# Variation in Electronic Prescribing Implementation Among Twelve Ambulatory Practices

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**BACKGROUND:** Electronic prescribing has been advocated as an important tool for improving the safety and quality of medication use in ambulatory settings. However, widespread adoption of e-prescribing in ambulatory settings has yet to be realized. The determinants of successful implementation and use in these settings are not well understood.

**OBJECTIVE:** To describe the practice characteristics associated with implementation and use of e-prescribing in ambulatory settings.

**DESIGN:** Multi-method qualitative case study of ambulatory practices before and after e-prescribing implementation.

**PARTICIPANTS:** Sixteen physicians and 31 staff members working in 12 practices scheduled for implementation of an e-prescribing program and purposively sampled to ensure a mix of practice size and physician specialty.

**MEASUREMENTS:** Field researchers used observational and interview techniques to collect data on prescription-related clinical workflow, information technology experience, and expectations.

**RESULTS:** Five practices fully implemented e-prescribing, 3 installed but with only some prescribers or staff members using the program, 2 installed and then discontinued use, 2 failed to install. Compared to practice members in other groups, members of successful practices exhibited greater familiarity with the capabilities of health information technologies and had more modest expectations about the benefits likely to accrue from e-prescribing. Members of unsuccessful practices reported limited understanding of e-prescribing capabilities, expected that the program would increase the speed of clinical care and reported difficulties with technical aspects of the implementation and insufficient technical support.

**CONCLUSIONS:** Practice leaders should plan implementation carefully, ensuring that practice members prepare for the effective integration of this technology into clinical workflow.

*KEY WORDS:* electronic prescribing; medical informatics; qualitative research; health services research.

## INTRODUCTION

Adverse drug events and drug–drug interactions in the ambulatory care setting are important public health problems.[1–3] Electronic prescribing could potentially ameliorate these problems through automated alerts and reminders at the time of prescribing.[4–11] In addition to improving medication safety, e-prescribing also could help prescribers and patients to select effective lower-cost medications, thereby improving adherence to medication therapies[12–14] while reducing costs to insurers and the health care system.[15,16] Finally, although some studies have shown that e-prescribing can take more time than handwritten prescribing,[17] many prescribers have reported seeing this technology as a way to save time.[18]

Currently, public and private initiatives are encouraging ambulatory practices to implement and use e-prescribing.[19] Despite these efforts, this technology has been adopted by only about 20% of physicians in ambulatory settings.[20,21] Commonly identified barriers to health information technologies (HIT) such as e-prescribing include expected productivity loss and a lack of time to learn about new systems,[22] as well as increased costs, the effort needed to adapt office systems, and technical difficulties.[23]

Once installed, HIT may be used inconsistently or in unexpected ways, and several studies have documented that HIT usage does not easily translate into better care in typical ambulatory care settings.[24–26] Choices made during HIT implementation may lead to technology usage that is substantially different from that envisioned by designers and policy makers. These implementation choices may limit the systems'

usefulness for improving quality and safety.[21,27,28] Better understanding of variation in how e-prescribing is implemented and used in everyday ambulatory care settings is important for ensuring the more widespread use and effective realization of the potential benefits of this technology.

Our aim was to develop new insights into factors that influence the effective implementation and use of e-prescribing in typical ambulatory care settings. In this study, we observed ambulatory practices before and after e-prescribing implementation and analyzed observational and interview data to identify implementation and use patterns.

## METHODS

We conducted a comparative case study of 12 ambulatory medical practices before and after the scheduled installation of an e-prescribing system through a program sponsored by Horizon Blue Cross and Blue Shield of New Jersey. This study was approved by the Institutional Review Boards of the RAND Corporation and the University of Medicine and Dentistry of New Jersey.

