



Ease of Use



Fit with Workflow



Technical Impact



Clinical Impact



Driver Adoption



Optimization Factors

Enhancing Access to Prescription Drug Monitoring Programs  
Using Health Information Technology:

# Integrating E-Prescribing with a Prescription Drug Monitoring Program: A Pilot Study

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**MITRE**

The Office of the National Coordinator for  
Health Information Technology  
Substance Abuse and Mental Health Services Administration  
**SAMHSA**



## Overview

The Michigan pilot at the Huron Valley Physicians Association (HVPA) demonstrated the value of health IT connectivity by:

- Making Prescription Drug Monitoring Program (PDMP) data more readily available during patient encounters in an ambulatory care setting
- Streamlining access to the PDMP by using an interstate PDMP data sharing hub

This pilot configuration showcased the workflow, ease of use, and added technical value of improved access to the PDMP in the ambulatory care setting by automatically querying the PDMP through data sharing networks and displaying the data in the electronic medical record (EMR) user interface.

## Pilot Design

This pilot sought to demonstrate the added value of:

- Enhancing existing E-Prescribing software by including PDMP data in the medication history. Physicians (prescribers) within the HVPA who don't use an EMR system use DrFirst's Rcopia. Among other features, Rcopia allows prescribers to query a patient's medication history from other sources. This pilot integrated the Michigan Automated Prescription System (MAPS) PDMP data into the Rcopia medication history feed, thus improving prescribers' view of prescription data that might not be available from other sources.
- Using interstate PDMP sharing hubs for intrastate access to PDMP data. Many PDMP systems have no mechanism that enables system integration, but some of these systems are connected to interstate data sharing hubs. In this case, the MAPS system has no application programming interface (API) for system integration, but it is connected to the National Association of Boards of Pharmacy's (NABP) Prescription Monitoring Program InterConnect (PMPi) interstate exchange. This pilot used PMPi as a means to access MAPS data, even though HVPA is located within the state of Michigan.

Appendix A describes technical considerations for the pilot, including a list of participants. Appendices B and C discuss operational and legal considerations, respectively. Figure 1 shows the pilot's workflow.

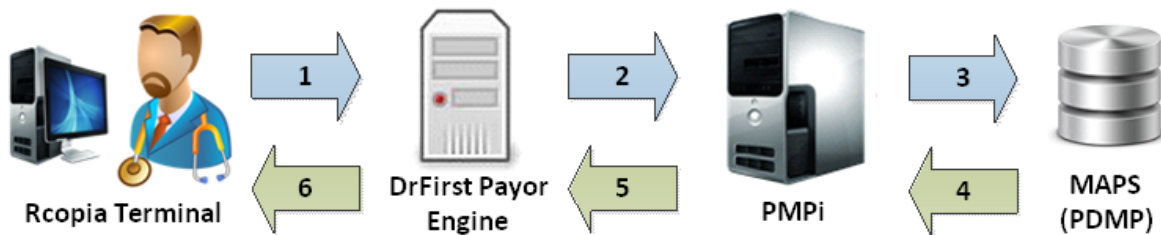


Figure 1. Pilot Workflow Diagram

Figure 1 illustrates the following specific process details:

1. An HVPA prescriber requests a patient’s medication history from Rcopia (E-prescribing software), which forwards the request to the Payor Engine.
2. The Payor Engine queries PMPi for the patient’s drug history.
3. PMPi uses the message’s routing data to forward the message to MAPS.
4. MAPS responds with the patient’s PDMP data and sends this back to PMPi.
5. The Payor Engine integrates the MAPS data with data that it had requested from other sources.
6. Prescribers view the integrated prescription history.

## Experiment

### Pre-Pilot State

Approximately 125 prescribers at the HVPA use DrFirst’s Rcopia E-Prescribing software. These prescribers typically do not use an EMR system. Rcopia provides the following functionality:

- Medication history reporting from a number of sources to help the prescriber derive the most complete medical history possible in support of their treatment of patients
- Medication reconciliation to support ongoing management of medications
- Electronic Prescription Services with alerts based on clinical criteria, including documented allergies, drug-on-drug interactions with other documented medications, and duplicate therapy instances with other documented medications.

