

Opioid  
Prescription  
Drug  
Monitoring  
Surveillance  
Report



2015

Department of Health and Human Services  
Division of Public Health

# Opioid Prescription Drug Monitoring Surveillance Report

**Release date: November 28, 2016**

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## Introduction

## Contents

INTRODUCTION.....	1
The Opioid Epidemic .....	1
Controlled Substance Utilization Review and Evaluation System (CURES) .....	1
Prescriber Guidelines .....	2
Purpose .....	2
Acknowledgments.....	2
METHODS.....	4
Data Source.....	4
Participants .....	4
Indicator Selection .....	4
Variables.....	4
Data Analysis.....	4
Table 1: Conversion Factors <sup>15</sup> .....	5
RESULTS.....	6
Participant Characteristics .....	6
Table 2: Patient Age at Date Opioid Prescription Filled, Sacramento County, 2008-2015.....	6
Sacramento County Prescribing Practices .....	7
Figure 1: Distribution of Prescribers by Zip Code, Sacramento County, 2015.....	7
Figure 2: Prescriptions by Patient Three Digit Zip Code, Sacramento County, 2015.....	7
Figure 3: Number of Opioid Prescriptions and Opioid Prescribers Reporting, Sacramento County, 2008-2015.....	8
Table 3: Number of Opioid Analgesics Reported per 1,000 Residents by Year (Excluding Buprenorphine and Methadone), Sacramento County, 2008-2015 .....	8
Table 4: Number of Opioid Prescriptions by Opioid Class, Sacramento County, 2008 & 2015.....	9
Opioid Prescriptions.....	10
Table 5: Percent of Opioid Naïve Patients Prescribed Long Acting, Extended Release Opioids by Year, Sacramento County, 2009-2015.....	10
Prescription Strength and Dosage .....	10
Table 6: Patients Receiving Opioid Prescriptions over 90/100/120 MME, Sacramento County, .....	10
2008-2015 (excludes Buprenorphine and Methadone) .....	10
Opioid Prescription Duration, Duplication and Overlap .....	11

## Introduction

Figure 4: Residents per 1,000 with 90 or More Days' Supply of Prescription Opioids by Year, Sacramento County, 2008-2015 .....	11
Figure 5: Multiple Number of Opioid Prescribers, Pharmacies Seen by Patients, Sacramento County, 2015 .....	11
Opioid and Other Prescription Combinations .....	12
Table 7: Overlapping Prescriptions by Year, Sacramento County, 2008–2015 .....	12
.....	12
Figure 6: Number of Patients with Overlapping Opioid and Benzodiazepine Prescriptions, Sacramento County, 2008-2015 .....	12
Opioid Dependency Treatment Prescriptions.....	13
.....	13
Figure 7: Number of Prescribers Reporting Buprenorphine, Methadone Prescriptions by Year, Sacramento County, 2008-2015 .....	13
Table 8: Buprenorphine, Methadone Prescriptions Reported per 1,000 Residents, Sacramento County, 2008-2015 14	
DISCUSSION.....	15
Key Findings .....	15
Patient Characteristics .....	15
Indicators .....	15
Strengths .....	17
Limitations.....	17
CONCLUSION.....	19
Recommended Actions .....	19
REFERENCES .....	20
Appendix 1: List of Opioids .....	21
Appendix 2: Indicators .....	22
Appendix 3: CURES Variables.....	23

## Introduction

# INTRODUCTION

### The Opioid Epidemic

Over 100 million people in the United States are affected by chronic pain.<sup>1</sup> Prescription opioids, traditionally prescribed for short-term injuries, surgeries, cancer patients, or end-of-life care, have been increasingly prescribed for long-term treatment of chronic pain since the 1990s. Opioids are a class of drugs that include the illicit drug heroin as well as licit prescription pain relievers like oxycodone, hydrocodone, codeine, morphine, fentanyl, among others.

Opioids can provide pain relief for patients experiencing moderate to severe acute pain, but have numerous side effects and their long-term effectiveness is largely unknown. Side effects of opioids include sleepiness, dizziness, confusion, and depression. Long-term use of opioids can result in opioid-induced hyperalgesia (increased sensitivity to pain), physical dependence, addiction, and/or opioid tolerance.<sup>2</sup> Opioid tolerance is a state of adaptation in which prolonged exposure induces physiologic changes that result in a decrease in the effects of the opioids over time. Opioid use disorder is a medical condition that can be characterized by compulsive use of opioids despite adverse consequences. Opioid misuse, overuse or mixing with sedatives or alcohol can result in respiratory depression, coma and/or death.

Despite these risks, sales of prescription opioids have quadrupled since 1999 nationally. Unfortunately, trends have shown an increase in adverse effects of prescription opioids with the increase in availability. The rate of opioid overdoses has tripled since 2000, and in 2014 over 60% of all drug-related overdoses in the US involved opioids.<sup>3</sup>

Fortunately, recent studies have indicated certain risk factors in prescribing practices that can alert prescribers to patients who may be at risk for misuse. Risk factors include:

- Multiple provider episodes or “doctor shopping”<sup>4-6</sup>
- High daily doses<sup>5,6</sup>
- Overlapping opioid and benzodiazepine prescriptions<sup>7</sup>
- Use of long-acting or extended-release (LA/ER) opioids, especially in new patients<sup>8</sup>

Understanding these risk factors may help providers better assist their patients in pain management while also protecting their health and safety.

### Controlled Substance Utilization Review and Evaluation System (CURES)

Forty-nine states and the District of Columbia have established Prescription Drug Monitoring Programs (PDMP) to track controlled prescriptions. Recently these systems have also been used to identify risk factors for misuse. In California, the Controlled Substance Utilization Review and Evaluation System (CURES) is a statewide database of Schedule II through IV prescriptions dispensed. The California Health & Safety Code Section 11165(d) (2013) now requires dispensing pharmacies, clinics, or other dispensers of these controlled substances to report information on the prescription dispensed to the Department of Justice via CURES on a weekly basis.<sup>9</sup> Currently, pharmacists and prescribers, as well as physician

## Introduction

assistants, nurse practitioners, law enforcement, licensing boards, and researchers can request patient information from the CURES database.

