patient communication survey, 33 (85%) responded, and 12 reported using Portal Mail at the time of the survey ("users") (Table 2). Both groups self-rated clinical software proficiency was high. Clinician nonusers regard telephone communications as more efficient compared to users (3.81 ± 0.68 v. 2.58 ± 0.99). Non-users disagree that adding the system to their current software is manageable (2.43 ± 0.97 v. 4.00 ± 0.85) and agree that Portal Mail increases workload (3.67 ± 0.91 v. 2.67 ± 1.23). With one extreme outlier removed, non-users estimated spending slightly more time returning telephone calls than users (44 ± 16 v. 37 ± 17 min) and saw more unscheduled patients per half day (1.78 ± 0.91 v. 1.54 ± 0.99). However, portal mail users answered neutrally to questions on whether telephone calls and unscheduled patients were decreased (3.09 ± 1.14 and 3.45 ± 1.21) (Table 2).

Clinician users agree that message content is appropriate (4.17 ± 0.94) and that Portal Mail improves the efficiency (4.08 ± 1.08) and quality (4.17 ± 0.94) of patient communication (Table 3). The clinician users introduce Portal Mail to selected patients (4.08 ± 0.90) and not to all patients (2.33 ± 0.89).

In open-ended comments, non-users indicate reasons for not using the system are unawareness and not having time to use another form of communication (see appendix/Table 4, available as an on-line data supplement at <http://www.jamia.org>).

Discussion

Although previous reports have identified reimbursement as a driving factor for clinical adoption in other healthcare systems^{1,2,5,17,18} it is not a factor in a capitated system like VHA.³ Therefore, we used several strategies to evaluate our clinicians' adoption of secure messaging to identify factors that might effect wider implementation in our setting.

Our experience and the work of others^{5,7,19,20} would seem to allay our clinicians' concerns about message quantity and quality since message volumes are low and the content is appropriate. However, we found that our clinicians selec-

Table 2 ■ Comparison of Mean (Standard Deviation) Clinician Survey Responses of Portal Mail Non-Users and Users

Survey Item	Mean Portal Mail Non-Users (N = 21)	Mean Portal Mail Users (N = 12)
I have adequate means of communicating with my patients.	3.6 (±1.1)	3.7 (±1.0)
I have sufficient time during office hours to return phone messages	2.2 (±1.2)	1.8 (±0.8)
In communicating with patients by all means available to me, I am able to respond to their concerns within 24 h.	2.3 (±1.1)	2.5 (±1.2)
In communicating with patients by all means available to me, I am able to respond to their concerns within 48 h.	3.3 (±1.1)	3.3 (±0.9)
I am satisfied with the current means available to me to communicate with patients:	3.1 (±1.2)	2.9 (±1.0)
Telephone calls are an efficient means to communicate with patients outside of office visits:	3.8 (±0.7)	2.6 (±1.0)
Written letters to patients are an efficient means to communicate with patients outside of office visits:	3.5 (±1.1)	3.8 (±0.6)
Patients have adequate means to contact me outside of office visits:	3.8 (±0.8)	3.2 (±0.7)
Using currently available means of communication, I reliably receive messages from patients:	3.8 (±0.8)	3.4 (±0.7)
Patients have adequate means available to communicate with staff to complete administrative tasks such as medication refills and appointments:	3.6 (±0.9)	2.9 (±0.8)
Using portal mail to communicate with patients increases workload:	3.7 (±0.9)	2.7 (±1.2)
Adding portal mail to my current software used to care for patients is manageable:	2.4 (±1.0)	4.0 (±0.9)
I have adequate assistance from clinic staff to communicate with patients:	3.1 (±1.2)	2.8 (±1.1)
I am able to effectively and efficiently use the software available to me for clinical care (i.e., CPRS, vista imaging, care management):	4.0 (±0.6)	4.3 (±0.5)

tively introduced secure messaging to patients, which may have limited patient adoption. Other studies^{1,17} report similar findings but have not explored reasons for selectiveness. We believe that our clinicians' selection may in part be related to judgments about patients' capability to use the system or to use it judiciously. Implementation of the national system will likely extend secure messaging beyond this select group of patients, which may further reduce clinician acceptance.

Similar to other studies,^{3,8,10} our survey shows mixed perceptions on workload. Interestingly, our clinician users view telephone communication as less efficient than non-users² and thus may be substituting one form of communication with another⁸ rather than adopting secure messaging to decrease workload. Therefore, clinician attrition and non-

acceptance of our secure messaging system may be related to physician communication preferences and ongoing skepticism that it will reduce workload.

Finally, we believe our clinicians experienced "clinical adoption inertia" or an unwillingness to change and adopt secure messaging resulting from relatively unstudied factors such as "information overload",^{21,22} "paperwork" burden,²³ the volume of alerts and reminders,²⁴ and additional tasks associated with computerized order entry.^{25,26} In our experience, a highly computerized clinical environment did not ensure clinician acceptance. Other studies support this notion, finding variability among VHA Hospitals' adoption of information technology attributed to human factors as well as organizational and cultural issues.^{15,24} Although reim-

