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September 2014

Improving Community Health Through Policy Research

The Indiana INSPECT Evaluation: Key Findings and Recommendations from a Descriptive Analysis of INSPECT Data

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The Center for Health Policy would like to thank the Indiana Professional Licensing Agency for funding this survey through the INSPECT Evaluation Grant #A262-3-250-107. The authors would like to thank Ms. Holly Walpole, the Indiana Professional Licensing Agency INSPECT Director and her staff for providing us with techinical assistance and the data sets used for this report.

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Background

Prescription drug misuse and abuse is a significant public health concern in the United States. According to the National Survey of Drug Use and Health (NSDUH), 20.9 percent of the U.S. population 12 years of age or older used prescription-type psychotherapeutics non-medically in their lifetime and 2.6 percent had done so in the past 30 days. These rates are second only to marijuana use (41.5% lifetime use, 6.6% past month use).[1] While central nervous system depressants and stimulants account for a significant percentage, opioid analgesics are by far the most widely misused and abused form of controlled prescription medication. The NSDUH estimated that during 2012, approximately 4.9 million people 12 years or older were currently misusing or abusing opioid pain relievers.[1]

Data suggest the high rate of opioid abuse in the United States is being driven by the high rate at which these drugs are prescribed.[2,3,4,5] In 2012, health care providers wrote 259 million prescriptions for opioid analgesics—enough for every adult in the United States to have a bottle of pills.[6] Manchikanti (2006) argues that illicit prescriptions by physicians, while rare, are in fact an issue contributing to the problem of opioid abuse. Many states also report problems with for-profit, high volume pain clinics or "pill mills" that prescribe large quantities of medications to individuals without a medical need.[7] Many of the abused opioids are obtained through the health care system. According to 2012 NSDUH fundings, 54% of the U.S. population who misused pain relievers in the past year received them from a friend or relative and 20% obtained them directly through a physician prescription. However, when asked how family and friends obtained the medication, nearly 86% replied they were prescribed by a healthcare provider.[1] One common method employed to acquire opioids from physicians is through doctor-shopping. Doctor-shopping refers to individuals who receive multiple simultaneous prescriptions of commonly abused drugs.[8] Individuals who abuse opioids may also engage in pharmacy shopping, i.e., the practice of using multiple pharmacies to simultaneously fill multiple opioid prescriptions.

One potential approach to curtailing the abuse of controlled prescription medication, particularly the abuse of opioid analgesics, is through the implementation of prescription drug monitoring programs (PDMPs).[9] PDMPs are statewide electronic databases that collect data on controlled substances dispensed within a state. The primary role of PDMPs is to help law enforcement, such as the Drug Enforcement Agency, in detecting and preventing drug diversion.[10] Besides law enforcement, data from PDMPs may be shared with health care agencies and health care providers to help identify inappropriate, suspicious, or illegal activities regarding the prescribing of prescription drugs.[10] Additionally, PDMPs can aid in reducing prescription fraud and doctor-shopping because these programs give health care providers and physicians more complete information about a patient's medical history and prescription records.[11]

In the mid-1990s, the Indiana General Assembly passed legislation to start a PDMP that would eventually be known as the Indiana Scheduled Prescription Electronic Collection and Tracking Program (INSPECT). When INSPECT first began, the program required licensed pharmacies in Indiana to report all schedule II controlled substances dispensed throughout the state. In 2004, INSPECT expanded into its present form, which now requires reporting by licensed pharmacies on all schedule II through schedule V controlled substances dispensed on an outpatient basis. INSPECT is partially funded by the Harold Rogers grant program with additional funding provided at the state level from a percentage of the controlled substance licensing fees.[12]

INSPECT, as Indiana's prescription drug monitoring program, was designed as a tool to address the problem of prescription drug abuse and diversion. Two critical functions are to maintain a warehouse of patient information for health care professionals and to serve as an important investigative tool for law enforcement.[12]

Purpose

The purpose of this report is to provide a descriptive analysis of INSPECT data. First, the report will describe the data sources analyzed and the procedures used to code the data for analysis. Second, the report will discuss the dispensation patterns of the most commonly abused controlled substances (i.e., opioids, benzodiazepines, stimulants, depressants, and muscle relaxants) over time. Third, the report will provide an analysis of doctor-shoppers, individuals who are potentially engaging in questionable activity in the pursuit of prescription opioids. Finally, the report will describe the opioid prescribing behavior of providers and explore practice characteristics that may differentiate providers who do or do not have doctor-shoppers in their practice. We elected to focus on opioids for our more fine-grained analyses due to the high rates at which these drugs are prescribed and their significant potential for abuse.

Data and Methods

The data for this report come from the Indiana INSPECT program overseen by the Indiana Board of Pharmacy and operated by the Indiana Professional Licensing Agency (IPLA), which also issues and collates data on professional licenses for the State of Indiana. The IPLA provided the Indiana University Purdue University–Indianapolis (IUPUI) Center for Health Policy (CHP) with INSPECT data for calendar years 2011, 2012, and 2013. The CHP also received licensure data for all providers who currently held a controlled substance prescriber license. All data received from IPLA were

de-identified. The overall study was sanctioned by the Indiana Board of Pharmacy, and the study design and methods was reviewed and approved by Indiana University Institutional Review Board (study #1303010789). Table 1 provides a description of the data elements contained in the INSPECT data files.

Table 1. Description of INSPECT Data Elements

Field Name	Description
PATIENTID	A unique identifier for each patient that filled a controlled substance prescription
STATE	The state in which each patient lives according to his/her driver's license
GENDER	The patient's gender according to his/her driver's license
BIRTH	The year of the patient's birth according to his/her driver's license
ZIP_PAT	The zip code of the patient's address according to his/her driver's license
DEA	The Drug Enforcement Agency identification number for the prescribing provider
WRITTEN	The date a prescription was written by the provider
FILLED	The date the prescription was filled by a pharmacy
QUANTITY	The quantity of a prescribed medication
DAYS_SUPPLY	The numbers of days' supply of a prescribed medication
NABP	The National Association of Boards' of Pharmacy identification number for the pharmacy that filled a given prescription
ZIP_PHARM	The zip code of the pharmacy that filled a given prescription
PAYMENT	The payment method used by a patient for a given prescription
NDC	The National Drug Code associated with a given prescription
PRODUCTNAME	The product name entered into the INSPECT system for a given prescription

The IPLA provided the CHP with provider-level licensure data to allow for analysis of INSPECT data at the individual provider level. The CHP received two files. The first file contained a list of each provider's DEA number and associated controlled substance provider license number (CSR) issued by IPLA. The second file contained provider CSR numbers and associated practice-level information for each provider. Providers could have multiple practice locations. Table 2 provides a description of the data elements contained in the provider-level licensure files.

Table 2. Description of Provider-Level Licensure Files

Field Name	Description
CSR	The unique IPLA-assigned controlled substance license number for each provider
DEA	The Drug Enforcement Agency identification number associated with each provider's CSR
DEGREE	The professional degree of each provider (e.g., DDS, MD, DO, etc.)
PROFESSION	The professional organization issuing a provider's license
LICENSETYPE	The type of license each provider holds
EXPIRATION	Expiration date of the provider's license
DISCIPLINE FLAG	An indicator of whether or not the provider has been professionally disciplined
DOB	The provider's year of birth
GENDER	The provider's gender
CITY	The city for each provider's practice location
COUNTY	The county for each provider's practice location
ZIP	The zip code for each provider's practice location

A significant challenge we encountered in the licensure data set was incomplete data entry in the CSR (or licensure 2) field. Providers who are registered to prescribe controlled substances have a specific CSR number. This number contains the same 8-digits as their state licensure number, but ends in a "B" (for their first registered practice site), "C" (for their second registered practice site), etc. In many cases, the final letter was missing in the licensure data set, making it impossible to accurately and confidently assign geographic information for providers with more than one registered site. However, we were able to link geographic information from providers with only one CSR registration to prescribing patterns. Joining the INSPECT data files to the licensure data resulted in 83% of records matching for 2011, 85% in 2012, and 86% in 2013. Records where a match did not occur were likely due to inaccuracy in DEA numbers or associated with out-of-state providers. To protect the identities of the individuals included in the dataset, the potentially identifying arrays of data (e.g., DEA and CSR numbers) were stripped from the dataset prior to analyzing the data.

