

# Can Electronic Health Records Help Improve Patients' Understanding of Medications?

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**M**ore than a decade of experience with our general internal medicine clinic electronic health record (EHR) (EPIC, Madison, Wisconsin) has shown that the EHR provides clinicians with increased efficiency in documentation, more rapid and timely access to tests and procedure findings, and useful preventive services alerts for patients.<sup>1,2</sup> However, we have also found that the attention required to enter and access EHR information in the examination room can potentially detract from the quality of interpersonal communication with patients.<sup>3</sup> Physicians may avoid spending the time required to clean up and update EHR medication screens during a particular visit, old prescriptions are left on lists, drugs that were prescribed by other medical specialists or alternative providers are not entered, and newly ordered prescriptions may be hastily discussed with patients.<sup>4,5</sup>

The advent of the EHR offers the potential for primary care practices to adopt new approaches to eliminating medication discrepancies, while also providing patients with easy-to-understand instructions about new prescriptions that will enhance medication safety and adherence. The Northwestern University general internal medicine clinic in downtown Chicago, Illinois, was recently awarded a grant from the Agency for Healthcare Research and Quality to design an EHR-based physician-randomized trial to simultaneously improve medication reconciliation and communication about new medications.

Because the EHR is in use during each patient visit, it is possible to easily review current medication lists. To aid in this process, our intervention includes a new step in the rooming process that enlists patients' help in flagging potential discrepancies. Patients receive an EHR medication list of their current medications at check-in, allowing them to review any discrepancies before their physician visit. In addition, to improve patient understanding of their new medications, we created plain-language medication information sheets that have been populated in the EHR to be printed out for patients when they are prescribed a new medication.

To help shape this intervention, we conducted postvisit in-person patient interviews to evaluate (1) the extent of medication discrepancies; (2) perceived problems, concerns, and questions (PCQs) about current medications; and (3) patient knowledge about new prescriptions, including what the newly prescribed medication is for, how and when to take it, and potential adverse effects. The results of this

**Objectives:** To present pilot data from an ongoing electronic health record (EHR) quality improvement study to improve medication management using patient previsit review of the EHR medication list and a plain-language new medication information sheet to provide with every new EHR prescription.

**Study Design:** Postvisit survey of 191 patients at an academic general internal medicine clinic.

**Methods:** Patients were asked about discrepancies and problems, concerns, and questions (PCQs) in their EHR summary for up to 10 current medications and about knowledge of new prescriptions. Findings describe the extent of medication discrepancies, perceived PCQs about current medications, and patient knowledge about new medications.

**Results:** Overall, 78.0% of patients had at least 1 discrepancy, more than half had a drug listed that they were not taking or dose or frequency discrepancies, and 8.9% reported an omission; 41.9% indicated at least 1 PCQ about their current medications. Among patients who received a new prescription, most knew what the new medication was for and how to take it. However, 66.0% indicated uncertainty about potential adverse effects that they should telephone the physician about.

**Conclusions:** Discrepancies can be efficiently categorized by previsit review of EHR medication lists. Prereview offers physicians the opportunity to better address important medication PCQs. Testing the value of EHR-generated plain-language medication information sheets requires follow-up interviews after medications are filled. Patients may not understand the actual benefits of new medications.

(*Am J Manag Care.* 2010;16(12):919-922)

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### Take-Away Points

Medication discrepancies, patients' perceived problems with current medications, and understanding of new prescriptions were evaluated in a postvisit survey of 191 patients from an academic general internal medicine clinic.

- Seventy-eight percent of patients had at least 1 discrepancy.
- Almost half of the patients had problems, concerns, and questions about their current medications.
- Two-thirds of patients were uncertain about potential adverse effects of newly prescribed medications.
- These results suggest the need for patient previsit review of the electronic health record (EHR) medication list and for use of EHR plain-language information about new prescriptions, including a description of medication benefits.

portions of patients with commission discrepancies (not taking a listed medication), omission discrepancies (taking an unlisted medication), and dose or frequency discrepancies (not taking a listed medication as prescribed), as well as an overall proportion of patients with any discrepancy.

### Interview Questions About New Medications

Patients who were prescribed a new

baseline study are being used to guide our planned EHR-based intervention.

## METHODS

### Patient Sample

For our baseline feasibility study, we decided to enroll a convenience sample of approximately 200 patients who were 21 years or older and fluent in English. On completion of the interview, participants were given \$10. The Northwestern University Institutional Review Board approved the study.

