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Original Contribution

## Who is prescribing controlled medications to patients who die of prescription drug abuse?

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## ABSTRACT

**Background:** Prescription drug–related fatalities remain a significant issue in the United States, yet there is a relative lack of knowledge on the specialty-specific prescription patterns for drug-related deaths.**Methods:** We designed a study that investigated medical examiner reports of prescription drug–related deaths that occurred in San Diego County during 2013. A Prescription Drug Monitoring Program search was performed on each of these cases to ascertain which physician specialties had prescribed controlled substances to these patients. The data were analyzed for each specialty, including pills per prescription, type of prescription, doctor shoppers (4 physicians + 4 pharmacies over 1 year), and chronic users ( $\geq 3$  consecutive months of medications). **Main findings:** In 2013, 4.5% of all providers in San Diego County wrote a prescription for a patient who died a prescription-related death. There were a total of 713 providers who prescribed 4366 medications totaling 328928 pills. Overall, emergency physicians gave the lowest number of prescriptions per provider (1.6), whereas pain management provided the highest amount per provider (12.9). Most prescriptions went to doctor shoppers (>50%) and chronic users (95.8%). Hydrocodone was the most frequently prescribed medication to those patients whose deaths were related to prescription drugs.**Conclusions:** Emergency physicians appear to provide fewer prescriptions to those patients who die due to prescription drugs. Emergency physicians do, however, account for a significant proportion of total providers in this study. These results highlight the need to use Prescription Drug Monitoring Program data to closely monitor prescription patterns and to intervene when necessary.

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## 1. Introduction

Prescription drug–related complications and fatalities continue to plague the United States. Unfortunately, the body of literature that describes this issue is lacking. Specifically, there are few studies that have evaluated prescription patterns of opioids by specialty, and there are even fewer studies that have evaluated all prescription-related deaths by specialty.

According to the available literature, in 2012, United States prescribers collectively wrote for 82.5 opioid pain relievers per 100 persons [1]. A study that investigated medical examiner data from 2002 to 2010 in Utah found that family medicine physicians accounted for the greatest proportion of opioid prescriptions and opioid-related fatalities (24.1%/30.2%). Anesthesia and pain management collectively provided the most opioid prescriptions per patient (mean, 12.3), although each

specialty only prescribed 1% of the total opioids given by all specialties [2,3]. Emergency medicine also provided a significant portion of opioid prescriptions [4]. However, a recent study found that emergency departments (EDs) prescribed 44% fewer pills per prescription and 17% less potent morphine equivalents when compared to office-based practices [5]. This study highlights the importance of investigating not only the number of prescriptions but also the total number of pills per prescription.

## 2. Material and methods

This is a retrospective observational study that investigated San Diego Medical Examiner reports of prescription drug–related deaths that occurred in San Diego County during 2013. A Prescription Drug Monitoring Program (PDMP) search was performed on each of these cases to ascertain which physicians and physician specialties had prescribed controlled substances to these patients over the previous 12 months.

The San Diego County Medical Examiner's Office follows Government Code Section 27491, which states that an investigation be conducted for all unnatural deaths that include homicides, suicides,

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accidents, deaths in custody, and certain infectious diseases. The San Diego County population includes approximately 3.2 million people, approximately 1% of the US population, with approximately 20000 deaths per year, of which approximately 10000 per year are investigated by the medical examiner's office.

The medications entered into the California PDMP database include all Schedule II to IV medications. In 2013, this did not include tramadol (Ultram), as inclusion of this drug started in August 2014. The data are obtained from pharmacy information that is uploaded into the state system on a regular basis. All major pharmacies have the software required to comply with the regulation (SB 809), which stipulates that the data be uploaded within 1 week of each prescription. Those prescriptions obtained from inpatient hospital pharmacies, the Veterans Administration, military hospitals, methadone clinics, and out-of-state pharmacies are not included.

A database was created that included all deaths in San Diego County from the period of January 1, 2013, until December 31, 2013, with a cause of death attributed to prescription drugs. This database did not include suicides but did include prescription drugs that were mixed with over-the-counter medications, alcohol, or illicit drugs. A PDMP inquiry was run for the 12-month period before date of death on all patients. This report included dates of prescription, names of medication, dosage, strength, number of pills, names of pharmacies, names of providers, and provider DEA numbers. A Google search was performed to determine the medical specialty of each provider. The study authors performed this search by entering the prescriber's name and credentials followed by "San Diego." The first 3 search results were evaluated to ascertain the provider specialty. The data were analyzed for each specialty to determine number of prescriptions, pills per prescription, type of prescription, doctor shoppers, and chronic users. In addition, study investigators reviewed the toxicology report for these deaths to determine if the medications prescribed matched what the toxicology

reports demonstrated. All data were analyzed using STATA data analysis software.

