Electronic Health Communication: An Educational Application for This Principle of the Patient-centered Medical Home

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The Patient-centered Medical Home (PCMH) relies on comprehensive, consistent, and accessible communication for the patient with all members of their health care team. "E-medicine" and health information technology (HIT) create many new possibilities in addition to standard face-to-face encounters. There is interest by both physicians and patients for enhanced access through electronic communication. However, there is little published literature regarding specific educational programs for medical professionals using electronic communication with patients. Faculty in a required 6-week family medicine clerkship developed, implemented, and evaluated an electronic health communication curriculum. This curriculum consists of a didactic session on electronic health communication including anticipated errors of communication and common clinical pitfalls. Each clerkship student receives a weekly e-mail from a standardized patient centered on a clinical question. Additionally, each e-mail contains a different communication challenge or predicted error. Students receive feedback each week on the e-mails and are evaluated with an objective structured clinical exam (OSCE) during the final week. The results of the weekly e-mails and the final OSCE show that students improve overall but continue to make predicted errors in communication despite didactic instruction and actual practice. These results reinforce the need for medical student education on electronic health communication with patients.

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The Patient-centered Medical Home (PCMH) relies on comprehensive, consistent, and accessible communication for the patient with all members of their health care team. "E-medicine" and health information technology (HIT) create many new possibilities outside of standard face-to-face encounters. There is interest by both physicians and patients for enhanced access through electronic communication, and electronic health records are an integral component of that communication. Harris Interactive found that about 67% of adults surveyed would prefer to receive test results and 77% reminders for physician visits or other care via e-mail.[1] Virji et al, on a patient survey in a family practice setting, found that 68% of patients used e-mail, and the great major-

ity of patients (80%) were interested in using e-mail to communicate with their physician or clinic.[2] Additionally, both the Future of Family Medicine Project and the Joint Principles of the Patient-centered Medical Home address the need and use of HIT for improved communication and enhanced access.[3,4] To meet this demand, medical students, residents, and physicians will need to learn how to communicate with patients via the Internet and by secure e-mail. There is little published literature regarding programs specifically designed to educate medical professionals in the proper use of electronic communication with patients.

To address this new demand, an electronic communication curriculum was developed to be delivered during a required 6-week third-year clerkship in family medicine. The curriculum consists of a didactic session during the first week, four weekly "standardized" patient e-mails with clerkship faculty feedback, and a final e-mail objective structured clinical exam (OSCE)

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during the last week. To design the curriculum, the faculty reviewed the published literature concerning the usage of electronic communication between physicians and patients. A study by Katz et al showed that of the clinical messages used on a Web-based patient-provider network, approximately half of the messages were directly related to the patient's health, and the other half were administrative.[5] Similarly, White et al found on a random review of e-mails that the most common message types were information updates to the physician (41.4%), requests for prescription renewals (24.2%), health questions (13.2%), and lab or X-ray results (10.9%).[6] The faculty developed the curriculum to focus on similar clinical needs, not administrative needs. These identified clinical needs included four potential challenges: confidentiality, clinical reasoning, health urgency, and sensitive health information. Subsequently, e-mails were developed to require a clinician response. Each student receives a weekly standardized e-mail that focuses on one of the identified clinical needs (Table 1). Students are expected to provide a timely and appropriate clinical response. Student e-mails are evaluated weekly for any errors of communication or medical knowledge using an evaluation rubric (Table 2), and students receive prompt feedback.