Tracking prescription drugs has been a practice in California since the 1930s. In 1939, the California Triplicate Prescription Program (TPP) was created. This program recorded Schedule II prescription information. In 1997, CURES was initiated and two years later fully replaced TPP and began tracking Schedule II through IV prescription information. In 2009, PDMP was introduced as a searchable, client-facing component of CURES, allowing providers to track patient prescribing habits. In 2013, Senate Bill 809 was introduced and passed, which required pharmacists to report dispensations of Schedule II through IV controlled substances at least weekly and providers to register for CURES access by January 2016.<sup>10</sup> The deadline for provider registration was extended to July 1, 2016. Inquiry of CURES by prescribers and dispensers for prescription misuse prevention or intervention remains voluntary. AB 809 also resulted in an upgrade to the CURES database to provide a more highly secure, responsive, scalable, and reliable system to accommodate a large increase in usage, integration with health information systems and a method for multi-agency collaboration and sharing of sensitive information.

## Prescriber Guidelines

A number of agencies have provided guidelines for prescribing opioids to patients with chronic, non-cancer pain. In 2014, the Medical Board of California released *Guidelines for Prescribing Controlled Substances for Pain*. The guidelines included considering safe alternatives before opioids, using caution when prescribing over 80 milligram morphine equivalents (MME) daily dose, and requesting CURES reports on patients.<sup>11</sup>

The Centers for Disease Control and Prevention (CDC) released new guidelines in March of 2016 that list 12 recommendations for prescribing opioids, most importantly stating non-opioid therapy is preferred for non-cancer or end of life care; the lowest possible effective dosage should be prescribed when used; and extreme care, caution, and monitoring practices should be used when prescribing opioids.<sup>3</sup>

## Purpose

This report analyzes data from the California PDMP CURES using indicators of medical use and possible non-medical prescription misuse adapted from indicator lists developed by the CDC and Brandeis University Center for Excellence. This report aims to identify risk factors of prescription opioid misuse in Sacramento County. It will be used to educate stakeholders and the community and to aid in preventing adverse outcomes of opioid misuse in the County.

## Acknowledgments

The Division of Public Health acknowledges the Sacramento County Division of Behavioral Health (SCBH), Alcohol and Drug Treatment Services, for providing treatment and recovery services for residents suffering from opioid and other substance dependencies. We would like to acknowledge the Sacramento Area Opioid Taskforce, established in 2016, for providing stakeholders with a forum for open dialogue about opioid misuse, and for its efforts to preventing opioid overdoses and deaths in Sacramento County. We'd like to recognize Lori Miller, Edward Dzuik, and Uma Zykofsky from SCBH for

## Introduction

their leadership in this multi-agency Taskforce and SCBH. We would also like to thank the California Department of Justice and Mike Small for providing access to the CURES dataset and for their assistance in interpretation and analysis of the data elements provided.

For questions or comments about this report, please contact the Sacramento County Epidemiology Program Manager, Jamie White, at [whiteja@saccounty.net](mailto:whiteja@saccounty.net).

## Methods

# METHODS

### Data Source

Data analyzed was from the California Prescription Drug Monitoring Program (CURES) made available by the California Department of Justice (DOJ). A de-identified dataset was provided for analysis of prescriptions entered into CURES from January 1, 2008 to December 31, 2015.

### Participants

Patients were included in analysis if they resided in Sacramento County at the time of prescription fill and a prescription was filled and entered into CURES between January 1, 2008 and December 31, 2015. Patients with prescriptions for any substance other than the opioids listed in Appendix 1 and benzodiazepines were excluded. Additionally, prescriptions missing days' supply or where the provider entered zero as days' supply were excluded from analysis for indicators relating to prescription duration.

### Indicator Selection

Indicators that were analyzed included a sub-set of CDC and Brandeis University indicators for risky prescribing practices and behaviors. Indicators considered for analysis can be found in Appendix 2.

Indicators were included when variables provided through CURES and DOJ were sufficient to calculate them. Variables available from CURES for analysis are found in Appendix 3. Number of providers registered was excluded as DOJ could not provide registration counts to counties at time of reporting.

### Variables

#### Definitions

Opioids included in analysis were taken from the Drug Enforcement Agency *Drug of Abuse*<sup>12</sup> and the Food and Drug Administration (FDA) list of long-acting and extended-release opioids.<sup>13</sup> A full list of opioids included in this analysis can be found in Appendix 1.

Multiple provider episodes (MPE) were defined and calculated according to the Brandeis indicator of six or more prescribers or pharmacies. Evidence for the threshold for defining a high dose of morphine milligram equivalents (MME) is still being gathered. New recommendations from the CDC state clinicians should avoid increasing dosage to 90 MME or more,<sup>3</sup> while Brandeis indicators suggest harmful dosage at 100 MME, but previous guidelines have shown harmful side effects at 120 MME. All three thresholds are included in this report due to the lack of consensus and evolving scientific evidence.

Patients were considered opioid naïve when they received their first opioid prescription. Patients with their first recorded opioid prescription in 2008 were excluded from analysis as it was the first year of data available and these patients could not be assumed to be opioid naïve.

### Data Analysis

#### Calculations

Per capita rates were calculated using the California Department of Finances July 1 population estimates for each calendar year.



## Results

Morphine milligram equivalents (MME) were calculated using the following PDMP Assist Brandeis formula:<sup>14</sup>

$$\text{Quantity per Day (QPD)} = \text{Quantity} / \text{Days' Supply}$$

$$\text{MME} = \text{QPD} \times \text{Conversion Factor (Table 1)} \times \text{Strength}$$

The units of measure (e.g., micrograms, milligram/milliliter etc.) reported for prescription strength varied by individual prescription in the CURES dataset. Prescription strengths were converted to milligrams when necessary to calculate MME.

**Table 1: Conversion Factors<sup>15</sup>**

	Administration	Conversion Factor
Buprenorphine	Injection	33.3
	Patch	12.6
	Nasal	15
	Oral	10
Fentanyl		7.2
Hydrocodone		1
Hydromorphone	Oral	4
Methadone	Up to 20mg per day	4
	21 to 40mg per day	8
	41 to 60mg per day	10
Morphine		1
Oxycodone		1.5
Oxymorphone		3
Tapentadol		0.4

Hydromorphone tablets can be taken orally or as a suppository, but method of administration was not generally indicated in the dataset. As a conservative estimate, it was assumed that only tablets were prescribed. Therefore, for all MME conversions of hydromorphone calculations used the tablet conversion factor of 4 as opposed to the suppository conversion factor of 10.

