

ORIGINAL ARTICLE

Pharmacy-related theft of controlled substances: RxPATROL® findings

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ABSTRACT

Objective: To characterize pharmacy-related theft data reported to the **Rx Pattern Analysis Tracking Robberies and Other Losses (RxPATROL®)** database during the time periods before (2007-2010) and after (2011-2016) the August 2010 switch to reformulated OxyContin® (oxycodone hydrochloride) extended-release tablets (Purdue Pharma L.P.).

Methods: The RxPATROL® database was queried to identify characteristics associated with theft of drug products. Variables analyzed included incident counts, drugs involved (OxyContin or other oxycodone products), pharmacy-security features, and other incident-related information. The data captured from 2007 to 2010, defined as the original formulation period, were compared with those captured from 2011 to 2016, defined as the post-reformulation period.

Results: A total of 6,905 incidents were reported from 2007 to 2016, with robbery (51.8 percent) and burglary (26.4 percent) being the most commonly reported incidents. The number of total robbery incidents reported peaked in 2010 and remained steady. Incidents reported as robberies that involved OxyContin initially increased from 2007 to 2010 and then steadily decreased from 296 in 2010 to 13 in 2016. Total burglary reports decreased from 2009 to 2015 and slightly increased from 2015 to 2016. Total burglary reports that involved OxyContin decreased after 2009. Total burglary reports that involved oxycodone remained steady from 2009 to 2014, decreased from 2014 to 2015, and remained steady from 2015 to 2016. The majority of reported incidents occurred on weekdays and involved suspects who entered and exited through the front door at pharmacies without security features such as alarms, dead bolts, and cameras.

Conclusion: Following replacement of the original formulation of OxyContin with a new formulation that has abuse-deterrent properties in 2010, pharmacy thefts of OxyContin reported to the RxPATROL® database decreased. The decreases were not fully explained by concurrent trends in total robbery or burglary incidents reported to the RxPATROL® database over the same time period.

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INTRODUCTION

Misuse and abuse of prescription pain relievers, including opioid analgesics, continues to be a

public health concern in the United States, with an estimated misuse prevalence rate in 2015 of approximately 4.7 percent (12,462,000 persons) among individuals 12 years or older.¹ One source of opioids for abuse is theft from pharmacies—a type of diversion.²

The Uniform Controlled Substances Act defines prescription drug diversion as the transfer of a

Previous presentation of the work: Partial results of this study were presented as a poster at the 78th Annual Meeting of the College on Problems of Drug Dependence, June 11-16, 2016, Palm Springs, California.

controlled substance from a lawful to an unlawful channel of distribution or use.³ Several mechanisms of diversion exist, including the selling or trading of prescriptions or controlled substances by health-care practitioners; theft (eg, robbery or burglary) from manufacturing, common or contract carriers, distributors, pharmacies, or ultimate users; forgery or alteration of prescriptions; and theft from institutional drug supplies.^{4,5} Although there is a general lack of data surrounding the frequency and magnitude of each method of diversion of prescription drugs,⁶ pharmacy theft is common.⁷ Prescription opioid analgesics are often targeted because of their inherent rewarding effects, restrictions on their prescribing, their known content and strength, and their lucrative street value.⁸

The federal Drug Enforcement Administration (DEA) requires its registrants that store prescription opioid analgesics (eg, pharmacies, distributors, hospitals) to report theft and significant loss of any controlled substance.^{4,9} Although these data can be informative, analyses of them are not regularly published; therefore, they are not easily accessible to inform pharmacy safety and security.^{4,7,10}

To better address these issues, Purdue Pharma L.P., Stamford, CT, developed the **Rx Pattern Analysis Tracking Robberies and Other Losses (RxPATROL®)** database, a voluntary, national, web-based repository of information on diversion of prescription medicines from pharmacies (primarily) that is intended for use by both pharmacies and law enforcement to learn from and combat pharmacy-related crimes.¹⁰

