

Final ACTION Contract Report

Building Implementation Toolsets for E-Prescribing



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Final Report

Building Implementation Toolsets for E-prescribing

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U.S. Department of Health and Human Services
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Preface

This project was funded as an Accelerating Change and Transformation in Organizations and Networks (ACTION) task order contract. ACTION is a 5-year implementation model of field-based research that fosters public–private collaboration in rapid-cycle, applied studies. ACTION promotes innovation in health care delivery by accelerating the development, implementation, diffusion, and uptake of demand-driven and evidence-based products, tools, strategies, and findings. ACTION also develops and diffuses scientific evidence about what does and does not work to improve health care delivery systems. It provides an impressive cadre of delivery-affiliated researchers and sites with a means of testing the application and uptake of research knowledge. With a goal of turning research into practice, ACTION links many of the Nation's largest health care systems with its top health services researchers. For more information about this initiative, go to <http://www.ahrq.gov/research/action.htm>.

Acknowledgments

The toolset was authored as a collaborative effort among researchers from the RAND Corporation; Point of Care Partners, LLC; University of California, Los Angeles; University of Medicine & Dentistry of New Jersey; and Manatt Health Solutions. Toolset contents were also drawn from numerous sources, including literature documenting studies of successful e-prescribing initiatives; observations gathered from visits to diverse practices that have successfully implemented e-prescribing; expert opinions from the project's Advisory Committee and existing tools that were adapted for inclusion in the toolset. We are grateful to Diane Schoeff for outstanding project management and to Kristin Leuschner for editorial assistance.

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(Note: The titles and affiliations for Advisory Committee members are those that were current during their participation.)

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Chapter 1. Introduction

The overall purpose of this ACTION project was to produce two e-prescribing implementation “toolsets” one aimed at health care provider organizations, ranging from small independent offices to larger medical groups and “safety net” clinics, and the other aimed at independent pharmacies. The project was initially focused on a toolset for provider organizations. The pharmacy toolset component was added as a supplement in the project’s second year. The assessment component of the project focused on obtaining feedback about each toolset from sites that have attempted to use them in the course of an e-prescribing implementation effort. This report summarizes findings from the assessment of each toolset and discusses how the toolsets were revised based on user feedback.

The specific aim of the assessment was to evaluate the usability of the prescriber and pharmacy toolsets as well as their usefulness in helping organizations successfully implement e-prescribing, with success defined as the use of e-prescribing by all clinicians for all eligible prescriptions. Using a multimethod assessment process, including interviews and work process observations, applied during site visits to physician offices and pharmacies participating in pilot testing the toolsets, we assessed the apparent impact of using the toolset on e-prescribing adoption and, secondarily, the potential impact of e-prescribing on clinical performance.

Ultimately, the goal of each toolset is to support more effective e-prescribing system implementation. E-prescribing, in turn, can enable improvement in the safety, quality and costs of prescription drug use, thereby advancing each of the priorities embodied in AHRQ’s mission, which is to improve the quality, safety, efficiency, and effectiveness of health care for all Americans. However, it was beyond the scope of this assessment to evaluate the effects of the toolsets on these outcomes.

This assessment report, after a brief discussion of the theoretical background for development of the provider and pharmacy toolsets, details the methods used to assess the use of these toolsets and the results of this assessment of use in provider and pharmacy pilot sites. It closes with some initial suggestions for future development and use of the toolsets.

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Chapter 2. Background

2.1 Challenges of E-prescribing Implementation

Studies have shown that adoption of health information technology (health IT) does not guarantee that systems will be used effectively or help organizations achieve expected goals. For example, once adopted, health IT may be used inconsistently or in unexpected ways. Several studies have documented that health IT usage does not easily translate into better care in typical ambulatory care settings (O'Connor, 2005; Chaudhry, 2006; Crosson, 2007). Choices made during health IT implementation may lead providers to use the technology in ways that differ substantially from those envisioned by designers and policymakers; these differences can limit the systems' usefulness for improving quality and safety (Crosson, 2005; Tamblyn, 2006; Grossman, 2007).

Studies of e-prescribing adoption have found similar patterns of inconsistent or ineffective use. One study examined a clinical reminder system that had been installed but not used consistently by providers. Barriers to use included ineffective coordination between nurses and physicians, high workloads, and poor interface usability; facilitators of use included the integration of prescription reminders into workflow (Saleem, 2005). Our own previous study of e-prescribing adoption found that successful implementation took place in settings where key stakeholders exhibited greater familiarity with technological capabilities and held realistic and relatively modest expectations regarding potential benefits (Crosson 2008). In this prior study, we also found that successful implementation of e-prescribing requires understanding the local context, a willingness to reengineer clinical workflow to realize potential efficiencies, and ongoing efforts to optimize clinical workflows. Results from these studies of health IT adoption and use suggest that organizations may need assistance or guidance based on the successful experiences of others in order to make the most effective use of health IT.

Both leaders of practices or pharmacies seeking to adopt e-prescribing and members of other organizations providing support for such adoption may use the toolsets developed for this project as they work to adopt and make effective use of electronic prescribing technology.

2.2 Conceptual Framework

The data gathering and analyses for the assessment of the toolsets developed for this project drew on several theories related to the adoption and use of information technology and accompanying organizational changes that facilitate adoption and use. Specifically, our data collection, assessment, and development of the toolsets were informed by the IMPACT model of practice change (Cohen 2004), the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh 2003) integrating insights from a variety of organizational change models, and a review of theories of health IT implementation (Karsh 2004). The concepts in these theories, which are described in the following paragraphs, overlap to some extent. However, efforts to test these theories or unify them were beyond the scope of this project. Instead, project teams simply used their concepts together within a combined framework of factors relevant to developing the E-Prescribing Implementation toolsets and assessing the use of the toolsets by relevant organizations.

The IMPACT model of practice change (Cohen, 2004) is based on several prior studies of primary care practice improvement interventions and has been used to understand and guide organizational change and improvement initiatives in primary care (Goodwin, 2001; Stroebel, 2005). This model suggests that making organizational changes in medical practice settings requires an approach tailored to the specific conditions of the setting, taking into account: (1) the motivations of key stakeholders for making change, (2) the physical and intellectual resources for carrying out change initiatives, (3) outside motivators for change, and (4) organizational understanding of the opportunities for change. This model provides a framework for examining how different provider organizations implement e-prescribing and how members of such organizations adapt an implementation toolset to their particular setting. While this model was developed for studying primary care settings, insights from the model are broadly applicable to other health care organizations such as pharmacies.

The UTAUT (Venkatesh et al., 2003) was developed to model the uptake of information technology. It integrates constructs from eight theories, including other models of technology adoption (Davis et al., 1989; Venkatesh and Davis, 2000) and more general theories of behavior change or adoption of innovation, such as the Theory of Reasoned Action (Fishbein and Azjen, 1975), the Theory of Planned Behavior (Azjen, 1991), Social Cognitive Theory (Bandura, 1986), and Diffusion of Innovations Theory (Rogers, 1995). The UTAUT posits that three basic factors predict the behavioral intention to use a newly adopted technology: performance expectancy, effort expectancy, and social influence; behavioral intention, in turn, determines system usage, along with facilitating conditions (e.g., organizational and technical support and other organizational features such as those identified by the IMPACT model). Longitudinal data from four organizations found that the UTAUT accounted for approximately 70 percent of the variance in user intentions to make use of a new system (Venkatesh et al., 2003).

Another recent review of theoretical models emphasizes several additional factors that influence the success of IT implementation efforts (Karsh, 2004), including end-user participation in the technology implementation process (which is thought to increase users' knowledge about the technology, improve their sense of control and commitment and decrease their anxiety), and users' sense of organizational justice (i.e., their perceptions of whether they are being treated fairly).

We drew on constructs from all of these theories as a guiding framework for analyzing the use of the toolset by practices and pharmacies that are engaged in e-prescribing implementation. The toolsets were structured using a model of implementation activities that are organized into discrete steps: initial goal setting and system selection, work process redesign, system launch, and post-launch remediation. This structure is intended to address insights from the theories used in development and evaluation of the toolsets. Specifically, the toolsets offer information designed to develop the physical and intellectual resources needed to implement e-prescribing, identify and explain significant outside motivators for adoption, address concerns relating to effort expectancy in order to affect behavioral intentions to use e-prescribing, and increase end-users' participation in implementation effort.

Although the toolsets model implementation in terms of steps they are not structured in terms of "stages;" that is, practices and pharmacies do not necessarily have to complete each step in a fixed order. However, each step can build on the results of whichever prior steps have been completed.

Since use of the E-Prescribing Implementation toolsets overall can be considered an organizational innovation, the theoretical models described above were also used as context for

understanding the use and impact of the toolsets' individual components. So, for example, the models can shed light on users' motivation to use individual tools included in each toolset in terms of performance and effort expectancies, social influence, facilitating conditions, and end-user involvement.

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Chapter 3. Toolset Development Process

The Physician and Pharmacy toolsets were developed using a multistage process designed to both ensure that appropriate issues related to e-prescribing implementation were addressed in each toolset and to promote ease of use of the documents and tools included with the toolsets among the targeted groups. The six steps involved in developing each of the toolsets are indicated below. This chapter provides an overview of each of the component processes that contributed to development of the final toolset. Step 5 (Pilot evaluation) is then described in further depth in Chapters 4 and 5.

1. *Environmental scan.* Catalog publicly available tools and artifacts, such as product comparisons, business agreements, and workflow diagrams that could assist in implementing e-prescribing connectivity.
2. *Advisory committee.* Convene an advisory committee to inform the development of toolset content and to assist in refining tools to be included with each toolset.
3. *Exemplary sites.* Observe and analyze the experiences of several sites that successfully adopted e-prescribing, identifying key implementation practices or system features for inclusion in the toolsets.
4. *Draft toolsets.* Develop outlines of chapter content and author chapters for each toolset to include the range of knowledge and materials that might be needed during e-prescribing implementation, including background knowledge, incentives for adopting e-prescribing, workflow patterns and feasible work process transitions, and guidance on other key organizational factors such as leadership, organizational culture, employee involvement, training, performance monitoring, and troubleshooting.
5. *Pilot evaluation.* Conduct a pilot evaluation of draft toolsets with sites that are undergoing e-prescribing adoption, with site visits to assess each toolset's use and impact, and to collect information that can inform toolset revision and improvement.
6. *Final toolsets.* Create the final Pharmacy and Physician Office E-Prescribing toolsets that pharmacies and physician offices can use to guide the adoption of e-prescribing.

By enabling the greater adoption of e-prescribing systems that are effective in improving safety quality and prescription drug costs, the toolsets are intended, in the long run, to advance each of the priorities embodied in AHRQ's mission, which are to improve the quality, safety, efficiency, and effectiveness of health care for all Americans. However, this report focuses on the use of and impact of the toolsets on e-prescribing implementation; these long-term effects could not be assessed in the pilot study described in this report.