Prior to this pilot, Rcopia did not have access to the MAPS system and thus was missing an important source of controlled substance prescription history. Prescribers who wanted this data were required to use the MAPS web portal. This required them to interrupt their normal workflow, log into MAPS, and search for a patient using the patient’s demographic information.

## Hypotheses and Specific Methods

The following hypotheses directly relate to six areas of interest that were the basis for evaluating the effectiveness of the pilots. Appendix D describes the evaluation methods in detail.

Table 1. Hypotheses and Intended Impacts

Area of Interest	Intended Impact
<b>Ease of Use</b>	By integrating MAPS data into existing Rcopia screens, PDMP data will be usable by existing Rcopia users without extensive training.
<b>Fit with Workflow</b>	HVPA prescribers will be able to view their patients' PDMP data in the same system that supports their day-to-day workflow. This will reduce, not add to, clinical overhead for accessing PDMP data.
<b>Technical Impact</b>	The use of PMPi will allow for access to MAPS data that would not otherwise be possible in the project time-frame.
<b>Clinical Impact</b>	More queries will be run for HVPA patients, resulting in more effective clinical decisions. The addition of a new source of patient prescription data will also result in medication conflict and duplicate therapy alerts being displayed to physicians in more cases than before, thus giving prescribers more warning of potentially harmful situations.
<b>Driver of Adoption</b>	Prescribers will accept the integration of PDMP information in Rcopia, and the pilot will serve as a springboard for further adoption.
<b>Optimization Factors</b>	The integration of MAPS data in Rcopia has identifiable opportunities to improve.

## Results

The trial consisted of 14 days of activity (10 weekdays and 4 weekend days) for the 125 Rcopia-using HVPA prescribers. The pilot test was a success both from a clinical and technical perspective.

### Clinical

Medication history queries ranged from 855–1505 queries on weekdays to approximately 30–90 on weekend days. In total, Rcopia users generated 11,402 queries to MAPS, and in 2,438 of those cases, MAPS was able to provide information about controlled substance prescriptions. Therefore, in approximately 21% of the cases where Rcopia queried MAPS, prescribers had access to data that might not have been available from other sources.

During the 14-day trial period with HVPA, Rcopia provided 231 Duplicate Therapy alerts which were informed by Medication History elements from MAPS. These alerts indicate that the patient might have been prescribed more than one prescription of similar drugs, which can be a harmful situation.

## Technical

Development was completed on time and on budget. Work included:

- Development of the interface from the Dr. First Payor Engine to PMPi
- Development of the code to post-process the PDMP data
- Enhancement of the Rcopia user interface to allow HVPA prescribers to view PDMP data
- Configuring Rcopia software to allow access to Michigan state PMPi data only to HVPA prescribers
- Configuring Duplicate Therapy Clinical Alerts in DrFirst's electronic prescribing systems based on the Michigan PMP data source

## Discussion

The pilot test was a success both from a clinical and technical perspective. From a clinical perspective, the pilot showed clear benefit in terms of both ease-of-use and workflow integration. The enhanced system was put into production with little or no disruption to prescribers, and they used it with no change to their workflow. The PDMP data enhanced Rcopia's medication history view and duplicate therapy clinical alerts, providing a deeper view of patients' prescription history than had been possible before.

From a technical perspective, the implementation validated that existing E-Prescribing applications can be modified to integrate PDMP data into their existing medication history displays. This indicates that other E-Prescribing vendors could incorporate this feature into their products.

Integrating via NABP's PMPi interstate exchange brought two important benefits. First, it allowed access to MAPS, which has no direct system integration capability. Without PMPi integration, MAPS could not accommodate system integration, either interstate or intrastate. Second, integrating via PMPi allowed DrFirst to connect to MAPS with no effort at all on the part of the MAPS development staff. Many PDMPs, MAPS included, are run on tight budgets with highly constrained resources. The ability to integrate with little or no effort on the part of the state is highly important as PDMP integration becomes more widespread. The approach in this pilot meets those requirements.