A purposive sample of 12 ambulatory medical practices (5 Family Medicine, 4 General Internal Medicine, 2 Obstetrics and Gynecology, and 1 Pediatrics) was identified to ensure a mix of practice size and physician specialty. Practices were selected from a list of those scheduled to implement either of two commercial e-prescribing programs. Both programs are designed for the electronic submission of prescriptions to pharmacies during the clinical encounter using a computer interface or personal digital assistant (PDA) and can be used to print paper prescriptions for patients. Prescriptions also can be electronically submitted outside of the clinical encounter. The Horizon program covered the costs of hardware, software, installation, training and ongoing support, and included honoraria of $100–$500/quarter to promote the ongoing use of e-prescribing.[29] Practices in this program were required to have a computerized practice management system and high-speed Internet access. To ensure that practices would have an opportunity to integrate e-prescribing into prescription workflow before follow-up assessment, participants had to be scheduled for implementation within a 2-month period after the planned initial data collection period. The sample was constructed such that half of the practices were scheduled for installation of Caremark's iScribe™ system and half for All-scripts' TouchScript™ system. (As this study is not intended to evaluate these products individually, they are blinded as program A or B in Table 1). All contacted practices consented to take part in the study.

We adapted data collection procedures from previous observational studies of ambulatory practices.[30–33] Before e-prescribing implementation, a field researcher visited each practice for 2 or 3 days. During the initial visits, conducted in March and April 2006, a field researcher used an observation template to guide qualitative data collection regarding physical environment and organizational culture as well as clinical and prescription workflow. In each practice, between 3 and 6 in-depth interviews[34] exploring existing prescription workflow and expectations relating to implementation were conducted with members of the following groups: physicians, office managers, and staff members involved in prescription workflow (baseline and in-depth interview questions can be found in Tables 2, 3 and 4 in the Appendix). Those physicians scheduled for e-prescribing implementation in each practice were selected for in-depth interviews. Questions in these interviews focused on expectations of how e-prescribing would affect work in the practice and how the practice handled work relating to formulary and benefit issues, prior authorization, and maintaining accurate medication history data. Field researchers also conducted key informant interviews[34] with other physicians and practice staff members to confirm workflow observations and reports from in-depth interviews.

Approximately 3 months after installation (September to November 2006), field researchers returned for a 2-day visit to learn about how the program had been implemented. Field researchers conducted in-depth and key informant interviews with both previously interviewed practice members and other staff. No subjects approached for in-depth or key informant interviews at baseline or follow-up refused to be interviewed.

In-depth interviews were audiotaped, transcribed, and entered, along with observational field notes and summaries of key informant interviews into ATLAS.ti[35] for coding and analysis.

A diverse team of investigators, including health services researchers, physicians, a nurse, social scientists, and industry experts, coded and analyzed text data using a template organizing style to identify common themes relating to e-prescribing implementation.[36] After the lead investigator (JCC) developed a coding template based on the observation and interview guides, a group of investigators (JCC, JLN, TS, DSB, CJW) met and coded field notes from one practice to refine the template, ensure its clinical relevance, and derive common operational definitions for codes.

### Table 1. Post-implementation Status of Twelve Ambulatory Practices

| Practice Specialty | Physicians | Staffing | e-Rx Program | Installation | Implementation |
|---|---|---|---|---|---|
| Family Medicine | 3 | 1 OM, 3 MAs, 4 S | B | Successful | Fully Implemented |
| Family Medicine | 4 | 1 OM, 1 LPN, 4 S | A | Successful | Fully Implemented |
| General Internal Medicine | 2 | 1 OM, 1 MA, 1 LPN, 4 S | B | Successful | Fully Implemented |
| General Internal Medicine | 1 | 1 OM | A | Successful | Fully Implemented |
| Obstetrics and Gynecology | 1 | 1 RN/OM, 1 MA, 1 S | A | Successful | Fully Implemented |
| Family Medicine | 2 (3 at follow up) | 1 OM, 2 LPNs, 3 MAs, 3 S | B | Successful | Uneven |
| General Internal Medicine | 1 | 1 OM, 1 MA, 1 S | A | Successful | Uneven |
| General Internal Medicine | 4 | 3 MAs, 1 OM, 5 support staff | B | Successful | Uneven |
| General Pediatrics | 4 | 1 OM, 2 MAs, 2 S | B | Successful | Discontinued |
| Family Medicine | 6 | 1 RN, 1 LPN, 1 OM, 4 MAs, 4 S | B | Successful | Discontinued |
| Obstetrics and Gynecology | 7 | 1 OM, 2 RNs, 2 S | A | Unsuccessful | Never Installed |
| Family Medicine | 1 | 1 OM, 2 S | A | Unsuccessful | Never Installed |