The various drugs contained in the INSPECT data sets were coded into a series of five categories

representing the most widely abused controlled substances: opioids, benzodiazepines, muscle relaxants, barbiturates/sedatives/hypnotics, and stimulants/anorectics/decongestants. Drugs not falling into any of the five categories were placed in a category representing other drugs. We completed coding of opioids, benzodiazepines, and muscle relaxants using a coding program developed by the Centers for Disease Control and Prevention (CDC) specifically for PDMP data. The CDC coding program creates a variable which indicates whether a given drug is an opioid, a benzodiazepine, or a muscle relaxant and additionally provides conversion factors for opioids that allow for the calculation of morphine milligram equivalents (MME). The CDC program codes tablet, capsule, spray, gel, liquid, lozenge, patch, and suppository formulations of opioids, benzodiazepines, and muscle relaxants. Certain opioids and benzodiazepine drugs are not captured by the CDC coding system as these are not typically used in outpatient settings or are otherwise not critical for the calculation of MMEs[1].

To account for the excluded formulations of opioids and benzodiazepines in the INSPECT data, a search of all NDC codes not coded by the CDC's program was completed. NDC codes representing uncoded opioids or benzodiazepines were placed in an 'other' opioid category or an 'other' benzodiazepine category. All muscle relaxants were captured by the CDC coding procedure across all the INSPECT data files. Unless otherwise stated, our analyses for opioids, benzodiazepines, and muscle relaxants used the CDC-coded dispensations. Barbiturates/sedatives/hypnotics and stimulants/anorectics/decongestants were coded using the product name contained in the INSPECT data files as well as through the use of NDC codes when product names were missing. A series of dummy variables was created to represent individual barbiturates/sedatives/hypnotics and stimulant/anorectic/decongestant drugs. Two dummy variables were created to represent whether a drug was or was not a barbiturate/sedative/hypnotic or was or was not a stimulant/anorectic/decongestant.

Controlled Substance Prescriptions over Time

We used the complete INSPECT data files for 2011, 2012, and 2013 to determine the prescription patterns for opioids, benzodiazepines, muscle relaxants, barbiturates/sedatives/hypnotics, and stimulants/anorectics/decongestants. Pharmacies dispensed a total of 9,008,158 controlled substance prescriptions in 2011; 10,872,957 in 2012; and 10,666,137 in 2013. Opioids accounted for the largest percentage of controlled substances dispensed across all three years for which data were available (48.55%, 2011; 48.36%, 2012; 46.85%, 2013) followed by benzodiazepines (22.29%, 2011; 21.83%, 2012; 21.88%, 2013) and stimulants/anorectics/decongestants (13.21%, 2011; 14.22%, 2012; 15.96%, 2013). Table 3 provides a breakdown of the number and percent of prescription dispensations across drug categories for 2011, 2012, and 2013.

Table 3. Controlled Substance Dispensations in Indiana by Drug Category

	2011		2012		2013	
	N	%	N	%	N	%
Opioids	4,373,414	48.55	5,258,042	48.36	4,997,019	46.85
Opioids not captured by the CDC	334,654	3.72	382,707	3.52	364,396	3.42
Benzodiazepines	2,007,501	22.29	2,373,455	21.83	2,334,096	21.88
Benzodiazepines not captured by the CDC	472	0.00	467	0.00	463	0.00
Muscle Relaxants	91,500	1.02	108,815	1.00	87,658	0.82
CNS Stimulants for ADHD, appetite suppression, and decongestion	1,190,307	13.21	1,546,481	14.22	1,702,322	15.96
Barbiturates and Miscellaneous Sedatives/Hypnotics	688,934	7.65	791,205	7.28	736,613	6.91
Other controlled substances	321,376	3.57	411,785	3.79	443,570	4.16
Total Controlled Substance Prescriptions	9,008,158		10,872,957		10,666,137	

Opioids

Opioids represented a total of 4,708,068 dispensations in 2011. The number of opioids dispensed in Indiana increased by nearly 933,000 dispensations in 2012 for a total of 5,640,749 dispensations (see Table 3). A slight decrease in the number of opioid dispensations was noted from 2012 to 2013. Based on CDC-coded opioids, the most frequently dispensed opioid across all three years of available data was acetaminophen/hydrocodone bitartrate (a.k.a. Vicodin) accounting for 64.86% of opioid dispensations in 2011, 63.79% in 2012, and 63.59% in 2013. The second most frequently dispensed opioid was acetaminophen/oxycodone hydrochloride (a.k.a. Percocet) which accounted for 10.24% of dispensations in 2011, 10.66% in 2012, and 10.97% in 2013. Table 4 provides a breakdown of the number and percentage of CDC-coded opioid dispensations by type.

[1] Excluded drugs were: fentanyl in solution, buprenorphine in solution, alfentanil, sufentanil, opioids in powder, dezocine, remifentanil, apomorphine hcl, hexaluorenium, alpharodine hcl, tincture of opium, topical tramadol, midazolam, and also cough and cold formulations including elixirs and combination products containing antitussives, decongestants, antihistamines, and expectorants.

Table 4. CDC-Coded Opioid Dispensations by Type over Time

	2011		2012		2013	
Drug	N	%	N	%	N	%
Acetaminophen/Butalbital/Caffeine/Codeine Phosphate	5,593	0.13	7,255	0.14	7,349	0.15
Aspirin/Oxycodone Hydrochloride/Oxycodone Terephthalate	747	0.02	196	0.00	16	0.00
Acetaminophen/Caffeine/Dihydrocodeine Bitartrate	621	0.01	460	0.01	298	0.01
Acetaminophen/Codeine Phosphate	177,084	4.05	181,779	3.46	158,330	3.17
Acetaminophen/Hydrocodone Bitartrate	2,836,659	64.86	3,354,366	63.79	3,177,851	63.59
Acetaminophen/Oxycodone Hydrochloride	447,978	10.24	560,715	10.66	548,037	10.97
Acetaminophen/Pentazocine Hydrochloride	725	0.02	645	0.01	598	0.01
Acetaminophen/Propoxyphene Hydrochloride	1	0.00	0	0.00	0	0.00
Acetaminophen/Propoxyphene Napsylate	53	0.00	5	0.00	0	0.00
Acetaminophen/Tramadol Hydrochloride	689	0.02	1,316	0.03	960	0.02
Aspirin/Butalbital/Caffeine/Codeine Phosphate	8,812	0.20	9,500	0.18	7,850	0.16
Aspirin/Caffeine/Dihydrocodeine	10	0.00	2	0.00	5	0.00
Aspirin/Carisoprodol/Codeine Phosphate	295	0.01	278	0.01	189	0.00
Aspirin/Oxycodone Hydrochloride	296	0.01	685	0.01	587	0.01
Belladonna Alkaloids/Opium Alkaloids	475	0.01	432	0.01	418	0.01
Buprenorphine	7,339	0.17	10,257	0.20	10,087	0.20
Buprenorphine Hydrochloride	14,883	0.34	20,993	0.40	27,508	0.55
Buprenorphine Hydrochloride/Naloxone Hydrochloride	111,226	2.54	146,207	2.78	152,654	3.05
Butorphanol Tartrate	4,855	0.11	4,523	0.09	4,189	0.08
Codeine Sulfate	1,164	0.03	1,350	0.03	1,258	0.03
Fentanyl	124,181	2.84	140,691	2.68	130,338	2.61
Fentanyl Citrate	2,088	0.05	1,747	0.03	1,145	0.02
Hydrocodone Bitartrate/Ibuprofen	43,131	0.99	49,729	0.95	41,962	0.84
Hydromorphone Hydrochloride	34,665	0.79	47,369	0.90	46,966	0.94
Ibuprofen/Oxycodone Hydrochloride	721	0.02	898	0.02	632	0.01
Levorphanol Tartrate	15	0.00	351	0.01	1,256	0.03
Meperidine Hydrochloride	6,777	0.15	6,937	0.13	5,270	0.11
Methadone Hydrochloride	86,415	1.98	103,079	1.96	90,719	1.82
Morphine Sulfate	173,121	3.96	225,209	4.28	218,240	4.37
Morphine Sulfate/Naltrexone Hydrochloride	466	0.01	0	0.00	0	0.00
Nalbuphine Hydrochloride	23	0.00	57	0.00	14	0.00
Naloxone Hydrochloride/Pentazocine Hydrochloride	3,775	0.09	3,579	0.07	2,966	0.06
Oxycodone Hydrochloride	214,332	4.90	290,270	5.52	288,491	5.77
Oxymorphone Hydrochloride	36,816	0.84	32,904	0.63	29,067	0.58
Tapentadol Hydrochloride	16,697	0.38	25,317	0.48	19,856	0.40
Tramadol Hydrochloride	10,686	0.24	28,941	0.55	21,913	0.44
Total Dispensations	4,373,414		5,258,042		4,997,019	