Methods

This electronic health communication curriculum begins with an introductory 1-hour didactic session during the first week of the clerkship. Content areas addressed include patient expectations, physician expectations, e-mail limitations, system issues, and confidentiality protections and are based on information published by the American Medical Association (AMA) and the American Medical Informatics Association (AMIA).[7-9] During weeks 2–5 of the clerkship, each third-year student receives a weekly e-mail based on a patient case. The e-mail is "standardized" (each student receives the same e-mail) and includes a question related to the patient case being considered that week during a distance learning discussion group. Each e-mail includes an identified communication and/or clinical challenge predicted to lead to clinical error. These anticipated errors include breeches of confidentiality, poor communication based on too little or too much clinical information given by the student, or failure of the student to realize the medical urgency of a patient situation. These communication and clinical errors were predicted based on the faculty's extensive use of distance learning in this clerkship, predicted errors within published guidelines, and known nonadherence of e-mail communication guidelines by practicing physicians.[7-10]

An evaluation rubric was created based on these predicted errors. The rubric includes seven areas of communication errors (conciseness, proofreading, language, font usage, medical jargon, formatting, and confidentiality), four areas of clinical judgment errors (content correctness, confidentiality, emergent/urgent health issues, and medical plan provision), and two areas of noncognitive errors (timely response and quality). Students are given feedback promptly on each weekly e-mail response. During the preliminary study of this curriculum, one faculty performed the initial evaluation of student e-mails. The completed evaluation rubrics were then reviewed by two other faculty members. Agreement was typically high. Any disagreements were settled by a consensus process involving all three

Table 1

Weekly E-mail Cases and Challenges

E-mail—Case #1	Challenge
"As you know my boyfriend and I had some trouble in the past. I was wondering what my cultures from my prenatal visit showed."	Content HIPAA Lay language
E-mail—Case #2	**Challenge**
"Tyler has an appointment next week for his 1-year check-up. I was wondering if he is due for shots at that time?"	Content Lay language
E-mail – Case #3	**Challenge**
"My wife has an appointment with you next week and I am concerned with some memory loss she is having. She just doesn't seem to be herself. Did you notice any problems with her memory last year when you saw her? Can you provide her with some medication to help with this? Please don't tell my wife that I contacted you. She seems very sensitive about her recent memory issues."	HIPAA
E-mail—Case #4	**Challenge**
"I am so sorry to bother you but I wanted to let you know this before my home visit scheduled next Tuesday. This morning after I got up I started a little blurrred vision and almost passsed out. The room seemed to spin. I am better now but I know how you like you to know everything for our visits. Should I be worried? See you later week."	Urgent issue

Table 2

Weekly E-mail Evaluation Rubric

Student Name:		
Components	*Case # Standard Met*	*Case # Standard Not Met*
COMMUNICATION		
Question addressed		
Concise		
Proofread		
Clear lay language		
Sharp clear font		
Avoidance of jargon		
Formatting/salutation confidentiality statement		
KNOWLEDGE		
Background		
Correct content		
HIPAA		
Discipline		
Urgent/non-urgent identified		
Problem-solving		
Plan provided		
NONCOGNITIVE		
Self-directed		
Timely response		
Motivation		
Overall quality		

faculty members. Analysis of these e-mails for presentation and publication were reviewed and granted an exemption by the Southern Illinois University School of Medicine institutional review board (IRB).

Final clerkship evaluation includes an e-mail OSCE given during the last week. Faculty designed the OSCE to reproduce all the challenges of the four weekly e-mails in one final e-mail, using the same evaluation rubric as for the weekly e-mails. The faculty hypothesized that there would be less errors noted in the e-mail OSCE due to information learned after the didactic session and practiced through weekly e-mails with individualized feedback.

Results

Weekly E-mails

A summary of evaluations from weekly e-mails (69 students, 276 e-mails) is provided in Table 3. The most frequent errors of communication seen in the initial weekly e-mail included lack of proofreading (23.2%),

unclear language/medical terminology (11.6%), and no inclusion of a confidentiality notice (55%). Students scored >89% in standards met for all other areas of communication assessed. Proofreading and unclear language/medical terminology improved to >89% standards met by the fourth e-mail. One area that remained <89% standards met was use of a confidentiality notice. At the fourth e-mail, only 82.6% of students were including the notice. The most frequent error of knowledge in the initial weekly e-mail was confidentiality (21.7%). This number improved after the weekly feedback and clerkship experience so that 0% committed that error by the last weekly e-mail. Students scored >89% in standards met for all other areas of knowledge assessed. Two of the four e-mails have an emphasis on confidentiality (HIPAA) protections. The second HIPAA challenge was repeated in a subsequent e-mail, which resulted in 4.4% of students committing the same error. One other area of knowledge error involved the identification of the need for urgent/emergent care by students. The final weekly e-mail of the clerkship has a key element in this area. Students failed to identify this urgent patient medical need in 27.5% of the replies. Students scored >89% standards met for all areas of noncognitive items assessed.