*Staffing abbreviations: OM=office manager, LPN=licensed practical nurse, MA=medical assistant, S=support staff including receptionists, RN=registered nurse*

After revisions to the template, a second group of investigators (JCC, NI, DL, BDB, EAM) coded data from an additional practice to ensure coding agreement. Data from a third practice was distributed to a diverse group of investigators, including clinicians, social scientists, and health services researchers (JCC, NI, JLN, DL) for individual coding using the final template, and Cohen's K was computed to assess coding agreement. Substantial agreement[37] between independent coders of the same data was found (Cohen's K=0.72) and the remaining data were distributed for individual coding by these investigators. Coding reports were generated and analyzed (JCC, NI) to determine common themes and generate data summaries. The lead investigator (JCC) selected representative text segments to illustrate themes and resulting analyses were checked with other team members to ensure validity and clinical appropriateness.

## RESULTS

Five practices successfully installed and fully implemented an e-prescribing program (3 program A, 2 program B), 3 successfully installed but unevenly implemented e-prescribing (1 program A, 2 program B), 2 successfully installed but implementation was discontinued (both program B) and 2 never installed e-prescribing (both program A) (see Table 1). In the following sections, we describe factors associated with this variation in implementation success. Direct quotes, either from audiotaped and transcribed interviews or recorded verbatim in field notes appear in quotation marks; additional information comes from observational field notes and summaries of key informant interviews.

### Successfully Installed, Fully Implemented

Physicians in these practices tended to have positive attitudes about and previous experiences with e-prescribing or electronic medical records (EMR), participation in continuing education courses relating to e-prescribing, and plans for the future use of other HIT. In one practice, the lead physician reported that she was "gung-ho about the whole thing" and "excited to finally enter the 21st century." Another physician in the same practice saw e-prescribing as "one step toward an EMR." The lead physician in another practice reported that he had used an EMR during residency training and found it useful for managing the care of patients with chronic illnesses. A physician in another practice reported recently attending "great" e-prescribing presentations at a professional conference that had prepared her for the upcoming implementation. The other physician in this practice reported he previously had used e-prescribing and was "looking forward to getting ... to try (it) again."

When asked to describe how they expected the programs to work, physicians in these practices had specific ideas about how their work might change or improve and how implementation might lead to changes in existing prescription workflow. For example, a physician in one practice said that her hope was that the e-prescribing system would lead to fewer patient calls, freeing up medical assistant time currently dedicated to handling these calls. Similarly, a physician in another practice expressed the hope that the program would eliminate prescription-related fax communications that currently had to be handled by the nursing staff. While acknowledging that it would take time to implement, he hoped the program would

lead to "less mistakes ... less call-backs ... (and) less prior authorizations." In another practice, one physician reported that he expected that the program would keep "a list of every patient's medication," offering the potential to save time in writing out renewal prescriptions.

Support staff in these practices voiced some understanding of the likely effects of e-prescribing implementation. For example, a medical assistant expected that by improving communication around renewal prescriptions, the e-prescribing system would eliminate the "double work" created by multiple inquiries regarding a single prescription coming from patients and pharmacies during the course of a work day. The office manager in this same practice thought that the program would likely save "a few phone calls ... (and) facilitate ... (the practice) running smoother." A medical assistant in a different practice hoped that formulary information in the program would help physicians adjust prescriptions in the clinical encounter, saving calls back and forth to the pharmacy to find substitutions for non-formulary medications and subsequently "a lot less paperwork." The office manager in another practice thought that the program would improve clinical workflow because in the current process the doctor "handles all of the (pharmacy) calls himself ... he has to interrupt what he is doing with the patients to take the call ... (but) if it were coming through the PDA he would be able to finish up with the patient (and) then ... transmit that information back."

Although practice members identified potential gains from e-prescribing, physicians and staff had modest expectations about the overall benefits of e-prescribing combined with anticipation of the potentially disruptive effects of implementation. For example, one physician hoped that the program would improve patient satisfaction through direct transmission of prescriptions to the pharmacy "because a lot of people want us to call stuff in ... and ... we don't have the capacity to do it for every patient." While holding out hope that the program could ultimately save her time, she noted that "first it will probably slow me down, while I learn." Another physician said that he thought the program was likely to lead to "a little bit less paperwork ... maybe fewer phone calls from the pharmacy (and) it may make it a little bit easier when a person comes in with multiple medicines to refill (but) ... I'm not sure how much it's going to speed visits up." Finally, another physician stated that he thought computerization would be an important part of improving care, but "I'm sure there will be bumps" along the road to installation.