Percent of patient prescription days with overlapping opioid prescriptions were calculated as follows:

$$\text{Prescription End} = \text{Date Filled} + \text{Days' Supply}$$

$$\text{Overlap} = \text{previous Prescription End} - \text{next Date Filled}$$

$$\text{If Overlap} > 0 \text{ then Percent} = \text{Overlap} / \text{previous Days' Supply}$$

An average of percent was found for each year.

If time in between prescriptions was +/- 7 days, including overlapping prescriptions, days supplies for each prescription were added together from sequential days' supply. If sequence was over 90 days, patients were included in analysis for long-term opioid usage.

## Results

# RESULTS

### Participant Characteristics

A total of 8,530,963 opioid prescriptions prescribed by 46,424 prescribers for 1,227,602 patients who resided in Sacramento County from 2008 to 2015 were analyzed.

Patients prescribed opioids were 59.1% female and 40.9% male. The proportion of patients prescribed opioids who were female remained fairly constant by individual year (data not shown).

Table 2 shows number of patients and number of prescriptions by patient age group at date prescription filled in 2008 compared to 2015. More than three out of every five patients receiving at least one opioid prescription in 2008 (62.1%) and 2015 (66.0%) were age 40 years or older. The largest percent increase in number of patients receiving at least one opioid prescription during this time period was among infants age less than two (+495.7%), followed by seniors age 60 to 69 (+46.9%).

The vast majority of total prescriptions were also prescribed for patients age 40 and over in 2008 (73.5%) and 2015 (79.6%). The largest percent increase in total number of opioid prescriptions was among infants age less than two (+331.9%) followed by seniors age 60 to 69 (+75.5%), whereas the largest decrease was among those age 18 to 29 (-26.4%).

**Table 2: Patient Age at Date Opioid Prescription Filled, Sacramento County, 2008-2015**

Age at Date Filled (All Opioids)	2008 Number of Patients	2015 Number of Patients	Percent Change in Patients from 2008-2015	2008 Number of Prescriptions	2015 Number of Prescriptions	Percent Change in Prescriptions from 2008-2015
0-1	47	280	495.7%	113	488	331.9%
2-17	7,410	7,681	3.7%	9,760	9,517	-2.5%
18-29	49,480	42,082	-15.0%	106,660	78,462	-26.4%
30-39	44,722	44,290	-1.0%	140,468	128,190	-8.7%
40-49	50,312	42,047	-16.4%	211,812	166,850	-21.2%
50-59	49,480	54,353	9.8%	230,438	267,768	16.2%
60-69	29,964	44,032	46.9%	128,750	225,988	75.5%
70+	36,831	42,844	16.3%	140,100	186,666	33.2%

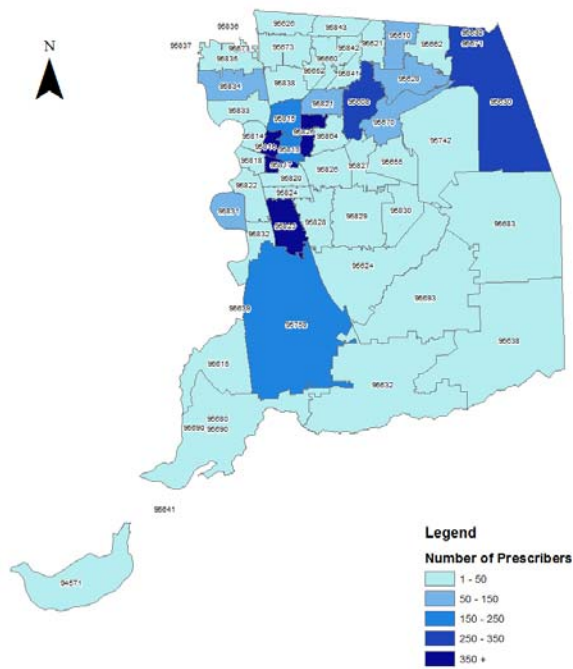
# Results

## Sacramento County Prescribing Practices

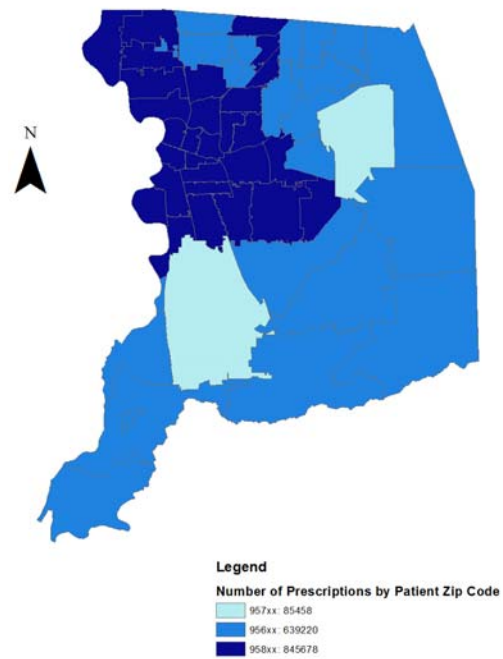
Figure 1 shows the distribution of opioid prescribers in Sacramento County in 2015. The two largest concentrations of prescribers were located in the East Sacramento/McKinley Park (95816) and North Oak Park (95817) neighborhoods. The next largest concentrations were in communities located in Arden Arcade (95825), Florin (95823), Folsom (95630) and Carmichael (95608).

Only the first three digits of the patients' zip code were available in the dataset provided. Figure 2 shows the distribution of opioid prescriptions by patient 3-digit zip code: 956, 957, and 958. Almost all (94.5%) of opioid prescriptions were to patients in zip codes 956xx and 958xx.