HVPA is one of many Rcopia users in the state of Michigan. Because this was a pilot, it was intentionally limited to HVPA prescribers. This was done for two reasons: First, it enabled DrFirst and the MITRE pilot team to work with only one set of end-users. Notifying the entire DrFirst customer base of the test would be impractical. Second, and more importantly, it allowed the integration functionality to be tested with only a slight increase in overall query load to the MAPS system. MAPS administrators were concerned that a large increase in queries might adversely affect all PDMP users, so it was important that the pilot involve a small user community.

## Outcome and Next Steps

In the future, increased adoption of PDMP data sharing can be driven in several ways. In post-pilot discussions, MAPS administrators indicated that they plan to increase MAPS capacity to allow the system to handle an increase in query load, which will allow more DrFirst customers (and others) to take advantage of MAPS integration functionality. In addition, other E-prescribing vendors can use a similar integration approach to add this capability to their products, thus increasing the number of prescribers who will benefit from effortless access to PDMP data.

DrFirst and HVPA plan to continue to run the MAPS integration in production. DrFirst is also considering plans to expand their use of PDMP data in other states as well.

DrFirst also identified several ways to enhance their MAPS integration. First, they plan to show the source of each medication in a patient's medication history display. This will give greater visibility to PDMP data. Second, they plan to add links from their alert displays to the PDMP itself, allowing providers to view a specific patient's report within MAPS easily.

## Other Pilots

The Enhancing Access to PDMP project conducted five additional pilots in Fiscal Year 2012 which are available for review. The pilots encompass a variety of user groups, including dispensers (pharmacists) and prescribers (ambulatory and emergency department) as well as different technological solutions. These papers can be found at the Office of the National Coordinator for Health Information Technology (ONC) PDMP website:

<http://healthit.hhs.gov/portal/server.pt?open=512&mode=2&objID=3870>.

## Appendix A: Technical Considerations

The following sections contain a detailed description of the pilot design, including participants and technologies.

### Participants

The following parties participated in the pilot:

- **Huron Valley Physicians Association (HVPA)**, (<http://hvpa.com/>) – Incorporated in 1983 as an Independent Physician Association (IPA), HVPA has over 700 physician members located in Washtenaw, Livingston, Lenawee, and Western Wayne counties. Approximately 25% of their members are primary care physicians, and 75% are specialists. HVPA activities are closely tied to the Saint Joseph Mercy Health System (SJMHS), a member of the Trinity Health System.
- **DrFirst** (<http://www.drfirst.com/>) – Has been providing award-winning e-prescribing software for over a decade, allowing providers to e-prescribe safe and efficient e-prescriptions through standalone e-prescribing as well as integrated e-prescribing solutions through over 200+ DrFirst certified partners.
- **Michigan Bureau of Health Professions** ([http://www.michigan.gov/lara/0,4601,7-154-35299\\_28150---,00.html](http://www.michigan.gov/lara/0,4601,7-154-35299_28150---,00.html)) – Regulates over 400,000 health professionals in Michigan who are licensed, registered, or certified under Articles 7 and 15 of the Michigan Public Health Code. Also manages the operation of the Michigan Automated Prescription System (MAPS).
- **The National Association of Boards of Pharmacy (NABP)**, (<http://nabp.net/>) – Located in Mount Prospect, IL, NABP is an impartial professional organization that supports state boards of pharmacy in creating uniform regulations to protect public health. NABP is responsible for the Prescription Monitoring Program InterConnect system (PMPi) that enabled access to INSPECT data.
- **Appriss, Inc.** (<http://www.appriss.com/>) – Located in Louisville, KY, Appriss develops and operates the PMPi as a subcontractor to NABP. They collaborated with Regenstrief on the system integration.

### Relevant Technologies and Tools

The following technologies and tools were vital components of the pilot.

#### Rcopia

Rcopia is a web-based health information service platform that provides physicians with the following services:

- Obtains medication history information from a number of sources to help physicians derive the most complete medical history possible in support of their treatment of the patient

- Performs medication reconciliation to support ongoing management of medications
- Enables Electronic Prescription Services with alerts based on clinical criteria, including documented allergies, drug-on-drug interactions with other documented medications, and duplicate therapy instances with other documented medications

### **DrFirst Payor Engine**

The DrFirst Payor Engine allows DrFirst to integrate additional sources of medication history into the feed for its customers, making the medication history more complete for physicians.