### Successfully Installed, Unevenly Implemented

Physicians in the 3 practices where the programs were successfully installed but unevenly implemented had high expectations about the ease of implementation, but at the same time reported concerns about how e-prescribing might affect their clinical independence or undermine their authority with patients. Regarding the upcoming installation, one physician stated that "anything you start new, it's going to cause problems up-front, but, I'm sure ... within 2 weeks that will all be sorted out." Another physician reported that he was concerned that the program might steer him to the products of particular companies leading to what he called "biased prescribing." Yet another physician expressed his general discomfort with the use of HIT and stated that using a hand-held computer in the encounter is "not a good idea, it doesn't

instill confidence" and might cause patients to doubt his clinical knowledge. As he put it, the best approach when using this technology is "always walk out of the room and excuse yourself, and then go back with … the right answer."

In contrast, staff members, who reported some autonomous involvement in pre-implementation prescription workflow, had modest and clear expectations about how the program would affect their work and were generally enthusiastic about the upcoming installation. Before implementation, one of these practices was observed to have protocols for prescription renewals that allowed staff members independently to authorize certain prescriptions. The office manager in this practice reported that she was "very enthusiastic" about the potential of the program to reduce staff time currently devoted to calling in prescriptions and to reduce the work generated when physicians prescribed drugs not on the approved formulary for a particular patient. In another practice, the office manager handled most of the communication with pharmacies relating to prescription renewals and she expected the program to "cut down on phone volume (and) … fax volume." She reported that the doctor hoped that the program would facilitate medical assistants renewing more prescriptions for patients rather than handling these requests in the clinical encounter himself.

Although these practices successfully installed the e-prescribing program, within 3 months most physicians were no longer using the program. When asked why he had stopped using the program, the physician who was uncomfortable with using a hand-held computer said that his computer had stopped working and that he "got lazy" about getting it fixed, perhaps indicating that his initial discomfort remained a barrier to use. The office manager said that she called the company about this, "but they don't call back." Given the expectations of ease of implementation and use, the perceived non-responsiveness of the company may help to explain why practice members discontinued using the program. Several doctors also said that they did not like the priority listing of generic medicines in the program and thought this could undermine their clinical authority as they prefer to write for brand name drugs, whereas others complained that the system led to extra work. However, in two of these practices, staff members continued using the program for renewal prescriptions and 1 staff member reported that the program reduced time spent on the phone with pharmacies.

## Successfully Installed, Implementation Discontinued

Prescribers and staff members in the 2 practices that successfully installed, but then discontinued use of the program exhibited very little advance knowledge of program functions or the potential effect on prescription workflow. In 1 of these practices, both the office manager and 1 of the medical assistants reported that they were unaware of the upcoming installation. The office manager asked the field researcher: "Is this something that the doctor will speak into when they would have something to do?" In another practice, the field researcher reported that much of the prescription workflow before implementation lacked clear organization. For example, a medical assistant in the practice worked on a prescription-related prior authorization request only to discover that it had been done the previous day. The only record of this work was an undated and unsigned note on a scrap piece of paper found

while repeating the authorization work. Only 3 of the 6 physicians in this practice planned to use the new program, ensuring that the practice would have to maintain 2 different prescription workflows. One of the doctors who did plan to use the system reported that, "I don't know anything about this one (but) … I used (an e-prescribing system) about 7, 8 years ago that was a disaster." He planned to try again to "see if they've gotten any better … if it can really supply updated information on … current medications … allergies and … insurance, what is their insurance today and what is it going to cover." Indicating very high expectations this physician stated that if the program can supply this information "then I would envision that it would be worthwhile, if it doesn't, then it's going to be less than perfect."

