

A Pilot Study: Integrating an Emergency Department with Indiana's Prescription Drug Monitoring Program

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Abstract. Rapid increase in abuse and overdose of controlled substances was the main driving force of implementing Prescription Drug Monitoring Programs (PDMP). We aimed to describe how the integrated Indiana's PDMP (INSPECT) data into an electronic health record (EHR) can improve clinical workflow within an emergency department (ED). After integration, upon patient arrival into the ED, a PDMP report containing history of dispensed schedule II-V medications is retrieved and stored in the patient's medical record. The evaluation of the new system among physicians showed high satisfaction of having access to the patients' medication history through the existing EHR. We show that the PDMP data was easily accessible and more informative in the new integrated system. The PDMP report alters the pattern of prescribing narcotic medications to patients. In conclusion, enhancing workflow through PDMP reports integration with the patients' EHR is valued by the clinicians and reduces the number of narcotic prescriptions.

Keywords: Opioid abuse, Prescription drug monitoring program, PDMP, Doctor shopping, EHR, Electronic health records, Effectiveness evaluation.

1 Introduction

Since early 1990s, prescribing opioids for chronic pain treatment has been widely accepted in the United States [1]. Endorsed by a report from Centers for Disease Control and Prevention [2], sales of opioid analgesics increased four times in the recent decade. Merely in 2010, 7.1 kg opioid analgesics per 10,000 people were sold in the United States equal to prescribe every adults in the United States with "5 mg of hydrocodone every four hours for one month" [2].

Along with the increase in the sale, the death from drug overdose has reached the epidemic level in the United States [3-5]. It has become the second principal cause of unintentional injury deaths after car accidents [2]. Opioid analgesics were responsible for more unintentional overdose deaths compared to the deaths from cocaine and heroin together. The severity of the situation in 20 states (e.g., Ohio) is such that the

deaths from unintentional opioid overdose have exceeded deaths from motor vehicle accidents.

To respond to the epidemic situation of substances abuse, 44 states have established prescription drug monitoring programs (PDMPs) in recent years to collect and monitor prescribing, sale, and dispensing of controlled substances [6]. PDMPs have promoted patient care by reducing the supply of excess or misprescribed opioids leading to lower probability of abuse [7-9]. PDMP reports give physician a better image of patient's behavior of controlled substances use not only before starting chronic opioid therapy, but also during the treatment. Physicians recognize the patient is at risk of abuse based on the pattern of previous physicians and pharmacies visits, amount of prescribed controlled substances (opioids, sedatives, stimulants), and number of overlapped opioid prescriptions.

Indiana's PDMP, called INSPECT (INDiana Scheduled Prescription Electronic Collection & Tracking), is one of the first of its kind that tracks outpatient dispensed schedule II-V controlled substances statewide. INSPECT covers over 1,700 pharmacies across the state providing about 12 million medication records per year. Each pharmacy in Indiana State has to report dispensed prescribed controlled substances (schedule II-V) for Indiana residents to the INSPECT system within seven days [10].

Despite the usefulness of PDMPs, physicians are not interested in using the system [11]. PDMP data is accessible through a web portal that requires additional time to find an open workstation, recall credentials for system access, and having available patient demographic information to retrieve the report. To make PDMP data more accessible to the physicians, the Office of the National Coordinator for Health IT (ONC) has sponsored pilot programs to test the effects of expanding Indiana and Ohio states PDMP utilizing health information technology (HIT). In this paper, we describe integration of INSPECT with an emergency department's (ED) management system at Wishard Hospital in order to increase utilization of INSPECT reports. We also performed empirical research to evaluate effectiveness of the new integrated system.

2 Integration

Wishard Memorial Hospital, Indianapolis, Indiana is a Level 1 Trauma Center and tertiary referral center. There are over 108,000 emergency visits annually. Before implementing direct access to patients' history of prescribed controlled substances, physicians had to switch to Indiana's PDMP web portal, query patients' history, and prescribe narcotics based on the INSPECT data. However, since integration of INSPECT system into Indiana Network for Patient Care (INPC), the largest health information exchange in Indiana, the physicians have had real-time access to patients' INSPECT report through CareWeb, Wishard's ED electronic health record (EHR) system.

To perform the integration, the current connection between INSPECT and prescription monitoring program interconnect (PMPi) was used, through which INSPECT retrieves patients' data from other states.