**Figure 1: Distribution of Prescribers by Zip Code, Sacramento County, 2015**



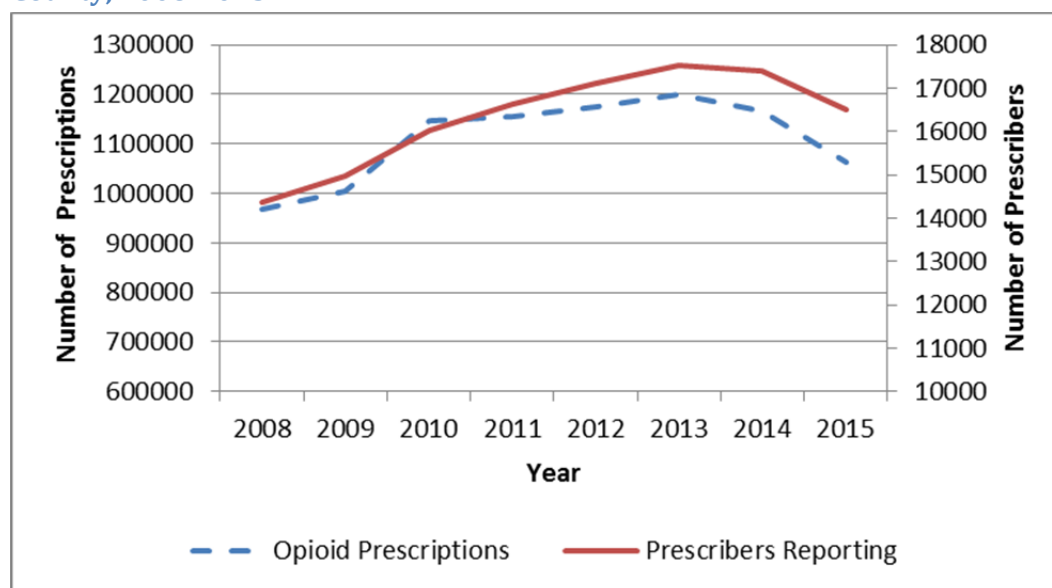
**Figure 2: Prescriptions by Patient Three Digit Zip Code, Sacramento County, 2015**



## Results

Figure 3 shows trends in opioid prescribing practices in Sacramento County. From 2008 to 2013, there was a 22.1% increase in the number of prescribers reporting at least one opioid prescription into the CURES database, followed by a 5.8% decrease from 2013 to 2015. A similar trend is also reflected in the number of total opioid prescriptions that have been reported to CURES since 2008, as well as the per capita rate of opioids prescribed (Table 3). In 2015, the total number of opioid prescriptions decreased by 9.5% from 2014, with the number of opioids per capita decreasing by 10.1% during the same time period.

**Figure 3: Number of Opioid Prescriptions and Opioid Prescribers Reporting, Sacramento County, 2008-2015**



**Table 3: Number of Opioid Analgesics Reported per 1,000 Residents by Year (Excluding Buprenorphine and Methadone), Sacramento County, 2008-2015**

Year	No. of Opioid Prescriptions Reported	No. of Opioid Prescriptions Reported per 1,000 Residents
2008	940,763	671.52
2009	972,630	689.12
2010	1,106,938	778.42
2011	1,113,390	776.55
2012	1,129,330	781.53
2013	1,147,608	788.55
2014	1,110,683	753.89
2015	1,009,621	677.91
<b>Total</b>	<b>8,530,963</b>	<b>739.82</b>

## Results

In 2015, 74.5% of opioids prescribed to Sacramento County patients were hydrocodone, when buprenorphine and methadone are excluded. When methadone and buprenorphine are included, 50.0% of prescriptions are buprenorphine and 36.6% are hydrocodone. Since 2008, the two opioid classes had decreases in the number of prescriptions: fentanyl (-9.9%) and hydrocodone (-3.4%). (Table 4) The largest percent increase in number prescriptions was seen in oxymorphone (+376.2%), buprenorphine (+510.2%), and tapentadol (+109,900%). The class with the largest increase in total number of prescriptions from 2008 to 2015 was oxycodone (+58,782 prescriptions), followed by morphine (+29,793 prescriptions).

**Table 4: Number of Opioid Prescriptions by Opioid Class, Sacramento County, 2008 & 2015**

	No. of Prescriptions in 2008	No. of Prescriptions in 2015	Percent Change from 2008-2015
Hydrocodone	778,486	751,755	-3.4%
Oxycodone	80,372	139,154	+73.1%
Morphine	38,908	68,701	+76.6%
Fentanyl	29,243	26,345	-9.9%
Methadone	22,582	25,288	+12.0%
Hydromorphone	13,255	20,191	+52.3%
Buprenorphine	4,756	29,020	+510.2%
Oxymorphone	499	2,376	+376.2%
Tapentadol	0	1,099	+109,900.0%

## Results

### Opioid Prescriptions

Though the number of opioid-naïve patients with long-acting (LA) or extended-release (ER) prescriptions has decreased overall since 2009, the percent of patients receiving LA or ER opioids who were opioid naïve has stayed consistent between 30 and 35% of total opioid patients since 2009 (Table 5).

**Table 5: Percent of Opioid Naïve Patients Prescribed Long Acting, Extended Release Opioids by Year, Sacramento County, 2009-2015**

	2009	2010	2011	2012	2013	2014	2015
Number of Naïve Patients with LA or ER Prescriptions	4,357	4,000	4,040	3,664	3,521	3,509	3,422
Percent of all Patients on LA/ER Opioids who were Naïve	32.0%	29.5%	31.0%	30.4%	31.9%	33.5%	34.9%

### Prescription Strength and Dosage

A patient who received a prescription that was calculated to be more than 90, 100 and 120 morphine milligram equivalents (MME) per day and either a 30 days' supply, or multiple prescriptions resulting in a continuous supply of 30 days or more are shown in Table 6. Though small changes in percentages can be seen, the percentages of patients receiving high MME doses of opioids remained steady from 2008 to 2015.