3.1 Environmental Scan

We began by conducting environmental scans to identify and catalog existing publicly available tools and artifacts that support physician e-prescribing implementation or pharmacy e-prescribing connectivity. For physician-related material, we drew on multiple sources, including those summarized in Table 1.

Table 1. Resources examined in environmental scan

Resource	Key Features
HRSA Health IT Adoption Toolbox	Website (currently http://www.hrsa.gov/healthit/toolbox/HealthITAdoptiontoolbox) consisting of 8 modules at the time we examined it, covering aspects of EHR adoption. We created assessments for each module (including “Goals and objectives,” “Project management,” “Workflow,” “Change Management,” and “Evaluating and Sustaining.” In general, chapters provided orientation to multiple external resources rather than step-by-step instructions. The external resources tended to be very detailed, but we refer to some of these in “Details” boxes within our toolsets, such as the DOQIT Organizational Redesign Workbook, a 146-page PDF.
eHealth Initiative Reports	The original <i>Clinician’s Guide to E-Prescribing</i> provided useful principles especially for the Selecting a System chapter of the Physician toolset. The June 2008 eHI report on progress in e-prescribing contained useful background on adoption, processes, and best practices for implementation. We used this as a reference list of topics to consider for coverage in the toolsets.
Technology readiness assessment tools	Survey instruments and guides from multiple sources were reviewed, including the 25-item questionnaire used in the DOQ-IT project (adapted by Lumetra from Organizations in Transition by William Bridges) a 52-item questionnaire used by the Texas Medical Association (originally from the InfoTech Research Group), a 30-item survey developed by Object Health for the California Community Clinic Association, and the published Organizational Change Manager instrument . * We also referred to two valuable review papers. †‡
Vendor Assessment Tools	Our primary sources included a spreadsheet tool developed by Point of Care Partners, initially for an e-prescribing initiative in North Carolina, a “vendor evaluation matrix” developed by Lumetra, and a published form by Grey, et al. §
Health Alliance Plan of Michigan (HAP) ePrescribing Toolkit	Multiple files actually used in managing HAP’s successful e-prescribing program, including sample contracts, implementation timelines, checklists, a baseline process assessment. Several of these were directly adapted for the toolset chapters on Planning the Transition and Setting up the Technology.
Center for Improving Medication Management	This site included useful patient flyers and a letter for pharmacies to announce the practice’s e-prescribing adoption and to provide tips for taking advantage of it.
AHRQ Health IT Evaluation Toolset	The outline of this document was a source of topics for the “Monitoring and Remediation” chapter of the toolset. This toolkit can be found at: http://healthit.ahrq.gov/portal/server.pt/community/health_it_tools_and_resources/919/health_it_evaluation_toolkit/27872

* Gustafson D, et al. Developing and testing a model to predict outcomes of organizational change. *Health Serv Res* 2003 April; 38(2): 751–76. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1360903/>

† Scott, et al. The quantitative measurement of organizational culture in health care: a review of the available instruments. *Health Serv Res* 2003 June; 38(3): 923–45. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1360923/>

‡ Weiner, et al. Conceptualization and measurement of organizational readiness for change. *Med Care Res Rev* 2008 Aug;65(4):379-436.

§ Gray M, Felkey BG, Carper J. Assessment tool for selecting an e-prescribing system. In: Hale PL, ed. *Electronic prescribing for the medical practice: everything you wanted to know but were afraid to ask*. Chicago: HIMSS; 2007. p. 117-30.

For pharmacy-related materials, resources developed by Surescripts, a health information network vendor, were one initial source. Surescripts’ had developed resources for pharmacies at all stages of e-prescribing implementation. Initial versions of the pharmacy toolset included sample announcement letters to patients and physicians and a patient flyer from Surescripts. However, a new patient flyer was substituted based on pilot testing and the potentially-proprietary letters were dropped as tools. Other sources of materials for the pharmacy toolset included the U.S. Agency for Healthcare Research and Quality and the American Pharmacists’ Association.

3.2 Advisory Committee

The project convened an Advisory Committee consisting of experts from regional e-prescribing implementation initiatives as well as experts in the implementation of practice change in diverse practice settings. When the task order was modified to add the Pharmacy toolset, we expanded the existing Committee by adding more pharmacy connectivity experts (new members indicated by an asterisk). Table 1 shows the individuals who participated on the Committee. We held all Committee meetings by teleconference due to the challenges of scheduling travel time for this group of experts. Meetings for each toolset covered (1) the analysis of successful e-prescribing implementations and the proposed outline for the toolset; (2) an the initial draft toolset for use in pilot testing and the final pilot testing plan; and (3) toolset revisions based on pilot testing results. The AHRQ TOO was invited to participate in these meetings and teleconferences.

Table 2. Members of the advisory committee

Name	Title, Affiliation
Jos Aarts, M.D.*	Erasmus University Medical Center (European e-prescribing expert)
Elaine Batchlor, M.D.	Chief Medical Officer, L.A. Care Health Plan
Martha Bernadett, M.D., M.B.A.	Executive Vice President, Research and Development, Molina Healthcare, Inc.
Kate Berry	Executive Director, Center for Improving Medication Management
Walter Cathey, Pharm.D.	President, Institute for Community Pharmacy, Los Angeles; Dean's Advisory Council, Western University of Health Sciences College of Pharmacy
Ajit Dhavle, Pharm.D., M.B.A.*	Senior Manager-Clinical Practice Integration, Surescripts
Joy Grossman, Ph.D.*	Senior Health Researcher, Center for Studying Health System Change
John Halamka, M.D.	Chairman, New England Health Electronic Data Interchange Network
Margaret Johnson, R.Ph.	Executive Pharmacy Director, Horizon Blue Cross Blue Shield of New Jersey
Charles Kennedy, M.D.	Vice President, Health Information Technology, WellPoint, Inc.
Timathie Leslie	Managing Director, Manatt Health Solutions
Robert Mayes (nonvoting ex officio)	Senior Advisor, Health IT, Agency for Healthcare Research and Quality
Anthony Schueth	Project Manager, Southeast Michigan E-Prescribing Initiative (SEMI)
Matthew Walsh	Associate Vice President-Purchaser Initiatives, Health Alliance Plan of Michigan
John Weir	President, Illumisys

Note: Titles and affiliations are shown as of the time of the individual's participation.

* denotes members added during development of Pharmacy toolset

3.3 Exemplary Sites

The elements contributing to successful e-prescribing connectivity were analyzed using a multistep data collection process that began with remote data collection from leaders and staff at successful pharmacies and was followed by site visits for interviews and direct observations.

Site Selection

The project selected 6 physician practices and 4 independent pharmacies that were highly successful in taking advantage of e-prescribing connectivity. Physician offices were identified based on recommendations by the Advisory Committee, and pharmacies were identified based on e-prescribing transmission volumes including volume of refill requests. Sites were also identified in consultation with the National Community Pharmacists Association (NCPA), and Surescripts for pharmacies. Sites were selected using purposive sampling aimed at representing a breadth of site characteristics including size, urban/rural location, and other features.

Site Visit Data Collection

During each site visit, a team of field researchers conducted a multimethod assessment of the site (summarized below in Table 3). Field researchers conducted in-depth interviews, key informant interviews, and field observations to document the work processes related to electronic prescriptions, and other relevant work processes that may have affected the successful implementation of electronic prescribing, including the distribution of responsibility for specific tasks among staff members, procedures for handling paper and faxed prescriptions, and other relevant processes. Field researchers also identified and explored any new or unanticipated findings relating to prescription-related workflow.

Staff members' perceptions of adequacy of training were elicited during informal conversations and in-depth interviews. Additional relevant information was documented, including type and amount of initial training for all staff, availability of support for technical issues, and other relevant issues.

Teamwork factors that could contribute to success in implementing electronic prescribing, including communication strategies used among staff members, decisionmaking, and conflict resolution were documented using observation techniques.

Focused time and motion studies were conducted at selected practice sites by shadowing and recording all tasks performed over a half-day (3 to 4 hours) time period. Field researchers recorded observations using an instrument based on the AHRQ Time and Motion database with the task categories used in previous AHRQ-sponsored time and motion studies of e-prescribing (Overhage, 2001; Hollingworth, 2007). Apparent exceptions to or violations of the processes elicited in interviews or expected from prior review of implementation and training materials were noted. When possible, the field researchers sought clarification of these exceptions from participants in order to fully elucidate implementation experiences and prescription-related workflow. After each site visit, work process diagrams were created to represent prescription-related processes for the sites that were visited.

Table 3. Multimethod assessment process

Method	Purpose	Person(s) Involved
Observation: Detailed descriptive field notes of the practice or pharmacy environment.	To describe features of the practice or pharmacy such as location and environment, as well as office systems that interface with e-prescribing systems, such as, medical records and computer systems. Details of routines and procedures around prescription handling, physician e-prescribing usage styles.	Field researchers spent time in different locations of the practice or pharmacy.
Key Informant Interviews: Informal interviews conducted with clinicians, pharmacists, other and staff, to clarify observations. Data captured in observations' field notes.	To gain understanding of organizational culture (values, beliefs, norms, and shared reality) from participants. Also used to clarify observations and emerging understandings of systems for handling prescription work. These interviews were used to identify ways in which actual implementation practices may have varied from those envisaged in the toolsets.	Field researchers spoke with individuals as they conducted their jobs to obtain perspectives and interpretations that were not directly observable.
In-Depth Interviews: Open-ended questions framed by an interview guide to elicit stories and narratives.	To explore experiences and perceptions of practice and pharmacy participants about e-prescribing, the facilitating conditions that led to successful implementation and the expectations and motivations of key stakeholders prior to and during implementation. Champions of e-prescribing and other key members of the organization were interviewed to identify problems that arose during implementation – focusing especially on those problems that were unexpected – and the techniques used to address them. Other key stakeholders were interviewed to assess their expectations and motivations.	Field researchers interviewed e-prescribing champions, physicians, practice managers, pharmacists and key staff members to obtain details about a particular topic of interest. These interviews were audio taped and later transcribed.
Time and motion study: Time spent on each task by a worker during a defined period	To obtain quantitative data on the mix of activities that consume workers' time. Quantitative labor estimates can in turn support cost estimates for alternative work process reconfigurations.	Field researchers shadowed workers and recorded time spent on each activity using a device or paper activity log.

The site visits focused on how the implementation process was successfully completed and what effect this process had on the actual (rather than expected) use of e-prescribing in these settings. Analysis of the data collected at exemplary sites demonstrated that there were several factors that contributed to successful implementation of e-prescribing. These key features included:

For Physician Practices

- Three of five exemplary physician practices had an *identifiable and respected physician champion* who articulated a vision for the technology and helped to ensure successful implementation. Champions played an important role in addressing potential barriers to adoption.
- Exemplary sites had comprehensive training and education strategies. For staff, education focused on benefits of e-prescribing and on setting realistic expectations for effects of using the system. Training addressed both how to use the system and new work processes.
- Exemplary physician practices had on-site technical support for training and implementation. Four sites had technical support departments that were part of a larger

practice organization. For the remaining site, technical support was provided by an outside organization through a contractual arrangement.

