Refereed paper

Study of electronic prescribing rates and barriers identified among providers using electronic health records in New York City

Sam Amirfar MD MS
City Medical Specialist
Sheila Anane MPH
Development Project Analyst
Michael Buck PhD
Biomedical Research Scientist
Rachel Cohen PhD
Training Manager
Steve Di Lonardo MSc
Quality Assurance Analyst
Phoenix Maa MBA
EHR Account Manager
Colleen McCullough BA
Program Analyst
Marlena Plagianos MSc
Data Analyst
Claudia Pulgarin MA
Data Analyst
John Taverna MPH
Data Analyst
Jesse Singer DO MPH
Executive Director of Development

Primary Care Information Project, The New York City Department of Health & Mental Hygiene, New York, USA

ABSTRACT

**Background** Increased electronic prescribing (eRx) rates have the potential to prevent errors, increase patient safety, and curtail fraud. US Federal meaningful use guidelines require at least a 40% electronic prescribing rate.

**Objective** We evaluated eRx rates among primary care providers in New York City in order to determine trends as well as identify any obstacles to increased eRx rates required by meaningful use guidelines.

**Methods** The data we analysed included automatic electronic data transmissions from providers enrolled in the Primary Care Information Project (PCIP) from 1 January 2009 to 1 July 2010 and follow-up telephone calls to a subset of these providers to identify potential barriers to increased eRx usage.

**Results** Over the course of the study, these providers increased the eRx rate from 12.9 to 27.5%, with an average rate of 24.1%. Conversations with
Introduciton

Medication errors are one of the primary forms of medical errors in the US.1–3 Because many preventable medication errors occur at the drug ordering stage,4 clinical computer systems have been seen as an opportunity to prevent these errors. In fact, electronic prescribing (eRx) has been shown to reduce medication errors5–7 by as much as ninefold.8 eRx not only ensures that medication orders are legible, but by originating prescriptions from an electronic health record (EHR) system, such orders can also be checked for drug–drug and drug–allergy interactions prior to submission. eRx also increases physician adherence to medication formularies, reducing overall healthcare costs.9,10 The US federal government has accepted that increased eRx is beneficial to providers and patients. In fact, in July 2010, the Center for Medicare and Medicaid Services established the Final Rule for meaningful EHR use, and set as a criterion that providers must transmit 40% of permissible prescriptions electronically. A study of incentivised eRx in Massachusetts found that barely half of providers achieved this level.11

Since 2005, the Primary Care Information Project (PCIP) at the New York City Department of Health & Mental Hygiene has succeeded in helping providers adopt EHRs and is now the largest community based EHR programme in the country.12,13 As part of the vision to improve population health, PCIP has established an electronic network that receives aggregated preventive care measures from 376 practices in medically underserved communities representing approximately 2000 providers who have implemented an EHR through this project. These data are aggregate and Health Insurance Portability and Accountability Act (HIPAA) compliant, containing no patient-level data. This paper describes a brief assessment of the current state of eRx within the PCIP in New York City. The primary goal of this assessment was to determine how providers were currently performing in relation to the meaningful use criteria for eRx set forth in the Final Rule, what factors, if any, were associated with particularly high or low utilisation of eRx, and qualitatively assess provider perceptions about eRx.

Method

Before evaluating the baseline eRx rate in New York City, we needed to determine the rate in other areas of the country such as Massachusetts. After confirming a low rate, we decided to perform a literature review to reiterate the documented benefits of eRx for providers and patients. Once we had documented the advantages in safety, costs and time, we decided to analyse our data in a more longitudinal manner in order to get an idea of whether eRx rates are trending upwards or downwards. We believed that a cross-sectional snapshot at one point in time would be more limiting. A 1-year analysis enabled us to determine whether eRx was, in essence, becoming more popular and whether reaching the meaningful use guidelines of 40% by the end of 2011 is feasible.

PCIP staff are instrumental in offsetting the transition, cost and burden of implementing an EHR through education, training and links to funding sources. PCIP has assisted more than 2000 providers over the past 3 years in adopting an EHR. The providers we
work with are primary care (internal medicine, family medicine, paediatrics, and obstetrics/gynaecology) and serve at least 30% of Medicaid/uninsured patients. Every month, 376 practices with these EHRs electronically transmit de-identified data concerning over 40 different measures, including eRx, automatically to PCIP.