RxPATROL® is a collaborative effort between industry and law enforcement designed to collect, collate, analyze, and disseminate pharmacy theft information to help protect the pharmacy environment. The RxPATROL® program is overseen by employees of Purdue Pharma L.P. with former law enforcement experience. This group works with law enforcement, the pharmacy community, and security professionals to populate the database with detailed crime information utilizing an incident-analysis software platform that incorporates written description, photographs, and streaming video from surveillance cameras and is capable of analyzing data and identifying trends. As uploading information and responding to follow-up inquiries is entirely voluntary, there is no economic incentive to report cases to the database.

As part of a multipronged effort to diminish the abuse of prescription opioid analgesics, the development of opioid analgesics with abuse-deterrent

technologies represents one approach that drug developers are uniquely able to provide. Development of formulations of opioids with abuse-deterrent properties and claims is considered to be a high public health priority by the US Food and Drug Administration (FDA).^{11,12} In August 2010, a reformulated, abuse-deterrent formulation of OxyContin (oxycodone hydrochloride, Purdue Pharma L.P.) extended-release tablets CII was introduced; this formulation was more difficult to crush and formed a viscous hydrogel that made snorting and injection more difficult than with the original formulation. Coincident with the launch of the reformulation, the original formulation was no longer shipped and eventually was removed from the market.¹³ By early 2011, most of the pharmacy supply of the original formulation of OxyContin had been replaced with the reformulation.¹³ Since abuse-deterrent opioid analgesic formulations have been available for only a few years, their effectiveness at deterring abuse in the community is still under active study. Recent studies have shown that the new formulation of OxyContin is less desirable to recreational drug users than the original formulation.^{14,15}

We postulated that diversion is demand driven and that an opioid drug product with established demand for abuse might be diverted less frequently after reformulation with abuse-deterrent properties that make it less attractive to abusers and, therefore, to diverters. To better understand trends in pharmacy diversion surrounding the introduction of the first opioid analgesic with abuse-deterrent properties, we conducted an analysis of pharmacy-related theft data reported to the RxPATROL database during time periods before (2007-2010) and after (2011-2016) the August 2010 switch to reformulated OxyContin.

OBJECTIVE

The objective of this manuscript is to characterize pharmacy-related theft data reported to the RxPATROL database during the time periods before (2007-2010) and after (2011-2016) the 2010 switch to reformulated OxyContin.

METHODS

RxPATROL database

The RxPATROL website has been previously described.¹⁰ Briefly, reports of diversion can be

posted to the RxPATROL database through an online portal. The web-based report form (<http://www.rxpatrol.com/>) captures information relevant to the type of incident (robbery, burglary, forgery, fraud, employee theft, shoplifting, cargo theft, and others), details of the incident, descriptions of suspects, and physical security specifics of the site of diversion. Database administrators may also actively reach out to a pharmacy for information after they receive report of a crime. The website administrator reviews all submitted reports, which then undergo a validation and quality assurance process. The information in RxPATROL database is de-identified so that individuals are not identified.

Data analysis

This analysis primarily describes pharmacy-related thefts that occurred in the United States and were reported to the RxPATROL database between January 1, 2007, and December 31, 2016. An incident was characterized as a robbery if it involved taking anything of value from the care, custody, or control of a person or persons by force or intimidation. Attempts are included in this analysis. Burglary was defined as the unlawful entry into a structure to commit a crime.

The RxPATROL database was queried to identify characteristics associated with the theft of drug products that contained controlled substances. The variables analyzed were related to incident counts, drugs involved (especially OxyContin or other oxycodone-containing drug products), pharmacy security features, and other incident-related information. Information from the years 2007 to 2010, defined as the original formulation period, was compared with information from 2011 to 2016, defined as the post-reformulation period, to compare time periods before and after introduction of the reformulation. Data were analyzed using Microsoft Excel 2010, and percentages were calculated. No further statistical analyses were performed.