Once a patient checks in ED, the registration application (McKesson) generates a Health Level 7 (HL7) ADT-A04 (patient registration) message. The INSPECT message processor module, which monitors ADT message, extracts the patient's name, birth date, sex, and medical record number from PID segment of the message. In the next step, Regenstrief Institute, the responsible entity for maintaining EHR system at Wishard Hospital, sends a request to PMPi using a HTTP POST operation. The query has two parts. One part is encrypted that identifies the patient. The other unencrypted part indicates which state is doing the query, which state is being queried, and who specific provider requested the medication history. In our case, it is not an individual provider, the hospital system acting as a provider. The message is in eXtensible Markup Language (XML) format in conformity with national PMIX (Prescription Monitoring Information eXchange) architecture. Once the PMPi interconnect hub validates that the particular requesting node is configured to make a request from INSPECT system, the Indiana's PDMP matches the supplied demographics against its known patients. If there is a match, the patient's history of prescribed controlled substances is returned in PMIX format to Regenstrief server. Then, it is sent to Wishard Hospital's repository to populate the clinical record via a simple HL7 message enclosed INSPECT report (Fig. 1 and Fig. 2).

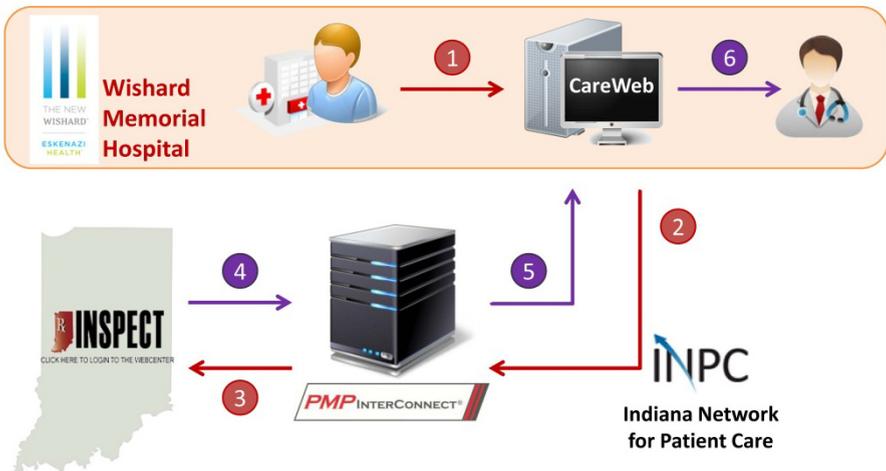


Fig. 1. Integrated workflow diagram. 1) Upon patient check-in, a request for patient's controlled substances history is sent to CareWeb. 2) CareWeb queries PDMP data from PMPi. 3) PMPi sends the request to INSPECT. 4) INSPECT responds with a PMDP report. 5) PMPi transfers the information to CareWeb. 6) CareWeb formats and stores PDMP report in EHR to be reviewed by physicians.