- Fourth, in exemplary practices, technical support and implementation planning teams assessed existing work processes prior to implementation and redesigned workflow to incorporate e-prescribing. Typically, the value of these efforts was not appreciated until after implementing e-prescribing.
- Challenges identified during site visits to exemplary physician practices included the receipt of prescription renewal requests by fax, even when the original prescription had been transmitted electronically; a lack of understanding on the part of pharmacists about how the provider's system works, and in some cases, pharmacists' reluctance to route refill requests through the Surescripts network. Several of these factors pointed to the need to address the role of pharmacies and patients when redesigning practice workflows to incorporate e-prescribing.

For Pharmacies:

- All four exemplary pharmacy sites reported staged e-prescribing adoption. Some chose to begin by installing the necessary software packages on only one computer. Other pharmacies chose to enable only a few functions at first, such as handling incoming e-prescriptions and then later initiated use of other functions, such as pharmacy-initiated electronic refill requests.
- Exemplary pharmacies also developed strategies for successfully timing the filling of electronic prescriptions.
- A key characteristic of successful pharmacies was the maintenance of good communication and working relationships with area prescribers. Exemplary pharmacies had several strategies for fostering and maintaining these connections.
- Challenges identified during site visits to exemplary pharmacies included a lack of formal training with system software which often led to workarounds that undermined the efficiencies and safety measures afforded by e-prescribing; concerns about health insurance company audits that led many pharmacies to maintain paper records for all prescriptions; and frequent problems with electronic prescriptions including “drop-down” errors when physicians selected an incorrect dosage amount or total quantity of medication, as well as errors in quantity for pre-packaged items (e.g., topical cream tube size).

3.4 Draft Toolsets

Based on findings from the environmental scan and analysis of successful implementations, we prepared draft toolsets. The table of contents for each toolset is depicted below, along with a brief description of the contents of each chapter.

Each chapter was assigned to a primary author or authorship team who created an initial chapter draft. Chapters were then reviewed by the Principal Investigator and circulated among the toolset team members for review and comment. This iterative process continued until the

team was satisfied that the draft toolset was ready for initial pilot testing and review by the advisory committee.

Table 4. Table of contents: physician toolset

Chapter	Purpose
1. How to Use the E-Prescribing Implementation Toolset	Understand how to use the toolset
2. Background: What You Need to Know About E-Prescribing	Understand the basics of how e-prescribing works and what federal policies, state policies, and local organizations may help you to implement e-prescribing
3. Laying the Foundation: Setting Goals and Achieving Buy-In	Set goals that will help you stay focused on the needs of your practice and gain the buy-in of key stakeholders
4. Assessing Readiness and Preparing for Major Process Change	Help your practice determine what type of e-prescribing system, if any, you are ready to adopt
5. Planning E-Prescribing Work Processes	Understand current work processes and prepare to redesign them to maximize the effectiveness of e-prescribing
6. Selecting a System	Understand the factors you need to consider when selecting a system and vendor
7. Planning the Transition and Getting Started	Plan effectively for a smooth transition to e-prescribing
8. Setting Up the Technology	Learn what you need to do to set up your e-prescribing system technology effectively
9. Training	Plan and execute the training you will need to take full advantage of your e-prescribing system
10. Launch	Prepare for a successful launch of your system
11. Monitoring Results and Remediating Shortfalls	Monitor your progress in meeting the goals you set for e-prescribing, and identify and solve the barriers to achieving the goals you set out

Table 5. Table of contents: pharmacy toolset

Chapter	Purpose
1. How to Use this Toolset	Provides an overview of toolset
2. Background: What You Need to Know About E-Prescribing	Describes the basics of how e-prescribing works, identifies relevant federal policies, and provides guidance on support and incentives for e-prescribing
3. Getting Ready for E-Prescribing	Reviews questions you should ask your pharmacy software vendor, suggested training, and options for coordinating with prescribers and patients
4. Optimizing Workflow to Take Advantage of E-Prescribing	Provides information on how to assess and optimize your workflow so that you are gaining the most efficiencies from e-prescribing
5. Costs and Benefits	Explains how to assess your return-on-investment for e-prescribing
6. Troubleshooting and Preventing Common Problems with E-Prescribing	Identifies some common problems with e-prescribing and provides suggestions on how to resolve those issues
7. Future directions/cognitive services	Discusses how e-prescribing might play a greater role in the future and how it may affect pharmacy services
Tools	

In addition to the resources, explanations, and strategies offered in each chapter, tools were developed to serve specific needs during the implementation process. While some tools were similar for physician practices and pharmacies (patient/customer flyers), all tools were tailored for the intended audience. Some tools (e.g., pharmacy return-on-investment calculator) were only applicable for one type of site. Examples of the tools provided in each toolset are depicted in Tables 6 and 7.

Table 6. Sample tools included in physician toolset

Chapter	Tool
1	A roster tool to identify the people comprising the practice's implementation team.
3	A workbook for each stage of this goal-setting process; the last page serves as a poster to communicate goals to everyone in the practice.
4	A readiness assessment spreadsheet that automatically tallies the answers that have been entered for each question.
5	A spreadsheet containing example tables that practices can modify to document their work processes.
6	A spreadsheet to rank e-prescribing functionalities and vendor characteristics; results enable users to compare different vendors' products in terms of meeting the practice's needs and priorities.
7	A variety of timeline tools to plan and monitor the implementation process.
9	A survey for assessing basic computer skills to identify users who may need additional assistance during implementation.
10	Sample flyers to use or adapt to communicate the launch of e-prescribing to patients.

Table 7. Sample tools included in pharmacy toolset

Chapter	Tool
3	Documents and Website copy that can be used to communicate e-prescribing capability to patients, physician practices, and the general public, and to educate them about e-prescribing
4	A tool to assist pharmacies in mapping workflow to best capitalize on the efficiencies of e-prescribing
5	A spreadsheet that can be used to calculate the return-on-investment for receiving new prescriptions and processing refill requests electronically

3.5 Pilot Evaluation

The assessment component of the project was focused on obtaining feedback from sites after they attempted to use the toolset in the course of their own e-prescribing implementation effort. The goal of the assessment was to evaluate the ease of use of the toolset as well as its usefulness in helping sites to successfully implement e-prescribing for both new prescriptions and refill requests. Site selection, recruitment, and pilot testing procedures, as well as workflow analyses are described in detail in Chapter 4; the detailed results of the pilot evaluation are presented in Chapter 5.

Site visit methodology closely followed the methods used during the exemplary site visits, with added focus on determining how the toolset assisted or failed to assist the adoption of e-

prescribing as well as identifying instances in which an improvement in the toolset documents or tools could be more effective in easing the transition. While some pilot testing is still underway, completed pilot tests with physician practices and pharmacies revealed several ways in which particular tools could be improved. For example, the patient flyers for both physicians and pharmacies were completely rewritten and reformatted based on site feedback, to simplify language and move details about taking advantage of e-prescriptions into a sidebar or, for a large-print version, onto the back.

3.6 Final Toolsets

Information collected from the pilot evaluations, additional review from the Advisory Committee, and feedback from volunteer physicians and pharmacists was used in creating a final draft of the toolset. This final draft underwent RAND's quality assurance peer-review process as well as review by AHRQ's Office of Communications and Knowledge Transfer. All suggested revisions will be collected into the final document and set of tools, which will be distributed by AHRQ to appropriate audiences.

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Chapter 4. Methods and Data

The goals of the assessment were to evaluate the usability and potential impact of the e-prescribing implementation toolsets using a multimethod assessment process designed to collect rich data from initial pilot users of both toolsets. Using the multimethod assessment process described in detail in Table 3 above we obtained user feedback on each toolset. At two provider sites (5 and 6), we also conducted in-depth workflow and work process observations before and after e-prescribing adoption.

In this chapter we describe the research questions guiding our assessment, the data collection methods that we used to assess pilot-testing site use of the toolsets, and our data analysis techniques.

4.1 Research Questions

Pilot-testing was conducted using site visits that focused on the implementation process and use of the toolsets. In particular, these visits focused on assessing both user reactions to the toolsets and (in order to assess how well the toolsets helped guide adoption) implementation experiences.

In regard to the toolsets we sought to address the following research questions:

- How do different provider organizations and pharmacies use the toolsets?
- What roles do outside resources play (e.g., Health Information Technology Regional Extension Centers (RECs) and IT departments) in the use of the toolsets to aid the implementation process?
- Which tools are easiest or most difficult to use?
- What recommendations do users have regarding the toolsets?
- How are the toolsets used in workflow redesign?
- What is the potential for changes in workflow to enable efficiency gains or cost savings in handling prescriptions?

In order to assess the extent of use of the component parts of the toolsets and to assess users understanding of key concepts explained in the toolsets we also assessed each organization's experience with the implementation of e-prescribing. Thus we assessed: motivations for e-prescribing adoption, how the adoption decision was made, training resources available to the organization, perceived effectiveness of available IT support, champion activities, work process changes, and methods for monitoring success.

4.2 Data Collection Methods

Data was collected from pilot test sites using two types of site visits. One type, which was conducted at every site, involved a 1-day visit to the site by a social scientist with extensive training in qualitative methods, to conduct interviews about use of the toolset and prescribing and to observe office functioning. The other type, conducted only at selected sites, involved two

separate visits by a team of industrial engineering specialists who conducted work process observations, key informant interviews, and time and motion studies before and after e-prescribing implementation. We considered both of these visits to be aspects of the multimethod assessment process shown in Table 3.

Postimplementation Interview-Focused Site Visits

Field researchers with extensive training in qualitative data collection visited each pilot testing site 4-8 weeks after e-prescribing implementation to determine progress with e-prescribing adoption, how the toolset was used in this process, how prescription-handling processes had changed (if at all), and how the toolset may or may not have informed any changes.

These field researchers used all of the qualitative methods shown in Table 3. Specifically, field researchers' observations and key informant interviews identified the actual work steps followed each site's processes related to medication use, handling of prescribing-related telephone messages, new and renewal prescription processes, features of the organizational environment including use of other IT, location of the practice or pharmacy, and community surroundings. In addition, in-depth interviews were conducted in each pilot-testing site with personnel involved in prescription management to assess the particular role each person plays and how the toolsets were used at each site. At physician offices, interviewees included prescribers, medical assistants or nurses involved in medication management, the office manager, and key implementation champions or toolset users. Appendix A shows the interview guide that the field researchers were trained on as a menu of possible questions to ask in the in-depth interviews in physician offices. The researchers tailored each interview by selecting questions appropriate to the interviewee's role and their experiences with the toolset. At pharmacy sites, interviewees included pharmacists, pharmacy technicians, and other toolset users. Interviews were audio taped and transcribed for analysis. Appendix B shows the interview guide that the field researchers were trained on for the pharmacy interviews. For all types of interview, researchers tailored the topic covered by selecting questions appropriate to the interviewee's role and their experiences with the toolset.