Table 3 ■ Clinician Portal Mail User Mean (Standard Deviation) Survey Scores

Survey Item	Mean Score
Estimate the total amount of time you spend responding to e-mail from patients using portal mail on a typical work day (in minutes):	9.7 (±4.8)
As a result of using portal mail, the number of phone calls from my patients has decreased:	3.5 (±1.1)
As a result of using portal mail, the number of my patients who walk-in without an appointment has decreased:	3.1 (±1.1)
The volume of portal mail messages that I receive is manageable and not overwhelming:	3.9 (±1.2)
Most portal mail messages are appropriate (i.e., not about urgent matters, appropriate content):	4.2 (±0.9)
Portal mail has improved my communication with patients:	3.9 (±1.1)
Portal mail has improved my efficiency in communicating with patients:	4.1 (±1.1)
Portal mail has improved the quality of my communication with patients:	4.2 (±0.9)
Portal mail has improved the quality of care that I deliver:	4.0 (±1.0)
I would recommend the use of portal mail to my colleagues:	4.1 (±1.2)
I introduce portal mail to all of my patients:	2.3 (±0.9)
I introduce portal mail to selected patients:	4.1 (±0.5)
The portal mail interface is easy to use:	4.1 (±0.9)
Portal mail increases the amount of time communicating with patients:	2.9 (±1.0)
Portal mail is a good way to answer patient's nonurgent medical questions:	4.3 (±0.6)
Portal mail is a good way to communicate test results:	3.9 (±1.0)
Portal mail is a good way to follow up on patient appointments:	3.0 (±1.2)

bursement may perhaps overcome clinical adoption inertia in other settings, the burden of clinical computing in our environment impeded our clinicians' acceptance of secure messaging.

References ■

1. Car J, Sheikh A. E-mail consultation in health care: 2- Acceptability and safe application. *BMJ*. 2004 Oct 30;329(7473):1046.
2. Liederman EM, Morefield CS. Web messaging: A new tool for patient-physician communication. *Jamia*. 2003;10:260-70.
3. Zhou YY, Garrido T, Chin HL, Wiesenthal AM, Liang LL. Patient access to an electronic health record with secure messaging: Impact on primary care utilization. *Am J Manag Care*. 2007;13:418-24.
4. Stone JH. Communication between physicians and patients in the era of e-medicine. *N Engl J Med*. 2007;356(24):2451-3.
5. Liederman EM, Lee JC, Baquero VH, Seites PG. Patient-physician web messaging: The impact on message volume and satisfaction. *J Gen Intern Med*. 2005;20:52-7.
6. Car J, Sheikh A. E-mail consultations in health care. 1 - Scope and effectiveness. *BMJ*. 2004 Oct 30;329(7473):1046.
7. White CB, Moyer CA, Stern DT, Katz SJ. A content analysis of e-mail communications between patients and their providers: Patients get the message. *Jamia*. 2004;11:260-7.
8. Katz SJ, Moyer CA, Cox DT, Stern DT. Effect of a triage based e-mail system on clinic resource use and patient and physician satisfaction in primary care. *J Gen Intern Med*. 2003;18:736-44.
9. Sittig DF. Results of a content analysis of electronic messages (email) sent between patients and their physicians. *BMC Med Inform Decis Mak*. 2003 Oct 1;3:11.
10. Bergmo TS, Kummervold PE, Gammon D, Dahl LB. Electronic patient-provider communication: Will it offset office and telephone consultation in primary care. *Int J Med Inform*. 2005;74:705-10.
11. Katz SJ, Nissan N, Moyer CA. Crossing the digital divide: Evaluating online communication between patients and their providers. *Am J Manag Care*. 2004 October;9:593-8.
12. Evans DW, Nichol PW, Perlin JB. Effect of implementation of an enterprise-wide electronic health record on productivity in the Veterans Health Administration. *Health Econ Pol Law*. 2006;1:163-9.
13. Perlin JB, Kolodner RM, Roswell RH. The Veterans Health Administration: Quality, value, accountability and information as transforming strategies for patient-centered care. *Am J Manag Care*. 2004;10(11):828-36.
14. Do W. Survey reveals physicians' love/hate relationship with technology. *Physician Exec*. 2004 Mar-Apr;30(2):4-10.
15. Doebbeling BN, Vaughn TE, McCoy KD, Glassman P. Informatics implementation in the Veterans Health Administration (VHA) healthcare system to improve quality of care AMIA Symp Proc. 2006;204-8.
16. Kane B, Sands DZ, AMIA Internet Working Group; Task Force on Guidelines for the Use of Clinic-Patient Electronic Mail Guidelines for the clinical use of electronic mail with patients. *Jamia*. 1998;5:104-11.
17. Kittler AF, Pizziferri L, Volk LA, et al. Primary care physician attitudes towards using a secure web-based portal designed to facilitate electronic communication with patients. *Inform Prim Care*. 2004;12:129-38.
18. Gaster B, Knight CL, DeWitt DE, et al. Physicians' use of and attitudes toward electronic mail for patient communication. *J Gen Intern Med*. 2003;18:385-9.
19. Stiles RA, Deppen SA, Figaro MK, et al. Behind-the-scenes of patient-centered care; content analysis of electronic messaging among primary care clinic and provider staff. *Med Care*. 2007 Dec;45(12):1205-9.
20. Leong SL, Gingrich D, Lewis PR, Mauger DT, George JH. Enhancing doctor-patient communication using email: A pilot study. *J Am Board Fam Practice*. 2005;18(3):180-8.
21. Hall A, Walton G. Information overload within the health care system: A literature review. *Health Inf Libr J*. 2004;21:102-8.
22. Wilson TD. Information overload: Implications for healthcare services. *Health Inform J*. 2001;7:112-7.
23. McRae S, Hamilton R. The burden of paperwork. *Can Fam Physician*. 2006;52:586-8.
24. Saleem JJ, Patterson ES, Militello L, et al. Exploring barriers and facilitators to the use of computerized clinical reminders. *J Am Med Inform Assoc*. 2005;12:438-47.
25. Ash JS, Sittig DF, Poon EG, et al. The extent and importance of unintended consequences related to computerized provider order entry. *J Am Med Inform Assoc*. 2007;14:415-23.
26. Eslami S, Abu-Hanna A, de Keizer NF. Evaluation of outpatient computerized physician medication order entry systems: A systematic review. *J Am Med Inform Assoc*. 2007;14:400-6.