**Table 6: Patients Receiving Opioid Prescriptions over 90/100/120 MME, Sacramento County, 2008-2015 (excludes Buprenorphine and Methadone)**

	90 MME		100 MME		120 MME	
	Percent of Patients	Number of Prescriptions	Percent of Patients	Number of Prescriptions	Percent of Patients	Number of Prescriptions
2008	11.9%	72,846	10.1%	60,642	7.3%	49,568
2009	12.6%	88,182	10.6%	73,522	7.7%	60,278
2010	13.0%	134,386	11.0%	111,093	7.7%	89,344
2011	13.0%	139,526	10.9%	113,687	7.8%	92,240
2012	13.1%	142,117	11.1%	115,565	8.1%	94,299
2013	12.8%	142,415	10.7%	113,522	7.9%	93,072
2014	12.8%	138,504	10.7%	108,114	8.1%	89,711
2015	13.2%	129,327	10.8%	97,232	8.2%	82,237

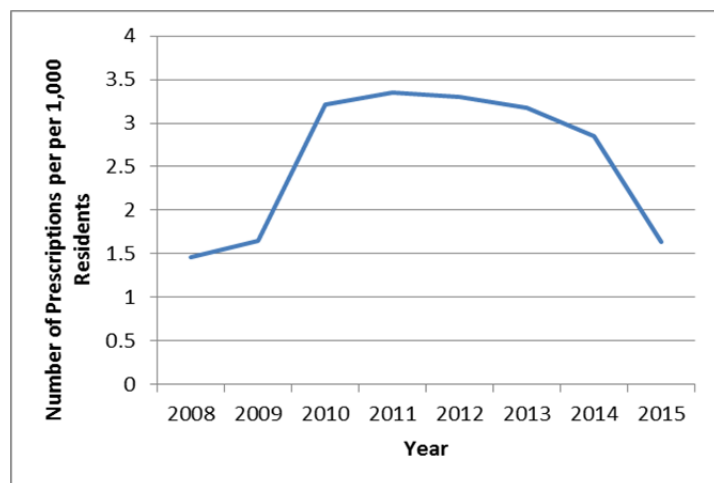
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### Opioid Prescription Duration, Duplication and Overlap

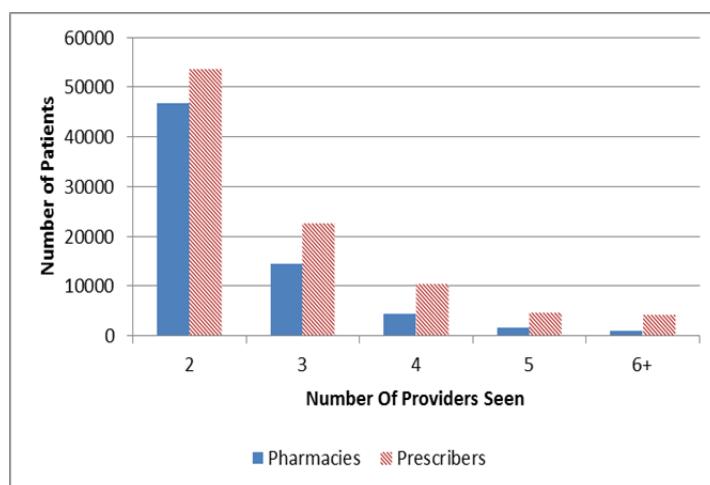
In 2010, 4,563 patients were prescribed greater than or equal to 90 days' supply of opioids, excluding buprenorphine and methadone. After a 96.8% increase from 2009, the number of prescriptions remained steady, until a decrease of 72.6% from 2013 to 2015. When calculated as per capita rates per 1,000 residents, these trends remain true (Figure 4).

In 2015, 65.3% of patients with opioid prescriptions saw only one prescriber, compared to 75.5% who saw only one pharmacist. Just 4,339 (1.6%) patients saw six or more prescribers in 2015, compared to 960 (0.3%) patients who saw six or more pharmacists (Figure 5). Percent of prescriptions reported that were filled with overlapping prescriptions ( $\geq 7$  days) are seen in Table 7. The percent of prescriptions filled with overlapping prescription days has stayed around 31% of prescriptions. From 2008 to 2014, the percent of overlapping prescription days decreased by 22.1%. In 2015, the number of overlapping prescription days increased by 4.1%.

**Figure 4: Residents per 1,000 with 90 or More Days' Supply of Prescription Opioids by Year, Sacramento County, 2008-2015**



**Figure 5: Multiple Number of Opioid Prescribers, Pharmacies Seen by Patients, Sacramento County, 2015**



## Results

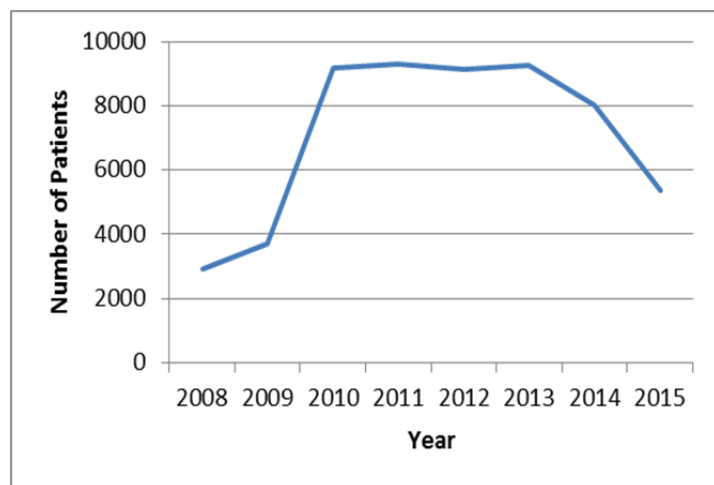
### Opioid and Other Prescription Combinations

Simultaneous or overlapping prescriptions of opioids and benzodiazepines are a strong risk factor for overdose. Figure 6 shows the percent of overlapping opioid and benzodiazepine prescriptions by year in Sacramento County. From 2008 to 2010, the number of patients in the County with overlapping opioid and benzodiazepine prescriptions for at least 30 days increased 215.3%. After 2010, the number of patients with overlapping prescriptions remained consistent around 9,200 patients, before decreasing 42.3% by 2015 (Figure 6).