Interviewers also sought to address technical and organizational factors typically associated with successful implementation and adoption of new information technology applications in order to identify causes of the success or failure of implementation guided by the use of the toolset. Based on the IMPACT and UTAUT models, as well as other studies of technology adoption, we included questions regarding: (1) motivation for system adoption; (2) technical factors (e.g., ergonomics, user interface, operating system, hardware and network access and reliability); (3) functionality (i.e., value of the system applications, integration with other systems); and (4) implementation factors (e.g., including employee involvement, training, presence and authority of a champion, management and peer influence, perceived voluntariness, and availability and quality of technical support). To assess specific uses of the toolset, interviewers focused on the perceived value of individual tools to support implementation of e-prescribing. We also asked participants for their recommendations regarding how to improve the toolset.

Pre- and Postimplementation Workflow-Focused Site Visits

Site visits focused on workflow observations were conducted by an industrial engineering faculty member and an industrial engineering graduate student. The team collected data using a combination of workflow observations, key informant interviews and time and motion studies^a at selected provider organization pilot sites pre- and postimplementation to observe differences in workflow attributable to e-prescribing adoption and use of specific tools in the toolset.^b Three of the pilot practices were selected^c for direct workflow observations before and after the e-prescribing implementation. However, one site declined the observation because of lack of space to accommodate the workflow observation team.

Thus, two sites (5 and 6) were visited pre- and postimplementation by the workflow-focused team postimplementation. Their observations focused on workflows related to the prescribing process, roles, physical environment, and use of workflow-related tools from the toolset. Changes from baseline were noted. Key informants were asked to describe gross patterns of work processes, frequencies, and workflow challenges. This allowed us to determine changes in the site personnel's understanding of their workflow (the focus of one of the toolset chapters) and the ability to describe their workflow compared to baseline. We also inquired whether workers perceived that any changes were related to the toolset, and in particular, the workflow chapter in the toolset.

Site 5 implemented an EHR that included e-prescribing, making it difficult to discern the workflow impact due to e-prescribing alone versus that due to EHR. Thus, only at Site 6 which implemented standalone e-prescribing did we carry out a time and motion study by shadowing task performers. A researcher spent multiple days observing prescribing processes and recorded time and steps of paper- and e-prescribing related process from the same persons (prescriber and staff-person). The researcher collected time data by using a stopwatch and a paper log to record the mix of activities and time spent on each. Since some activities were not part of a regular process but rather were an exception or problem to be addressed as it arose (e.g., pharmacy inquiries) the researcher used an issue log to record the issue and the time it took to address it.

4.3 Pilot Site Selection and Recruitment

We selected a purposive sample of six provider organizations (PO) and three pharmacies (PH) for pilot-testing the prescriber and pharmacy implementation toolsets shown in Table 8. Potential sites were identified based on their being in the planning or early implementation process for adopting e-prescribing, either through a standalone or an electronic health record (EHR) system, or through a process that could lead to a choice of either system. Sites were recruited to maximize diversity of key organizational characteristics including number of providers or pharmacists, provider specialty, number of employees in other roles, typical patient

^a We collected time and task data for prescribing related processes with the intent of understanding the incremental change in time and work process as a result of e-prescribing implementation.

^b Comments from the staff of the pilot sites were sought regarding use of specific tools in the toolset. However, it was not possible to determine if the change was due to information gleaned from the toolset or from other sources.

^c These sites were the ones expected to have the greatest changes in work processes associated with their implementation. The three sites not selected were making smaller or no changes in their installed technology (see Table 8). The selected sites were also located in California, which served to make travel costs feasible for the Los Angeles based workflow team.

or client population, ownership, current IT systems in use, and stage of e-prescribing technology adoption.

Decisionmakers at selected sites were recruited by an investigator who explained the study, including the potential benefits of using tools that are based on successful implementations, and offered a \$1,000 honorarium in recognition of the time required to provide feedback and access for site visitors.

Table 8. Pilot testing sites

Site ID	Organizational Characteristics	Stage of Adoption	Implementation Phases Assessed	Toolset Users
PO1	28 clinicians, part of large medical group, residency training site, on-site technical support for EHR and e-prescribing	Adding e-prescribing functions to an existing EHR	Planning, training, going live, initial use of e-prescribing	Clinician champion, IT support staff, office support staff
PO2	1 clinician	Changing from existing EHR to new EHR with e-prescribing	Initial use of e-prescribing within an EHR	Clinician champion, local medical foundation staff
PO3	2 clinicians, independent urban practice	Had EHR with e-prescribing; but no e-prescribing use	Remediating low e-prescribing use	Regional extension center staff
PO4	1 clinician, independent urban practice	Had EHR with e-prescribing; but no e-prescribing use	Remediating low e-prescribing use	Regional extension center staff
PO5	3 clinicians, part of larger integrated medical group with centralized IT support	Newly adopting an EHR with e-prescribing	Initial use of e-prescribing in context of full EHR adoption	Information technology implementation staff
PO6	12 part-time attending physicians, 5 full-time nurses, and 12 residents; a satellite outpatient clinic of a large academic medical center with centralized IT support	Newly adopting standalone e-prescribing	Introduction of standalone e-prescribing	Information technology implementation staff
PH1	Primary site for a 3-store independent chain (none e-prescribing). Urban commercial setting; focused on long-term care; uses robot for filling; typical staffing: 2-3 pharmacists, 2-3 interns, 10 pharmacy techs, 5-6 clerks; 500-800 Prescriptions/day	Using 15-year-old software, considering e-prescribing implementation	Planning and decision to activate e-prescribing	Pharmacist
PH2	Single-site independent pharmacy. Suburban pharmacy with compounding business, uses pharmacists overseas to assist with order entry; typical staffing: 2-3 pharmacists on site, 2-3 pharmacists overseas, 4 interns, 3 pharmacy techs, 2 clerks; 200-300 Prescriptions/day	Activated e-prescribing immediately after receiving toolset	Initial e-prescribing adoption	Owner/Pharmacist
PH3	Smaller site from a 3-store chain (last to activate e-prescribing). Urban inner-city, located in hospital building; typical staffing: 1 pharmacist, 2 pharmacy techs, 2 clerks; 120-150 Prescriptions/day	E-prescribing recently activated	Remediating after e-prescribing activation with no training	Pharmacist

4.4 Introduction of Pilot Sites to the Toolset

At the first two participating physician sites, and at each of the pharmacy sites, study staff worked directly with site personnel to facilitate use of the toolsets. For these sites, based on preliminary phone calls, we identified the individuals most likely to act as change agents with responsibility for the e-prescribing implementation. The principal investigator, assisted by other toolset authors, conducted a 1-hour orientation teleconference, introducing these individuals to the appropriate toolset for the site. Printed copies of the draft toolset were sent to the site in advance of the call. On the call, the study team reviewed the toolset chapter-by-chapter, giving an overview of each tool and how it could be used. The orientation included a more detailed review of the toolset that focused on the chapters that appeared most relevant for the site's current state of adoption. For example, for sites that had already selected a system and embarked on the installation process, the orientation focused more on the troubleshooting and monitoring chapters. Complex tools such as spreadsheets were demonstrated, as appropriate. After 2-3 weeks, we conducted a follow-up teleconference to review the site's use of the toolset, answer any questions, further explore the progress in implementation, and to offer suggestions about how to use tools that would be appropriate.

At the remaining four provider sites, rather than working directly with personnel at the site, the project team provided orientation to specialized support personnel who were specifically responsible for assisting the site with EHR or standalone e-prescribing implementation. This approach was adopted in response to input from external advisors, in recognition of changes in the health IT landscape, including the development of Health Information Technology Regional Extension Centers (RECs) authorized by the Health Information Technology for Economic and Clinical Health (HITECH) Act and designed to support health care providers' EHR adoption. Two of the provider sites were in fact supported by a single federally funded REC. At the remaining two provider sites, toolset users were from dedicated information technology support groups within two larger integrated medical groups. To facilitate use of the toolset by these support staff, the project team followed the same protocol of teleconference orientation sessions used with the first two provider sites but used these calls to orient support personnel as well as providers.

4.5 Data Analysis

Qualitative Analysis

The primary goal of our analyses was to derive formative feedback to inform immediate improvements in the toolsets. A secondary goal was to assess current e-prescribing implementation practices and how they may best be supported, both by the tools in the toolset or by support organizations such as RECs or other IT support personnel.

We combined confirmatory and other systematic attributes of classic content analysis (e.g., Berelson 1952; de Sola Pool 1959; Krippendorff 1980; Weber 1990) to create a coding scheme to analyze interview responses and field notes. We also used grounded theory to capture emerging themes that were not represented in the theories underlying the research questions (e.g., Glaser & Strauss 1967; Strauss & Corbin 1990, Dey 1993; Glaser 1992).

Candidate codes that captured constructs and emerging themes were identified and used to develop a codebook (Crabtree and Miller, 1999; Dey, 1993; Miles and Huberman, 1994; Willms, 1990; Araujo, 1995). We then proceeded with content coding or applying labels to capture meaning in each unit (Weingart, 1997). Data were coded using text management software (ATLAS.ti) in order to facilitate the retrieval of information related to particular codes and the association of various codes with each other. Disagreements between coders regarding the application of codes were reconciled by consensus.

Workflow Data Analysis

The workflow observation and key informant interview data collected by the industrial engineering team were analyzed using a pre and post case comparison for each of the two participating pilot sites. The time and motion data from Site 6 pre-implementation were used to categorize the most frequent steps and time spent in the prescribing workflow. The issue log data was categorized, and for each issue a judgment was entered regarding whether e-prescribing could have enabled dealing with the issue more efficiently. By comparing the workflow differences and the nature and frequencies of issues before and after e-prescribing implementation, this log was used to explore the influence of the adoption on the practice. In addition, the presence of issues in this log demonstrated the use of the toolset. Thus, if specific issues were discussed in the toolset but not addressed in the implementation then we concluded that the tools specific to that issue were not used.

Chapter 5. Pilot Testing Results

This chapter presents the results of our assessment of practice organizations' and pharmacies' use of the implementation toolsets along with results from the pre- and postimplementation evaluation of prescribing workflow.

Because of the more extensive data collected at provider sites, three of the sections in this chapter focus on findings from provider sites. The fourth and final section of this chapter focuses on findings from the pharmacy pilot sites.

5.1 How Provider Organizations Used the Toolset

Provider organizations used the toolset either on their own or with guidance and assistance from outside support personnel. Use of the toolset varied widely among the provider organizations participating in the pilot testing, but, as shown in Table 9, was limited largely to the use of some individual tools. Some provider organizations reported use of only a few specific tools while one clinician champion at one site reviewed the entire toolset in detail, shared it with IT support staff and then used recommendations from the toolset to plan and structure the implementation of e-prescribing functionality. Several of the provider organizations found the informational flyers, handouts for patients, and goal setting worksheets to be particularly valuable but struggled with how to use the vendor selection and work process redesign sections. As expected, use of specific tools also varied according to stage of implementation. Navigation of the large and complex toolset was the largest barrier to its effective use.