Physicians were focused on increasing the speed of prescribing. In one practice, a physician reported that his biggest concern was "if we are really going to save time." A physician in another practice said that following implementation, "I realized that it wasn't going to be a time improvement … (and) … I just can't devote the time to become the expert I have to be to make it work flawlessly." This physician said that struggles with the program led to a decrease in "face time" with patients and that he chose to maintain patient contact rather than work to solve implementation problems.

A physician and staff member in this practice reported that following the initial installation and training, they had problems with product support and found that the interface for the product regularly stopped functioning. The physician who had championed e-prescribing in the practice reported, "we went online Friday, I tried on Saturday, it worked. I tried at 9 AM Monday, it didn't work. We contacted them and they called us 2 weeks later on Monday. So, the momentum was already gone." This experience made it difficult to get other prescribers to use the program again and with uneven commitment from the practice requiring parallel electronic and paper-prescribing workflow, the practice abandoned the effort.

## Never Installed

Two practices failed to install e-prescribing. Similar to members of those practices that discontinued use, physicians and support staff in these practices expected that e-prescribing would lead to greater efficiency and safety but, at the same time, had little specific knowledge of program functionality. There was no evidence that either office staff or physicians had a clear understanding of how the program would fit within existing prescription workflow or how existing procedures might need to be changed to accommodate the new technology. In addition, there was no evidence of plans to prepare staff or make changes to prescription workflow in preparation for the upcoming implementation.

A physician from one practice reported that his primary objective was to use the program to increase the speed of the prescription process and subsequently of clinical care in the practice. Unlike practice members in successful practices who anticipated potential disruptions during installation and discussed likely effects of the program on prescription workflow, the biggest pre-implementation concern of this physician was "to load and maintain a (patient) database" for use in the system. In the other practice, a physician reported, "the only thing I know about (e-prescribing) is the presentation that was given to us." He reported that in this presentation "the biggest

thing that came across to me was ... the reduction in medical errors and ... (that the goal was) to try and speed up the process for the clinician." This physician reported that he was not concerned about the upcoming implementation or the effects it might have on his practice. The office manager in this practice reported that she knew "nothing" about the upcoming installation of the program and had little understanding of how the program would be used. The office manager in the other practice similarly reported that she was not part of the decision-making process leading to e-prescribing implementation and was skeptical of the potential value of the program suggesting that "it works well if you're organized (but) if you're extremely disorganized or you don't have a set routine, I think it's going to be just as difficult to implement as it would be to document things in a chart." Other support staff reported to the field researcher that documentation in this practice was an issue as, "the doctor usually just refills renewal requests that come in and ... doesn't make any documentation in the chart. ... Some patients call him on his cell phone, and then he'll call in the prescription. He has pharmacies programmed into his cell phone." The doctor had only been in the practice about 18 months and was very concerned about building the practice and ensuring enough patient flow to survive financially. The practice lacked any standing orders for prescription renewals and all prescription-related calls were routed directly to the physician.

## DISCUSSION

In practices that successfully implemented e-prescribing, greater efficiencies were hoped for, but these hopes were tempered an appreciation of the challenges likely to be faced during implementation. Practice members' expectations about the program seemed informed by the actual capabilities of the technology, indicating more effective communication within the practice about the upcoming installation. These expectations focused on improving prescription workflow rather than on large scale practice changes such as speeding overall clinical workflow to improve financial returns. These more modest expectations may indicate relatively widespread information sharing within the practice and may also have conferred protection from the common challenges of HIT implementation. By contrast, those members of unsuccessful practices who were aware of the upcoming installation had expected that the program would speed their clinical work, function "flawlessly" and be implemented with minimal disruption to existing routines. When e-prescribing was "less than perfect" and failed to meet these expectations, practices either failed to complete installation or discontinued use. Although all practices had similar access to technical support, this was reported to be inadequate in some practices that discontinued or failed; possibly reflecting that in successful practices, prior experience with HIT gave practice members greater comfort in accessing technical support or led them to sustain their efforts when faced with routine technical problems. Effective communication of e-prescribing capabilities among ambulatory practice members along with planning for effects on clinical workflow are important elements in encouraging the more widespread adoption and effective use of this technology.

