

# Interoperable Electronic Prescribing In The United States: A Progress Report

The adoption of e-prescribing has started to accelerate, but its use is not yet as widespread as policymakers want it to be.

by **Maria A. Friedman, Anthony Schueth, and Douglas S. Bell**

**ABSTRACT:** Although the vast majority of U.S. physicians still handwrite prescriptions, adoption of electronic prescribing is slowly growing. Major barriers to adoption remain, including the inability to electronically submit prescriptions for controlled substances and confusion about standards for data exchange. Federal and state governments and private insurers are using payment and policy incentives to boost e-prescribing because they still believe in its promise for improving the quality and efficiency of health care. However, additional efforts and further investments are needed to reap the benefits of e-prescribing on a national scale. [*Health Affairs* 28, no. 2 (2009): 393–403; 10.1377/hlthaff.28.2.393]

**E**LECTRONIC PRESCRIBING BURST ONTO THE health policy scene in 2003 with passage of the Medicare Prescription Drug, Improvement, and Modernization Act (MMA). MMA created a prescription drug benefit for Medicare beneficiaries (Part D) and required that Part D plans support an “electronic prescription program,” should any of their providers and pharmacies voluntarily choose to prescribe using computer systems. MMA also called for the adoption and testing of specific technical standards for the data exchange transactions that Part D plans would use.<sup>1</sup>

Medicare and other payers are particularly interested in fostering the use of e-prescribing because it could provide information at the point of care to improve the quality and safety of medication use while lowering medication costs.<sup>2</sup> Health plans that have sponsored e-prescribing programs expect an initial return on investment (ROI) simply through increased generic drug use and formulary compliance. For example, the Health Alliance Plan of Michigan estimated a five-year ROI of more than \$14 million, based on the 2005 and 2006 improvement in its generic

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use rate.<sup>3</sup> A new study based on e-prescribing in Massachusetts found that physicians who adopted e-prescribing systems with the ability to check formulary status increased their prescribing of generics and other lower-cost options, resulting in a conservative estimate of savings for consumers and insurers of \$845,000 per 100,000 patients per year.<sup>4</sup> Such savings could be particularly important for Medicare, which spent \$42.2 billion in 2007 for beneficiaries' prescription drugs.<sup>5</sup> Such savings also could become increasingly important for private insurers that are facing decreasing investment earnings and enrollment because of the recent economic crisis.

With the impetus from Medicare, e-prescribing has gained momentum. In many areas of the United States, payers, employers, pharmacies, technology partners, professional associations, state governments, legislators, and other stakeholders are working to spur its adoption through incentive payments; legislation; and funding for software, hardware, and connectivity fees.

Since 2006 we have seen a dramatic rise in volume for key transactions: prescription transmissions, eligibility checks, formulary and benefit information, medication history requests in ambulatory settings, and medication requests for patients in acute care settings (Exhibit 1). The numbers reflect both maturing of the market as well as expanding use by prescribers, which is still primarily occurring among early adopters.

Although these transaction volumes indicate that e-prescribing is working for at least some prescribers, patients, and pharmacists, electronic prescriptions remain a small fraction of the estimated 1.45 billion prescriptions and renewals annually eligible for routing in the United States, despite the numerous ongoing adoption-oriented activities nationwide and the muscle of major health care stakeholders behind e-prescribing.<sup>6</sup> Recent estimates still put e-prescribing adoption at fewer than one in ten physicians.<sup>7</sup> There are also challenges in keeping physicians using electronic systems after they have been installed.<sup>8</sup> In addition, there are disconnects between the pace of standards development and adoption, legislative requirements and implementation (particularly with respect to certain state laws and privacy and security), and evolving business needs.