INSPECT		Indiana Prescription Monitoring System								
www.in.gov/inspect		402 W Washington St, Room W072; Indianapolis, IN 4								
		Phone: (317) 234-4458 Email: inspect@pla.in.gov Fax: (317) 233-4236								
Inspect RX Report										
dummy.patient			Date: 12-09-2010							
Search Criteria: Last Name: dummy First Name: patient Date Of Birth: 1/1/2000 Gender: 6			Page: 2 of 5							
Patients that match search criteria										
Pt ID	Name	DOB	Address							
1904	PATIENT DUMMY	01/01/2000	3109 W SYCAMORE KOKOMO IN 46901							
1882	PATIENT DUMMY	01/01/2000	3109 W Sycamore St Kokomo IN 469014181							
9945	PATIENT DUMMY	01/01/1950	123 HAPPY STREET SC 29306							
7088	PATIENT DUMMY	06/28/1900	4681 W COWDEN RD IN 47429							
4601	PATIENT DUMMY	04/18/1958	2530 N WEBSTER ST IN 46901							
4604	PATIENT DUMMY	04/15/1945	250 MC DOWELL LN IN 47462							
4605	PATIENT DUMMY	06/28/1953	4681 W COWDEN RD IN 47429							
Prescriptions										
Fill Date	Product, Str, Form	Qty	Days	Pt ID	Prescriber	Written	Rx #	N/R	Pharm	Pay
11/15/2010	HYDROCODONE BITARTRATE AND ACETAMINOPHEN TABLETS, 500 MG,5 MG, TABLET	60	8	9945	BR D	11/12/2010	4006082	N	1520318	U
10/12/2010	EMBEDA CAPSULES EXTENDED RELEASE, 30 MG,1.2 MG, CAPSULE, EXTENDED RELEASE	84	28	1882	KL J	10/12/2010	2013618	N	1517979	U
08/10/2010	HYDROCODONE BITARTRATE AND ACETAMINOPHEN TABLETS, 500 MG,7.5 MG, TABLET	30	5	1904	DI M	08/10/2010	4059071	N	1517979	U
07/22/2010	HYDROCODONE BITARTRATE AND ACETAMINOPHEN TABLETS, 500 MG,10 MG, TABLET	20	4	1904	RI K	07/22/2010	4017439	N	1536373	U
07/22/2010	HYDROCODONE BITARTRATE AND ACETAMINOPHEN TABLETS, 500 MG,10 MG, TABLET	20	4	1904	RI K	07/22/2010	4017439	R	1536373	U
07/22/2010	HYDROCODONE BITARTRATE AND ACETAMINOPHEN TABLETS, 500 MG,10 MG, TABLET	60	10	1904	RI K	07/22/2010	4017439	R	1536373	U
07/22/2010	HYDROCODONE BITARTRATE AND ACETAMINOPHEN TABLETS, 650 MG,10 MG, TABLET	150	30	1904	RA B	07/22/2010	4017445	N	1536373	U
07/17/2010	TUSSINEX SUSPENSION EXTENDED RELEASE, NS:NS, SUSPENSION, EXTENDED RELEASE	120	10	9945	TH F	07/17/2010	4004975	N	1532161	U

DISCLAIMER: The State of Indiana does not warrant the above information to be complete or accurate. This report, and the information contained in this report, must be used in accordance with IC 35-48-7, the INSPECT Health Practitioner Usage guidelines, and all Federal laws pertaining to confidential patient health information. To ensure protection of patient privacy, this report must never be mailed, emailed, faxed or otherwise distributed. If this report is printed or stored on-site, it must be marked "Do Not Copy." Misuse of INSPECT data is a criminal offense and could result in action adverse to an account holder's professional license.

Fig. 2. A sample INSPECT report

3 Evaluation of Effectiveness

We developed a survey in collaboration with other providers at Wishard hospital to evaluate effectiveness of the new integrated system on clinical workflow at ED and

The screenshot shows the CareWeb interface for patient TUCKER, MARK. At the top, it displays "(M) Age: years" and "TUCKER, MARK". Below this is a navigation bar with "Select a patient", "Browse Patient Record", and "Other". A "Hide Menu" button is also present. The main content area is titled "Chronologic Results - Page: 1 (underline indicates changed Result)".

Date	Description	Elapsed	Results	Status/Priority	ORD#/Normals	Links
07-Sep-12 07:33	Chest Frontal	Today	(a) <u>▼</u> IMPRESSION Minimal atelectasis both bases. Heart size normal. ET tube tip 3 cm above the carina. Right IJ catheter and lungs catheter tips mid-SVC. Enteric tube tip below the diaphragm. DICTATED BY: Dr. [redacted] 2012 7:36AM TRANSCRIBED BY: [redacted] (a) <u>▼</u>	Final		
	RADIOLOGY REPORT		History: Check position of tubes and lines. Comparison: One day prior Examination: AP chest 07 September 2012 at time 07:30 Transcribed by: [redacted] Transcription Date - 201209070736 (a) <u>▼</u>			
	SIGNATURE		[redacted] (a) <u>▼</u>			
07-Sep-12 07:34	XRAY IMAGING STUDY		XRAY IMAGING STUDY	Final		
	XRAY IMAGING STUDY		CHEST SINGLE VIEW FRONTAL (a) <u>▼</u>			
04-Sep-12 10:11	EKG	3 Days	EKG IMPRESSION: Sinus tachycardia, Nonspecific ST and T wave abnormality, Prolonged QT, [redacted] on 9/7/2012 7:15:45 AM (a) <u>▼</u> Abnormal ECG. (Confirmed by: [redacted]) Ventricular Rate 120 (a) <u>▼</u> BPM Atrial Rate 120 (a) <u>▼</u> BPM P-Wave AXIS 59 (a) <u>▼</u> degrees R-Wave Axis 25 (a) <u>▼</u> degrees T-WAVE AXIS 64 (a) <u>▼</u> degrees	Final		

At the bottom left of the interface, there is a vertical menu with various report types, including "INSPECT Drug Report".