### **Prescription Monitoring Program InterConnect (PMPi)**

NABP's PMPi is a system that facilitates the secure sharing of data between state PMPs. The InterConnect rules engine allows each participating state full autonomy to enforce its own rules and policies of data access when sharing with other states. InterConnect does not house any data but serves as a conduit. For security purposes, messages are encrypted by the sender so PMPi is incapable of reading the patient information. PMPi uses the PMIX messaging specification developed by the Bureau of Justice Assistance. PMPi serves as the API for INSPECT in this pilot (seeing Rcopia as a State), a role which was not envisioned during the design or rollout of this hub. This may introduce additional complexities for multi-state pilots. Note that this API configuration was seen in three pilots. More details are available on the following NABP PMPi fact sheet: <http://www.nabp.net/programs/assets/PMPInterconnectFactSheet.pdf>.

### **XML (Extensible Markup Language)**

XML is an open standard for defining data elements on both web pages and business-to-business documents. XML uses a similar tag structure as HTML (Hypertext Markup Language), but while the latter defines how elements are displayed, the former defines the contents of the elements. By providing a common method for identifying data, XML supports business-to-business transactions and has become a widely adopted format for electronic data interchange.

### **Testing**

Pre-production testing used a MAPS test database. After the original production launch on August 1, DrFirst staff members discovered that queries to the Michigan PMP were failing despite the fact that identical queries succeeded during system testing. It was determined that the MAPS production database was configured to respond to a different query structure than the test database, so the DrFirst systems had to be rolled back from production and reprogrammed to accommodate the different production environment. The subsequent programming, combined with recertification of the solution through DrFirst's customer and partner ecosystem certification, delayed the start of data gathering until August 11, 2012.

### **User Interface**

Figure A-1 shows an example of a drug history display for a patient in the Rcopia interface.



Medication List for Bob Test (DOB: 02/03/1983)								
<a href="#">Display Detailed Medication Report</a> <a href="#">Medications Reviewed</a>								
Drug	Formula	Sig	Qty	Notes	RfI(s)	Start Date	Last Fill Date	Action
Coumadin (warfarin)	5 mg Tablet	Take 1 tablet by mouth once a day	30 tablet		5	05/21/2012(stop on 12/03/2012)	06/06/2012	<a href="#">Delete</a> <a href="#">Modify</a> <a href="#">Unstop</a> <a href="#">Stop</a>
Dexilant (dexlansoprazole)	60 mg Cap, Delayed Rel., Multiphasic	Take 1 capsule by mouth once a day	30 capsule		5	05/21/2012(stop on 12/03/2012)	06/06/2012	<a href="#">Delete</a> <a href="#">Modify</a> <a href="#">Unstop</a> <a href="#">Stop</a>
hydrocodone-acetaminophen	7.5-650 mg Tablet	Take 1 tablet by mouth twice a day	60 tablet		2	08/28/2012(stop on 10/29/2012)	08/28/2012	<a href="#">Delete</a> <a href="#">Modify</a> <a href="#">Unstop</a> <a href="#">Stop</a>
Lexapro (escitalopram)	10 mg Tablet	Take 1 tablet by mouth once a day	30 tablet		5	05/21/2012(stop on 01/08/2013)	07/12/2012	<a href="#">Delete</a> <a href="#">Modify</a> <a href="#">Unstop</a> <a href="#">Stop</a>
Xanax (alprazolam)	1 mg Tablet	Take 1 tablet by mouth once a day	30 tablet		3	06/06/2012(stop on 11/16/2012)	07/31/2012	<a href="#">Delete</a> <a href="#">Modify</a> <a href="#">Unstop</a> <a href="#">Stop</a>

Figure A-1. Sample Patient Drug History

Figure A-2 provides an example of a clinical alert that a physician receives when writing a prescription that provides duplicate therapy.