Table 9. Use of individual tools by provider organizations

Tool	Name	Provider Organizations Using Tool
1.1	E-Prescribing Team Roster	0
2.1	Local E-Prescribing Incentive Programs	0
3.1	Goals Worksheet and Poster	1
4.1	Health IT Readiness Assessment Instrument (electronic file tallies results)	0
5.1	Sample Workflow Diagrams	0
5.2	Sample Task Table	0
6.1	E-Prescribing Vendor Assessment Tool (electronic file tallies results)	0
7.1	Timeline for Standalone E-Prescribing Implementation	0
7.2	OCHIN EHR Implementation and Planning Tool	0
7.3	Timeline for EHR Transition	0
7.4	Outreach Letter Announcing E-Prescribing Plans to Pharmacies	1
9.1	Computer Skills Assessment	0
10.1	Flyer for Patients (English, Large-print, Spanish versions)	3
10.2	"Prescription Pad" Handout for Patients	1

Across all of the organizations that we observed, a common thread in the observations emerged: that e-prescribing adoption was seen as a way to computerize existing work processes rather than as an opportunity to redesign work processes in any systematic way, as advocated in the toolset. This view of e-prescribing led to the development of workarounds in many practices and meant that practices often did not realize substantial efficiencies when implementing e-prescribing.

Examples of use by provider organizations are detailed in the following sections.

Practice 1

The practice had been using *Centricity* for several years and had already implemented prescribing work processes that required typing prescriptions in the electronic record and then printing them out for patients to take to their pharmacy of choice. Renewal requests arrived by phone and fax and were handled by dedicated nursing staff. Interviewees reported that the practice typically saw approximately 120 patients each day and wrote approximately 100 new prescriptions and handled 60-70 refill or renewal prescriptions in the period prior to “turning on” e-prescribing functionality.

The clinician champion used the toolset to help set goals for the e-prescribing implementation process. Specifically, she reported that they were concerned with improving “turnaround time” for renewal requests, reducing costs by reducing the use of paper, making the prescribing process faster for patients, reducing the frequency of patients calling for urgent renewals, reducing phone calls from pharmacies to clarify prescriptions, and reducing the need for prior authorizations.

Following the teleconference introduction to the toolset by the project team the practice spent 1 month planning e-prescribing implementation. The toolset was shared with IT support personnel and training of staff and clinicians was conducted by IT staff. Despite recommendations in the toolset, the training was limited to a one-hour presentation and did not include hands-on training.

After reviewing the toolset, the clinician champion determined that e-prescribing would not require additional work and elected not to focus on work process redesign, despite the recommendations of the toolset. Despite recommendations in the toolset, we also observed no evidence of ongoing monitoring of goals set using the tools from the toolset.

Practice 2

The second pilot-testing site was a solo physician practice that had four medical assistants and reported treating approximately 50 patients each day. Most patients seen at the practice needed multiple prescriptions.

This practice was one of 17 participating in a grant-funded project focused on implementation of the eClinicalWorks electronic health record (EHR) system. The EHR implementation included e-prescribing implementation support. Specifically, e-prescribing was activated immediately prior to a 5-day training program during which the practice went live with the technology. Our site visit occurred approximately 1 month after the initial go-live date.

Support for use of the e-prescribing system was provided primarily by a local foundation in charge of the grant-funded implementation project and secondarily by the EHR vendor. Since the practice had been using the EHR and faxing prescriptions for approximately 5 years, it reported little need for work process changes to shift to submitting these prescriptions electronically. The

principal new work involved educating patients about the electronic submission of prescriptions to pharmacies, for which the practice used a patient handout from the toolset. While the clinician champion in this site reviewed the toolset, he reported that it was likely of greater value to the implementation and IT support staff of the foundation than for the practice since they were responsible for the transition to e-prescribing and the toolset provided extensive guidance in the phases of implementation that the foundation staff were supporting.

In the remaining practices, primary use of the toolset was by IT support staff outside of the practices. These support staff, in turn, were expected to apply tools and principles from the toolset in assisting participating pilot practices with e-prescribing adoption (in the context of adopting either a full EHR or a standalone e-prescribing system). A brief summary of the implementation experiences of each site are provided below and a more detailed examination of toolset use by IT support staff is provided in section 5.2.

Practices 3 and 4

Practices 3 and 4 were solo and two-physician practices respectively. Both had existing relationships with a local REC and worked closely with quality improvement (QI) staff, responsible for assisting practices in the adoption of health IT. These services were provided to the practices under a service agreement with the REC and in these cases, REC QI staff members were the principal users of the toolset.

Practice 5

Practice 5 was a small practice with 6 clinicians and part of a larger integrated medical group that had recently implemented a new EHR system that included e-prescribing. The practice was still transitioning from the old paper records system during the observation period and staff members and prescribers were still learning how to accomplish basic tasks. As part of the implementation process, the toolset was reviewed by IT support from the medical group but not used to plan training or work process redesign efforts. The practice did use the patient handout tool from the toolset to alert patients to the new e-prescribing processes in the practice.

Practice 6

Practice 6, was a larger internal medicine and pediatrics practice and served as a residency training site. The office was a community satellite site for an academic health center. The larger integrated medical group supported implementation of a standalone e-prescribing system as a bridging technology in anticipation of implementation of a full-function EHR within the next year. The toolset was shared with IT support staff from the medical group prior to implementation and was reviewed by the project team with these staff members. Tools from the toolset were not used and IT support staff reported that the size of the “manual” was such that they did not examine it carefully but only skimmed a few sections. Thus the toolset was not used to plan implementation, training and initial use of e-prescribing.

5.2 Role of Support Organizations in Applying the Physician Toolset

Regional Extension Center Quality Improvement Staff

In the provider organizations supported by an REC, use of the toolset proceeded along a common path. Specifically, the QI staff of the REC were oriented to the toolset and given copies for their use. These copies were then shared with physicians in each of the provider organizations piloting the toolset.

Across these organizations the REC staff was assisting practices with implementing and using eClinicalWorks including e-prescribing functions. In these practices, e-prescribing is introduced during a 2-week training focused on what one QI staffer called “doctor functions, like charting.” This process was already well-established before the REC partnered with the toolset development team and REC staff reported that most sections of the toolset were of limited value to them. Specifically, they found the emphasis on choosing a vendor and work process change planning to be not needed for supporting their work. These sections were seen as of limited use since the choice of e-prescribing vendor had already been made before they started working with the practices and REC staff did not understand the necessity of work process change planning in the small practices that they typically worked with. A common theme when talking to the REC staff about using the toolset in support of these practices was that they could see the value of some tools (e.g., the goal-setting worksheet, the patient handouts and flyers) but found the toolset as a whole overly complex and more comprehensive than they needed for their work.

Physician champions in these practices generally found the toolset to be too long for them to effectively use and one suggested that it be delivered as either an electronic reference or a Webinar. As one physician said regarding the toolset, “why aren’t you using technology instead of paper? Isn’t that what you are trying to get us to do?”

One of the two practices supported by the REC successfully implemented e-prescribing functions following the introduction of the toolset. However, problems with pharmacies not accepting e-prescriptions, difficulties prescribing “stepped” medications, and problems with handling electronic renewal requests persisted. Each of these topics is discussed in the toolset, suggesting the need for revision to support easier navigation of the tools.

Medical Group IT Support Staff

Two of the provider organizations that pilot-tested use of the toolset were part of two larger integrated medical groups with centralized IT support staff. In one of these cases, the medical group was in the process of implementing a new EHR with e-prescribing functions while the other medical group (PO6) was implementing standalone e-prescribing as a bridging technology prior to future implementation of a full-function EHR.

In the first of these two provider organizations (PO5), IT support staff were leading an EHR roll-out effort throughout the medical group and the office that we visited was an initial site for these efforts. For this office, we introduced the toolset directly to the IT support staff, rather than working directly with the members of the office, in a manner analogous to our work with the REC. We conducted an introduction and a follow-up teleconference to review the toolset with the lead support staff member prior to the start of EHR implementation for the participating site.

During the observation period, the practice was still using both paper and electronic health records and was in a transitional stage, scanning paper records and checking electronic records against existing paper records. Neither the prescriber nor clinical support staff observed during the site visit appeared comfortable with the e-prescribing software and often struggled with functions discussed in the toolset (e.g., handling renewal requests, maintaining medication lists, adding new pharmacies to the lists of those to which prescriptions can be sent, incorrect dosing requiring pharmacy call-backs, saving favorite prescriptions, and stepped prescriptions).

When the head of the IT support group was asked about the toolset he reported that he read it through but did not use it because “we were already doing everything it said.” However, the ongoing struggles of staff and clinicians to use the software efficiently for prescribing gave evidence that they had not, in fact, used the planning, goal setting, training, or work process redesign tools in the toolset.

In the second site using this implementation approach (PO6) we found a similar lack of use of the toolset. Users of the standalone e-prescribing system being adopted in this site reported little training prior to implementation and exhibited varying levels of familiarity with basic functions discussed in the toolset such as designating a favorite pharmacy for specific patients or looking up pharmacies to submit electronic prescriptions. The approach to work process redesign used in the practice was to focus not on implementing e-prescribing in ways that would support clinicians in their prescribing decisions but in ways that would ensure that the flow of patients through the practice was not disrupted. Thus, prescribers continued to handwrite prescriptions on paper forms that were then given to medical assistants for entry into the e-prescribing system and submission to the pharmacy. This prescribing work process required that medical assistants be assigned to specific prescribers and that they each dedicate 1 hour per day to submitting new prescriptions and handling renewals. The implementation followed in this site thus eliminated the possibility of meeting two of the key goals for e-prescribing, as described in the toolset, of eliminating handwriting-related prescribing errors and increasing the convenience of prescribing for patients (as, in using the process the site had implemented, patients now have to wait as long as 24 hours to get their new prescriptions submitted).

5.3 Pre-Post Comparison of Prescribing Workflow with E-Prescribing Implementation at Provider Sites

As previously discussed, workflow observations before and after e-prescribing implementation were completed at the two sites where e-prescribing was being initially implemented without previous use of an EHR. A time and motion study was conducted at site 6 and baseline analysis of these data is presented below. At one site we observed both pre and post implementation, at a second site we observed pre implementation and their implementation plans but only some initial implementation had occurred at the time of this report, and a third site did not permit us to conduct observations.

Practice 5 Workflow Case Study

The site was visited before and after implementing e-prescribing. Prior to implementation, we found that considerable space and labor were taken up in storage and processing of paper records. It appeared likely that e-prescribing, along with implementing electronic health records,

would make a significant impact on the clinic’s workflow. After implementation the clinic was visited again and most of the expected changes took place. The expectation, as at other pilot sites, was that e-prescribing implementation would work well and provide operational improvements such as space and labor savings.