Fig. 3. A screenshot of CareWeb. "INSPECT Drug Report" link is accessible at the bottom left

physicians' behavior of prescribing opioids. The survey was designed to take less than one minute to fulfill. From July 9, 2012 to November 30, 2012, the physicians at Wishard Hospital's emergency department had access to the new INSPECT report delivered through the EHR interface (CareWeb) by clicking on a provided link only shown to physicians (Fig. 3). Providers were asked to answer to three optional questions after retrieving reports (Table 1).

Table 1. The survey to evaluate effectiveness of the new integrated system

Question	Possible answers
Was there information in the INSPECT report that you were not aware of? (Select one answer)	Yes Somewhat No
Will the INSPECT report modify your prescribing behavior? (Select one or more answers)	Yes, I will reduce the number of pills I prescribe. Yes, I will reduce the number of prescriptions I write. No, there will be no change in my prescribing behavior for this patient. Yes, I will increase the number of pills I prescribe. Yes, I will increase the number of prescriptions I write.
Did you find the INPSECT data easier to obtain through CareWeb? (Select one answer)	Yes Somewhat No

4 Results

Through the integrated system, CareWeb successfully accessed PMPi hub upon patient arrival at ED, retrieved INSPECT report, and stored a printable Portable Document Format (PDF) format of the report in EHR. Physicians could access patients' INSPECT report by selecting the provided link on patients' profile in CareWeb.

Over the five-month study, 488 providers accessed 3540 INSPECT reports through CareWeb that shows significant increase in number of providers contrary to previous nonintegrated system. Providers who retrieved the reports completed 866 surveys through the study. Ninety-eight percent (N=831) of the respondents indicated that having access to the PDMP data through the existing EHR was much easier to use. In addition, 85% (N=815) found information within the report that they were unaware of previously. In response to the question whether INSPECT report changed their narcotics prescribing pattern, 58% (N=455) of answers indicated reduction and 6% (N=50) specified increase in either number of prescriptions or number of narcotic pills prescribed, whereas 36% (N=280) of respondents stated that the PDMP data did affect their planned prescribing manner.

5 Discussion

Through this pilot study, we introduced an integrated EHR with PDMP administration system that successfully provided the physicians at Wishard Hospital's emergency department with immediate access to patients' history of controlled substances use. According to the providers, the integration could improve clinical workflow at emergency department and had effects on their planning for prescribing narcotics to patients.

The integration of EHR with PDMP not only brings convenience for the physicians, but also improves workflow. Centers for Disease Control and Prevention [12] reported that the demand for opioid analgesics at ED has increased severely in recent years. This increase in the requests amplifies the problem of identifying opioid abuser patients because checking patient's PDMP data is a time-consuming task causing suspension in clinical workflow. Most participant physicians (98%, N=831) found the new system easy to use and fit with clinical workflow at emergency department. The new integrated system facilitates providers' access to patients' history of controlled substances that help physicians rapidly and accurately identify abuser patients who visit emergency department requesting opioid analgesics.

In addition, the new formatted PDMP report led physicians to make a reasonable decision about prescribing opioid medications to patients. In more than half of cases (64%, N=505), physicians stated that accessing to the PDMP data changed their plans to prescribe narcotics for patients either increased or decreased prescriptions. On the contrary, physicians did not change their decision in 36% (N=280) of cases. This might be because the PDMP data endorsed physician's perception or could not provide enough evidence that the physician changes the prescription plan. Therefore, in accordance to other studies [13,14], PDMP reports alters medical practice by assisting providers to find doctor shopper patients to make the most appropriate decision regarding prescribing opioids.

6 Conclusion

Improving delivery of healthcare data within the existing workflow has tremendous payoffs. Integrating available EHR with PDMP data could ease of use, access to information that was previously unknown, with reduction in opioid prescribing. One of our physicians provided this comment: "I have to say that this is probably one of the more genius moves of the 21st century... having easy access to INSPECT without going to a totally different website and have it pop up instantly has taken a lot of time off of decision making for me."

The authors greatly acknowledge Mark Tucker for his contribution to this paper in particular describing the integrated system workflow.

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