Benzodiazepines

The total number of benzodiazepines dispensed increased by just over 365,000 dispensations from 2,007,973 in 2011 to 2,373,922 dispensations in 2012 with dispensations dropping slightly in 2013 (see Table 3). The most commonly dispensed benzodiazepine in 2011, 2012, and 2013 was alprazolam (a.k.a. Xanax) accounting for 43.54%, 43.46%, and 42.81% of CDC-coded benzodiazepine dispensations respectively. Clonazepam (a.k.a. Klonopin) was the second most frequently dispensed benzodiazepine within the state making up 21.72% of CDC-coded benzodiazepine dispensations in 2011, 22.08% in 2012, and 22.81 in 2013. Table 5 provides a breakdown of benzodiazepine dispensations for 2011, 2012, and 2013 by type.

Table 5. CDC-Coded Benzodiazepine Dispensations by Type over Time

	2011		2012		2013	
Drug	N	%	N	%	N	%
Alprazolam	874,090	43.54	1,031,459	43.46	999,253	42.81
Chlordiazepoxide Hydrochloride	12,038	0.60	13,775	0.58	12,770	0.55
Clobazam	1	0.00	2,613	0.11	5,504	0.24
Clonazepam	436,097	21.72	523,953	22.08	532,482	22.81
Clorazepate Dipotassium	14,440	0.72	15,423	0.65	14,424	0.62
Diazepam	226,487	11.28	270,398	11.39	264,358	11.33
Estazolam	2,814	0.14	3,052	0.13	2,618	0.11
Flurazepam Hydrochloride	3,771	0.19	3,934	0.17	3,394	0.15
Lorazepam	317,363	15.81	371,646	15.66	369,704	15.84
Oxazepam	6,634	0.33	7,102	0.30	5,785	0.25
Quazepam	61	0.00	56	0.00	12	0.00
Temazepam	94,662	4.72	106,542	4.49	101,018	4.33
Triazolam	19,043	0.95	23,503	0.99	22,774	0.98
Total Dispensations	2,007,501		2,373,456		2,334,096	

Stimulants/Anorectics/Decongestants

The stimulant/anorectic/decongestant category was composed of drugs used for the treatment of Attention-Deficit-Hyperactivity Disorder (ADHD) (e.g., methylphenidate), narcolepsy (e.g., modafinil), weight loss (e.g., phentermine), and allergies (e.g., pseudoephedrine). Cocaine and methamphetamine were also included in this category due to their occasional medicinal use. Dispensations of stimulant/anorectic/decongestant medications have increased steadily from 1,190,307 in 2011 to 1,702,322 in 2013. Stimulant drugs used for the treatment of ADHD accounted for the majority of stimulant/anorectic/decongestant dispensations in 2011 (1,005,135) 2012 (1,310,402) and 2013 (1,389,767). The most commonly dispensed stimulant medications across all three years of data were dextroamphetamine saccharate/ ametphatmine aspartate/dextroamphetamine sulfate/amphetamine sulfate (a.k.a. Adderall), methylphenidate (a.k.a. Ritalin), and lisdexamfetamine (a.k.a. Vyvanse). Phentermine (a.k.a. Suprenza) was the most commonly dispensed anorectic in 2011, 2012, and 2013 accounting for 10.44%, 10.74%, and 14.33% respectively. Pseudoephedrine-containing decongestants accounted for a small minority of dispensations across the three year study period. Table 6 provides a breakdown of stimulant/ anorectic/decongestant dispensations by type over time.

Table 6. Stimulant/Anorectic/Decongestant Dispensations by Type over Time

	2011		2012		2013	
Drug	N	%	N	%	N	%
Cocaine	12	0.00	12	0.0	14	0.0
Dextroamphetamine Saccharate/ Amphetamine Aspartate/ Dextro-amphetamine Sulfate/ Amphetamine Sulfate	390,238	32.78	501,560	32.43	558,975	32.84
Dextroamphetamine	10,845	0.91	10,139	0.66	9,866	0.58
Benzphetamine	1,230	0.10	1,138	0.07	596	0.04
Dexmethylphenidate	76,528	6.43	104,721	6.77	110,588	6.50
Diethylpropion	2,233	0.19	2,564	0.17	2,340	0.14
Lisdexamfetamine	231,918	19.48	321,547	20.79	328,448	19.29
Methamphetamine	190	0.02	233	0.02	212	0.01
Methylphenidate	295,606	24.83	372,435	24.08	381,890	22.43
Modafinil	54,463	4.58	62,870	4.07	62,560	3.67
Phendimetrazine	2,707	0.23	3,057	0.20	2,672	0.16
Phentermine	124,246	10.44	166,065	10.74	243,919	14.33
Pseudoephedrine	91	0.01	140	0.01	242	0.01
Total Dispensations	1,190,307		1,546,481		1,702,322	

Barbiturates/Sedatives/Hypnotics

The barbiturates/sedatives/hypnotics category was composed of barbiturates (e.g., butalbital), non-benzodiazepine sedatives (e.g., chloral hydrate), and prescription sleep-aides (e.g., eszopiclone). Dispensations of barbiturates/sedatives/hypnotics

increased from 2011 to 2012 by just over 102,200 dispensations and decreased slightly from 2012 to 2013. The barbiturate/sedative/hypnotic most often dispensed was the prescription sleep-aide zolpidem (a.k.a. Ambien) accounting for 81.60% of dispensations in 2011, 82.38% in 2012, and 82.42% in 2013. As a group barbiturates accounted for a relatively small percentage of dispensations across the three-year study period (6.60%, 2011; 6.71%, 2012; 7.20%) with the most commonly dispensed barbiturate in each year being phenobarbital (a.k.a. Luminal). Table 7 provides a breakdown of barbiturate/sedative/hypnotic dispensations over time by type.