The specialties were grouped as primary care/internal medicine (IM) subspecialties (cardiology, endocrinology, family practice, general practice, gastroenterology, gynecology, infectious disease, internal medicine, nephrology, neurology, nurse practitioners, oncology, physician assistant, physical medical and rehabilitation, and rheumatology), psychiatry, Surgery (ENT, neurosurgery, ophthalmology, orthopedics, plastic surgery, podiatry, radiology, surgery, urology, and vascular surgery), emergency and urgent care (ED/UC), pain (anesthesia and pain medicine), and dentistry (Table 1).

The definition of doctor shopping used for this study was the "4-4-12" model or prescriptions from 4 different physicians, plus 4 different pharmacies over a 12-month period. This definition has been used in previous studies [6]. Chronic use was described as 3 or more consecutive months of a prescription medication. We calculated descriptive statistics for all measures noted above [7].

### 3. Results

#### 3.1. Demographics

The San Diego Medical Examiners Office reported 254 deaths related to prescriptions in calendar year 2013. Of those, 186 (73%) had PDMP data in the 12 months before death. The cohort of 186 patients that had PDMP data were 60% male and had a mean age of 46.4 years, with a range of 19 to 73 years.

#### 3.2. Specialist Data

Our search identified 713 providers who prescribed 4366 medications totaling 328928 pills. Among these providers, primary care/IM

**Table 1**  
Prescription and pill numbers by specialty (in order of % total Rx)

	No. of providers	No. of Rx	% Total Rx	Rx/provider	Pills/Rx	No. of Rx to doctor shopper per provider	%Rx to doctor shopper per provider	No. of Rx to chronic user per provider	%Rx by specialty to chronic user
IM	141	947	21.7	6.7	72.8	3.2	47.8%	6.5	97.2%
Psychiatry	77	795	18.2	10.5	57.9	5.8	55.7%	10.0	97.1%
Family practice	118	761	17.4	6.4	69.2	2.8	43.1%	6.1	95.0%
Physician assistant	59	274	6.3	4.6	84.9	2.2	47.5%	4.4	94.9%
Nephrology	1	1	5.1	1	30	1.0	100.0%	1.0	100.0%
ED/UC	140	217	5.0	1.6	22.9	1.0	64.1%	1.2	78.8%
Pain	13	182	4.2	14	94	6.2	44.0%	14.0	100.0%
Neurology	8	221	4.1	27.6	106.9	17.1	62.0%	27.6	100.0%
Orthopedics	22	178	4.1	8.1	169	6.1	75.8%	8.0	98.9%
Physical medicine and rehabilitation	11	155	3.6	14.1	93.9	7.5	52.9%	14.0	99.4%
Nurse practitioner	22	112	2.6	5.1	93.7	3.2	62.5%	4.9	95.5%
Gynecology	6	110	2.5	18.3	98.3	1.3	7.3%	18.2	99.1%
Dentistry	33	79	1.8	2.4	18.9	1.3	55.7%	2.0	84.8%
Anesthesia	7	75	1.7	10.7	102.9	2.4	22.7%	10.7	100.0%
Podiatry	4	54	1.2	13.5	64.2	11.0	81.5%	13.5	100.0%
Surgery	15	51	1.2	3.4	56.5	1.2	35.3%	2.9	86.3%
Oncology	4	44	1.0	11	52.6	8.0	72.7%	11.0	100.0%
Rheumatology	5	36	0.8	7.2	84.6	5.0	69.4%	7.2	100.0%
Endocrinology	1	23	0.5	23	82.2	0.0	0.0%	23.0	100.0%
Neurosurgery	3	7	0.3	2.3	100	1.7	71.4%	2.3	100.0%
General practice	3	9	0.2	3	62.4	1.3	44.4%	3.0	100.0%
Gastroenterology	1	7	0.2	7	162.9	0.0	0.0%	7.0	100.0%
Cardiology	1	4	0.1	4	39.8	4.0	100.0%	4.0	100.0%
ENT	2	3	0.1	1.5	60	1.0	66.7%	1.5	100.0%
Infectious disease	3	5	0.1	1.7	62.8	0.3	20.0%	1.0	60.0%
Plastic surgery	1	2	0.1	2	9	1.0	50.0%	1.0	50.0%
Radiology	2	2	0.1	1	36	0.5	50.0%	0.5	50.0%
Urology	5	6	0.1	1.2	41.7	1.0	100.0%	1.0	100.0%
Vascular surgery	1	2	0.1	2	45	0.8	66.7%	0.8	66.7%
Unknown	3	3	0.1	1	38.7	2.0	100.0%	2.0	100.0%
Ophthalmology	1	1	0.02	1	30	0.0	0.0%	0.0	0.0%
Total	713	4366					50.7%	5.9	95.8%
Mean				6.1	75.3	3.1			