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**EXHIBIT 1**  
**Growth Of Key E-Prescribing Transactions, 2006–2008**

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Transaction type	2006	2007	2008 (est.)
Ambulatory eligibility checks	38,282,112	58,391,573	86,596,230
Ambulatory medication history requests	3,914,736	6,707,101	15,226,666
Formulary downloads (by point-of-care vendors)	178,657	1,006,480	1,588,746
Acute care medication history requests	873,839	1,764,169	3,193,339
E-prescriptions	13,000,000	35,000,000	100,000,000

**SOURCE:** SureScripts-RxHub, LLC.

In this paper we describe public- and private-sector activities aimed at spurring e-prescribing adoption and improving interoperability. We also discuss reasons for lagging physician usage and trends that will affect future implementation.

## **Paving The Roads: Progress In Adopting Standards**

Developing and updating the technical standards undergirding e-prescribing and other health information technology (IT) systems sounds like an engineering issue, rather than a policy issue. However, these standards are important because they are the key to systems' interoperability and to achieving policy goals.<sup>9</sup> They also create a level playing field among vendors' offerings, so that purchasers can buy with confidence.

As noted previously, MMA prescribed the adoption and testing of specific e-prescribing standards for Medicare Part D. It also called for pilot-testing of standards for which there was not "adequate industry experience." Soon after MMA was passed, the U.S. Department of Health and Human Services (HHS) determined that adequate experience existed for three basic e-prescribing standards, including the SCRIPT standard for transmitting electronic prescription requests between prescribers and pharmacies (Exhibit 2). Following the adoption of these "foundation standards," the Centers for Medicare and Medicaid Services (CMS) and the Agency for Healthcare Research and Quality (AHRQ) arranged for pilot tests during 2006 of several additional standards in settings that included long-term care.<sup>10</sup>

Based on the results of the pilots, the CMS issued a final rule that requires the use of the following three additional standards for Part D e-prescribing, beginning 1 April 2009.<sup>11</sup> (1) Formulary and benefit transaction standard: Use of this standard gives prescribers information about which drugs are covered by a beneficiary's drug benefit plan. (2) Medication history transaction standard: Use of this standard provides prescribers with information about the medications a beneficiary is already taking, including those prescribed by other providers, to help reduce the number of adverse drug events. (3) Fill status notification: This allows prescribers to receive an electronic notice from the pharmacy telling them that a patient's prescription has been picked up, has not been picked up, or has been partially filled. Its use is expected to improve the monitoring of medication adherence in patients with chronic conditions.

The final rule also adopted the National Provider Identifier (NPI) for e-prescribing under Medicare Part D, and it retired National Council for Prescription Drug Programs (NCPDP) SCRIPT 5.0 in favor of the upgraded NCPDP SCRIPT 8.1.<sup>12</sup>

Three other standards were evaluated in the 2006 pilots and were judged not ready for use, so therefore were not adopted: (1) RxNorm drug nomenclature: This standard—developed and maintained by the National Library of Medicine (NLM)—provides standard names for clinical drugs (active ingredient+strength

## EXHIBIT 2 Overview Of Current E-Prescribing Functions And Standards

Function	Standard	Status
Coverage eligibility checks between prescribers and plan sponsors	ANSI ASC X12N 270 (inquiry) and 271 (response) v4010, and Addenda	Mandated in e-prescribing Final Rule, based on adequate industry experience
Prescription drug coverage information	NCPDP Formulary and Benefit Standard, v. 1.0	Mandated in e-prescribing Final Rule, based on results of pilot-testing
New prescriptions and renewal requests to pharmacies	NEWRX and refill request functions of NCPDP SCRIPT, v. 8.1	Mandated in e-prescribing Final Rule, based on adequate industry experience
History of prescriptions filled and covered by current health plan	Medication History function of NCPDP SCRIPT, v. 8.1	Mandated in e-prescribing Final Rule, based on results of pilot-testing
Prescription cancellation and change requests	Cancel and Change functions of NCPDP SCRIPT, v. 8.1	Mandated in e-prescribing Final Rule, based on adequate industry experience
Fill status inquiry for prescriber to determine status of a specific prescription	Fill Status function of NCPDP SCRIPT, v. 8.1	Mandated in e-prescribing Final Rule, based on results of pilot-testing
Exchange prior authorization requirements	ANSI ASC X12N 278 plus HL7 prior authorization attachments	Not mandated in e-prescribing Final Rule, based on results of pilot-testing
Represent identity of drugs that can be prescribed (for use within any of the transactions shown)	RxNorm (updated weekly)	Not mandated in e-prescribing Final Rule, based on results of pilot-testing; updated standard being reevaluated
Represent instructions to the patient	NCPDP Structured and Codified Sig Format, v. 1.0	Not mandated in e-prescribing Final Rule, based on results of pilot-testing; updated standard being reevaluated