Table 7. Barbiturate/Sedative/Hypnotic Dispensations by Type over Time

	2011		2012		2013	
Drug	N	%	N	%	N	%
Butalbital	11,136	1.62	12,991	1.64	11,333	1.54
Butabarbital	88	0.01	64	0.01	54	0.01
Chloral hydrate	969	0.14	714	0.09	92	0.01
Eszopiclone	65,006	9.44	68,358	8.64	59,818	8.12
Mephobarbital	214	0.03	17	0.00	0	0.00
Meprobamate	2,083	0.30	2,035	0.26	1,557	0.21
Methohexital	0	0.00	1	0.00	0	0.00
Phenobarbital	33,964	4.93	39,989	5.05	41,580	5.65
Secobarbital	38	0.01	52	0.01	14	0.00
Sodiumoxybate	3,791	0.55	3,772	0.48	3,919	0.53
Zaleplon	9,462	1.68	11,425	1.44	11,155	1.51
Zolpidem	562,183	81.60	651,787	82.38	607,091	82.42
Total Dispensations	688,934		791,205		736,613	

Muscle Relaxants

As a group, muscle relaxants accounted for approximately 1.0% of the overall controlled substances dispensed in 2011, 2012, and 2013. The total number of muscle relaxants dispensed was highest in 2012 (108,815 dispensations) and lowest in 2013 (87,658 dispensations). Carisoprodol (a.k.a. Soma) was by far the most frequently prescribed muscle relaxant accounting for 97.82% of dispensations in 2011, 97.71% in 2012, and 97.66% in 2013. Table 8 presents a breakdown of muscle relaxant dispensations by type over time.

Table 8. Muscle Relaxant Dispensations by Type over Time

	2011		2012		2013	
Drug	N	%	N	%	N	%
Aspirin/Carisoprodol	391	0.43	298	0.27	197	0.22
Baclofen	20	0.02	110	0.10	65	0.07
Carisoprodol	89,503	97.82	106,323	97.71	85,610	97.66
Chlorzoxazone	63	0.07	69	0.06	63	0.07
Cyclobenzaprine Hydrochloride	726	0.79	1,038	0.95	820	0.94
Metaxalone	114	0.12	112	0.10	62	0.07
Methocarbamol	243	0.27	219	0.20	205	0.23
Tizanidine Hydrochloride	440	0.48	646	0.59	636	0.73
Total Dispensations	91,500		108,815		87,658	

Demographic Characteristics of Controlled Substance Users

To determine whether any demographic characteristics were associated with the dispensation of controlled substances, we analyzed the 2013 INSPECT data set by patient gender, patient age, and level of urbanicity of the patient's county of residence. To determine urbanicity, we used the U.S. Department of Agriculture Rural-Urban Continuum Codes (RUCC) for Indiana. Gender was related to controlled substance dispensations. The percentage of females to whom opioids, benzodiazepines, barbiturates/sedatives/hypnotics, stimulants/anorectics/decongestants, and muscle relaxants were dispensed was higher than the percentage of males to whom these substances were dispensed. Age was also related to controlled substance dispensations. Individuals 50 years of age or older were more likely to be dispensed an opioid, a benzodiazepine, a barbiturate/sedative/hypnotic, or a muscle relaxant. The only exception was noted with stimulant/anorectic/decongestant drugs, where the highest

percentage of dispensations was to individuals under the age of 18. The patient's area of residence was also found to be related to dispensations. Across all drug categories, the majority of dispensations were made to patients living in metropolitan areas with the largest percentage of dispensations made to individuals living in areas with a population of 1,000,000 or more. Within non-metropolitan areas, the highest percentage of controlled substance dispensations across all categories was made to individuals living in metropolitan-adjacent areas with a population between 2,500 and 19,999. Table 9 provides a breakdown of dispensations by patient demographic characteristics.

Table 9. Demographic Characteristics of Controlled Substance Users by Drug Category in 2013

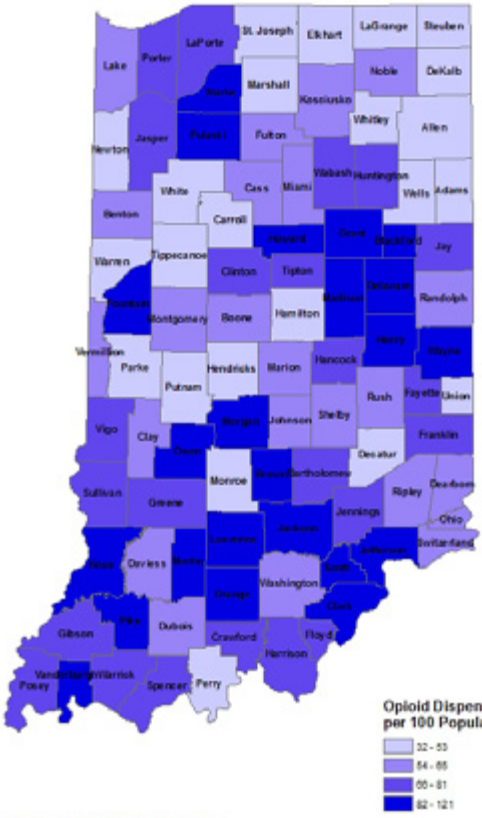
	CDC-coded Opioids		CDC-coded Benzodiazepines		Stimulants, Anorectics, Decongestants		Barbiturates, Sedatives, Hypnotics		CDC-coded Muscle Relaxants	
	N	%	N	%	N	%	N	%	N	%
Total Individuals	1,215,130	100.00	489,587	100.00	296,737	100.00	153,073	100.00	18,664	100.00
Gender										
Male	527,224	43.41	164,967	33.71	134,819	45.45	55,756	36.45	7,323	39.25
Female	687,395	56.59	324,391	66.29	161,834	54.55	97,220	63.55	11,332	60.75
Age										
Under 18	53,194	4.38	12,099	2.47	102,035	34.39	4,626	3.02	52	0.28
18-25	130,697	10.76	24,339	4.97	40,099	13.51	4,538	2.96	497	2.66
26-29	75,913	6.25	20,487	4.18	15,793	5.32	3,985	2.60	580	3.11
30-39	201,973	16.62	72,628	14.83	42,680	14.38	17,381	11.35	2,886	15.46
40-49	201,569	16.59	88,467	18.07	43,324	14.60	28,151	18.39	4,557	24.42
50-59	229,353	18.87	105,541	21.56	33,721	11.36	38,205	24.96	5,700	30.54
60 & over	322,431	26.53	166,026	33.91	19,085	6.43	56,187	36.71	4,392	23.53
Urban/Rural Location										
Metro 1 Million or More	532,425	45.63	211,313	44.70	119,195	46.00	68,831	46.68	8,275	46.10
Metro 250,000 to 1 Million	170,082	14.58	69,634	14.73	43,099	16.63	22,896	15.53	1,970	10.97
Metro fewer than 250,000	191,783	16.44	79,327	16.78	42,471	16.39	24,992	16.95	2,814	15.68
Nonmetro 20000+ adjacent to metro	62,552	5.36	22,622	4.79	11,950	4.61	7,055	4.78	1,003	5.59
Nonmetro 20000+ not adjacent to metro	31,546	2.70	14,664	3.10	6,650	2.57	3,606	2.45	668	3.72
Nonmetro 2500-19999 adjacent to metro	149,922	12.85	62,372	13.19	29,790	11.49	16,743	11.36	2,650	14.76
Nonmetro 2500-19999 not adjacent to metro	16,310	1.40	7,380	1.56	3,463	1.34	1,927	1.31	328	1.83
Nonmetro completely rural less than 2500	12170	1.04	5,385	1.14	2,506	1.00	1,399	0.95	243	1.35