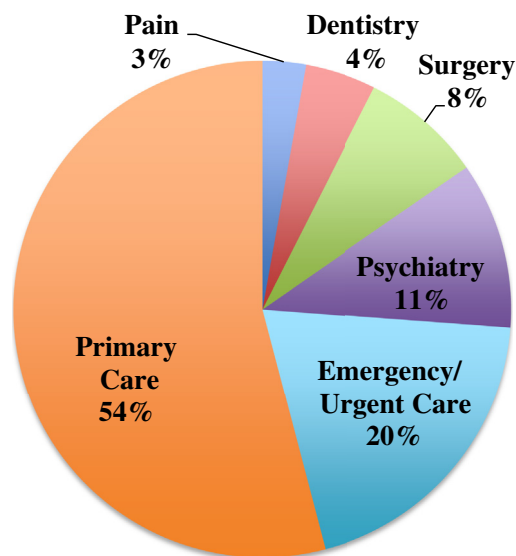


Figure. Percent of prescribers by specialty.

comprised the majority at 54%, followed by emergency medicine (20%) and psychiatry (11%) (Figure). The percentage of providers did not necessarily correlate to the percentage of prescriptions and pills. Of note, although most providers in the database prescribed to only 1 patient who later died due to prescription medications, there were 3 providers in the database who had each prescribed to 4 of these patients. According to the DEA registry, there were approximately 16 000 DEA registrants in the San Diego Area in 2013. Therefore, more than 4.5% of all providers in San Diego gave a prescription to someone who died of a prescription-related death that year.

The mean number of prescriptions written per provider (Rx/provider) in 1 year was 6.1, with neurology providing the highest number at 26.3 and nephrology and radiology providing the lowest at 1. Primary care/IM physicians accounted for 62.1% of all prescriptions. This included 2.6% from nurse practitioners and 6.3% from physician assistants. Psychiatry was the next highest at 18.2%, followed by surgery 7.0%, pain specialists 5.9%, ED/UC physicians 5.0%, and dentistry 1.8% (Tables 1 and 2).

The mean number of pills per prescription (pills/Rx) was 75.3, with orthopedics providing the highest at 169 and plastic surgery with the lowest at 9. After grouping specialties, we found that dentists averaged 19, emergency physicians 23, psychiatry 58, primary care/IM 79, pain 97, and surgery 123.

### 3.3. Doctor shopping

There were 52 patients meeting the definition of doctor shoppers of the 186 patients with PDMP data (28%). Most of all prescriptions written (50.7%) were to doctor shoppers. The percentage of doctors within each specialty that prescribed to doctor shoppers varied. Some specialties were high above this 50.7% mean (orthopedics and podiatry), whereas some were far below (general surgery and anesthesia) (Table 1). Of all prescriptions written by surgeons, 69.3% were given to doctor shoppers, which was the highest among all specialties. The mean number of prescriptions per provider written to doctor shoppers was 3.1. Excluding the outliers discussed in the following paragraph, psychiatrists gave the greatest number of prescriptions to doctor shoppers per provider (5.8). Emergency and urgent care physicians gave the least amount of prescriptions per provider (1.0).

There was only 1 provider in each of the specialties of cardiology, nephrology, and vascular surgery that prescribed to doctor shoppers. For these 3 providers, 100% of their prescriptions went to doctor shoppers.