### Interview Protocol About Current Medications

Each month, physicians were sent a list of scheduled patients and were asked to give permission for patients to receive a mailing regarding the study interview. Immediately after a scheduled patient visit checkout, patients were approached by a trained study research assistant (JRW) to assess interest and to obtain consent. Participants were asked if the physician had reviewed their current medications with them during that day's visit. Participants were then asked to go over their postvisit summary report, which is routinely printed directly from the EHR and given to them at checkout. The postvisit summary contains a list of their current medications and any new medications prescribed at that visit and includes all prescriptions from our large multispecialty practice. The research assistant then went through up to 10 previously existing prescriptions on the medication list summary. The research assistant asked participants if they were taking any medications that were not on the postvisit summary list. For this study, we only describe discrepancies with prescription medications.

For each current medication that was actually being taken, the research assistant then asked the participant: (1) Are you still taking it? (2) Are you taking it the way listed here? (3) Do you have any problems, concerns, or questions about the medication? If so, the research assistant asked what those PCQs were. Participants were asked if they wanted their physician or nurse to contact them about any reported PCQs. We describe the pro-

cedure during the visit were asked to rate their degree of uncertainty about each new prescription. Patients were asked (1) Do you know what your physician prescribed the medication for? (2) Do you know how to use or take it? (3) Do you know if there are any adverse effects that you should call your physician about? Patients were also asked if they had any PCQs about the new prescription that they were unable to discuss with their physician. The research assistant did not judge whether patient answers were correct but only whether the patient was confident that he or she understood the prescription. Patients were also asked how long they were supposed to take the new medication. However, because duration of use for as-needed or trial prescriptions is often uncertain, this variable was not included in calculating the proportion of patients who indicated that they fully understood their new prescriptions.

## RESULTS

A total of 116 patients refused participation before we reached our goal of interviewing 191 patients with current prescriptions. Among 191 patients, 38.7% had at least 10 prescription medications listed on their postvisit summary report, 77.0% had at least 5, and 23.0% had 1 to 4. Only 5.2% of patients reported that they had not discussed their medications with their physician during the visit.

### Current Medication Discrepancies and PCQs

The **Table** gives the proportion of patients with any medication discrepancies between their postvisit self-report and their EHR postvisit summary printout, summed across up to 10 current prescriptions. We present each discrepancy category by patient sociodemographic characteristics. Commission and dose or frequency discrepancies were reported by 55.5% of all patients. (Indeed, about one-quarter of all patients had more than 1 medication discrepancy in these categories [data not shown].) About 9% of patients reported omission discrepancies. Combining these categories across all prescriptions resulted in a remarkable 78.0% of patients who had at least 1 (any) discrepancy. There were no

**Table.** Medication Discrepancies by Patient Characteristic at Postvisit Interviews Among 191 General Internal Medicine Clinic Patients Reviewing up to 10 Prescription Medications

Variable	%				
	All Participants	Commission Discrepancy <sup>a</sup>	Dose or Frequency Discrepancy <sup>b</sup>	Omission Discrepancy <sup>c</sup>	Any Discrepancy
<b>Age, y</b>					
≥65	42.9	50.0	53.7	2.4	75.6
≤64	57.1	52.3	56.9	13.8	79.8
<b>Sex</b>					
Female	67.0	51.6	52.3	10.9	78.1
Male	33.0	50.8	61.9	4.8	77.8
<b>Race/ethnicity</b>					
African American	36.6	47.1	57.1	8.6	75.7
White or other	63.4	53.7	54.5	9.1	79.3
<b>Education</b>					
≤High school graduate or general equivalency diploma	17.8	52.9	58.8	2.9	82.4
Some college	35.1	43.3	50.7	10.4	73.1
≥College degree	47.1	56.7	57.8	10.0	80.0
<b>All participants</b>	100.0	51.3	55.5	8.9	78.0
<sup>a</sup> Not taking a listed medication.					
<sup>b</sup> Not taking a listed medication as prescribed.					
<sup>c</sup> Taking an unlisted medication.					

significant differences in discrepancies by patient characteristics.

When asked whether they had PCQs about any medication they were taking, 41.9% of patients had at least 1. While patients reported various PCQs, the most frequent concerns were about whether medications were working, if certain symptoms were potential adverse effects, when to stop taking a drug, and what were the correct dosages. Three percent of patients indicated that they wanted to contact their physician about a particular PCQ.

### Understanding of New Medications

Forty-eight study patients (25.1%) received at least 1 new prescription at their study visit. Only 1 patient indicated that he or she did not know what the new medication was for. Only 5 patients expressed uncertainty about how to take their new medication. However, 35 patients indicated uncertainty about potential adverse effects that they should call the physician about. Only 3 patients had PCQs that they were unable to discuss with the physician.