**SOURCE:** Authors' analysis.

+dose form). It can serve as a bridge among commercial drug database nomenclatures that are used by dispensers, payers, and e-prescribing software systems. (2) Structured and Codified Sig: This standard provides uniform and codified patient instructions for taking medicines (for example, take one tablet twice a day), the implications of which are vital to patient safety.<sup>13</sup> (3) Transactions for electronic prior authorization (ePA) of medications: This set of standard-based transactions enable more efficient preapproval from health plans for certain medications and justification of those that are viewed as expensive.

Recognizing the continuing need for these three standards, both the government and industry have been continuing to work on them. The NLM has addressed several content gaps that the MMA pilots found in RxNorm. Acting on lessons learned from these pilots, the industry reworked the Structured and Codified Sig standard and also incorporated it into the SCRIPT standard starting with Version 10.4. The CMS has recently funded additional testing of the most recent version of these two standards. Additional work on ePA is also proceeding, with funding from AHRQ.

The results of the e-prescribing pilots, and the CMS's subsequent adoption of certain standards, were a mixed blessing for e-prescribing. On the one hand, the CMS's official adoption of the three standards codified the use in Medicare Part D

of some standards that the industry had been using for years and provided focus and inducement to the refinement of others. More importantly, their required use in Medicare Part D will be critical for driving more-advanced functionality and e-prescribing adoption by payers and vendors that have not yet fully participated in e-prescribing. On the other hand, the fact that three other standards were pilot-tested but not adopted may have created a perception that e-prescribing is generally not mature. Anecdotally, some medical groups have indicated that they would delay support of e-prescribing until the “full suite” of standards had been vetted and required for use by the federal government. Many system vendors also have said that they will not move forward with development unless standards are locked in by the federal government.

■ **Other standards.** The CMS also is moving ahead to adopt updated e-prescribing standards with increased functionality, such as version 10 of NCPDP SCRIPT and version D.0 of the NCPDP Telecommunications Standard for pharmacy claims. These will be important for moving e-prescribing into long-term care settings. Also of future importance to e-prescribing is the use of the *International Classification of Diseases*, Tenth Revision (ICD-10), code set, whose granularity will be important for implementing pay-for-performance (P4P). This more robust diagnosis code set ultimately may facilitate the use of diagnoses on prescriptions, which should assist with prior authorization and improve decision support to identify and prevent medication errors.

■ **Controlled substances.** Stakeholders recently have pushed to address another major adoption barrier: the inability to electronically transmit prescriptions for controlled substances. In response to congressional and industry pressure, the Drug Enforcement Agency (DEA) issued a proposed rule to permit e-prescribing of controlled substances. Stakeholders are waiting for a final rule to be promulgated because it will largely determine whether the burden and costs associated with implementation, as proposed by the DEA, outweigh the benefits. Should the rule prove to be onerous, providers may opt to continue to prescribe controlled substances using the current paper process, since the latter is still likely to be allowed; this may inhibit adoption of e-prescribing. Should the DEA promulgate a rule that is reasonable, many believe that the DEA’s rules will become the de facto requirements for all e-prescribing systems, because users and vendors will not want to have separate software for e-prescribing controlled and noncontrolled substances.