The clinic was located in an office building and included four exam rooms, offices for the doctors, a common area with desks, tables, a fax machine, and files along with a reception area. Generally just one or two doctors had scheduled patients each day. One doctor worked full time at this clinic and other physicians worked part time with varying schedules throughout the week.

Prior to Implementation. Observations and interviews were conducted in December 2010 prior to the implementation. An implementation specialist was interviewed who works for the corporate owner of the clinic, and is responsible for implementing an EHR that also includes an electronic prescription capability. The corporate owner was responsible for the selection, training, and implementation of the system and, therefore, the site had limited knowledge about e-prescribing prior to the system’s implementation because training did not begin until the implementation started. The site determined that the corporate owner’s information system specialist would be the user of the toolset. The office manager, physicians, and several staff were also interviewed both before and after the transition.

None of the staff worked exclusively on prescriptions. Prescription related tasks at the clinic depended on the type of prescription request (new or refills approval). The only large, single block of time related solely to prescriptions was returning the medical record folders to filing cabinets once a week. During the week the folders had been taken from filing cabinets for a patient visit or prescription related request and had to be put in a doctor’s office prior to the patient visit. After the visit the medical record folders were piled on various tables until the end of the week for re-filing.

Table 10. Task sequence for paper prescribing in Practice 5

New prescriptions	Refills approval requests
<ol style="list-style-type: none"> 1. Medical record pulled for provider * 2. Patient with provider * 3. Provider writes prescription 4. Provider and patient walk out of exam room with paper prescription 5. Medical assistant takes prescription from patient or provider and makes copy (or takes carbon if there is one) † 6. medical assistant puts copy in medical record † 7. Patient takes prescription from medical assistant, sometimes receptionist handles this, and goes to pharmacy † 8. Medical record stored on table* 9. Medical record put in filing shelf * 	<ol style="list-style-type: none"> 1. Fax received from pharmacy requesting refill approval, see Figure 1. † 2. Faxes pulled from fax machine and sorted by doctor † 3. Pull medical records for patient † 4. Put medical record and faxed request in provider’s office in the in-box, see Figure 2 † 5. Provider reviews and fills out approval on request form, signs. In some cases medical assistant does approval and provider not involved 6. Medical assistant picks up refill and medical re#ords from provider desk † 7. Medical assistant faxes request to pharmacy † 8. Confirmation back from pharmacy picked up (these are discarded unless a problem or a very high priority) † 9. Medical assistant puts request in medical record 10. Return medical record to desk and later (often as a batch on Friday) to shelf †

* These tasks would take place even if a prescription were not required. Sometimes an EHR system is implemented at the same time as electronic prescribing which further eliminates such tasks.

† These tasks may be eliminated or reduced with e-prescribing.

Table 11. Exceptions or issues related to prescribing

Exceptions and special cases
1. Doctor changes medication but issues remain that require phone calls and fax transmissions between the doctor's office, pharmacy, and patient to resolve the change request
2. Doctor denies refill approval, which results in phone calls and/or visits from patients approximately for more than 50 percent of denied refill requests
3. Patient requests a different medication than the one prescribed, subsequent to the appointment, requiring multiple phone calls or fax messages to resolve the request
4. Office staff answers phone calls from patients and pharmacies requesting information regarding the status of a prescription [†]

[†] These tasks may be eliminated or reduced with e-prescribing.

Figure 1. Provider office



The corporation which owns the clinic was implementing the EHR/e-prescribing system with approximately 800 doctors. When they implement the new system they plan to scan medical records for each patient who visits at the time of the visit. Thus the transition to digital records will be gradual. This clinic has about 10,000 medical records, of which only approximately 3,000 records are active. The implementation was planned for January 2011, but did not occur until May 2011. Doctors were to be given a \$10,000 incentive for using their e-prescribing system. The corporate office expected a reduction of 40 percent of current paper costs and savings in floor space, which was limited at this particular site.

Postimplementation. The same clinic was visited after the EHR transition, in June 2011. The corporate specialist who implemented e-prescribing reported that the toolset material seemed accurate to him and that the staff were pleased with the system and said it was not particularly difficult to learn. It was unclear to what extent the specialist relied upon the material in the toolset, but responses from others interviewed at the site indicated that extensive work process planning as advocated in the toolset was not done prior to implementation. In fact, members of the practice indicated that they did not expect the staffing or role changes that did occur in the course of the implementation.

The practice closed for only one day for the implementation, and then returned to normal operations. The clinic implemented e-prescribing at the same time it implemented a complete EHR system for the office. This changed more than the prescription workflow, since other functions were also made paperless. In terms of prescriptions, the doctor's inbox (Figure 5.1), previously full of papers became merely a window on their computer screen with reminder

messages requiring a response. Thus, the doctor's office became much less cluttered. The overall office workspace also became much less full of paper. Desks piled high with folders no longer occurred. However, the total space rented for the clinic remained the same. Based on post implementation observation, much less paper is being used postimplementation compared with prior to implementation and eventually the file cabinets shown in Figure 5.2 may become unnecessary.

Figure 2. Fax machine and medical record filing shelves



The main problem experienced was the scanning required to convert past records to digital ones. The amount of work required to scan paper medical records into digital format was underestimated and, because of the amount of work required, the office experienced delays in implementing the EHR and e-prescribing system.

The number of clerical staffing actually grew once e-prescribing was implemented, primarily for scanning records, although that effect was expected to be temporary (several months), with decreases over time as more records are scanned in to the system.

The role of the doctor and nurse seemed to change a bit since the office could more easily exclude the doctor from the routine renewal order process. The office manager felt that the implementation of e-prescribing, and also EHR, would have no effect on their total staffing.

The physicians liked the EHR system overall. They commented that it became easier to find information than from the prior paper record system; and that patient records became more “informative”. However, with e-prescribing prescriptions took more time for the physician since they had to do some tasks such as entering the order to the pharmacy, which were previously handled by the staff. They found it easy to learn, though some doctors struggled more with the learning than others during the transition.

Practice 6 Pre-Implementation Time and Motion Analysis

This office was visited prior to implementation of e-prescribing. It was a part of a larger outpatient complex of an academic medical center. The office has 12 attending physicians for a various number of appointment sessions during each week, 5 fulltime nurses, 5 receptionists, 1 health information management staff for organizing medical records, and approximately 12 residents. The office is located in an urban area in a large medical office building. It has multiple exam rooms on two sides of a hallway, offices for the doctors, and reception area for waiting and

patient registration staff. An administrative office area is used for processing of paperwork, faxing, and filing.

At this site, paper documents were stored in a separate storage room and prescription records were tracked using a Web-based computer billing system that also stores the appointment schedule. The prescription related administrative procedures followed in this office were similar for other offices in their system.

Prior to implementation. The project team observed and interviewed study staff in 2011 prior to e-prescribing implementation. A manager who supervised the existing workflow of the office and who was responsible for the office’s transition to e-prescribing was interviewed for the study. The e-prescribing system to be implemented was being used at other offices in the medical center’s system.

The prescription handling workflow at the office is shown in Table 13. According to the staff interviewed, on average, this office received approximately 50 renewal orders per day by fax and phone, mostly by fax, and 5 to 10 new prescriptions per day. None of the staff worked exclusively on prescriptions. At this site, doctors wrote orders for new prescriptions in the exam room and gave it to patients. Staff received copies of new prescriptions. However there was no system to assure this always occurred and thus no reliable records of new prescriptions were maintained in patient medical records or in the computer system. When patients or pharmacies requested renewals for the first time, the nurses often had to consult the prescribing doctor or asked the pharmacy to send a copy of the original prescription. The site’s staff expected that e-prescribing would improve record keeping and, in turn, improve medication safety and the renewal process.

Table 12. Task sequence for paper prescribing in Practice 6

New prescriptions	Refills approval requests
1. Medical record pulled for provider *	1. Fax received from pharmacy requesting refill approval, or emails from the call center showing patient call for refill approval. †
2. Provider talks with and/or examines patient *	2. Faxes pulled from fax machine and bundled on self waiting for processing †
3. Provider writes prescription	3. Nurse separates refill request faxes from shelf or checks emails and reviews requests and sorts out duplicates†
4. Provider and patient walk out of exam room with paper prescription	4. Nurses check patient information in the computer system or medical records, such as last visit day and prescription records †
5. Nurse takes prescription from patient or provider and makes copy to keep a record (or takes carbon if there is one) ††	5. Nurses check the requests against medication protocol for approval†
6. Nurse enters prescription into the computer system ††	6. If requires physician approval, put medical record and faxed request in provider’s office †
7. Nurse puts copy in medical record ††	7. provider reviews and fills out approval on request form, signs
8. Patient takes prescription from nurse, and goes to pharmacy ††	8. Nurse picks up refill and medical records from provider desk †
9. Medical record put in filing shelf *	9. Nurse faxes approved prescriptions to pharmacy or call pharmacy to authorize prescriptions †
	10. Confirmation back from pharmacy picked up (these are discarded unless a problem or a very high priority) †
	11. Input prescription notes in the computer system
	12. Return medical record to filing shelf and later (often as a batch) back to medical record room †

* These tasks would take place even if a prescription were not required. Sometimes an EHR system is implemented at the same time as electronic prescribing which further eliminates such tasks.

† These tasks may be eliminated or reduced with e-prescribing.

‡ These tasks were optional in this office and often did not take place.

The site received refill requests as faxes or phone calls from pharmacies or, if patients called for approval, the request was routed through a call center that served multiple offices in the outpatient complex. Four staff members work part-time handling these requests. The manager reported spending approximately 20 percent of her time on prescription-related work. The prescription-related work is particularly busy on Mondays and Fridays in comparison to the rest of the week. Some of the workflow prior to implementation was managed by email among the staff at the office and the call center. Typically, one clinical support staff person would be assigned to handle renewals for the entire office for a week and this assignment would rotate among staffers (four plus the manager). A protocol had been developed for clinical support staff to approve renewal requests that met certain criteria.

During the time and motion study, we observed 111 renewal prescriptions being handled. Our observations took place on five separate days spread over four calendar weeks to ensure a mix of days of the week and times of the month for the workflow. On average, each renewal took about 5.074 minutes to complete. We also observed 15 incidents of time-consuming or frustrating processes related to renewal approval prior to e-prescribing implementation, shown in Table 13. These were instances in which the existing workflow required the completion of difficult or added steps in order to accomplish what staff members reported could be accomplished in fewer steps. Follow up observations were not conducted in this site.