Note: Categories may not sum to the total individuals due to missing data

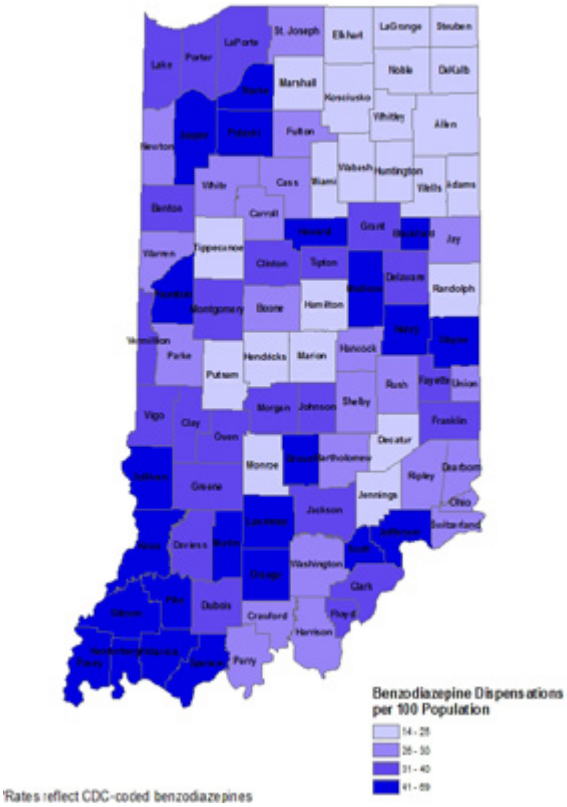
Geographic Analysis of Controlled Substance Dispensations

Using 2013 INSPECT data, we determined the pattern of controlled substance dispensations within the state in the following manner: we assigned the patient zip code associated with each individual dispensation to its centroid county using an algorithm developed by the U.S. Census Bureau. We then aggregated the variables representing CDC-coded opioid dispensations, CDC-coded benzodiazepine dispensations, stimulant/anorectic/decongestant dispensations, barbiturate/sedative/hypnotic dispensations, and CDC-coded muscle relaxant dispensations to the county level in order to obtain the total dispensations for each category within each of Indiana's 92 counties. We linked 2013 county-level population data for Indiana to the aggregated data set and computed the dispensation rate by 100 population for each of the five drug classes of interest. Using Arc GIS geographical mapping software we then mapped the dispensation rates across the state of Indiana. Maps 1-5 display the dispensation rates across Indiana for CDC-coded opioids, CDC-coded benzodiazepines, stimulants/anorectics/decongestants, barbiturates/sedatives/hypnotics and CDC-coded muscle relaxants. Table 10 provides a breakdown of dispensation rates for each class of controlled substance by county.

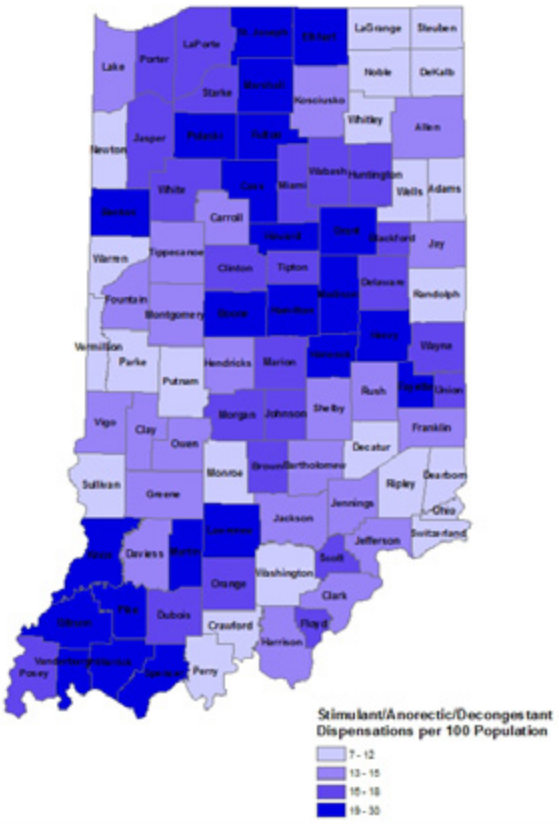
Map 1. Rate of Opioid Dispensations in Indiana for 2013*



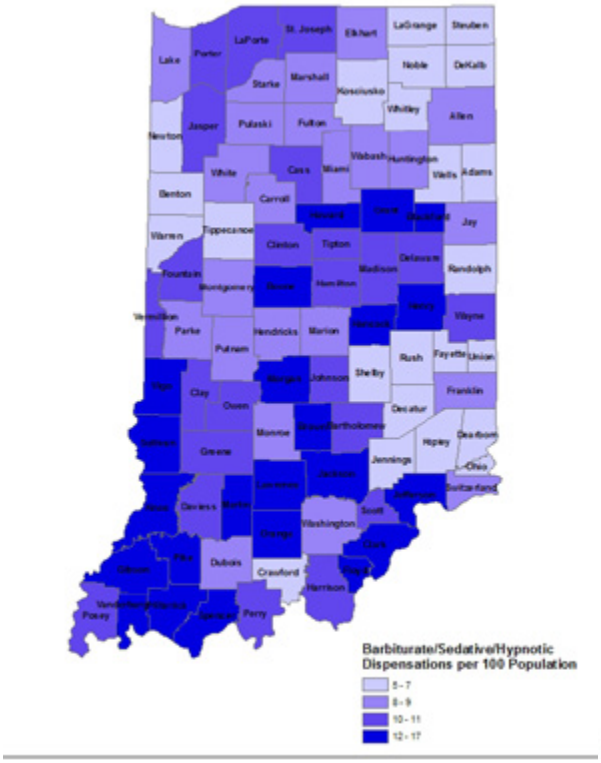
Map 2. Rate of Benzodiazepine Dispensations in Indiana for 2013*



Map 3. Rate of Stimulant/Anorectic/Decongestant Dispensations in Indiana for 2013



Map 4. Rate of Barbiturate/Sedative/Hypnotic Dispensations in Indiana for 2013



Map 5. Rate of Muscle Relaxant Dispensations in Indiana for 2013*

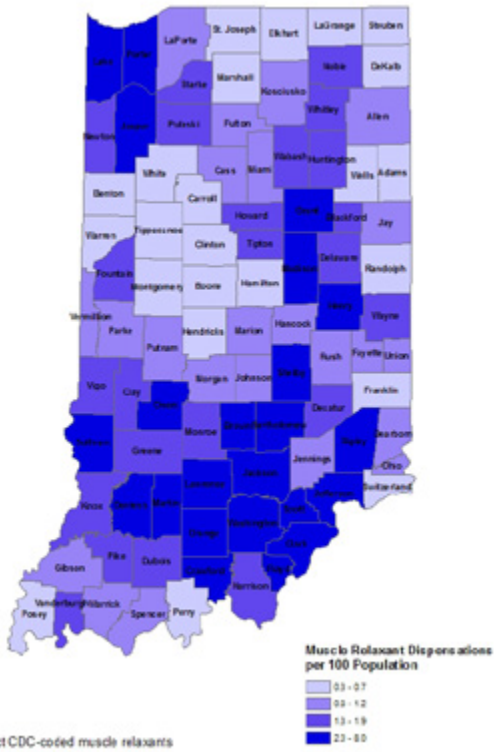


Table 10. Rate per 100 Population of Controlled Substance Dispensations for Indiana Counties in 2013