■ **Standards harmonization.** Numerous standards development organizations (SDOs) have responsibility for the development and updating of standards within their technical domains. The overlap and similarities of standards among various SDOs have been a long-standing source of confusion among health IT stakeholders and a barrier to interoperability. To address this issue, the Healthcare Information Technology Standards Panel (HITSP) was created in 2005 with federal seed money. It is now a cooperative, public-private partnership with more than 600 member organizations and has become the established convener for integrating standards and

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bringing them into harmony.<sup>14</sup> HITSP’s sustainability will depend, among other things, on the continuing commitments of hundreds of volunteers. This could be challenging when companies are paring back on employees and may be unable to spare them for extracurricular activities. Indeed, the same resource issues will affect the numerous SDOs involved in creating the technical standards undergirding e-prescribing and health IT systems.

■ **Interoperability certification.** A major obstacle to health IT adoption is confusion about whether health IT systems are sustainable and interoperable. To address this need, the Certification Commission for Health Information Technology (CCHIT) was created in 2004 and subsequently was sponsored with federal and industry funding. It is now an independent, nonprofit organization that is the recognized certification body for electronic health records (EHRs) and their networks. To date, 150 EHR products have been certified (representing about three-quarters of the ambulatory EHR market), and all must have at least minimum e-prescribing functionality. CCHIT will begin certifying ambulatory, stand-alone e-prescribing systems in June 2009.<sup>15</sup> This is viewed as creating a first path toward EHR adoption for e-prescribers, not a dead end to full EHR adoption. In addition, having products certified to the latest standards is becoming a competitive advantage for vendors and adopters.

Moving forward, the trick will be to keep pace with innovation without increasing the complexity and cost of certification. Education and outreach will be important to ensure that adopters understand what these certifications and endorsements really mean. For example, adopters may perceive that certification will ensure that pharmacies can handle their prescription, when in fact it only means that transactions can be sent accurately or that specific functionalities exist within an application. A certification does not necessarily cover or approve data content or how a function is used.

### **Lowering The Tolls: Efforts To Spur E-Prescribing Adoption And Use**

Although e-prescribing adoption has started to accelerate, uptake is not where policymakers want it to be. Furthermore, levels of e-prescribing use have been lower than expected among those who have adopted the technology. One recently published study of 1,200 Massachusetts physicians who had adopted e-prescribing showed that their use increased gradually from 15 percent to 26 percent of prescriptions from April 2004 to March 2005.<sup>16</sup> Similar results were found in the RAND/New Jersey e-prescribing pilot study.<sup>17</sup> These studies demonstrate the challenge that many physicians have in integrating these systems and using them

in their practices.

■ **Medicare's efforts.** The government is using its considerable Medicare policy and payment levers to boost e-prescribing adoption and use. Carrot-and-stick incentives for e-prescribing under Medicare were created under the Medicare Improvements for Patients and Providers Act (MIPPA) of 2008. Under MIPPA's provisions, Medicare will offer incentive payments to eligible physicians who meet an annual threshold of e-prescribing/patient volume. The bonuses will start at 2 percent for two years beginning in 2009 and then will drop to 1 percent in 2011 and 2012 and to 0.5 percent in 2013. Those who do not e-prescribe will have their Medicare reimbursements decreased by 1 percent in 2012, 1.5 percent in 2013, and 2 percent in 2014 and later, although some providers will be exempt. A secondary goal is to boost "true" electronic prescribing by requiring the use of "qualified" e-prescribing systems, which must have a considerable level of functionality and also align with standards required by Medicare Part D.<sup>18</sup>

■ **Private insurers.** Private insurers across the country are also using payment and policy levers to promote e-prescribing. A number are providing incentives of free or reduced software, hardware, and connectivity as well as incentive payments for adoption and use. Taking a different approach, Blue Cross Blue Shield of Massachusetts will require physicians to e-prescribe to qualify for its physician incentive programs beginning in 2011.