Table 13. Time-consuming or frustrating incidents related to prescribing observed in Practice 6

Prescribing/renewal related time-consuming/frustrating incidences	Roles involved	Time (minutes)	Likely effect from transition to e-prescribing
Patient's caregiver called to clarify dosage on prescription. Nurse had to speak with doctor to confirm	Nurse - Provider	18	Unaffected
Prior authorization (PA) form required due to insurance not covering medicine prescribed by provider	Nurse - Provider	80	Reduced if e-prescribing system can suggest substitutes not needing PA
Duplicate prescription - nurse did not find out until called pharmacy	Nurse	15	Eliminated
Call patient to confirm prescription authorization	Nurse	4	Reduced if e-prescribing system can suggest substitutes not needing PA
Pharmacy fax number missing in email from doctor - had to call patient to find out the number	Nurse	3	Eliminated
Call to verify dosage on prescription (2 different ones from 2 different doctors)	Nurse - provider	10	Eliminated
Pharmacy fax number missing in email from prescriber - had to call patient to find out the number	Nurse	3	Eliminated
Duplicate of prescription - email from doctor received and processed but when called in a fax had been sent already (no notes in system)	Nurse	8	Eliminated
Prescription ready to be called in but pharmacy was closed until 9 am	Nurse	20	Eliminated
On hold with pharmacy for prescription authorization	Nurse	20	Reduced
Received prescription but patient was not a regular patient of the practice	Nurse	5	Reduced
Duplicate prescription	Nurse	5	Eliminated
Repeat fax that did not go through	Nurse	3	Eliminated
Clarification of dosage with pharmacy and provider	Nurse - provider	15	Reduced
Fax number on email was wrong so nurse had to call patient to get the right number	Nurse	15	Reduced

5.4 Pharmacy Pilot Testing Results

Similar to our findings in physician offices, pharmacy staff members also struggled with use of the toolset. Lead pharmacists found it difficult to make time during their busy workdays to examine the document. This difficulty often led to the postponement of site visits, which were initially intended to examine the effect of toolset use on work practices during implementation. It became apparent that an adjustment in our research design was necessary. Rather than focusing primarily on work process outcomes that changed during e-prescribing implementation, we focused instead on feedback on the toolset and the usefulness of the provided tools.

Of the three sites selected for pilot testing, one was considering initiating e-prescribing and two had recently implemented e-prescribing. The two sites that had implemented e-prescribing relied on vendor training for support during the implementation process. The pharmacist at the site that had not yet implemented e-prescribing reported that the toolset description of how e-prescribing works was superior to descriptions provided by vendors.

In each of the three pharmacies that were selected to pilot test the toolset, the lead pharmacist reviewed the toolset and gave feedback to the research staff on the usefulness of the tools included in the toolset and the toolset document itself. One common theme that emerged from these discussions was a desire for the toolset to be more easily navigable. With limited time, pharmacy staff wanted to be able to quickly locate the information relevant to a particular issue, rather than using the document as a manual to be read from start to finish. Suggestions included making the toolset available electronically, using electronic “tabs” and indexing key terms. Based on this feedback from the first two sites where we conducted orientation, we developed a “quick start” guide intended to help pharmacies to classify their stage of development and then to select the most appropriate tools for their situation. However, when we used the quick start guide with the remaining pharmacy, our impression was that they classified themselves as being more advanced than they were in fact, potentially leading them to skip over important tools.

Other feedback received during pilot site visits focused on the need to refine the tools and toolset. At the pharmacy site that had not yet implemented e-prescribing, the pharmacist made use of the return on investment (ROI) calculator, one of the tools intended to assist pharmacies making a decision about whether or not to implement electronic prescribing. When using the ROI calculator the pharmacist pointed out the need to add a set-up fee and monthly charge to the calculator and to allow users to input more location-specific wages.

Pharmacy site 3 examined the tools and indicated that the tools would be helpful to pharmacies undergoing the implementation process. Though this pharmacy had implemented e-prescribing a few months earlier, they still found it useful to display the patient flyers in their pharmacy.

Across all pharmacy pilot sites, a common concern was simultaneously making use of the efficiencies of e-prescribing while meeting the auditing requirements for companies that provide pharmacy benefits.

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Chapter 6. Discussion

Among the physician offices that participated in pilot testing, those that had recently adopted e-prescribing each achieved a level of success that they considered acceptable, at least at 1 month after implementation. Each of them used at least one tool from the toolset, and they typically expressed satisfaction with these tools. The patient flyer tool and the prescription pad handout from the troubleshooting chapter were the most popular overall. The goal-setting poster was also appreciated and used by one practice. However, the majority of individual tools were not used among the practices we observed.

Overall, the use of the toolsets was considerably less extensive than anticipated. One reason for this was the difficulty of identifying practices at an appropriately early stage of planning for e-prescribing but with sufficient commitment to move forward to warrant enrollment in the site-visit protocol. In the end, the practices that could commit to moving forward had typically already selected a particular e-prescribing product and in many cases had already adopted an implementation plan, either from their vendor or their support organization. Therefore, these practices did not feel they needed the implementation-related content in the toolset.

Our strategy of facilitating toolset use via personnel from outside support organizations—essentially a train-the-trainer approach—did not appear to produce increased use of the toolset. The procedures followed by IT staff and support organizations in conducting implementation didn't appear to take advantage of behavior change theory. Behavior change requires reducing environmental constraints that are obstacles to the desired behavior. It also requires that adult learners, such as physicians and staff members, develop skills that are reinforced and maintained. However, our findings suggest that the implementation processes used by support personnel had weak effects, at best, on providers' knowledge and skills. One potential reason for this weak effect may be that frequency of visits from the support personnel, and their power to effect change in the practice were probably too limited for them to have a substantial impact. Analogously, interactions of the study staff with the trainers may also have been too infrequent and over too short of a time period for them to develop enough expertise with the toolset content. It should be noted, however, that it was as challenging to schedule time with these staff as it was with physicians participating in the study.

Since the toolset specifically recommended work process redesign, future revisions of the toolset should focus attention on providing more explicit guidance on how to approach this.

6.1 Toolset Complexity as a Barrier

Many sites expressed that an obstacle to use of both toolsets was the daunting overall volume of information in each toolset and the challenge of locating resources within the toolset that were of greatest use and interest to them. Some asked for a guide to help them select and focus on the most appropriate material, or otherwise to make it clearer what material was intended for larger as opposed to smaller organizations or for EHR vs. standalone e-prescribing adopters. In response to this feedback from an early pharmacy pilot tester, we developed a 1-page quick start guide for the pharmacy toolset but the pharmacy that then pilot-tested this guide classified themselves as being more advanced than the study team thought appropriate, and thus they were not directed to the more basic resources that the team expected that they would need the most.

Our conclusion was that the quick-start guide is probably not yet a reliable diagnostic instrument and that it should only be used as one possible introductory mechanism. The toolset now indicates that pharmacies should address with their vendor the issue of tailoring implementation resources and training early in the implementation process.

6.2 Implications for E-Prescribing Adoption Efforts

The adoption and uptake of e-prescribing will likely remain a substantial challenge in the coming years. Our findings suggest that an effective approach to assisting with this challenge may require a larger up-front investment of time and intensity of training to achieve success. This applies both to the activities of support staff in training and working with members of practices and to the activities of trainers themselves in learning to use the toolsets.

Alternative media might also be explored as mechanisms for delivering the toolsets and included tools. Video material might hold people's attention better, though it could be expensive to produce. Interactive Web materials that include a built-in practice assessment might assist with tailoring content to individual practices. However, if the assessment isn't perfectly accurate practices could be misclassified and be directed to the wrong materials. Furthermore, being directed to a highly tailored set of materials risks practices missing the big picture. Finally, a short version of the toolsets with links to more detailed information contained in the current versions could aid in navigating the material. A solution linking such a bullet-point level presentation to more detailed information and specific tools might be quickly assembled from the existing material.

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Appendix A: In-depth Interview Guides

A.1 Physician Office Pilot Site Visit Interview Guide

Verb tenses in the questions will need to be adjusted depending on whether the practice is planning for a particular phase, is currently involved in that phase, or has already completed the phase. The interviewer will focus in particular on the implementation phases that the site has engaged in since receiving the toolset, with additional exploration of other phases that are relevant for the site.

For any responses that do not correspond to the toolset – for example, if they say that they haven’t communicated their plans to adopt eRx to payers, prescribers, etc., the interviewer can ask something like:

The toolset recommends X. Is there a reason that you haven’t done X?
How can the toolset be changed to improve X?

For any specific problems or successes in the process, the interviewer can use the critical incidents technique. This involves asking about:

- (a) the situation—what led up to the event;
- (b) the event itself – what happened, who was involved, what did they do, etc.
- (c) the consequences

Topic	Topic, Chapter and/or Theory Assessed	Question
Toolset	Use of the toolset, Ch. 1	Who is involved in making a decision about whether to adopt e-prescribing? How did you determine whom to include in this group? Did you use the team roster (Appendix 1) to decide who to include in this group?
Motivating factors	Motivating factors : IMPACT model; Ch. 2,3	<ul style="list-style-type: none"> - Why are you thinking about adopting e-prescribing? (Probe: Were financial incentives part of the reason? Was having more reliable prescribing a reason? (Were there outside motivators such as incentives; internal motivators such as greater reliability in prescribing.) - What resources, if any, have you used in the decisionmaking process? Where did you find out about these resources? Did you read or use the Background chapter of the toolset? <ul style="list-style-type: none"> o (Probe: Did you talk to people from other practices that use e-prescribing o Did you look at Websites about HIPAA privacy and security (links in Ch. 2) o Did you look at links about incentives for e-prescribing (Ch. 2) o Did you look at the ONC Web site (Ch. 2) o Did you contact a regional extension center (Ch. 2) o A consultant o Other

Topic	Topic, Chapter and/or Theory Assessed	Question
Experience and expertise	Experience and expertise: IMPACT	<ul style="list-style-type: none"> - Can you tell me about prior experiences your practice has in implementing large organizational changes? - Have members of your practice collaborated on special projects in the past? How did it go?
Goal setting	Goal setting: Ch. 3	<ul style="list-style-type: none"> - Have you set goals for what you hope to accomplish by implementing e-prescribing? If so, what are they? - Who was involved in setting goals? - Did you use the goals worksheet? - If yes, how helpful was it? How could it be improved? - Did you use the goals poster? - If yes, how helpful was it? How could it be improved? - If no, why not? How did you communicate the goals to the practice?
Readiness	Readiness: Ch 4	<ul style="list-style-type: none"> - Have you taken any steps to determine if the practice is ready, and if so, how? - Did you use the readiness assessment in Ch. 4? - If yes, how did you use it? (Who was involved, how did you collect answers, did you modify the questions for your practice, etc.) - How helpful was it? - How could it be improved?
Social Influence a)	Social Influence: Ch. 3, UTAUT	Do you have someone in your practice who you consider the 'champion' for e-prescribing? By champion, I mean someone who negotiates consensus among stakeholders and maintain communication and enthusiasm among providers. What is he/she doing to champion e-prescribing?
Social Influence b)	Social Influence: Ch. 2, UTAUT	What does other staff think about the idea of implementing e-prescribing? (If there is apprehension): What is being done to address staff concerns? Who is/was involved?
Perceived gains	Perceived gains: Ch. 3, UTAUT	How do you expect e-prescribing to affect: <ul style="list-style-type: none"> - Your job? - Patients? (Probe negative expectations for how they plan to deal with them.)
Ease of use	Ease of use: UTAUT	How easy or difficult do you think it will be to use the e-prescribing system?
Other facilitating factors	Other facilitating factors: UTAUT	(Not sure these apply to the deliberation or planning stages – more appropriate for implementation)
Selecting a System	Ch. 6	Has your practice selected a system or started the selection process? <ul style="list-style-type: none"> - How are you/did you go about selecting one? - Are you looking/did you look at more than one vendor, and if so, how did you compare them? - Did you use the vendor assessment tool? If yes, how helpful was it? How could it be improved? - What criteria did you consider/are you considering? - Who was/is involved in the decision?
Implementation	Ch. 7	<ul style="list-style-type: none"> - Who is involved in planning the implementation? - What are their roles?
Implementation	Ch. 7	<ul style="list-style-type: none"> - Do you have a timeline for the implementation? - How was your launch date determined? Who was involved? - How was the timeline communicated to the staff? - Do you feel like it's the right amount of time/are you on track?