**Table 7: Overlapping Prescriptions by Year, Sacramento County, 2008-2015**

	Percent of Prescriptions Filled with Overlapping Days	If Overlapping, Percent of Overlapping Prescription Days
2008	30.2%	83.4%
2009	30.9%	75.1%
2010	30.6%	72.2%
2011	30.1%	70.8%
2012	31.2%	68.8%
2013	31.1%	66.5%
2014	31.0%	65.0%
2015	31.2%	67.6%

**Figure 6: Number of Patients with Overlapping Opioid and Benzodiazepine Prescriptions, Sacramento County, 2008-2015**





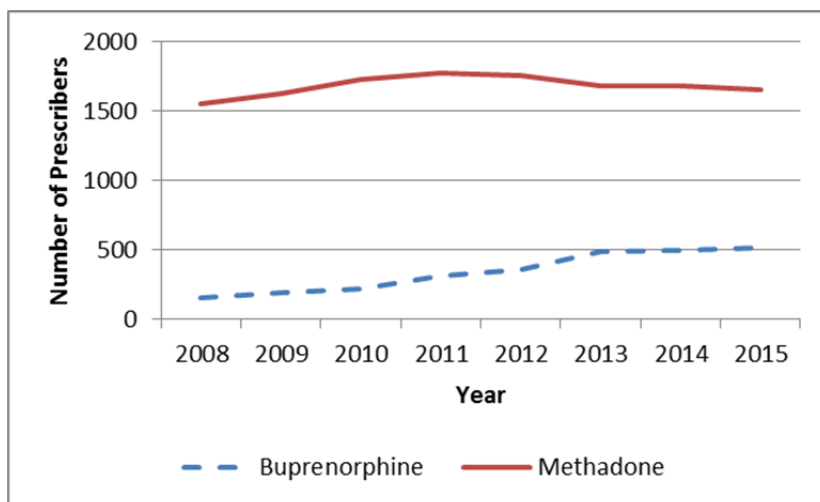
## Results

### Opioid Dependency Treatment Prescriptions

From July to December 2015, 1,609 prescribers in Sacramento County prescribed at least one patient methadone or buprenorphine (Figure 7). The number of prescribers reporting buprenorphine prescriptions has continued to increase, up 246.6% since 2008. In 2015, there were 515 individual prescribers who reported 138,439 buprenorphine prescriptions to Sacramento County residents. This equates to 56.6 buprenorphine prescriptions per prescriber, up from 31.9 in 2008.

Methadone prescriptions and prescribers reporting to CURES in Sacramento County have decreased recently after many years increasing. Until 2011, the numbers of prescribers reporting methadone prescriptions had increased 14.2%, but have since fallen 6.8%. This coincided with a 21.0% increase in total number of prescriptions until 2012, since followed by a 7.4% decrease. As both numbers have followed a similar trend, the number of prescriptions per prescriber has varied slightly but stayed between 14.52 and 15.85 since 2008.

**Figure 7: Number of Prescribers Reporting Buprenorphine, Methadone Prescriptions by Year, Sacramento County, 2008-2015**



Since 2008, the number of buprenorphine prescriptions reported to CURES per 1,000 residents in Sacramento County has increased 474.0%, from 3.4 in 2008 to 19.5 in 2015 (Table 8). The largest increase was from 2008 to 2013, at 396.7%. Since then, the increase rate for buprenorphine prescriptions has slowed to 15.6%. Methadone prescriptions increased from 16.1 prescriptions reported per 1,000 residents to 18.9 in 2010, an increase of 17.6%. Since then, methadone prescriptions per capita have decreased by 10.3% to 17.0 per 1,000 residents.

In 2008, there were 16 patients prescribed 40 or more milligrams of methadone. Ten of these had 30-day prescriptions, two had these prescriptions refilled. Since 2009 there have been no prescriptions of methadone of 40 or more milligrams.

*Results*

**Table 8: Buprenorphine, Methadone Prescriptions Reported per 1,000 Residents, Sacramento County, 2008-2015**

	Buprenorphine Prescriptions Reported per 1000 residents	Percent Change per Year	Methadone Prescriptions Reported per 1000 residents	Percent Change Per Year
2008	3.39	-	16.08	-
2009	5.45	60.7%	17.46	7.9%
2010	9.44	73.0%	18.91	7.7%
2011	9.73	3.1%	18.64	-1.4%
2012	11.63	19.5%	18.87	1.2%
2013	16.86	45.0%	18.24	-3.5%
2014	19.17	13.7%	17.69	-3.1%
2015	19.49	1.7%	16.96	-4.3%

## DISCUSSION

### Key Findings

#### Patient Characteristics

The majority of patients in Sacramento County who were prescribed opioids from 2008 to 2015 were female (59.1%).

Patients age 40 years and older were most likely to be prescribed at least one opioid prescription in 2015 (66.0%). Those age 40 years and older represented an even larger majority (79.6%) of total prescriptions filled, indicating that this group is more likely to have multiple prescriptions in a single year.

There was a sharp increase (+495.7%) in the number of infants, age less than two, who were prescribed at least one opioid from 2008 to 2015. This may be due to an increase in clinical diagnosis of neonatal abstinence syndrome (NAS). NAS is a result of the sudden discontinuation of fetal exposure to substances such as opioids that were used or misused during pregnancy. Pharmacological treatment (typically morphine) is required if symptoms of NAS do not improve with non-pharmacological treatment.

For children under age 18, 65.1% of prescriptions were prescribed to children over age 15. It is interesting to note that though the number of patients under age 18 has increased since 2008, the total number of prescriptions has decreased. The Federal Drug Administration (FDA) approved the use of the opioid painkiller OxyContin® (oxycodone) for certain children as young as age 11 in August 2015. Doctors could previously prescribe OxyContin® off-label to very sick children in severe pain, so it is unclear whether the FDA approval will lead to more oxycodone prescriptions for children after 2015.

#### Indicators

Overall trends in indicators analyzed show a sharp increase in prescriptions from 2008 to 2009, followed by a plateau from 2010 to 2013, and a decrease from 2014 to 2015.

CURES became searchable in 2009, allowing prescribers and pharmacists to request patient histories. Though searching CURES for prescription misuse prevention is voluntary, this function coincided with a dramatic change in prescribing habits the following year as it presumably became routine practice for many providers. Around this time, most indicators of risky opioid prescribing practices stopped the dramatic increases seen from 2008 to 2009 and began to level off.

