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Improved Quality At Kaiser Permanente Through E-Mail Between Physicians And Patients

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ABSTRACT The American Recovery and Reinvestment Act identified secure patient-physician e-mail messaging as an objective of the meaningful use of electronic health records. In our study of 35,423 people with diabetes, hypertension, or both, the use of secure patient-physician e-mail within a two-month period was associated with a statistically significant improvement in effectiveness of care as measured by the Healthcare Effectiveness Data and Information Set (HEDIS). In addition, the use of e-mail was associated with an improvement of 2.0–6.5 percentage points in performance on other HEDIS measures such as glycemic (HbA1c), cholesterol, and blood pressure screening and control.

Study Data And Methods

Setting and Data Sources Kaiser Permanente is the country’s largest not-for-profit integrated health delivery system, serving 8.6 million members in nine states and the District of Columbia. It provides and coordinates the entire scope of care for members.

Between 2004 and 2010, Kaiser implemented a nationwide comprehensive electronic health record, called KP HealthConnect™. The patient portal is integrated with KP HealthConnect™ and, as described above, includes several functions that empower patients to manage their own health and care, such as the ability to securely e-mail doctors. Nationwide, 35 percent of current Kaiser Permanente members are registered on http://kp.org.

In this study we used data on secure patient-physician e-mail and effectiveness of care in Southern California, where Kaiser serves its members through an exclusive contract with the Southern California Permanente Medical Group, comprising more than 6,000 physicians representing all specialties. Of approximately 3.3 million members, 455,133 adults met Healthcare Effectiveness Data and Information Set (HEDIS) criteria for diabetes, hypertension, or both: 60 percent had hypertension alone, and
40 percent had diabetes with or without hypertension. We focused on these conditions for our study because of their high prevalence and costs of care.

**Secure Patient-Physician E-Mail** Secure patient-physician e-mail rolled out in Southern California between March 2006 and February 2007. By April 2009, approximately 25 percent of members were registered on the patient portal. All primary and specialty care physicians were available by secure patient-physician e-mail as of October 2007. By December 2007, 4.2 percent of regional members, or 18,504 adults, had e-mailed their primary care provider teams. By December 2008, 7.8 percent of regional members, or 35,423 adults, had used secure patient-physician e-mail.

Our focus was secure e-mail communication between adult patients and their primary care physicians. During our study, 556,339 secure patient-physician e-mail threads were logged, containing 630,807 messages. Eighty-five percent of these threads were initiated by patients. The average thread contained 1.13 patient messages and 1.16 provider messages. (See the Online Appendix for examples of patient-provider e-mail messages from our study.)

As of December 2008, 3,092 primary care physicians had used secure messaging with at least one patient. Physicians developed their own ways of handling secure patient-physician e-mail. Some preferred to have medical assistants triage the messages, while others preferred to review all of the messages personally.

In this study we did not collect physician-level measures related to secure e-mail with patients. However, in other Kaiser Permanente internal studies, it was determined that physicians received two to twelve messages each weekday. Responding to a message took 3.5 minutes on average, but there was a great deal of variation.

A published study of the use of secure patient-physician e-mail at Kaiser Permanente reported that 75 percent of e-mail encounters had to do with ongoing medical problems or care plans. The five leading reasons for patients to e-mail their physicians were to report a change in a condition (16 percent), discuss lab results (14 percent), discuss a new condition (12 percent), discuss changes in prescription dose (11 percent), and discuss the need for a new prescription (10 percent). Patient-initiated e-mail messages were clinically relevant; 63 percent required clinical assessments or decisions, and 24 percent required clinical actions, such as ordering a laboratory test.

**Study Results** In the regression analysis, the use of secure patient-physician e-mail was associated with improved performance on HEDIS measures. This effect was statistically significant for each measure (Exhibit 1). In addition, in December 2008, at the conclusion of our observation period, the proportion of patients whose HEDIS measures improved ranged from 4.0 percent to 11.1 percent.
EXHIBIT 1

Difference In Performance On HEDIS Effectiveness-Of-Care Measures Among Patients Using And Not Using Secure E-Mail To Communicate With Their Physicians, Kaiser Permanente Southern California, 2008