## DISCUSSION

Approximately 4 of 5 interviewed patients had some type of discrepancy on their EHR summary, almost half of the patients reported a PCQ about at least 1 existing medication, and two-

thirds of patients receiving a new medication reported inadequate information, mainly about potentially harmful adverse effects that would merit calling their physician. Many discrepancies were the result of specialty medications that had not been entered in or removed from medication lists. While patient PCQs were common, it was unclear to what extent these issues reflected poor communication with the primary care physician as opposed to inevitable concerns and ambiguity about medication safety and efficacy. Finally, patients' failure to clearly understand the most important adverse effects of new medications may have largely been a function of overly detailed warnings such as those found on package inserts, as well as lack of physician time to fully address adverse effects and other issues at the time of a new prescription.<sup>6-10</sup>

### Our EHR-Based Medication Communication Quality Improvement Effort

For physicians randomized to the intervention, an EHR medication list is automatically printed when a patient checks in for the physician visit, with instructions for the patient to cross out any duplicate medications or medications that he or she is no longer taking. On the same printout, patients are asked to indicate any concerns that they have by marking checkboxes labeled

for adverse effects, cost, refill requirements, or other needs. There is also space for patients to add any medications they are taking that are not on the list, including any over-the-counter medications, vitamins, or supplements. These sheets are collected when patients are roomed and are made available for review by their physician. Anecdotally, physicians have reported that the sheets are of great value in “cleaning up” discrepancies. Our initial tracking of visit durations finds no additional time for experimental vs usual-care physicians, although it is unknown whether additional discussion of medications may be displacing time that would have been used for other patient concerns.

### Improving Patient Knowledge About New Medications

Medication information sheets used in our study were created for the top 250 prescribed medications by the joint efforts of a communication specialist (GM) and a health literacy specialist (MSW), as well as pharmacists, physicians, and patients interviewed in focus groups. Each sheet is formatted under the following 8 headings: purpose, benefit, length of treatment, instructions, safe use, adverse effects and warnings, discussion points, and follow-up. These medication information sheets are automatically printed for patients along with each new prescription at checkout following visits to physicians randomized to our quality improvement intervention.

### Other Lessons for Evaluating Medication Communication Quality Improvement

Investigations have found that when prescribing a new medication physicians most frequently mentioned product name and instructions for use; other topics such as risks and benefits were mentioned far less frequently.<sup>11</sup> Herein, while patients knew what a medication was prescribed for, they had much less certainty of what to expect about the actual health benefits of their prescription. With the creation of new medication information sheets, we stress the importance and understanding of medication benefits, in part to balance fears about the potential adverse effects listed. We also emphasize the most common adverse effects and warnings that patients should call their physician about if they experience them, rather than relying on package insert warnings that often include a long laundry list of every reported adverse effect regardless of its rarity.

To obtain a more objective rating of patient knowledge about their new medications, we now use postvisit interviews and telephone follow-up interviews, which take place after the patient has filled (or not filled) his or her prescription. Only by waiting until patients have filled their prescriptions can we assess their understanding as correct or incorrect and obtain a better idea of how patients are actually taking their medications.

In conclusion, these pilot data were used to develop a bet-

ter strategy to improve medication reconciliation and patient knowledge about medication regimens. Using real-time review and access to educational materials afforded by the EHR, we expect to create a higher standard of care for primary care physicians that will require no significant additional time or effort over the long run. We are evaluating these changes to our process of care in a physician-randomized trial. If proved successful, our approach has the potential for rapid adaptation and dissemination by any practice that uses the EHR.

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**Funding Source:** This research is funded by grants 1R18HS017220-01 and R21CA132771 from the Agency for Healthcare Research and Quality (MSW).

**Author Disclosures:** The authors (JRW, JF, GM, CLW, DPD, DWB, MSW) report no relationship or financial interest with any entity that would pose a conflict of interest with the subject matter of this article.

**Authorship Information:** Concept and design (JF, GM, CLW, DPD, DWB, MSW); acquisition of data (JRW, JF, GM, CLW, DPD, MSW); analysis and interpretation of data (JRW, JF, CLW, DPD, DWB, MSW); drafting of the manuscript (JRW, JF); critical revision of the manuscript for important intellectual content (JF, GM); statistical analysis (JF); provision of study materials or patients (GM, CLW, DPD); obtaining funding (JF, GM, DWB, MSW); administrative, technical, or logistic support (JRW, GM, DWB, MSW); and supervision (GM, DWB, MSW).

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