County	CDC-coded Opioids	CDC-coded Benzodiazepines	Stimulants, Anorectics, Decongestants	Barbiturates, Sedatives, Hypnotics	CDC-coded Muscle Relaxants
Adams	35.07	14.61	8.83	5.02	0.73
Allen	48.09	18.29	14.90	8.84	0.91
Bartholomew	73.94	30.63	13.86	11.55	2.13
Benton	53.88	33.68	23.46	7.72	0.43
Blackford	114.73	42.35	18.24	13.23	1.90
Boone	54.39	28.30	23.45	13.46	0.37
Brown	90.26	39.96	15.71	12.33	1.98
Carroll	46.19	26.59	13.18	9.58	0.33
Cass	59.75	30.31	19.41	9.81	0.75
Clark	83.00	36.48	15.31	13.92	2.82
Clay	60.57	35.22	14.77	11.57	1.31
Clinton	77.40	39.38	15.94	10.62	0.53
Crawford	72.10	26.16	10.63	7.51	2.75
Daviess	62.07	39.86	15.68	10.00	2.14
Dearborn	55.52	26.04	9.95	7.80	1.27
Decatur	52.86	22.99	10.67	6.81	1.51
DeKalb	36.56	14.91	12.62	7.17	0.65
Delaware	93.03	33.10	18.43	11.56	1.92
Dubois	56.37	33.21	16.92	8.42	1.72
Elkhart	47.57	20.36	24.38	8.61	0.62
Fayette	79.56	39.14	22.17	6.70	0.80
Floyd	81.38	38.41	17.66	13.97	2.74

County	CDC-coded Opioids	CDC-coded Benzodiazepines	Stimulants, Anorectics, Decongestants	Barbiturates, Sedatives, Hypnotics	CDC-coded Muscle Relaxants
Fountain	83.48	47.02	14.41	11.27	1.75
Franklin	70.67	36.74	15.30	9.74	0.75
Fulton	64.36	26.81	22.67	9.37	1.05
Gibson	76.12	43.21	25.66	13.47	1.11
Grant	93.98	37.20	25.53	13.61	1.96
Greene	70.70	38.16	15.40	11.06	1.83
Hamilton	37.92	19.85	23.26	11.49	0.60
Hancock	65.65	29.81	25.35	12.22	0.77
Harrison	74.23	28.17	13.28	10.67	1.72
Hendricks	41.96	20.04	15.08	9.21	0.69
Henry	121.40	46.26	21.02	12.06	1.99
Howard	98.27	44.29	23.52	16.52	1.66
Huntington	66.34	19.88	17.95	9.56	1.65
Jackson	88.03	33.07	13.02	11.77	1.94
Jasper	76.13	41.94	17.19	11.66	1.99
Jay	74.85	30.16	13.61	8.61	1.02
Jefferson	87.42	44.94	15.05	13.64	2.04
Jennings	75.30	25.03	14.09	7.94	1.30
Johnson	65.58	31.77	17.00	11.67	0.91
Knox	101.61	58.65	21.08	17.04	1.85
Kosciusko	54.68	20.19	13.10	7.62	1.01
LaGrange	32.35	13.68	7.36	5.19	0.54
Lake	64.72	34.35	12.97	9.47	2.24
LaPorte	80.54	32.80	18.50	9.91	1.29
Lawrence	101.87	45.58	21.25	13.97	4.31
Madison	93.88	41.78	20.24	11.56	3.16
Marion	61.54	24.37	16.14	8.78	0.77
Marshall	51.77	25.23	23.59	8.05	0.56
Martin	103.99	65.43	24.95	15.40	8.05
Miami	59.03	25.35	18.81	9.11	0.79
Monroe	39.01	18.97	10.93	9.13	1.54
Montgomery	61.59	34.03	14.09	8.47	0.70
Morgan	92.78	37.31	18.49	13.79	1.19
Newton	50.98	30.69	11.34	6.40	1.44
Noble	55.69	25.07	11.26	6.83	1.35
Ohio	62.51	28.56	7.17	7.59	1.28
Orange	102.17	50.04	18.72	13.69	3.18
Owen	83.44	34.55	13.19	10.86	2.55
Parke	44.79	26.98	10.31	8.83	0.86
Perry	51.69	28.79	11.66	10.03	0.58
Pike	113.29	68.67	26.47	15.69	1.88
Porter	72.10	33.51	18.34	11.05	2.29
Posey	78.81	41.05	18.96	11.28	0.60
Pulaski	88.58	42.17	20.96	9.59	1.75
Putnam	47.18	21.37	10.23	8.04	1.02

County	CDC-coded Opioids	CDC-coded Benzodiazepines	Stimulants, Anorectics, Decongestants	Barbiturates, Sedatives, Hypnotics	CDC-coded Muscle Relaxants
Randolph	63.05	21.29	12.44	6.82	0.70
Ripley	56.98	27.36	8.33	5.89	2.20
Rush	64.87	27.68	15.02	7.22	1.25
St. Joseph	53.17	26.23	21.77	9.98	0.67
Scott	112.72	53.12	15.97	10.89	7.54
Shelby	59.72	26.64	12.83	7.53	2.17
Spencer	78.68	43.43	22.31	13.28	1.06
Starke	101.72	46.32	18.53	8.75	1.79
Steuben	42.25	18.13	10.61	6.30	0.42
Sullivan	78.57	46.32	12.39	11.97	2.33
Switzerland	61.53	28.58	8.29	8.20	0.74
Tippecanoe	40.50	23.39	15.30	7.29	0.30
Tipton	71.23	33.61	17.37	11.74	1.80
Union	52.91	29.59	17.20	6.93	1.11
Vanderburgh	100.66	51.74	30.06	16.22	1.40
Vermillion	62.71	33.39	12.82	9.93	1.27
Vigo	70.75	38.55	15.59	12.60	1.56
Wabash	70.17	23.78	15.97	8.33	1.89
Warren	49.70	26.03	8.01	6.25	0.42
Warrick	71.43	41.29	27.95	14.42	0.95
Washington	62.92	29.45	9.95	8.91	4.72
Wayne	89.04	43.67	17.23	10.73	1.61
Wells	48.70	18.45	11.61	7.87	0.64
White	52.82	28.82	17.58	8.61	0.39
Whitley	53.41	19.32	12.72	6.57	1.55

Doctor-Shopping

Despite the common use of unsolicited reporting by PDMPs to identify potential persons of interest (POIs), no standardized criteria have yet been developed. Hence, standardization and validation of such measures will be crucial to "permit reliable identification of questionable activity within and across jurisdictions".[8]

In 2010, the Indiana State Board of Pharmacy defined INSPECT's threshold for determining a POI as a patient who has received controlled substance prescriptions from 10 or more unique prescribers in a continuous 60-day period.

Another threshold measure used by the Bureau of Justice Assistance (BJA) identifies POIs as patients who have obtained controlled substance prescriptions from at least 5 unique prescribers and at least 5 unique pharmacies in a 3-month period.

For this report, we measured the extent of doctor-shopping in Indiana based on the previous two definitions:

1. Patients who received opioid prescriptions from 10 or more unique prescribers within a two-month calendar period
2. Patients who received opioid prescriptions from 5 or more unique prescribers utilizing 5 or more unique pharmacies within a three-month calendar period

Analyses were conducted on annual de-identified INSPECT data, 2011 through 2013, using SAS® 9.3 statistical software. Results are displayed in table format for each individual year and in narrative format focusing on the most recent information, i.e., 2013.

Results

Description of Study Population

In 2013, more than 10.5 million controlled substances (schedules II-V) were dispensed in Indiana and nearly half of them (5 million) were opioids. These opioids were dispensed to 1.2 million unique patients. The average (mean) patient who received opioids in 2013 was 46.9 years old and had 4.1 opioid prescriptions. Slightly more than half (56.6%) of patients were female.

Most patients receiving opioids visited only

one or a small number of prescribers for their medications. In 2013, the average (mean) number of unique prescribers per patient was 1.58 (median=1.00), but ranged from 1 to 40. Similarly, most patients only visited a few pharmacies for their opioid medications. The average (mean) number of unique pharmacies was 1.32 (median=1.00), but ranged from 1 to 25.