RESULTS

The DEA collates, but does not regularly publish, total annual pharmacy theft incidents involving controlled substances. A total of 6,905 incidents throughout the United States were reported to the RxPATROL database from 2007 to 2016. During 2014-2016, RxPATROL captured 47.4 percent of the

robberies reported to the DEA.⁹ Robbery and burglary were the most common types of incidents reported and accounted for 51.8 percent and 26.4 percent, respectively, of all reported incidents. Other reported incidents included fraud (12.3 percent), forgery (6.6 percent), cargo theft (1.3 percent), shoplifting (0.4 percent), and employee theft (0.5 percent).

The number of pharmacy robberies reported to RxPATROL increased between the original formulation period (2007-2010) and the post-reformulation period (2011-2016); 1,222 robberies (305.5/period year) and 2,353 robberies (392.17/period year), respectively (Table 1; Figure 1). The trend in incident reports shows that the total number of robbery incidents initially increased through 2010 and then remained somewhat steady from 2011 to 2016.

During the study timeframe, OxyContin accounted for approximately 10 percent of prescriptions for extended-release/long-acting (ER/LA) opioid analgesics and less than 4 percent of prescriptions for all formulations of opioid analgesics (ER/LA; immediate-release single-entity; and immediate-release combination products). Reports of robberies involving OxyContin decreased from 684 (171/year) during the original formulation period to 327 incidents (54.5/year) during the post-reformulation period. Comparing the years that bounded the study timeframe, 15 robberies that involved OxyContin were reported in 2007, compared with two in 2016 (Table 1; Figure 1).

Conversely, reports of robberies involving other oxycodone products increased from 95 (23.75/year) during the original formulation period to 709 (118.17/year) during the post-reformulation period, with 19 occurring in 2007, increasing to 142 in 2016 (Table 1; Figure 1).

Reports of burglaries increased initially over the study period, but leveled out somewhat after 2009 and then decreased steadily after 2012. Burglaries during which OxyContin or oxycodone were taken decreased during the post-reformulation period of OxyContin with abuse-deterrent properties (Table 1).

Combining all robberies and burglaries, 2,059 incidents were reported during the OxyContin original formulation period, and 3,348 incidents were reported during the OxyContin post-reformulation period. The number of theft incidents that involved OxyContin decreased from 771 (192.75/year) during the original formulation period to 366 (61/year) in the post-reformulation period. This contrasts with what was observed for other oxycodone-containing products, where 202 (50.5/year) incidents were

Table 1. Burglary and robbery incidents involving OxyContin compared to incidents involving oxycodone from 2007 to 2010 compared with 2011 to 2016

Year	Burglary incidents, n (percent)			Robbery incidents, n (percent)		
	Total burglary incidents	OxyContin	Oxycodone*	Total robbery incidents	OxyContin	Oxycodone*
2007	176 (9.6)	15 (11.9)	27 (12.6)	194 (5.4)	85 (8.4)	19 (2.4)
2008	185 (10.1)	16 (12.7)	16 (7.4)	162 (4.5)	83 (8.2)	7 (0.9)
2009	253 (13.8)	31 (24.6)	31 (14.4)	367 (10.3)	220 (21.8)	23 (2.9)
2010	223 (12.2)	25 (19.8)	33 (15.3)	499 (14.3)	296 (29.3)	46 (5.7)
Subtotal (Pre[†])	837 (45.7)	87 (69.0)	107 (49.8)	1,222 (34.2)	684 (67.7)	95 (11.8)
2011	216 (11.8)	12 (9.5)	19 (8.8)	386 (10.8)	94 (9.3)	105 (13.1)
2012	229 (12.5)	11 (8.7)	23 (10.7)	441 (12.3)	84 (8.3)	125 (15.5)
2013	204 (11.1)	6 (4.8)	26 (12.1)	320 (19.0)	62 (6.1)	86 (10.7)
2014	148 (8.1)	5 (4.0)	23 (10.7)	424 (11.9)	54 (5.3)	133 (16.5)
2015	86 (4.7)	3 (2.4)	7 (3.3)	390 (10.9)	20 (2.0)	118 (14.7)
2016	112 (6.1)	2 (1.6)	10 (4.7)	392 (11.0)	13 (1.3)	142 (17.7)
Subtotal (Post[†])	995 (54.3)	39 (31.0)	108 (50.2)	2,353 (65.8)	327 (32.3)	709 (88.2)
Total	1,832	126	215	3,575	1,011	804