<table>
<thead>
<tr>
<th>HEDIS measure</th>
<th>HEDIS performance difference between users and nonusers of secure e-mail</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PATIENTS WITH DIABETES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HbA1c screening</td>
<td>6.9</td>
<td>p &lt; 0.0001</td>
</tr>
<tr>
<td>HbA1c less than 9%</td>
<td>1.1</td>
<td>p &lt; 0.0001</td>
</tr>
<tr>
<td>LDL-C screening</td>
<td>7.2</td>
<td>p &lt; 0.0001</td>
</tr>
<tr>
<td>LDL-C less than 100 mg/dl</td>
<td>10.5</td>
<td>p &lt; 0.0001</td>
</tr>
<tr>
<td>Retinopathy screening</td>
<td>8.3</td>
<td>p &lt; 0.0001</td>
</tr>
<tr>
<td>Nephropathy screening</td>
<td>4.2</td>
<td>p &lt; 0.0001</td>
</tr>
<tr>
<td>BP less than 140/90</td>
<td>6.6</td>
<td>p &lt; 0.0001</td>
</tr>
<tr>
<td>BP less than 130/80</td>
<td>6.1</td>
<td>p &lt; 0.0001</td>
</tr>
<tr>
<td><strong>PATIENTS WITH HYPERTENSION ONLY</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BP control less than 140/90</td>
<td>4.0</td>
<td>p &lt; 0.0001</td>
</tr>
</tbody>
</table>

**SOURCE** Authors’ analysis. **NOTES** Results are based on a logistic regression model; see text. HEDIS is the Healthcare Effectiveness Data and Information Set. HbA1c is hemoglobin A1c. LDL-C is low-density lipoprotein cholesterol. BP is blood pressure. In December 2008, based on secure patient-physician e-mail use between 1 September 2008 and 31 October 2008 (in percentage points). Additional details are available in the Online Appendix, which can be accessed by clicking the Online Appendix link in the box to the right of the article online.

In the matched-control analysis, secure patient-physician e-mail use was associated with an improvement in performance (p < 0.0001, or highly unlikely to be due to chance) on HbA1c screening and control, LDL-C screening and control, retinopathy screening, and nephropathy screening of 2.4–6.5 percent (Exhibit 2). It was also associated with improved performance on blood pressure control (less than 140/90) among members with diabetes (p < 0.001, also unlikely to be due to chance) and with blood pressure control (less than 140/90) among members with hypertension alone (p = 0.002, unlikely to be due to chance) A 2.7-percentage-point difference between pre-post performance in tighter blood pressure control among mem-

EXHIBIT 2


<table>
<thead>
<tr>
<th>HEDIS measure (N)</th>
<th>Nonusers</th>
<th>Users</th>
<th>Difference, users versus nonusers</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PATIENTS WITH DIABETES</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HbA1c screening (4,676)</td>
<td>97%</td>
<td>-3.9</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>HbA1c less than 9% (4,075)</td>
<td>87</td>
<td>-4.0</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>LDL-C screening (3,186)</td>
<td>96</td>
<td>-4.1</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>LDL-C less than 100 mg/dl (2,557)</td>
<td>63</td>
<td>-0.5</td>
<td></td>
</tr>
<tr>
<td>Retinopathy screening (3,815)</td>
<td>71</td>
<td>-0.9</td>
<td></td>
</tr>
<tr>
<td>Nephropathy screening (4,676)</td>
<td>98</td>
<td>-2.5</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>BP less than 140/90 (1,602)</td>
<td>88</td>
<td>-4.3</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>BP less than 130/80 (1,428)</td>
<td>56</td>
<td>2.7</td>
<td>0.05</td>
</tr>
<tr>
<td><strong>PATIENTS WITH HYPERTENSION ONLY</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BP control less than 140/90 (5,345)</td>
<td>90</td>
<td>-6.5</td>
<td>&lt; 0.0001</td>
</tr>
</tbody>
</table>

**SOURCE** Authors’ analysis. **NOTES** HEDIS is the Healthcare Effectiveness Data and Information Set. HbA1c is hemoglobin A1c. LDL-C is low-density lipoprotein cholesterol. BP is blood pressure. “Pre” denotes HEDIS measures at baseline, before the use of secure e-mail was studied. “Post” denotes the change in HEDIS measures two months after e-mail use (in percentage points). In December 2008, based on secure patient-physician e-mail use between 1 September 2008 and 31 October 2008 (in percentage points). Additional details are available in the Online Appendix, which can be accessed by clicking the Online Appendix link in the box to the right of the article online.
The use of e-mail was associated with a 2.0 percentage-point improvement in HEDIS performance. When compared to matched controls, would meet each of nine HEDIS measures. In the matched-control analysis, most of the changes for nonusers reflected decreased performance on HEDIS measures. We did not see this decrease in our larger HEDIS population. E-mail users had higher baseline HEDIS measures than the population average. Matching cases and controls on baseline performance resulted in two very high-performing cohorts. High baseline performance appears unsustainable in those who did not use e-mail; they demonstrated unchanged or decreased performance, while e-mail users maintained or increased their performance.