■ **State governments.** State governments are also promoting e-prescribing. As of May 2008, fifty-two pieces of legislation related to e-prescribing had been introduced across nine states.<sup>19</sup> Minnesota enacted legislation in 2008 that requires physicians who are contracting with state employee health plans' medical networks to use e-prescribing by 2011. The National Governors Association is taking steps to promote e-prescribing in the states.<sup>20</sup>

## Bringing Standardization Up To Speed

There are more than 100 commercial e-prescribing systems available today, many of which do not have the full set of functionalities required for e-prescribing in Medicare Part D or MIPPA. That number may begin to dwindle for several reasons. E-prescribing is no longer in its infancy, and it is time for the normal shakeout and consolidation that occurs in emerging markets. Evidence that this is beginning to happen is provided by the 2008 merger of SureScripts and RxHub to form a single nationwide network for e-prescriptions and the merger of health information software companies Allscripts and Misys. The goal of near-universal true electronic prescribing by physicians treating Medicare beneficiaries is on the horizon, thanks to the implementation of MMA, MIPPA, and other CMS requirements. These levers will help ensure that e-prescribing offerings are standards-based and interoperable, which will reassure undecided prescribers that they can buy with confidence and not delay implementation any longer.

## Building Momentum: Next Steps For E-Prescribing Policy

Although major progress has been made in creating improved e-prescribing functionality and interoperability, more work needs to be done. The following policy actions are likely to affect the adoption and interoperability of e-prescribing.

■ **Moving beyond incentive payments.** Incentive payments, for either adopting or using e-prescribing, will help get user adoption beyond its current nascent point, but there is evidence that payments alone are not enough. It has been suggested that for every \$5 spent on incentives, \$1 should be spent on education, implementation, and training.<sup>21</sup> Such support could be provided by vendors, consultants (for example, commercial entities or the CMS's Quality Improvement Organizations) or via the Internet. When being paid for training, education, and implementation support, some vendors have been quite effective at helping clients through technology and workflow integration issues, while others have not. There is anecdotal evidence to suggest that spotty implementation assistance is a weak link in e-prescribing sustainability. Examples of successful efforts include those undertaken by the eRx Collaborative in Massachusetts, the Rhode Island Quality Institute, and Horizon Blue Cross/Blue Shield of New Jersey. When such payment is not provided, either a third party has been contracted to help, or results have been mixed. Examples of successful third-party support are the Southeastern Michigan e-Prescribing Initiative (SEMI) and the BlueCross BlueShield of North Carolina initiative. Stakeholders have also attempted to use the Internet to provide needed assistance. In May 2008 the American Academy of Family Physicians, American Academy of Pediatrics, American College of Cardiology, American College of Obstetricians and Gynecologists, and Medical Group Management Association launched a Web site and campaign to help support doctors' move to e-prescribing.

■ **Making a better business case.** The business case for e-prescribing is not clear for providers, who see the benefits for other stakeholders but not for themselves. The ROI must be better quantified for adopters, and better data and metrics are needed. The case for value—as distinct from ROI—must be made. There is evidence that e-prescribing improves patient satisfaction, as well as employee satisfaction once the learning curve is completed.<sup>22</sup> For example, e-prescribing could improve the quality of work life, through eliminating after-hour prescription follow-up for nurses or giving pharmacists more time to consult with patients instead of handling prescription callbacks. Prescriber and pharmacy champions can share their experiences with the benefits of e-prescribing, which can be more convincing than ROI numbers alone. Value also can be created by adding clinical content or links to e-prescribing for data to improve the quality of patient care, such as laboratory tests or results.

■ **Increasing stakeholders' involvement.** Although major progress has been made in the use of e-prescribing, some stakeholders still need to contribute missing

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pieces. For example, independent pharmacies and those in rural areas tend to lack the ability to receive and process e-prescriptions, or if they have the ability, they might not use all features, out of concern over transaction fees. Many also need better broadband connectivity, which the Federal Trade Commission (FTC) is working to address. Incentive programs or grants to small pharmacies may help with infrastructure adoption or upgrades.