*Oxycodone products excluding OxyContin.

[†]Pre and Post refer to Pre- and Post-reformulation.

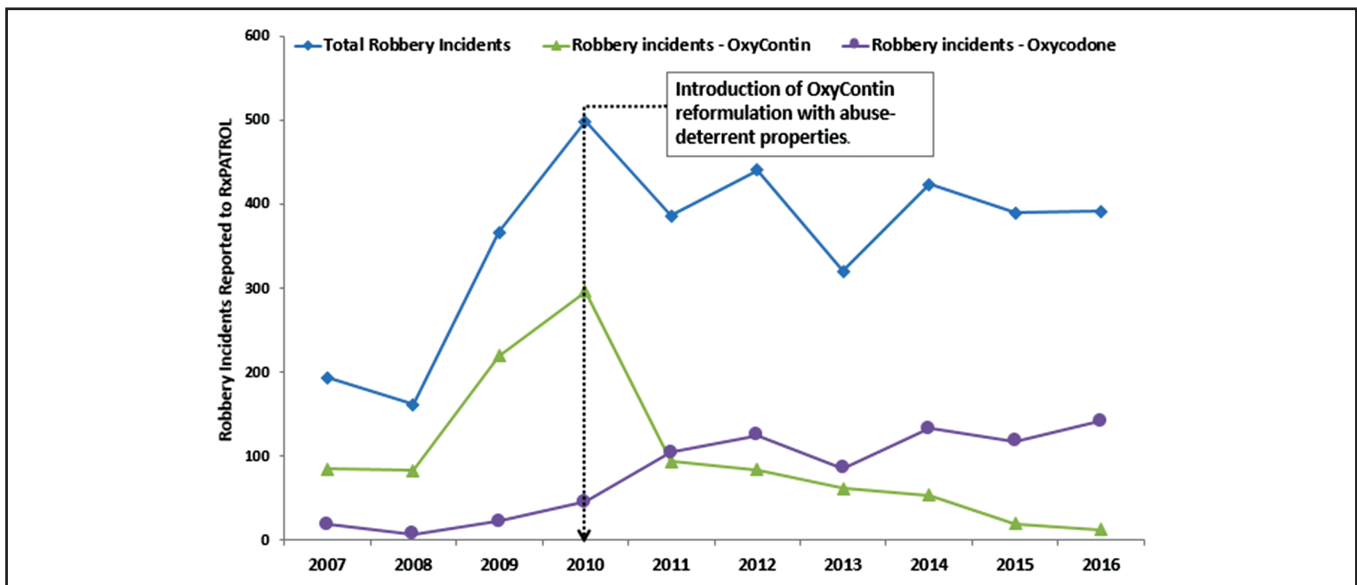


Figure 1. Robbery incidents reported to the RxPATROL® database by incident type, 2007 to 2010 compared with 2011 to 2016. Total robbery incidents increased steadily until 2010, remained relatively steady through 2014, and somewhat decreased from 2015 to 2016. This is in contrast to robbery incidents involving OxyContin that increased until 2010 and then dropped from 2011 to 2016. Robberies involving other oxycodone-containing products slightly increased during the study timeframe.

reported during the original OxyContin formulation period and 817 (136.2/year) were reported during the OxyContin post-reformulation period (Table 1).