This study is limited in that it was not intended to represent the prevalence of adoption issues among ambulatory practices. Instead, practices were chosen purposefully to represent a range of ambulatory practice types and sizes and to elucidate the spectrum of adoption issues that they may encounter. Nonetheless, practices that enrolled in this e-prescribing program may differ systematically from other practices. In particular, there were no large multi-specialty group practices participating in the study. However, the majority of ambulatory health care in the United States is still delivered in smaller offices similar to those that we targeted for the current study. We did not collect patient-level information such as the total number of patients in each practice, insurance mix, commonly prescribed medications, or chronic illness incidence. Although these are important issues affecting the extent to which e-prescribing may potentially benefit a particular practice, successful implementation in practices that differ in these characteristics is, nonetheless, likely to require attention to the issues identified in this study. In addition, practices in this study had financial incentives for using e-prescribing. These incentives may have encouraged more practices to successfully implement e-prescribing than might otherwise have done so. Additional study would be needed to test the hypotheses we generated regarding the key determinants of successful e-prescribing implementation and use across a broader range of practice settings.

Before e-prescribing implementation, physicians and ambulatory practice leaders need to be aware of the capabilities and limitations of this technology. Our results indicate that ambulatory practice leaders should plan e-prescribing implementation carefully, ensuring that all practice members are aware of and prepared for the likely effects of this technology on prescribing systems and clinical workflow. Practices should have timely access to high-quality technical support as well as support for managing the organizational and workflow changes that HIT implementation demands. Ideally, practices should plan changes to prescription workflow before implementation to ensure that the potential benefits of this technology are effectively realized.

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# APPENDIX

**Table 2. Baseline Interview Questions—Prescribers and Office Staff**

| | Prescriber | Office Staff |
|---|---|---|
| When in the encounter do you typically give a prescription to the patient? | X | |
| What happens when a prescription renewal request arrives? Create a workflow diagram for this process with the interviewee. Use the existing workflow diagram to make sure that all steps are covered. | X | X |
| What happens when a drug that you/a clinician prescribe is not covered as expected by the patient's insurance? Create a workflow diagram. | X | X |
| Do you have any resources to help you keep track of what medications are covered by different plans? Helpful? Used often? | X | |
| What happens when you find out from the pharmacy that a prescription interacts with something else the patient is taking or that the patient is allergic? Create a workflow diagram. | X | |
| What happens when you find out "prior authorization" is required? Create a workflow diagram. | X | X |
| Are your chart notes dictated and transcribed or handwritten? How do you maintain a list of current medications? How complete is it? Do you use flow sheets or reminder systems? | X | |
| Tell me about the last time there was a breakdown in the usual routine relating to prescriptions. How did different people react? | X | X |
| Your practice will be implementing an electronic system for handling prescriptions. What are your thoughts about this? What do you know about it? What impact do you think this change will have on your work? What are your hopes for this change? What concerns do you have about this? | X | X |
| How was the decision made to move to e-prescribing? What was your role in that decision? | X | |
| How did you find out about the upcoming e-prescribing implementation? | | X |
| Under what conditions could you authorize a renewal without needing to wait for the clinician? How does this process vary by clinician? | | X |
| How does all of this work around prescribing fit into your typical day in the practice? | | X |
| What happens with this process (i.e., prescribing) if you are not here? | | X |

## Table 3. Office Manager Interview Questions—Baseline and Follow-up

| | Baseline | Follow-up |
|---|---|---|
| How many prescribers practice in this office? | X | X |
| How many half-day sessions does each provider see patients out of this office? | X | X |
| How many nurse FTEs work in the office during normal staffing conditions? | X | X |
| Who handles receiving and returning telephone messages? How many people are employed in these roles? What is their training/background? (including office staff, nurses, and others involved in the above roles) | X | X |
| Please describe the telephones systems and the procedure for handling patient and other calls. How does the practice triage patient calls? How are prescription related calls handled? | X | |
| How are computers used in the office? Who has access and for what? How many are there? | X | |
| One of the pieces of information we'd like to have your help with, is tracking how many scheduled patients, cancellations, walk-ins, and no-shows you have at this office over a one week period of time. I have a tally sheet here that we'd like for you or somebody else in the office to use to organize this information. | X | X |
| How has the e-prescribing program changed work within the practice? What are the biggest benefits? What are the unintended consequences? | | X |
| How has the number of telephone renewal requests changed from before e-prescribing? | | X |
| How has the number of telephone calls the office now receives about coverage, safety, and prior authorization problems changed from before e-prescribing? | | X |
| Have you changed the number of FTEs that you use to handle prescription-related telephone messages and faxes as a result of the program implementation? | | X |
| Have there been any other significant changes in office personnel or procedures since we were last in your practice? | | X |
| Has the office changed the process of handling non-office visit renewal requests? | | X |
| Has the office changed the process of handling prescription call backs (such as about coverage, safety, and prior authorization problems)? | | X |