The 5 urologists in our study also provided 100% of their prescriptions to doctor shoppers. There were 8 neurologists in the database, who wrote a mean of 17.1 prescriptions per provider that went to doctor shoppers. This was the highest outlier, with podiatry following at 11 prescriptions per provider given to doctor shoppers.

### 3.4. Chronic users

Chronic use was found in 128 (68.8%) of the patients. The overwhelming majority of all prescriptions were given to chronic users (95.8%). The mean number of prescriptions written to chronic users per provider was 5.9. Pain specialists gave 100% of their prescriptions to these chronic users (12.9 prescriptions per provider). The number of prescriptions to chronic users per provider was 10.0 for psychiatry, 6.8 for primary care/IM, 5.2 for surgery, 2.0 for dentistry, and 1.2 for ED/UC physicians.

### 3.5. Prescriptions

There were 42 medications on the PDMP reports that included opioids, benzodiazepines, sleep aids, stimulants, and others. The percentage of pills and percentage of prescriptions were not always the same. Opioids were 62.8% of all pills and 53.8% of all prescriptions. Sleep aids were 3% of all pills and 8% of all prescriptions. For “other medications,” the percentage of pills was 8.2%, and for prescriptions, it was 9%. The pill and prescription overall percentages were relatively the same for benzodiazepines (24.5%) and stimulants (1.3%) (Table 3).

A total of 190 patients received opioids, which included 2350 prescriptions with 206 700 pills, which is a mean of 1088 opioid pills/patient/year. Opioids were by far the largest medication prescription and pill category followed by benzodiazepines, other, sleep aids, and stimulants. Primary care prescribed most of total opioid pills (69.2%), whereas dentistry prescribed the least (0.6%). Opioids comprised 91.6% of all prescriptions written by surgeons, 88.6% for dentists, 80.9% for pain physicians, and 73.5% for ED/UC physicians.

Ninety-three patients received benzodiazepines, which included 1211 prescriptions with 80 686 pills, which is a mean of 868 pills/patient/year. Primary care/IM prescribed most of all benzodiazepine pills (52.0%), whereas ED/UC physicians prescribed only 0.95%. Most of the prescriptions written by psychiatrists in this database were for benzodiazepines (72.2%), although their total pill numbers did not exceed that of primary care/IM.

Seventeen patients received sleep aids, which included 356 prescriptions with 9901 pills, which is a mean of 582 pills/patient/year. Zolpidem (Ambien) was the most common sleep medication prescribed. Primary care/IM prescribed most of total sleep aid pills (57.2%), followed by psychiatry (39.4%) and pain (2.2%). Of all prescriptions written by primary care/IM, 2.8% were for sleep aids, which was the highest among all specialties.

Thirty-one patients received stimulants, which included 58 prescriptions with 4560 pills, which averages to 147 pills/patient/year. Only 3 specialties prescribed stimulants, with psychiatry accounting for most pills (57.2%), followed by primary care/IM (41.5%) and surgery (3.4%). Of all prescriptions written by psychiatrists, 5.7% were for stimulants.

The “other” category of medications included carisoprodol as the most common medication, followed by testosterone, lyrica, phenobarbital, dronabinol, and estrogen. One hundred twelve patients received “other” medications, which included 391 prescriptions with 27 081 pills. The specialty accounting for most “other” medication pills was primary care/IM (90.7%). Of all prescriptions written by ED/UC physicians, 5.9% were for “other” medications, followed by primary care/IM (2.8%) and surgery (0.6%).

### 3.6. Specific medications

Hydrocodone was the most frequently prescribed medication, with the greatest number of total pills (95 821), total patients (123), and total number of prescriptions (990) (Tables 4 and 5). Primary care/IM

**Table 2**  
Prescription and pill numbers by specialty category (in order of % total Rx)

	No. of providers	No. of Rx	% Total Rx	% total pills	Rx/provider	Pills/Rx	No. of rx to doctor shopper per provider	%Rx to doctor shoppers	No. of Rx to chronic user per provider	% Rx to chronic users
Primary care/IM	384	2709	62.1	65.0	7.1	79	3.3	47.1	6.8	96.8
Psychiatry	77	795	18.2	14.0	10.3	58	5.8	55.7	10.0	97.1
Surgery	56	306	7.0	11.5	5.5	123	3.8	69.3	5.2	95.4
Pain	20	257	5.9	7.6	12.9	97	4.9	37.7	12.9	100
ED/UC	140	217	5.0	1.5	1.6	22.9	1.0	64.1	1.2	78.8
Dentistry	33	79	1.8	0.5	2.4	19	1.3	55.7	2.0	84.8
Total	710	4363						50.7		95.8
Mean					6	75	3.1		5.9	