The ability to search CURES beginning in 2009 and the dispensing requirements in 2013 may have also contributed to the recent observed decrease in the number of prescribers reporting at least one opioid prescription. Increased awareness of the opioid epidemic and/or an unwillingness of some prescribers to continue opioid prescribing due to increased scrutiny may have also influenced this decline in the number of opioid prescribers. The most recent data analyzed in this report is from 2015, before it was required for prescribers to register for CURES. Therefore it is difficult to determine if there was a true decrease in opioid prescribers or if fewer chose to report to CURES in 2015.

## Discussion

From 2008 to 2013, there was also an overall increase in number of opioids prescribed. This trend may be related to an increase in prescribers reporting or an increase in demand of opioids. Since 2013, the number of opioids prescribed in Sacramento County has decreased. However, the number of prescribers reporting prescriptions to CURES has also decreased. A similar trend is reflected in opioid prescriptions per 1,000 residents, eliminating a change in population as a factor.

Despite the recent decreases in total opioid prescriptions, there were some types of opioid prescriptions that were substantially more commonly prescribed in 2015 compared to 2008. Oxycodone (+58,782 prescriptions) and morphine (+29,793 prescriptions) were the class of opioid with the largest increase in total number of prescriptions from 2008 to 2015, whereas tapentadol (+109,900.0%) and buprenorphine (+510.2%) had the largest percent increase.

Since 2009, between 30% and 35% of patients in Sacramento County receiving their first opioid prescription were prescribed long-acting (LA) or early-release (ER) opioids, a risk factor for potential misuse.<sup>8</sup> This percentage of opioid-naïve patients receiving LA or ER opioid prescriptions has remained consistently around one-third of total patients from 2008 to 2015 despite a decrease in the total number of opioid-naïve patients prescribed LA or ER opioids.

There was an overall increase in the percentage of patients receiving at least one opioid prescription who were prescribed a high daily dose of opioids from 2008 to 2015. This suggests that the decreasing trend in total opioid prescriptions is more likely due to providers choosing non-opioid treatment options for patients that may have previously received the lowest dosages of opioids rather than a change in prescribing practices for patients who may require more intensive pain management treatment. Days' supply of opioids was missing for some (7.8%) opioid prescriptions, so excluding these prescriptions from analysis may have biased the total percentage of patients on high dosages. However, the percent missing days' supply remained relatively constant by year, so it is unlikely that this would influence the trend over time.

An important side effect of prescription opioids is increased tolerance,<sup>2</sup> so an increased duration of a opioid prescription could increase a patient's chance of misuse. After nearly doubling the per capita rate of 90 or more days' supply of opioids from 2009 to 2010, the rate returned to 2009 level by 2015. This decrease in sustained supply of prescription opioids is promising.

"Doctor shopping," defined in this report as seeing six or more prescribers or pharmacists in six months, is a risk factor for prescription drug abuse.<sup>2</sup> In 2015, 4,339 (1.6%) patients saw six or more prescribers, compared to 960 patients (0.3%) who saw six or more pharmacists. It is encouraging to see that only around 1% of patients in Sacramento County appear to be potential doctor shoppers.

Overlapping prescriptions is another potential indicator for doctor shopping<sup>2</sup> and for risk of abuse; therefore it is concerning that almost one-third of all opioid prescriptions in Sacramento County have overlapping days. Though the percent of prescriptions filled seven or more days before the previous prescription had finished remained around 31% since 2008, the percent of overlapping days has decreased. The consistent decrease in percent of overlapping prescription days may suggest this is due

## Discussion

to increased awareness of the opioid epidemic potential risk factors for prescription drug misuse by providers, especially pharmacists.

Simultaneous use of opioid and benzodiazepine prescriptions greatly increases the risk of overdose, including overdose death.<sup>7</sup> There has been a decrease in patients receiving overlapping opioid and benzodiazepine prescriptions since 2013. However, this decrease is not as great as the decrease in trends for total opioid prescriptions; the percent of patients with overlapping opioid and benzodiazepine prescriptions remained much higher in 2015 compared to 2008.

Buprenorphine and methadone are both commonly used to treat opioid dependency, though they can also be prescribed to treat pain. Buprenorphine prescriptions have continued to increase over the years while methadone prescriptions have begun to decline recently in Sacramento County. Methadone, a less expensive treatment option, is still more commonly prescribed than buprenorphine. The increase in utilization of buprenorphine observed in the data from 2008 to 2015 may reflect popular perception in medical communities that buprenorphine, a partial agonist, has a lower risk of misuse or side effects than full agonists like methadone. Full agonists act on opioid receptors on nerve cells to produce both pain-killing and addictive effects, whereas partial agonists do not activate opioid receptors to the same extent. Medical providers cannot dispense outpatient methadone prescriptions to patients with opioid use disorder per federal guidelines. Increased provider awareness of the opioid epidemic in recent years may have also contributed to providers decreasing the number of outpatient methadone prescriptions for pain patients who have not been diagnosed with opioid use disorder to minimize the risk of these patients later developing opioid use disorder.

## Strengths

Over 8.5 million prescriptions were analyzed for this report, from 46,424 prescribers for 1,227,602 patients. The large amount of data made available for analysis increases confidence that trends reported were accurate representations of opioid prescribing trends in Sacramento County.

The indicators used in this report were adapted from widely-accepted indicator lists developed by reputable health entities (i.e., CDC and Brandeis).

## Limitations

Data used in this report is from voluntary reporting years and may not be inclusive of all opioid prescriptions or opioid prescribers in Sacramento County.

Information on the percent of total of prescribers who were registered with CURES was not made available to Sacramento County Public Health (SCPH).

The dataset provided by the Department of Justice to SCPH excluded some variables that would have made pertinent additional analysis possible. The dataset did not include prescriber type (e.g., primary care, dentist etc.) and so analysis of trends over time for different provider types was not possible. Useful information on patient location (e.g., 5-digit zip code), was also not included in the dataset,

## *Discussion*

making it impossible to detect geographic patterns in patients at highest risk for potential opioid misuse. These additional variables would have been valuable to inform prevention efforts.