Table 11: Controlled Substance Dispensations in Indiana (INSPECT 2011-2013)

	2011	2012	2013
Total dispensations (all controlled substances)	9,008,158	10,872,957	10,666,137
Opioids only	4,373,414 (48.5%)	5,258,042 (48.4%)	4,997,019 (46.8%)
Number of unique patients within opioids	1,134,015	1,254,968	1,215,130

Persons of Interest (POIs)

The analyses resulted in very different findings for POIs depending on the threshold values used (IPLA vs. BJA). For IPLA's definition, we identified patients who received opioid prescriptions from at least 10 different prescribers within a two-month period; i.e., between January 1 and February 28/29, March 1 to April 30, etc. According to the IPLA definition, the number of POIs ranged from 2 (November-December) to 10 (March-April) in 2013. A total of 30 patients were identified for the year as POIs. They ranged in age from 20 to 60 years and 18 patients (60%) were female. The total number of POIs does not equal the sum of POIs from the individual two-month periods, indicating that some patients satisfied the doctor-shopping criteria for multiple time periods throughout the year.

BJA's threshold for POIs was considerably less conservative. For BJA's definition, we identified patients who received opioid prescriptions from at least 5 different prescribers and utilized at least 5 unique pharmacies within a three-month period; i.e., between January 1 and March 30, April 1 and June 30, etc. According to this definition, the number of POIs ranged from 167 (October-December) to 268 (July-September) in 2013. A total of 816 patients were identified for the year as POIs, ranging in age from 13 to 83 years. Just a little over half (459 patients or 56.4%) were female. The total number of POIs does not equal the sum of POIs from the individual three-month periods, indicating that some patients satisfied the doctor-shopping criteria for multiple time periods throughout the year.

In 2013, a total of 25 patients satisfied both IPLA and BJA threshold criteria. These patients ranged in age from 20 to 56 years and slightly more than half (14 patients or 56%) were female.

Table 12: Persons of Interest (INSPECT 2011-2013)

		2011	2012	2013
IPLA	Jan 1 – Feb 28/29	1	13	3
	Mar 1 – Apr 31	5	7	10
	May 1 – Jun 30	16	9	6
	Jul 1 – Aug 31	11	7	6
	Sep 1 – Oct 31	11	10	6
	Nov 1 – Dec 31	10	10	2
	Annual Total	**46**	**52**	**30**
BJA	Jan 1 – Mar 31	50	374	235
	Apr 1 – Jun 30	356	362	240
	Jul 1 – Sep 30	371	326	268
	Oct 1 – Dec 1	357	298	167
	Annual Total	**989**	**1,167**	**816**

Our analyses indicated POI patients differed significantly from other (non-POI) patients in age and total number of opioid prescriptions; i.e., POIs tended to be younger and had more opioid prescriptions for the entire year. This held true for both POI definitions (IPLA and BJA).

Table 13a: Differences between POIs and Non-POIs (INSPECT 2011)

	IPLA POI		IPLA Non-POI		*p**
	Mean	Median	Mean	Median	
Age	38.43	36.50	46.00	46.00	0.0061
Total number of opioid prescriptions	39.02	38.50	3.86	2.00	<.0001

	BJA POI		BJA Non-POI		*p**
	Mean	Median	Mean	Median	
Age	38.55	37.00	46.00	46.00	<.0001
Total number of opioid prescriptions	23.64	21.00	3.84	2.00	<.0001

Table 13b: Differences between POIs and Non-POIs (INSPECT 2012)

	IPLA POI		IPLA Non-POI		*p**
	Mean	Median	Mean	Median	
Age	37.23	33.50	46.24	46.00	0.0004
Total number of opioid prescriptions	34.90	32.00	4.19	2.00	<.0001

	BJA POI		BJA Non-POI		*p**
	Mean	Median	Mean	Median	
Age	38.63	36.00	46.25	46.00	<.0001
Total number of opioid prescriptions	24.82	22.00	4.17	2.00	<.0001

Table 13c: Differences between POIs and Non-POIs (INSPECT 2013)

	IPLA POI		IPLA Non-POI		*p**
	Mean	Median	Mean	Median	
Age	39.13	37.00	46.92	47.00	0.0203
Total number of opioid prescriptions	42.70	45.00	4.11	2.00	<.0001

	BJA POI		BJA Non-POI		*p**
	Mean	Median	Mean	Median	
Age	39.45	38.00	46.92	47.00	<.0001
Total number of opioid prescriptions	23.49	21.00	4.10	2.00	<.0001

Note: Total number of opioid prescriptions is skewed (not normally distributed); in such cases, the median is a better representation of the central tendency than the mean.

*Significance is based on the Wilcoxon-Mann-Whitney test, a non-parametric test analog to the independent samples t-test that can be used when the dependent (or outcome) variable is not normally distributed.

Provider Level of Analysis of Opioid Dispensations

As opioids have been the most widely prescribed controlled substance over the three years in which INSPECT data are available and due to their significant potential for abuse and adverse consequences, we chose to focus our analysis on provider-level prescribing of opioids. Additionally, we will limit our focus to providers for whom we were able to match licensure information to INSPECT data and the patients who filled prescriptions from these providers. Limiting the data in this manner allows us to explore the impact provider characteristics may have on prescribing practices. Results are displayed in table format for each individual year and in narrative format focusing on the most recent information, i.e., 2013.

Results

Description of Study Population

20,457 providers with licensure data had controlled substances dispensed by a pharmacy in 2013. Of these 20,457 providers, 18,121 (88.6%) registered at least one opioid dispensation. Table 14 describes the available demographic information on providers who had opioid dispensations and for whom licensure data were available.

Table 14. Demographic Characteristics of Opioid Prescribers with Licensure Data

	2011		2012		2013	
	N	%	N	%	N	%
License Type						
Medical Doctors (MD)	9822	60.60	10,509	59.79	10,718	59.15
Doctor of Osteopathy (DO)	764	4.71	838	4.77	925	5.10
Dentist (DDS/DMD)	2647	16.33	2,744	15.61	2778	15.33
Doctor of Podiatric Medicine (DPM)	240	1.48	254	1.45	262	1.45
Advanced Practice Nurse (APN)	2169	13.38	2,548	14.50	2710	14.96
Physician Assistant (PA)	444	2.74	533	3.03	589	3.25
Doctor of Veterinary Medicine (DVM)	121	0.75	151	0.86	139	0.77
Gender						
Male	10,284	63.45	10,873	61.86	11,051	60.98
Female	5,661	34.93	6,432	36.59	6,806	37.56
Unknown	262	1.62	272	1.55	264	1.46
	M	SD	M	SD	M	SD
Age	48.99	11.47	49.08	11.78	49.18	11.86

The 18,121 providers who had at least one opioid prescription dispensed accounted for 4,326,281 opioid prescriptions dispensed by a pharmacy in 2013. Pharmacies dispensed opioids to 1,122,586 unique patients. Opioid dispensations for these patients ranged from a low of one to a high of 382 dispensations. Most patients prescribed opioids (49.40%) filled only one opioid prescription during 2013 (see Figure 1). The median number of opioid dispensations in 2013 for patients who received an opioid was two while the mean number of opioid dispensations per patient was 3.9 (SD = 5.3; see Table 15).