Since a perpetrator may demand specific drugs during a robbery, these reports were analyzed in greater detail to gain a better understanding of security features and other aspects that may be consistently associated with this type of pharmacy crime. A summary of these findings is provided as Appendix. Robberies occurred more frequently on weekdays than on weekends. They were more common during the day and evening, with approximately equal proportions occurring between 0800 and 1159, 1200 and 1559, and 1600 and 1959 hours. There was a slight decrease in incidents from 2000 to midnight. Interestingly, 94 percent of the incidents reported that there was no safe for storing controlled substances on the premises and 97 percent of incidents reported that the suspect entered through the front door. Most pharmacies did not have the minimum of at least one desirable security feature, such as a manual alarm, deadbolt on the door, door alarm, hidden camera, visible camera within the premises, public monitor showing security camera feeds, or motion detector. A weapon was alleged to be present in 73 percent of the robberies, with 47 percent of reports stating that it was displayed. The most commonly reported weapon used during reported robberies was a handgun (63 of the armed robberies).

DISCUSSION

Diversion of prescription opioid analgesics remains a problem in the United States. In 2014, more than 10 million dosage units of opioid analgesics were lost, and those containing oxycodone or hydrocodone are the most commonly diverted prescription opioid analgesic.⁸ The DEA has also reported that the total number of armed robberies of DEA registrants during which prescriptions drugs were stolen has increased since 2009.⁸

The total number of pharmacy robbery and burglary reports increased between the original formulation period (2007-2010) and the post-reformulation period (2011-2016), peaking in 2009 (burglaries) and 2010 (robberies), and then remaining nearly steady. However, analysis of the reports from RxPATROL database showed a decreased trend in the theft of OxyContin from pharmacies following the 2010 introduction of and replacement with a reformulated OxyContin that has abuse-deterrent properties. The total number of combined robberies and

burglaries that involved OxyContin has gradually decreased from 2011 onward, as compared with an observed increase in incidents that involved other oxycodone-containing products.

The overall effectiveness of abuse-deterrent formulations in reducing their abuse in the community remains an open question with the FDA. Some studies have shown that the new reformulation of OxyContin with abuse-deterrent properties is less desirable to recreational drug users than the original formulation.^{14,15} One study found that during the few years following the introduction of the OxyContin reformulation, OxyContin was prescribed less frequently, its street price decreased, and it was diverted less frequently.¹⁵ Another analysis reported a 50 percent decrease in the rate of doctor-shopping (overlapping prescriptions from 2+ prescribers/3+ pharmacies) for OxyContin after its reformulation, particularly involving higher tablet strengths (eg, 80 mg OxyContin tablets).¹⁶ These data suggest that the demand for OxyContin for purposes of abuse decreased following the introduction of the reformulated OxyContin with abuse-deterrent properties. Data on robberies and burglaries involving OxyContin presented in this study support these findings and suggest that reformulated OxyContin with abuse-deterrent properties is less sought out during pharmacy crime than the original formulation or other oxycodone-containing products.

To reduce and prevent diversion of prescription drugs, the American Society of Health-System Pharmacists (ASHP) has published draft guidelines to help inform health systems on best practices for implementing effective programs aimed at preventing diversion of controlled substances.¹⁷ In these guidelines, the ASHP outlines best practices for the storage and security of controlled substances by encouraging a combined approach of implementing facility controls (eg, camera surveillance), physical access controls (eg, locks or biometric technology), and frequent inventory checks. One of the key elements identified in these guidelines includes ensuring that these substances remain in a locked and secured location, unless the drug is in the direct physical control of an authorized individual.¹⁷ This guidance further highlights the importance of security video surveillance monitoring, especially in high-volume storage areas that are at risk for diversion, as a deterrent to pharmacy theft.¹⁷

A total of 3,575 pharmacy robberies were reported to the RxPATROL database from 2007 to

2016. Analysis of these robberies revealed that most pharmacies did not have basic security features on their premises and that most suspects used the front door as the point of entry and exit, supporting the need for implementation of the ASHP guidelines.