Each class of product reported into CURES varied in units of measurement for strength, making standardization for comparison of morphine milligram equivalents (MME) difficult. Imperfect methods of converting units such as milligram per hour (mg/hr) and percent per milliliter (%/mL) to milligram per day for MME conversion may have contributed to some inaccuracies in the results.

There were 686,335 opioid prescriptions in CURES missing the days' supply variable or with a value of zero. This accounted for 7.6% of opioid prescriptions from 2008 to 2015. With an average of over 85,000 opioid prescriptions per year missing days' supply when reported to CURES, MME calculations maybe skewed.

## Conclusion

# CONCLUSION

This first-ever Sacramento County report on opioid prescription drug monitoring surveillance revealed that trends in opioid prescribing practices have generally begun to improve in Sacramento County since 2013. However, there is still much to learn about the opioid epidemic locally. It is important for the community to sustain the positive momentum observed in indicators in recent years, and for the County to remain vigilant in monitoring and addressing areas of continued concern.

## Recommended Actions

Based on the report findings, the following actions are recommended to better understand prescription opioid use and misuse and to curb the opioid epidemic in Sacramento County:

1. Improve prescription opioid surveillance data quality, availability and standardization:
  - a. Provide guidelines and trainings for all dispensers of opioids required to report prescriptions to CURES on data entry standards to ensure data accuracy and completeness.
  - b. Petition for access to more complete CURES datasets, including full patient zip code and provider type data from the Department of Justice to better understand the geographic burden of prescription opioid misuse at the neighborhood-level and inform local prevention efforts.
  - c. Collaborate with the California Department of Public Health Prescription Opioid Misuse and Overdose Prevention Workgroup Data Taskforce to develop a data indicator toolkit for state epidemiologists and data analysts.
2. Coordinate prevention efforts, streamline and maximize resources:
  - a. Strengthen collaboration with area stakeholders, including the Sacramento County Opioid Task Force and neighboring jurisdictions.
  - b. Utilize available guidance from the Centers for Disease Control (CDC) and California Department of Public Health (CDPH) recommendations to address the opioid epidemic and to expand strategies that will result the greatest impact.
3. Establish concrete goals to address opioid prescribing practices and improve the health of Sacramento County residents by 2020:
  - a. Eliminate doctor-shopping
  - b. Decrease the number of opioid prescriptions with a daily dose of 90 MME or higher by 25%
  - c. Reduce the number of overlapping opioid and benzodiazepine prescriptions by 25%
  - d. Decrease the percent of opioid-naïve patients prescribed LA or ER opioids to 15%

## Appendix

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# Appendix

## Appendix 1: List of Opioids

Class	Name	Long Acting / Extended Release
Fentanyl	Actiq	
	Duragesic	*
	Fentanyl	
	Fentanyl Citrate	
	Fentanyl Trans Dermal System	*
	Fentora	
Hydromorphone Morphine	Hydromorphone HCL	
	Kadian	*
	Morphine Sulfate	*
	Morphine Sulfate – Sodium Chloride	
	MS Contin	*
	Ora Morph SR	
	RMS	
	Roxanol	
Oxycodone	Oxy IR	
	Oxycodone HCL	
	Oxycodone HCL – Acetaminophen	
	Oxycodone HCL – Aspirin	
	Oxycodone HCL – Ibuprofen	
	OxyContin	*
	Percodan	
	Roxicet	
Oxymorphone	Opana ER	*
	Oxymorphone HCL	*
Tapentadol Hydrocodone	Nucynta ER	*
	Hydrocodone Bitartrate	
	Hydrocodone Bitartrate – Acetaminophen	
	Hydrocodone Bitartate - Guaifenesin	
	Hydrocodone and Chlorpheniramine PE	
	Hydrocodone Bitartrate – Homatropine	
	Hydrocodone Bitartrate – Ibuprofen	
	Hydrocodone Polistirex – Chloriphenira	
	Vicodin	
Buprenorphine	Bupenex	
	Butrans	*
	Suboxone	
	Subutex	
	Zubsolv	
	Bunavail	
Methadone	Methadone HCL	*
	Methadone Concentrate	
	Methadone Intensol	

## Appendix 2: Indicators

### CDC Indicators for Prescription Opioid Misuse

Indicator	2015 Report
Percent of prescribers registered	N/A*
Number of pharmacists registered	N/A*
Number, rate of opioid analgesics per 1,000 residents	Number: 1,063,929 (excluding buprenorphine and methadone) Rate: 677.9
Percent of patients receiving >90 MME daily dose of opioid analgesics	35,899
Rate of Multiple provider episodes for prescription opioids per 100,000 residents	15.2
Percent of patients prescribed long-acting / extended release opioids who were opioid naïve	34.9%
Percent of patient prescription days with overlapping opioid prescriptions	67.6% (of overlapping prescriptions)
Percent of patient prescription days with overlapping opioid and benzodiazepine prescription	50.1%

\*Registration numbers not provided.

### Brandeis University Indicators for Prescription Opioid Misuse

Indicator	2015 Report
Opioid prescriptions per 1,000 residents (excluding buprenorphine)	1,370.3
MME per resident per year (excluding buprenorphine)	25.8
Hydrocodone (Norco 5mg equivalent) per resident per year	19.4
Residents on > 100 MME daily for at least 30 days	29,390
Residents on 40 mg or more of methadone for at least 30 days	0
Residents on combo opioid/benzodiazepine for at least 30 days	5,353
Residents on 90 sequential days of opioids per 1,000	1.6
Residents using 6+ prescribers or pharmacies	Prescribers: 4,339 Pharmacies: 960

### **Appendix 3: CURES Variables**

1. Patient ID (Unique ID assigned to each patient)
2. Pharmacy ID (Unique ID assigned to each pharmacy)
3. Prescriber ID (Unique ID assigned to each prescriber)
4. Patient Birth Year
5. Gender
6. Patient City
7. Patient State
8. Patient Zip (First 3 Digits)
9. Prescriber Zip
10. Pharmacy Zip
11. Product Name
12. NDC Number
13. Strength
14. Quantity (Number Dispensed)
15. Days' Supply (Estimated number of days the medication will cover)
16. Date Filled
17. Refill Number
18. Payment (Private Pay, Medicaid, Medicare, Commercial Insurance, Military/VA, Worker's Compensation, Indian Nations, Other)

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