prescribed the greatest percentage of hydrocodone pills (63.3%), followed by surgery (27.6%), pain (4.0%), psychiatry (2.5%), ED/UC physicians (1.9%), and dentistry (0.7%). The number of total prescriptions per specialty followed a different pattern, due to a difference in the mean number of pills per prescriptions. Of the pills prescribed by primary care/IM, 68.3% were for hydrocodone. This far exceeds the hydrocodone percentage prescribed by surgery (13.9%), ED/UC physicians (8.6%), dentistry (3.4%), psychiatry (3.2%), and pain (2.6%).

Oxycodone was the second most frequent medication given to those patients who died in relation to a prescription medication. Primary care/IM physicians and pain specialists prescribed this medication with the greatest frequency. Alprazolam was the third most commonly prescribed medication (total pills). Primary care/IM distributed the greatest percentage of alprazolam pills (66.0%), followed by psychiatry (27.1%). Clonazepam was the third most common medication in terms of number of prescriptions. Psychiatrists prescribed this medication most frequently. Primary care/IM prescribed the greatest number of morphine, hydromorphone, methadone, carisoprodol, diazepam, and zolpidem. Psychiatry prescribed the greatest number of lorazepam pills. Emergency and urgent care physicians prescribed the greatest number of chlorthalidone pills (48.5%). Pain specialists prescribed the greatest number of fentanyl patches (36.3%).

#### 4. Discussion

Deaths related to prescription drugs have become unnecessarily common [8–11]. Opioid analgesics alone are now responsible for more

deaths than motor vehicle accidents and suicides [12]. As part of an effort to curb this concerning trend, we must first identify what medications are most commonly linked to prescription-related fatalities and what groups are prescribing these medications most frequently.

Primary care/IM specialties generally have large numbers of providers. These large prescriber bases, however, do not adequately account for the observed number of prescription-related deaths attributed to these specialties. Emergency medicine has a similar number of providers in our study at 140, compared to internal medicine at 141, yet only 217 (5.0%) of the prescriptions were given by ED/UC physicians, whereas 947 (21.7%) were provided by IM. Sixty-nine percent of the opioids in the database were prescribed by primary care/IM, whereas only 1.76% were prescribed by emergency medicine (Table 3). This suggests that although these patients are presenting to the ED, they are still receiving most their pills elsewhere. This is despite the data showing that ED/UC physicians prescribed more to doctor shoppers (64.1%) than IM (47.8%). Internal medicine did prescribe nearly 20% more frequently to chronic users (97.2%) than ED/UC physicians (78.8%), which may partially account for the 4-fold difference in total prescription numbers between these 2 specialties. Previous data have shown that chronic users are at increased risk for prescription-related deaths and that this risk increases with the number of prescriptions dispensed [13,14].

For opioids, one would expect to see the greatest number of prescriptions given by primary care/IM specialties, pain specialists, and surgeons, which is what we identified in our study. One would not expect, however, that psychiatry would prescribe more opioids than ED/UC and dentistry.

**Table 3**  
Medication categories by specialty groups

		Opioids	Benzodiazepines	Sleep aid	Stimulants	Other	Total
Total	No. of patients	190	93	17	31	112	186
	No. of Rx	2350	1211	356	58	391	4366
	% of total Rx	53.8	24.5	8.2	1.3	9.0	
	No. of pills	206700	80686	9901	4560	27081	328928
ED/UC	% of total pills	62.8	24.5	3.0	1.4	8.3	
	ED/UC % total pills	1.8	1.0	0.3	0	4.3	1.5
	ED/UC % total Rx	6.6	3.4	0.3	0	5.7	5.0
	ED/UC frequency <sup>a</sup>	73.5	15.5	0.6	0	5.9	100
PC/IM	PC % total pills	69.2	52.0	57.2	41.5	90.7	65.0
	PC % total Rx	68.7	45.3	61.5	32.8	77.6	62.1
	PC frequency	66.9	19.6	2.8	0.9	2.8	100
	Surgery % total pills	16.7	1.3	0.6	1.3	3.4	11.5
Surgery	Surgery % total Rx	10.7	1.8	0.6	3.5	7.9	7.0
	Surgery frequency	91.6	2.7	0.6	0.2	0.6	100
	Dental % total pills	0.6	0.2	0.3	0	1.1	0.5
	Dental % total Rx	2.9	0.7	0.6	0	0	1.8
Dental	Dental frequency	88.6	9.5	0	0	0.2	100
	Psych % total pills	2.0	41.2	39.4	57.2	0.5	14
	Psych % total Rx	2.9	44.9	34.8	63.8	6.0	18.2
	Psych frequency	8.9	72.2	0.2	5.7	0.2	100
Pain	Pain % total pills	9.7	5.0	2.2	0	0.5	7.6
	Pain % total Rx	8.2	3.8	2.3	0	2.7	5.9
	Pain frequency	80.9	14.6	0.1	0	0.1	100