**Confirm Prescription Despite Warning**

The medication(s) you have prescribed may not be appropriate given this patient's information.

**NOTE!** Hello Kitty Test (01/01/1982) has had no allergy data entered and may be allergic to this medication. Please enter this data to avoid receiving this warning.  
**DUPLICATE THERAPY ALERT!** Hello Kitty Test (01/01/1982) already has a pending prescription for **Lunesta (eszopiclone)**, which is in the same therapeutic category (Hypnotics) as the drug you have just prescribed, **Lunesta (eszopiclone)**.

Figure A-2. Sample Clinical Alert

Physicians viewing a list of pending prescriptions for patients will see a warning indicating duplicate therapy. Note the warning for the pending Lunesta prescription in Figure A-3.

**Pending Prescriptions for this Patient**

[\[Select All\]](#) [\[Select None\]](#) [\[Delete Selected\]](#)

Prescriptions 11 - 20 of 35 [\[Prev\]](#) [\[Next\]](#)

Signature Password:

[Add to Meds](#)  [Print Pharmacy](#)

Serial#	Dr/Staff	Name	Date	Status	Drug	Sig	Qty	RfI(s)	Action
<input type="checkbox"/> DEV-966046	FL	Hello Kitty Test	06/14/2012	pending	Lunesta (eszopiclone) 1 mg Tablet	Take 2 tablet by mouth every four to six hours while awake after meals -- kjjknk	3	1	<a href="#">Modify</a> <a href="#">Delete</a> <a href="#">Favor</a>

**SCHEDULE IV**

Figure A-3. Sample Prescription Warning

## Appendix B: Operational Considerations

### Key Operational Assumptions

- MAPS administrators were concerned that a flood of queries from Rcopia could negatively impact MAPS users by increasing query response time. During planning, the pilot team made sure that the number of participating prescribers was small enough to prevent a large increase in MAPS queries from Rcopia.
- MAPS management had not budgeted for pilot-related efforts and was therefore concerned that pilot-related development might disrupt other important development projects. The pilot team thus made sure that the pilot test accessed MAPS through already-implemented mechanisms (in this case, PMPi).
- User interface changes were minimized to ensure that physicians' user experience of Rcopia was not disrupted.

## Operational Advantages or Barriers

This pilot test had the advantage of having a relatively small number of participants compared to some other pilots, which reduced the project management complexity. Another advantage was that DrFirst's Rcopia already had a user interface for displaying medication history, so the developers were able to use that interface to display the PDMP data. This reduced both the development effort and changes visible to end-users.

## Pilot Schedule

Task Name	Start	Finish	Duration
Planning	June 22, 2012	June 29, 2012	6 days
Development/Testing	July 1, 2012	August 10, 2012	30 days
Execution/Monitoring	August 11, 2012	August 24, 2012	10 days
Post-Pilot Analysis/Report	August 24, 2012	August 31, 2012	5 days

## Pilot Costs

Vendor	Services	Sub-Contract
DrFirst	Development, testing, project oversight, pilot monitoring	\$83,000

MITRE subcontracts are fixed price instruments. It is noted that no participants requested legal review costs for business (e.g., MITRE subcontract). Other expenses may also have been insufficiently enumerated in this list, and regional cost factors may likewise play a role in the quoted prices. Thus, the actual cost of reproducing this pilot elsewhere may be more or less than this amount, even when attempting to exactly replicate these circumstances.

## Appendix C: Legal Considerations

This section looks at the policy and regulatory considerations and obstacles, as well as the agreements implemented.

### Policy and Regulatory Considerations

To successfully conduct the pilot on production systems, certain laws and policies need to be in place to support the pilot design. For this pilot, the Michigan Bureau of Health Professions was involved in the planning to ensure that the pilot implementation met their security requirements.

### Agreements Implemented

The only agreement implemented for this pilot was the NABP-DrFirst Letter of Agreement (LOA).