Some of this apparent nonsustainability is probably attributable to regression to the mean. In general, when observing repeated measurements in the same group, both relatively high and low measures are likely to be followed by less extreme ones nearer the true mean. Except for LDL-C control rates, increases in performance among e-mail users were modest, indicating a possible ceiling effect. Additionally, we attribute the inconclusive findings regarding a dose-response effect to the short time period during which we looked for the effect of using e-mail and a lack of statistical power.

Further research, ideally using a randomized controlled study, is needed to confirm the association we present here. Isolating the use of secure patient-physician e-mail from other online resources is key for validating its impact on the quality of care.

**Implementing Secure Patient-Physician E-Mail** Initially, physicians were concerned about the potential additional workload of secure patient-physician e-mail. As noted earlier, however, most physicians receive few messages each workday and respond quickly. Many physicians perceive that the use of e-mail increases their efficiency and improves the care they provide.

A pilot study of physicians’ responses yielded favorable comments. One provider observed: “I love this for diabetics. They can print the doses and numbers. They follow my instructions to the letter with e-mail. It’s easy, helpful, and better than playing phone tag.” Another commented: “I
like it and the patient likes it; I wish more patients would use it.”

If patients raise issues that are too complex or lengthy to address using e-mail, physicians can request that the patient schedule an office visit.

**WHY CARE MAY HAVE IMPROVED** It is not clear how the use of secure patient-physician e-mail might improve care. Possible mechanisms include the increasing continuity of care, patient-physician connectedness, and supporting patient self-management.

Continuity of care, defined as regular contact between providers and patients, affects glycemic and lipid control. To the extent that the use of e-mail lowers barriers to regular contact, it may promote continuity of care.

Patient-physician connectedness describes the closeness of relationships between patients and their physicians. Among 9,632 patients with diabetes, HEDIS process-of-care measures were higher for those connected to primary care providers, as opposed to primary care practices. In a 2005 internal survey of 2,677 Kaiser Permanente members using secure patient-physician e-mail, 85.5 percent agreed with the statement that it “enables a more personal relationship with my primary care provider.”

Self-management support empowers patients to manage their health and improves glycemic and hypertension control. As one patient commented in the internal survey, “I feel more in control over my medical condition. I have access to people I need to consult with, so it puts me back in charge.”

Further research is needed to investigate the relationship between the use of e-mail and the possible mechanisms by which it might improve care and the care experience.

**POLICY IMPLICATIONS** Patients prefer being able to securely e-mail their providers, and evidence is accumulating that secure patient-physician e-mail increases care efficiency. The association between the use of e-mail and HEDIS performance documented here suggests that patient-physician e-mail may help achieve the “triple aim” of high-value health care: improving individual care experiences and the health of populations and reducing per capita costs of care.

Insurance reimbursement, which could be the leading impetus for physicians to offer e-mail to their patients, currently constrains its broad use. Fee-for-service models could increase physicians’ efficiency and potentially improve patients’ care by reimbursing providers for the use of secure patient-physician e-mail.

Nonfinancial barriers to the use of e-mail should also be addressed. Current quality measures, such as those used by HEDIS and the National Committee for Quality Assurance, rely on face-to-face visits as the standard of care. For example, an office visit is now required to document the ongoing presence of hypertension.

Policy solutions are also needed. Even when online health resources are available to underserved populations at no cost and with assistance, the use of the resources by these groups is low.

**CONCLUSION** The use of secure patient-physician e-mail in the context of a comprehensive electronic health record is associated with improved performance on HEDIS effectiveness-of-care measures. Further research is needed to confirm the potential of e-mail use as an important new modality for primary care. ■

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NOTES


7 The Online Appendix can be accessed by clicking the Online Appendix link in the box to the right of the article online.