Abbreviation: PC, primary care.

<sup>a</sup> Percentage of medication number of pill category given by a specialty compared to all pills given by that specialty.

**Table 4**  
Percent of pills for specific medications by specialty (in order of total pills)

	Total pills	No. of patients	No. of Rx	ED/UC %pills	PC/IM %pills	Surgery %pills	Dental %pills	Psych %pills	Pain %pills
Hydrocodone	95821	123	990	1.9	63.3	27.6	0.7	2.5	4.0
Oxycodone	61322	100	667	1.6	76.9	8	0.7	0.2	12.6
Alprazolam	26839	39	318	0.2	66.0	0.02	0	27.1	6.7
Clonazepam	25271	44	399	0.3	41.2	0.4	0.5	55.2	2.5
Morphine	25044	32	293	0.3	79.0	8.6	0.1	0.7	11.3
Carisoprodol	20279	30	260	1.1	75.1	9	0	10.6	4.2
Lorazepam	12239	37	215	1.6	37.0	1.0	0.03	54.5	5.9
Diazepam	11846	26	142	0.6	65.8	6.1	0.1	24.3	3.1
Hydromorphone	11397	20	128	0.4	48.9	7.0	0	1.1	42.6
Zolpiderm	8431	43	306	0.4	62.7	0.7	0.3	33.4	2.5
Methadone	5654	14	66	0	100	0	0	0	0
Chlordiazepoxide	703	17	33	51.3	40.4	2.6	0	5.7	0
Fentanyl	454	13	61	0	33.9	2.2	3.3	24.2	36.3

Perhaps this is due to the increased number of prescriptions given to chronic users by psychiatrists (97.1%) or due to a subset of psychiatrists specializing in addiction or pain management. Specifically, there were 140 ED/UC providers who prescribed 1.8% of the opioids to these patients, vs 77 psychiatrists who prescribed 2.0% of the opioids in our study.

Doctor shoppers received approximately half of the prescriptions in this study but only accounted for 20.5% of the patients. Previous studies have shown that doctor shoppers are at significantly increased risk for death from prescription medications [15]. The mean number of prescriptions per provider to doctor shoppers was 3.1, with neurology providing 17.1 prescriptions per provider to doctor shoppers, the most in this study. An increase in an individual's doctor-shopping behavior has been shown to precede drug-related death [15,16]. Given the large proportion of doctor shoppers in our study on prescription-related deaths, perhaps increased vigilance is warranted on the part of providers to identify this behavior early and to provide appropriate intervention.

The overwhelming majority of prescriptions (95.8%) in our study went to chronic users, who accounted for 68.8% of the patients. It is not surprising that a majority of patients that died due to prescription drugs over the course of this study were chronic users. With prolonged use of a potentially dangerous medication, the risk of death increases accordingly [15]. One of the more interesting outliers in this study involved neurology, which prescribed 100% of their medications to chronic users. Although there were only 8 neurologists in this study, they collectively prescribed more pills than all of the 141 ED/UC providers combined. This phenomenon was not apparent in previous studies [2]. The predominance of chronic users in this investigation highlights the need for medication agreements. These patient-provider contracts (if consistently re-evaluated to avoid unwarranted refills) have been shown to significantly curb medication abuse [17]. Increased use of PDMP data helps to identify those patients at the greatest risk of addiction and allows for expedited referrals to addiction specialists.