LIMITATIONS

There are limitations to the RxPATROL database that should be considered when using it for research purposes. Information is submitted to the RxPATROL database voluntarily, and information is not systematically collected within a given state or across the nation. Analysis is based on the information entered into the system by the law enforcement officer, the reporting pharmacist, or the RxPATROL administrator, and information regarding specific drug products or drug substances is not always available or may be misclassified. As a database that relies on the volunteering of incident reports, RxPATROL is likely subject to underreporting bias.¹⁰ Furthermore, the individual reporting the incident may also introduce bias that affects the type of incidents reported. The small number of employee thefts reported to the RxPATROL database could possibly be an example of underreporting bias and an unwillingness to report this specific type of crime. Nonetheless, the database provides a useful snapshot of pharmacy-related drug diversion in the United States.

In the few years following the introduction of reformulated OxyContin with abuse-deterrent properties, fewer prescriptions were written for OxyContin.¹⁵ It is possible that this influenced the number of OxyContin-related thefts reported to the RxPATROL database. It is also possible that other factors, including increased awareness of abuse-deterrent properties and public resources directed at the misuse of prescription opioid analgesics, have contributed to making OxyContin a less desirable product for theft and abuse.¹⁸

CONCLUSION

Diversion of prescription opioid analgesics remains a problem in the United States, and pharmacy-related crimes contribute to the supply used for unlawful purposes. Almost 6,000 reports of diversion incidents were recorded in the RxPATROL database from January 1, 2007, through December 31, 2016. Collectively, robbery and burglary accounted for almost 78 percent of the total incidents reported

to the RxPATROL database. The majority of incident reports indicated that suspects entered through the front door, and the pharmacy did not have basic security features such as a safe, dead bolt, or camera.

Data from the RxPATROL database showed that the total number of reported robberies increased from 2007 to 2010 and then plateaued through 2016. A different pattern was observed for robberies that involved OxyContin, which increased initially until 2010 but then dropped after 2010 from 25 reported incidents to two reported incidents in 2016. However, reports of robberies implicating other oxycodone-containing products have risen steadily since 2008. The number of reported burglaries decreased after 2009, as did the number involving OxyContin or other oxycodone products.

The observed decrease in pharmacy-related thefts associated with OxyContin was not completely explained by concurrent trends in total robbery or burglary incidents reported over the time frame of the study. Taken together, these data suggest that reformulated OxyContin with abuse-deterrent properties may be less desirable to those perpetrating such crimes than the original OxyContin formulation.

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Appendix: Security features and robbery characteristics reported to RxPATROL, 2007-2016 (N = 3,570)

Security features		Robbery-related information	
Alarm		Day of week	
Yes	30 percent	Weekday	76 percent
No	70 percent	Weekend	24 percent
Dead bolt on doors		Time of day	
Yes	3 percent	0000 to 0359	9 percent
No	97 percent	0400 to 0759	6 percent
Door alarm		0800 to 1159	
Yes	4 percent	1200 to 1559	22 percent
No	96 percent	1600 to 1959	24 percent
Hidden camera		2000 to 2359	
Yes	2 percent	Use of weapon	
No	98 percent	Armed weapon displayed	47 percent
Public monitor		Armed weapon not displayed	
Yes	5 percent	Not armed/unknown	26 percent
No	95 percent	Type of weapon	
Internal camera		Pistol	8 percent
Yes	15 percent	Handgun	63 percent
No	85 percent	Rifle	<1 percent
Motion detector		Shotgun	1 percent
Yes	7 percent	Knife	9 percent
No	93 percent	Baseball bat	<1 percent
Safe on premises		Others	
Yes	6 percent	Entry by front door	97 percent
No	94 percent	Exit by front door	92 percent