For the purposes of this study, and in alignment with the Final Rule, an eRx was an electronically generated prescription using certified EHR technology and transmitted to a pharmacy system. A prescription transmitted from the EHR via fax did not qualify as an e-prescription, since it requires manual entry of data by a pharmacist and increases risk of error. We calculated eRx rates by dividing the number of office visits where an electronic prescription was written by the number of office visits where a prescription was ordered. These percentages were calculated monthly for each provider.

We analysed eRx data, using three data sources to complete our assessment:

1. phone and in-person surveys of 37 PCIP providers’ attitudes of eRx, as well as their perceived obstacles to wider adoption
2. EHR database of New York City pharmacies that accept eRx along with their addresses used in production of a map
3. PCIP database of aggregate de-identified counts of each provider’s EHR utilisation transmitted automatically monthly from January 2009 to July 2010.

We used chi-square tests to determine whether the number of office visits, the number of prescriptions written and the number of support staff had any relation to the practices where eRx is >40%. We used a cut-off of a P-value of <0.05 to dispel the null hypothesis. We used SPSS for statistical analysis and graphical output.

Results

Based on survey results, providers are generally in favour of eRx. Providers emphasised the convenience of eRx, its potential to save time, error reduction and improved legibility. In addition, they felt that eRx prevented call backs from pharmacies, improved office workflow, increased patient safety and reduced forgery. Finally, providers felt eRx created a permanent log allowing providers to check when a patient fills a prescription and allowed tracking of the origins of a prescription in case of an audit. Interestingly, providers tended to overestimate their own eRx rates primarily due to their belief that faxing a prescription qualified as eRx.

Despite the advantages of eRx, providers see patient preference as the primary obstacle to increased eRx use. Providers’ reasons for patients’ desire not to use eRx included patient distrust of eRx, patients’ uncertainty concerning their pharmacy preference, patients’ desire to utilise mail-order pharmacies and proof of a prescription that a paper prescription affords. Additionally, providers expressed frustration that it is not possible to electronically prescribe durable medical equipment, such as glucose strips, nebuliser/tubing, surgical supplies and over-the-counter ointments.

Another obstacle to increased eRx use was the providers’ belief that a significant number of pharmacies do not accept e-prescriptions or have significant delays in filling them, despite more than half (52%) of all pharmacies accepting eRx (Figure 1). Even when providers commit to eRx, they are often unsure how to easily identify a pharmacy convenient for the patient that accepts eRx.

Aggregate utilisation data from the 376 practices between January 2009 and July 2010 indicated that eRx was utilised in approximately 21.7% of office visits in which a prescription was generated, and eRx rates increased by 0.82% each month (Figure 2). Across all these practices, eRx rates more than doubled (12.9 to 27.5%) from the beginning of 2009, and practices that ‘went live’ on the EHR more than 1 year ago had a higher eRx rate than those that adopted an EHR less than 1 year ago (25.0 vs 21.6%) (Figure 3). A histogram showing eRx performance by decile can be seen in Figure 4.

Eighty-one practices have achieved the meaningful use eRx rate >40%. These high eRx practices had a lower support staff to full-time equivalent provider ratio of 3.6 ($P = 0.02$). In addition, these practices tend to prescribe more medications, although the results were not statistically significant ($P = 0.06$; Table 1).

Discussion

Principal findings

In general, although currently low, the rate of eRx is increasing. Our data suggest increased adoption of eRx by the provider and patient community. The practices with the highest rates of eRx have a number of qualities in common. They tend to have fewer office visits where prescriptions were written and have a higher support staff to provider ratio. Surveyed providers indicate that they generally like eRx but are limited in its greater use by patient preference for paper prescriptions, inability to electronically prescribe durable equipment, and belief that pharmacies are not yet ready to accept eRx.
Implications of the findings

eRx rates have slowly been increasing despite perceived barriers by providers, and many providers are on course for satisfying the meaningful use requirement of at least 40% eRx. Providers are beginning to see the advantages of eRx, and patients are becoming accustomed to the concept of eRx. One potential reason for the increased eRx among providers is a number of incentive programmes offered for increased eRx use. For example, since 1 January
Table 1  Characteristics of high and low E-prescribing practices