## Appendix D: Evaluation Methods

### Evaluation Approach – Hypotheses and Specific Methods

The Federal Government and the MITRE Corporation conducted pilot studies, small-scale experiments, to test the feasibility of proposed workflows and evaluate their outcomes before investing resources in a full-scale, permanent implementation. These pilots provide valuable insights concerning time requirements, system challenges, and opportunities for process improvement—all of which can be addressed to improve final system design and performance success.

Evaluating the PDMP Pilots required a disciplined and consistent approach to examine the impact of the new or changed technical and clinical work process features toward achieving the following goals:

- **Workflow Logistics** – Providing the correct amount of the appropriate information, in the proper condition, at the right place and time, in the necessary position/sequence
- **System Performance** – Achieving desired outcomes
- **Predicting Implementation Success** – Extrapolating the results to a larger system

MITRE’s systematic analytic approach effectively consolidated these objectives into a set of three consistent evaluation themes: usability, impact, and scalability. The PDMP Pilots varied from simple to more complex health IT connectivity configurations to the PDMP, so testing afforded the opportunity to examine the different facets of performance along a continuum of technical sophistication (see Figure D-1).

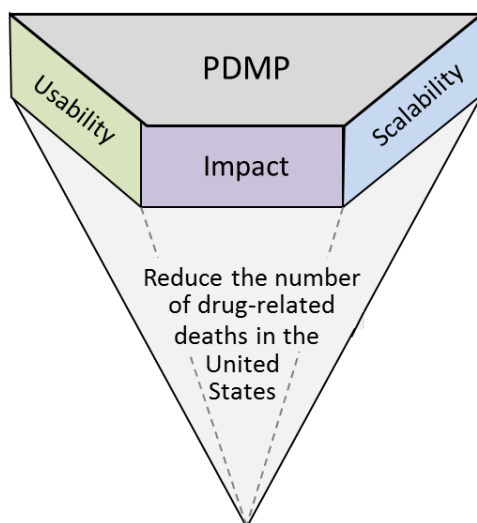


Figure D-1. Evaluation Themes

This appendix describes the three evaluation themes in detail. Each theme and its accompanying areas of interest, with associated evaluation metrics, were the basis for evaluation of the PDMP pilots.

### Usability

The primary focus of the usability theme is the user's perspective. The following areas of interest concern the optimization of the care delivery experience and the efficiency in performing work processes by leveraging and maximizing technical integration:

- **Ease of Use** – Promoting easier and more efficient ways to access to the PDMP prescription drug data than the previous method for providers and dispensers
- **Fit with Workflow** – Natural integration into existing clinical and health IT workflows for providers and dispensers

### Impact

The impact theme is meant to validate that the connectivity method to the PDMP was achieved and ultimately resulted in a positive impact to clinical care outcomes (reducing the number of prescription drug-related deaths). The following areas of interest assess the technical and clinical impact:

- **Technical Impact** – Resulted in maximizing connections to existing technologies and increased queries to the PDMP data
- **Clinical Impact** – Resulted in timely and meaningful PDMP prescription drug information, readily available at the time of decision-making, that positively impacted care delivery to the patient

### Scalability

The scalability theme assessed the capability of the new work processes to be widely applied and accommodate growth in the existing system of providers and dispensers. The following areas of interest assessed how well participants adopted the new process and the degree to which it improved the existing workflow:

- **Driver of Adoption** – Accepted by the participants so that pilot drove further adoption by other sites or user groups (e.g., providers), if applicable
- **Optimization Factors** – Generated identifiable improvement opportunities to increase the usefulness and timely availability of PDMP prescription drug information

## Appendix E: Acronyms

<b>API</b>	Application Programming Interface
<b>EMR</b>	Electronic Medical Record
<b>HTML</b>	Hypertext Markup Language
<b>HVPA</b>	Huron Valley Physicians Association
<b>IPA</b>	Independent Physician Association
<b>LOA</b>	Letter of Agreement
<b>MAPS</b>	Michigan Automated Prescription System
<b>NABP</b>	National Association of Boards of Pharmacy
<b>PDMP</b>	Prescription Drug Monitoring Program
<b>PMPi</b>	Prescription Monitoring Program InterConnect
<b>SJMHS</b>	Saint Joseph Mercy Health System
<b>XML</b>	Extensible Markup Language