OSCE

A summary of evaluations from the e-mail OSCE (69 students) is provided in Table 3. By review of the table, it is noted that greater than 11% of the students committed errors in the component areas of proofreading, use of the confidentiality notice, and identification of urgent needs. The results show similar errors as compared to the weekly e-mails despite weekly, individualized feedback. We performed Fisher's Exact Test on results from each of the weekly e-mail challenges (Table 1) against student performance on the e-mail OSCE. The only statistically significant result was for clear lay language between case 1 and the e-mail OSCE. We were unable to perform any paired statistical evaluation because we had only requested exempt status from our IRB. This type of an independent chi-square test may underestimate statistical significance.

Discussion

Electronic health communications are likely to be frequently used in the near future. The Future of Family Medicine Project and Joint Principles of the Patient-centered Medical Home direct us to engage the patient through electronic communication as a method of enhanced access.[3,4] Patients have demonstrated their preference to have access to their clinician and specific health information using secure electronic communication.[1,2] The didactic session taught here is based on current recommendations of the AMA and AMIA.[7-9] The e-mail evaluation rubric is based on prior faculty

Table 3

Weekly E-mail and E-mail OSCE
Student Performance (n=69)

Components	*Case #1* *Standard Not Met*	*Case #2* *Standard Not Met*	*Case #3* *Standard Not Met*	*Case #4* *Standard Not Met*	*OSCE* *Standard Not Met*
COMMUNICATION					
Question addressed	5.8%	0%	4.4%	5.8%	0%
Concise	10.1%	2.9%	1.0%	0%	5.8%
Proofread	23.2%	4.4%	5.8%	5.8%	15.9%
Clear lay language	11.6%	7.2%	5.8%	1.0%	1.0%
Sharp clear font	0%	0%	0%	0%	0%
Avoidance of jargon	0%	1.0%	0%	0%	0%
Formatting/salutation confidentiality statement	55%	24.6%	15.9%	17.4%	20.3%
KNOWLEDGE					
Background					
Correct content	1.0%	2.9%	2.9%	4.4%	5.8%
HIPAA	21.7%	0%	4.4%	0%	10.1%
Discipline					
Urgent/non-urgent identified	N/A	N/A	N/A	27.5%	26.0%
Problem-solving					
Plan provided	0%	1.0%	1.0%	1.0%	5.8%
NONCOGNITIVE					
Self-directed					
Timely response	1.0%	0%	1.0%	0%	0%
Motivation					
Overall Qquality	1.0%	0%	4.4%	0%	1.0%

experience with communication and professionalism during family medicine clerkship tutor groups in distance or distributive learning. In addition, key concepts from health informatics were included in the evaluation rubric.[7-10]

We hypothesize that the components of this curriculum will provide a foundation for principles of electronic communication that will facilitate a greater adherence to published guidelines when used in clinical practice. A limitation of this study is the evaluation rubric, which will need to be validated in the future. Additionally, a larger number of student e-mails will require assessment to establish reliability. Faculty evaluators' inter-rater reliability is another future project. As demonstrated by the findings from this electronic health communications curriculum, there is a need for medical student education on this subject. We assume that this same need exists for residents and practicing physicians. Some may argue that current medical students have known and used electronic communication most of their lives and that this is not a new media for them. However, as the results of the weekly e-mails and final e-mail OSCEs demonstrate, students require further education on confidentiality, legal precautions, and communication on clinical topics. Theoretically, these may be skills and knowledge that could be mastered through repetitive didactic sessions and standardized e-mail exercises. Unfortunately, the widespread use of secure electronic communication will likely occur within clinical practice before a proven curriculum is established. More research and education is needed in this emerging field.

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