<table>
<thead>
<tr>
<th>Metric</th>
<th>eRx rate (monthly average)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&gt;40%</td>
<td>10–40%</td>
</tr>
<tr>
<td>No. of practices</td>
<td>81</td>
<td>120</td>
</tr>
<tr>
<td>Office visits with Rx (mean)</td>
<td>370</td>
<td>358</td>
</tr>
<tr>
<td>No. of Rx issued (mean)</td>
<td>1149</td>
<td>1161</td>
</tr>
<tr>
<td>Support staff/full-time equivalent (mean)</td>
<td>3.6</td>
<td>3.7</td>
</tr>
</tbody>
</table>
2010, eligible New York State providers can receive $0.80 per dispensed Medicaid e-prescription, while retail pharmacies can receive $0.20. Since January 2009, for their Medicare patients, qualifying providers may be eligible for 2% of their total allowed charges under Medicare Part B.15

There are additional steps that can be taken to increase the rate of eRx adoption. First, EHRs should incorporate functionality that allows providers to search more granularly for pharmacies to accommodate patient preference, especially in areas where pharmacy density is high. Patients do not often know the address of their pharmacy or which pharmacy they prefer to use. In an area of high pharmacy density such as New York City, this can pose a significant problem. Second, the prescription of durable medical equipment (i.e. glucose strips, nebuliser/tubing, surgical supplies and over-the-counter ointments) must be included in the eRx compendium. These items have been specifically excluded from meaningful use measurements in the Final Rule On Meaningful Use, however, the workflow implications of excluding these items are critical. Providers who want to eRx medications for patients must use a separate paper prescription for durable equipment, requiring two separate processes not consonant with ease of workflow. In this case, providers simply opt to use paper for all of the prescriptions. Third, mail-order pharmacies need to be included as an option for eRx. Many patients are increasingly using mail-order pharmacies due to cost, and eRx needs more penetration to accommodate this trend. Fourth, increased education for patients on the benefits of eRx including increased safety and efficiency while decreasing errors, can break down many of the myths existing in the community concerning eRx. Finally, providers need to be educated that faxing prescriptions does not constitute eRx. Faxing does not afford the increased patient safety and increased legibility advantages as the pharmacist must manually input the prescription, leaving opportunity for error.

The eRx rate of 24.1% was found to be closer to the upper end of published ranges of 11–24%.21–23 The final rate of 27.5% in the second quarter of 2010 likely represents an increased interest in eRx in the community because of several factors, such as meaningful use standards, increased adoption of EHRs within New York City, and a variety of incentive programmes through New York State and the federal government.

Limitations of the method
Our sample of primary care clinics included all practices within PCIP who were capable of transmitting their data electronically. There were a few practices that had regular difficulties with their transmissions and may not be well represented in our data. If these practices with transmission issues also tend to be practices with lower eRx rates, then we may be overestimating the actual eRx rate among PCIP practices. This might include a bias toward practices who were already more functional or successful and likely to use a new technology such as eRx. In addition, because our practices are primary care oriented, we cannot extrapolate these eRx rates to those of specialists within New York City.

Call for further research
Our research suggests that eRx rates are increasing among New York City primary care providers. Future research can continue to determine whether this trend continues. Additional further analyses can compare eRx rates and rates of increase by borough and patient insurance type. Our study focused on providers perceptions regarding eRx; future studies investigating pharmacies and patients perceived barriers would be illuminating.

Comparison with the literature
Our providers attitude toward eRx was generally favourable, which is similar to other studies published.17–15 While our providers generally viewed eRx as a time saver, especially for established patients with a lot of medications that need renewals, other studies suggest that handwritten prescriptions are faster.20 However, these studies can be vendor-specific and depend on the electronic software system being used. These studies also do not take into account the time saved from call backs from pharmacies for illegibility or formulary issues.

Conclusions
With increased use and acceptance of eRx by providers, pharmacies, and patients, the benefits of reduced errors, increased patient safety, and decreased costs can be realised. While data suggest that eRx rates are currently low, the latest trends indicate increased adoption by the community. With increased education of patients and providers, many of the perceived barriers can be reduced, leading to increased eRx rates and all the benefits therein.
REFERENCES


CONFLICTS OF INTEREST

None.

ADDRESS FOR CORRESPONDENCE

Sam Amirfar
Primary Care Information Project
The New York City Department of Health & Mental Hygiene
42–09 28th Street
Long Island City
NY 11101
USA
Email: samirfa1@health.nyc.gov

Accepted September 2011