Topic	Topic, Chapter and/or Theory Assessed	Question
Implementation	Ch. 7	<ul style="list-style-type: none"> - What kinds of devices will staff use to access the system (e.g., PDAs, desktop computers, laptop computers, tablet computers). <ul style="list-style-type: none"> o How did you make this decision? - Does the practice need to acquire any hardware, wireless or wired Internet connections/upgrades, or additional software (aside from the e-prescribing system itself) in order to implement the system? <ul style="list-style-type: none"> o What is needed? o How was this determined?
Implementation	Ch. 7	<p>Have you communicated your plans to implement e-prescribing to anyone, such as patients, pharmacies, health plans, pharmacy benefit managers (PBMs), or Surescripts?</p> <ul style="list-style-type: none"> - How did you communicate the information? Did you use the letter templates in the toolset?
Setting up the system	Ch. 8	<ul style="list-style-type: none"> - Who will have access rights to the system? How was this determined? - Where will users access the system?
Setting up the system	Ch. 8	<p>What process are you using to link the e-prescribing with your practice management system/populate the system with patient information?</p>
Setting up the system	Ch. 8	<ul style="list-style-type: none"> - Have you set up any favorites lists (e.g., pharmacies, prescriptions) or other kinds of templates? Who has set these up? How many items are on each favorites list? - Do you have a prescription renewal protocol?
Setting up the system	Ch. 8	<p>What is your plan to test the system?</p>
Training	Ch. 9/4	<p>Do all staff members have basic computer skills? How did you determine this? Did you use the computer skills assessment tool?</p>
Training	Ch 9	<p>Describe how you will train staff to use the system:</p> <ul style="list-style-type: none"> - Topics: <ul style="list-style-type: none"> o Use of the e-prescribing system (usually provided by the vendor) including how to use formulary and medication history information; o generic medication names (for ease of searching); o orientation to new workflow; o education about the value of the technology to the practice. - Who will be trained? - When and where? For how long? - Are there computers available for staff to practice using the system? - [Are there] Plans for refresher training and remedial training?
Training	Ch 9	<p>Do you have one or more super users? By super users, I mean a resident expert in your organization who others can turn to for help in using the system. What are their roles?</p>
Training	Ch 9	<ul style="list-style-type: none"> - Do you have protocols for: <ul style="list-style-type: none"> o prescriptions that will still be hand signed o handling decision-support messages (such as drug-drug interactions, allergies, prior authorization and medication costs) o handling mail order pharmacies including "split scripts," which are needed when a patient will need a small (1-2 week) supply of a medication while awaiting mail order delivery o Documentation of the use of medication samples o (prescription renewals protocol was discussed in Ch. 8). - How are users being trained on these protocols?

Topic	Topic, Chapter and/or Theory Assessed	Question
Launch	Launch: Ch. 10	(questions about setting launch date and communicating the launch are in Ch. 7 above)
Launch	Launch: Ch. 10	<ul style="list-style-type: none"> - How are you communicating the launch date to pharmacies and to patients? - Did you use: <ul style="list-style-type: none"> o the sample flyer o the prescription-sized handout o letters? o an outgoing voicemail message o posters o other?
Launch	Launch: Ch. 10	- Are you reducing any staff schedules during the launch? If so, for whom, and how much/long?
Launch	Launch: Ch. 10	Are you planning to have any extra help on launch day, e.g., a representative from the vendor, a user from another practice who already knows the system?
Launch	Launch: Ch. 10	Which of the following procedures will be emphasized? How? <ul style="list-style-type: none"> - Submitting prescriptions during each patient's visit; don't "batch" submissions to complete later in the day - Bundling multiple prescriptions for a single patient - Processing renewal requests in a timely manner - Enabling decision support tools, such as alerts and error-checking - Limiting e-prescribing to prescribers, and monitoring activity reports regularly
Monitoring and Remediating Shortfalls	Monitoring and Remediating: Ch. 11	How are you monitoring outcomes or effects of the systems? Have you compared results to your original goals? How well do they match up?
Monitoring and Remediating Shortfalls	Monitoring and Remediating: Ch. 10/11	For offices that have already implemented: <ul style="list-style-type: none"> - What kinds of problems have you encountered in your implementation or use of the e-prescribing system? - How have you diagnosed the problems? Have you used any analytical tools (e.g., fishbone diagrams)? - Who is involved in diagnosing and remediating problems? - How have you addressed these problems? - Probes from Ch. 10 of toolset: <ul style="list-style-type: none"> o Pharmacies reported missing prescriptions o Inefficient workflows o Lost Internet access o Prescriptions written off-system

A.2 Pharmacy Pilot Site Interview Guide

Verb tenses in the questions will need to be adjusted depending on whether the practice is planning for a particular phase, is currently involved in that phase, or has already completed the phase. The interviewer will focus in particular on the implementation phases that the site has engaged in since receiving the toolset, with additional exploration of other phases that are relevant for the site.

For any responses that do not correspond to the toolset—for example, if they say that they haven't communicated their plans to adopt eRx to payers, prescribers, etc., the interviewer can ask something like:

The toolset recommends X. Is there a reason that you haven't done X?

How can the toolset be changed to improve X?

For any specific problems or successes in the process, the interviewer can use the critical incidents technique. This involves asking about:

- (a) the situation—what led up to the event;
- (b) the event itself – what happened, who was involved, what did they do, etc.
- (c) the consequences

Stage & Topic	Chapter	Question
General questions		<ul style="list-style-type: none"> - Tell me about how your e-prescribing implementation is going. Where in the process is your pharmacy right now? - How do you expect e-prescribing to affect: <ul style="list-style-type: none"> o Your job? o Workflow in the pharmacy? o Patients? (Probe negative expectations for how they plan to deal with them.) - How easy or difficult do you think it will be to use the e-prescribing system? - Which toolset chapters did you read or use? - What was helpful? - What was not helpful?
Use of the toolset	Ch. 1	<ul style="list-style-type: none"> - Which arguments for adopting e- prescribing were convincing? Why? - Which arguments for adopting e- prescribing were not convincing? Why not? - Do you think that there are reasons for adopting e-prescribing that were not covered in the toolset? - Who was involved in making a decision about whether or not to adopt e-prescribing?
What you need to know about e-prescribing	Ch. 2	<ul style="list-style-type: none"> - Did the toolset help you to understand the steps involved before an electronic prescription arrives at your pharmacy? - What parts of this process could be better explained? - Did the toolset help to inform you about the rules and regulations relevant to e-prescribing? <ul style="list-style-type: none"> o HIPAA o Controlled substances - Were you able to find any financial incentives or local support organizations that applied to your pharmacy? - Did you talk to people from other pharmacies that use e-prescribing? If so, were they able to give you any helpful advice? Any advice that we should include in the toolset?

Stage & Topic	Chapter	Question
Readiness	Ch. 3	<ul style="list-style-type: none"> - What steps, if any, have you taken to determine if the pharmacy is ready for e-prescribing (e.g., determined whether software vendor supports e-prescribing; determined cost of implementation)? Was the chapter helpful in determining the steps you needed to take? - Have you determined if your pharmacy management system requires a software update in order to implement e-prescribing? - Have you determined what training is available from your software vendor? - Describe how you will train staff to use the system: <ul style="list-style-type: none"> o Who will be trained? o When and where? For how long? - Are you planning to have any extra help on launch day, e.g., an additional pharmacy tech? - Describe any advance coordination you've done with prescribers. - Did you find any of the tools provided for communicating with prescribers useful? What revisions would you recommend for these tools? <ul style="list-style-type: none"> o Coming soon letter? o Launch letter? - How did you communicate your new capabilities to patients? - Did you use the patient flyer from the toolset? What revisions would you recommend for it? - Was the description of potential issues with electronic renewals helpful or unhelpful? Please describe. - Was the description of potential issues with new e-prescribers helpful or unhelpful? Please describe.
Workflow	Ch. 4	<ul style="list-style-type: none"> - Did this chapter help you to understand how workflow analysis could help your pharmacy be more efficient? What revisions would you recommend for this chapter? - Did you sketch out the current workflow and/or potential new workflow? - Was the description of "best practices with e-prescribing" helpful or unhelpful? Please describe.
Costs and Benefits	Ch. 5	<ul style="list-style-type: none"> - Did you find the description of costs and benefits convincing? - Did you use the spreadsheet to calculate savings from e-prescribing? <ul style="list-style-type: none"> o If no, why not? o If yes, how was the worksheet helpful/not helpful? - Do you have any suggestions for making this tool easier to use?

Stage & Topic	Chapter	Question
Troubleshooting	Ch. 6	<p><i>For pharmacies that have already implemented:</i></p> <ul style="list-style-type: none"> - What kinds of problems have you encountered in your implementation or use of the e-prescribing system? - Probe for: <ul style="list-style-type: none"> o Errors in e-prescriptions o System goes down o "Lost" e-prescriptions o Difficulty tracking renewal requests o e-prescription is unclear o Staff difficulty processing e-prescriptions - How have you addressed these problems? - Was the toolset helpful in identifying ways to deal with these issues? - Anything we should add? <p><i>For pharmacies that have not yet implemented:</i></p> <ul style="list-style-type: none"> - Have you read through the troubleshooting chapter? - Have you discussed potential trouble spots with pharmacy staff?
Future Directions	Ch. 7	<ul style="list-style-type: none"> - What was helpful about this chapter? - What was not helpful? - Does your pharmacy currently have plans to implement any clinical services including medication therapy management or routine immunization services? - Do you think that time savings from e-prescribing will allow you to further extend your services?
General questions		Do you have specific recommendations on how we can improve the toolset?