Payers also need to make their formularies more readily available for use in e-prescribing, which will assist in physician decision support and reduce costs for both payers and patients by helping prescribers select less costly therapeutically appropriate alternatives for their patients. Prescribing drugs that are covered by insurance will help with medication compliance because patients will not fill prescriptions they cannot afford or will try to stretch their medications to save money.<sup>23</sup> In fact, there is evidence to suggest that one-third of new prescriptions are never filled, but the use of e-prescribing can increase patients’ pickup of new prescriptions by more than 11 percent compared with relying on hand-delivered prescriptions.<sup>24</sup> Medication noncompliance leads to deaths, injuries, avoidable hospitalization, development of complications, and disease progression.<sup>25</sup> E-prescribing also can help prescribers monitor medication compliance for patients with complex chronic illnesses.

State Medicaid agencies are beginning to move toward e-prescribing, which also shows promise for improving the quality of beneficiaries’ care as well as reducing program costs. Down the road, the growing ability to conduct real-time eligibility and benefits checks at pharmacies may reduce expensive “pay and chase” recovery of costs for drugs that were inappropriately billed to Medicaid instead of private insurers. This could result in billion-dollar savings to the federal government and the states.<sup>26</sup> Moreover, states need to address regulatory inconsistencies about electronic transmission of such health information as e-prescriptions and telemedicine across state lines and about licensure of professionals, including pharmacists, who treat patients in multiple jurisdictions.

■ **Privacy and security.** The expanding adoption of health information exchange, including e-prescribing, raises concerns about the safety and privacy of patient information. Indeed, concerns about patients’ privacy and data security have stalled congressional action on some legislation aimed at expanding the use and interoperability of health IT. As noted elsewhere in this issue of *Health Affairs*, policymakers in the public and private sectors are struggling to find the right balance between consumers’ control over their data and the need to use those data in their care.<sup>27</sup> This balance is the subject of numerous federal and state efforts. From a technical perspective, considerable attention continues to be paid to ensuring the au-

thentication of users, the integrity of prescriptions, and the privacy and security of personal health information that passes through the e-prescribing networks. In addition, policymakers are considering whether the privacy and security requirements of the Health Information Portability and Accountability Act (HIPAA) of 1996 and its implementing regulations are adequate as they stand, and whether HIPAA protections should be expanded to apply to other entities in the e-prescribing chain beyond prescribers, payers, and pharmacies. Federal and state laws concerning transmission of information (including medication history) related to such sensitive conditions as HIV/AIDS, mental health, and substance abuse need to be examined and aligned.

■ **Pilot-testing and industry collaboration.** One of the most valuable lessons learned from HIPAA implementation is the need for pilot-testing before standards are adopted. Even small pilots yield valuable results, help create needed metrics, and demonstrate ROI. The e-prescribing industry has been collaborative in pilot-testing e-prescribing implementations and tweaking standards. The expectation is that this will continue, along with federal funding for larger-scale endeavors.

**I**N 2003, POLICYMAKERS VIEWED E-PRESCRIBING as the “low-hanging fruit” among information technologies that could improve the quality and efficiency of health care because it could provide relatively immediate benefits and could be implemented either within EHRs or on its own. In the intervening years, the field has advanced, but uptake still remains slow. As e-prescribing is becoming a reality, it is also becoming clear that many obstacles still need to be cleared for truly interoperable e-prescribing to produce the national-scale effects on prescription drug use that were originally envisioned, and that e-prescribing implemented on its own might not be enough to achieve policy and other goals. Although the road may remain difficult, the promise of e-prescribing has not diminished. Further investments are needed to clear the obstacles. If current trends continue, e-prescribing still represents a step toward reaping the benefits of IT and automated decision support in health care on a national scale.

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#### NOTES

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