One of the most important features of the PDMP is improved provider communication. Although we have yet to develop a universally shared medical record, the PDMP allows for prescribers across all institutions and specialties to access prescription drug information and to subsequently avoid potentially fatal drug interactions as well as duplicate prescriptions.

## 5. Limitations

The study had several limitations. The first limitation is that the PDMP system does not include prescriptions filled by the Veterans Affairs, military, hospitals, methadone clinics, out-of-state pharmacies, Internet, and illegal prescriptions.

In evaluating the percentage of providers that were present on the PDMP reports, a total of all DEA licenses for the area were used. The inactive DEAs and Imperial County DEAs, however, could not be separated from the San Diego DEAs. Therefore, the percentage of active San Diego County physicians who wrote a prescription to a patient who died due to a prescription-related death was likely higher than the reported 4.5%.

Although DEA licenses were used to identify providers, we used a Google search to assign medical specialties without checking with the specialty medical boards. Physicians were categorized as IM, family practice, psychiatry, and physical medical and rehabilitation who may have been specializing in pain management. Emergency medicine and urgent care were put together because some emergency physicians practiced in urgent care settings. There may have been other specialties that practiced in an urgent care setting that were not included. Physician assistants and nurse practitioners were assumed to be in primary care/IM.

Many patients did not have a toxicology report on autopsy that matched their PDMP data within 2 months of death (100/254). In addition, some patients had ongoing illicit drug and alcohol use and were concurrently taking additional prescription medications. Therefore, we cannot presume causation between a certain prescription drugs and

**Table 5**  
Percent of prescriptions for specific medications by specialty (in order of total pills)

	Total pills	No. of patients	No. of Rx	ED/UC %Rx	PC/IM %Rx	Surgery %Rx	Dental %Rx	Psych %Rx	Pain %Rx
Hydrocodone	95821	123	990	8.6	68.3	13.9	3.4	3.2	2.6
Oxycodone	61322	100	667	8.0	67.0	11.5	3.2	0.3	10.0
Alprazolam	26839	39	318	0.9	60.1	0.3	0	31.8	6.9
Clonazepam	25271	44	399	0.8	34.3	0.2	0.5	62.4	1.8
Morphine	25044	32	293	1.4	78.2	6.5	0.3	0.3	13.3
Carisoprodol	20279	30	260	4.2	76.2	8.9	0	7.3	3.5
Lorazepam	12239	37	215	6.5	41.4	2.3	0.9	44.7	4.2
Diazepam	11846	26	142	2.8	57.0	8.5	2.1	25.4	4.2
Hydromorphone	11397	20	128	1.6	64.1	7.0	0	0.8	26.6
Zolpiderm	8431	43	306	0.3	67.0	0.7	0.7	28.8	2.6
Methadone	5654	14	66	0	100	0	0	0	0
Chlordiazepoxide	703	17	33	48.5	42.4	6.1	0	3.0	0
Fentanyl	454	13	61	0	52.5	1.6	1.6	18.0	26.2

death. Finally, given that this study was conducted in a specific geographical region, the results may not be indicative of the specialty-specific prescribing patterns in other areas of the United States.

## 6. Conclusions

In 2013, more than 4.5% of all providers in San Diego County with a DEA license wrote a prescription for a patient with a subsequent cause of death attributed to prescription drugs. Although there is no direct correlation between prescription drug distribution and death, every medical specialty should evaluate their practices, consider what other providers are prescribing, and see where improvements can be made in their own prescribing patterns. The criterion standard is to have all chronic controlled prescriptions managed by a single provider and a single pharmacy for safety. Prescription Drug Monitoring Program review is an important tool when determining the safety of prescriptions and when identifying patients who require addiction treatment. With the insights provided by this study, we suggest that all providers should make a concerted effort to evaluate their own prescribing patterns in the context of their specialty. When prescribing new medications, providers should take into account what other physicians are prescribing to avoid potentially fatal drug interactions and duplicate prescriptions. With the use of PDMP data and with increased prescriber vigilance, we can avoid prescription-related fatalities and prescription medication addition, while promoting drug rehabilitation through decreased prescription numbers and through increased addiction medicine referrals.

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For more information on the San Diego Prescription Drug Abuse Medical Task Force and safe prescribing recommendations/resources, please visit [SanDiegoSafePrescribing.org](http://SanDiegoSafePrescribing.org).

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