## Table 4. Follow up Interview Questions—Prescribers and Office Staff

| | Prescriber | Office Staff |
|---|---|---|
| Your practice recently implemented an electronic system for handling prescriptions. What are your thoughts about this? What impact do you think this change has had on your work? In what ways did the program live up to your expectations? In what ways did it not? What were the most challenging aspects of implementing the e-Rx program in your practice? What were the easiest aspects? | X | X |
| How often do you use pen and paper for prescriptions now? How do you decide which method to use? | X | |
| How do you transmit prescriptions to the pharmacy? How do you decide between electronic transmission vs printing out or electronically faxing a prescription? Does use of retail vs mail-order pharmacy matter? | X | |
| How has e-Rx changed your ability to select medications that will be covered by the patient's insurance? How has the system changed the way you check formulary and benefit information, compared with traditional prescribing? What would you say about the accuracy of the formulary and benefit information in the system? | X | |
| How well does the system work to prevent calls from the pharmacy? How does the frequency of pharmacy calls compare between electronic and traditional prescribing? | X | |
| How has e-Rx changed your ability to determine if a prescription interacts with something else the patient is taking or that the patient is allergic to? Describe the steps in handling allergy and drug interaction warnings. How is this process different from the way that you check for drug interactions or allergies with traditional prescribing? What would you say about the usefulness of the system for preventing these types of medication errors? What about dosing errors? | X | |
| How has e-Rx changed your ability to see the patient's current medications? How complete is this information? Are you able to see prescriptions from other physicians? Is this feature important? How well does it work? How has the system changed the way that you keep track of patients' current medications, compared with traditional prescribing? | X | |

*(continued on next page)*

Table 4. (continued)

| | Prescriber | Office Staff |
|---|---|---|
| How has e-prescribing changed the way Rx renewals are handled? | X | |
|   Could you show how you handle a few renewal requests that you've received through the e-prescribing system? *If possible, time the handling of up to 3 (minutes and seconds).* | | |
|   Could you also show how you now handle renewal requests that you've received by phone or fax? *If possible, time the handling of up to 3 (minutes and seconds).* | | |
|   How often would you convert a manual renewal request to an e-prescription? Do you have a policy on this? | | |
| What happens with the e-prescription processes if you are not here? | X | |
|   For example, can someone else handle your renewal requests? | | |
| How has e-prescribing changed the way other pharmacy messages are handled? | X | |
|   For example handling a formulary problem, ambiguity, or safety question. | | |
|   Could you also show how you now handle pharmacy messages that you've received by phone or fax? *If possible, time the handling of up to 3 (minutes and seconds)*: | | |
|   Has the process of handling these messages changed since e-Rx? | | |
| What happens when an electronic prescription renewal request arrives? | | X |
| What happens when there is a problem with a drug that the clinician has prescribed using the e-prescribing program (not covered by the patient's insurance, dosage problem, allergy, etc)? | | |
| What happens when you find out "prior authorization" is required for an electronic prescription? | | |
|   Elicit a step-by-step description of the workflow. | | |
|   Let's say you spent a solid hour doing nothing but one of these tasks. How many would you get done? | | |
|   How does the amount compare between e-Rx and traditional Rx? If different, why? | | |
|   Would insurance-related messages take more or less time than safety-related messages? | | |
| Under what conditions could you authorize an electronic renewal without needing to wait for the clinician? | | X |
|   How does this process vary by clinician? Elicit a step-by-step description of the workflow. | | |
|   How many of these messages could you handle if you spent a solid hour on just that? How does the amount compare between e-Rx and traditional Rx? If different, why? | | X |
| What is your involvement with new electronic prescriptions? | | X |
| How has electronic prescribing changed how all of this work around prescribing fits into your typical day in the practice? | | X |