Figure 1. Percent of Patients who Received Opioids by Number of Dispensations in 2013

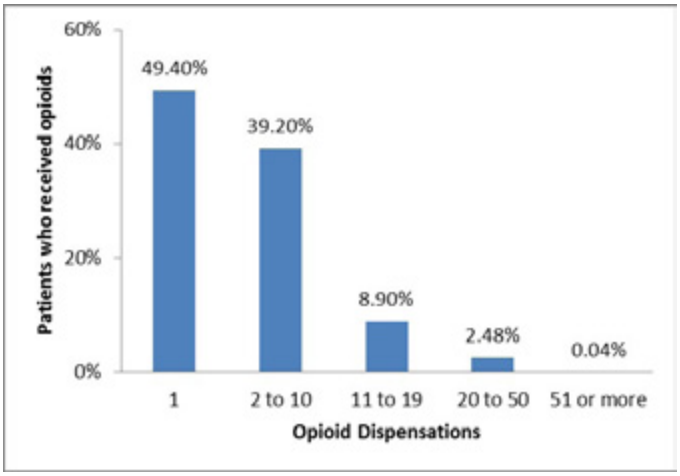


Table 15. Characteristics of Opioid Dispensations

	2011	2012	2013
Total controlled substance prescribers	18,148	19,668	20,457
Total opioid prescribers	16,207	17,577	18,121
Total opioid dispensations	3,635,221	4,488,098	4,326,281
Total patients who obtained opioids	1,017,162	1,149,960	1,122,586
Median opioid dispensations per patient	1	2	2
Mean opioid dispensations per patient	3.6 (SD = 4.9)	3.9 (SD = 5.7)	3.9 (SD =5.3)
Range of opioid dispensations per patient	1-156	1-469	1-382

Using licensure data, we analyzed opioid dispensations by prescriber type. In the 2013 INSPECT data file, Medical Doctors (MD) were associated with the largest percentage of opioid dispensations (68.5%) followed by advanced practice nurses (APN; 12.7%) and dentists (8.6%). The opioid dispensation patterns in 2011 and 2012 were similar to those seen in 2013 (see Table 16).

Table 16. Opioid Dispensations by Prescriber Type over Time

	2011		2012		2013	
	N	%	N	%	N	%
Medical Doctors (MD)	2,577,770	70.9	3,133,384	69.8	2,963,319	68.5
Advanced Practice Nurses (APN)	412,999	11.4	544,898	12.1	550,525	12.7
Dentists (DDS/DMD)	302,349	8.3	382,209	8.5	373,285	8.6
Doctors of Osteopathy (DO)	256,881	7.1	311,447	6.9	315,087	7.3
Physician Assistants (PA)	49,845	1.4	75,128	1.7	83,926	1.9
Podiatrists (DPM)	34,751	1.0	40,193	0.9	39,518	0.9
Veterinarians (DVM)	626	0.0	839	0.1	614	0.1
Total Opioid Dispensations	3,635,221		4,488,098		4,326,281	

In order to better analyze prescribers, we divided them into deciles; i.e., 10 groups each accounting for approximately 10 percent of prescribers, based on the number of opioid dispensations attributable to them. The lowest decile (decile 1) contains prescribers with the least amount of dispensations and the highest decile (decile 10) encompasses prescribers with the uppermost amount of dispensations. Table 17 provides a breakdown of the range of dispensations associated with prescribers within each decile. As shown in Figure 7, prescribers in the 10th decile accounted for 58.0% of opioid dispensations in 2013.

Table 17. Opioid Dispensations by Decile

Decile	Range of Dispensations	N of Prescribers	%
1	1 – 2	2,126	11.7
2	3 – 5	1,353	7.5
3	6 – 15	1,975	10.9
4	16 – 33	1,794	9.9
5	34 – 64	1,792	9.9
6	65 – 115	1,837	10.1
7	116 – 189	1,804	10.0
8	190 – 312	1,811	10.0
9	313 – 593	1,816	10.0
10	594 – 15,902	1,813	10.0

Overall, deciles were fairly similar to one another. In terms of profession, MDs made up over 50% of prescribers in all deciles except deciles 4 and 5. Both deciles 4 and 5 had a lower representation of MDs and a higher representation of dentists. MDs were most strongly represented in decile 10, nearly three-quarters of the prescribers. The gender distribution across deciles was also similar, with males comprising 50% or more of prescribers. As the deciles increased in number of dispensations, the percentage of males within the deciles also increased. Compared to the other deciles, decile 10 contained the highest percentage of male prescribers. Table 18 provides a breakdown of each decile by prescriber type, gender, and age.

Figure 2. Percent of opioids dispensed by prescribers within each decile

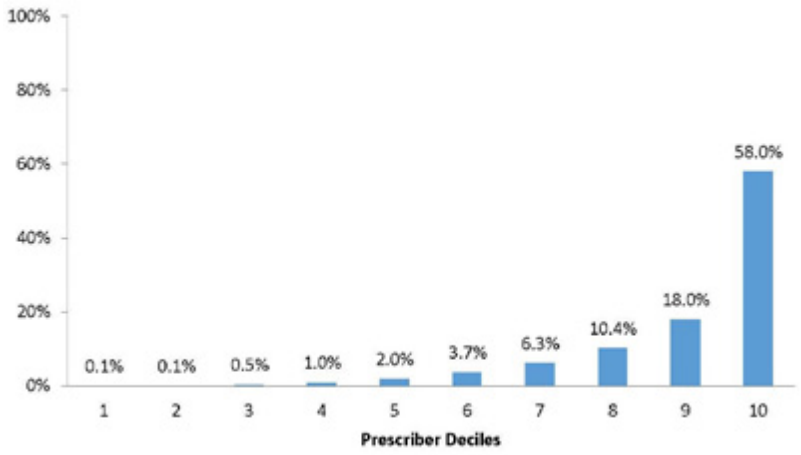


Table 18. Demographic Characteristics of Prescribers within Deciles

	Decile 1		Decile 2		Decile 3		Decile 4		Decile 5	
	N	%	N	%	N	%	N	%	N	%
Degree										
DDS/DMD	162	7.62	141	10.42	318	16.10	465	25.92	445	24.83
DO	94	4.42	49	3.62	63	3.19	67	3.73	79	4.41
DPM	16	0.75	9	0.67	18	0.91	26	1.45	34	1.90
DVM	88	4.14	22	1.63	21	1.06	5	0.28	3	0.17
MD	1,350	63.50	826	61.05	1129	57.16	862	48.05	873	48.72
APN	374	17.59	272	20.10	345	17.47	304	16.95	288	16.07
PA	42	1.98	34	2.51	81	4.10	65	3.62	70	3.91
Gender										
Male	1138	53.70	738	54.59	1122	56.39	1054	58.88	1040	58.26
Female	947	44.69	602	44.53	827	41.96	720	40.22	720	40.34
Missing	34	1.60	12	0.89	22	1.12	16	0.89	25	1.40
	M	SD	M	SD	M	SD	M	SD	M	SD
Age	50.67	13.12	49.57	12.46	49.73	12.38	48.94	12.09	47.89	12.10
20-29	51	2.42	29	2.16	45	2.30	61	3.43	54	3.05
30-39	453	21.52	305	22.71	441	22.52	406	22.82	485	27.39
40-49	508	24.13	332	24.72	482	24.62	442	24.85	458	25.86
50-59	550	26.13	386	28.74	556	28.40	482	27.09	427	24.11
60 or over	543	25.80	291	21.67	434	22.17	388	21.81	347	19.59

	Decile 6		Decile 7		Decile 8		Decile 9		Decile 10	
	N	%	N	%	N	%	N	%	N	%
Degree										
DDS/DMD	410	22.32	325	18.02	232	12.81	142	7.82	138	7.61
DO	88	4.79	99	5.49	120	6.63	129	7.10	137	7.56
DPM	43	2.34	47	2.61	37	2.04	23	1.27	9	0.50
DVM	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
MD	933	50.79	1009	55.93	1149	63.45	1262	69.49	1325	73.08
APN	286	15.57	252	13.97	203	11.21	197	10.85	189	10.42
PA	77	4.19	72	3.99	70	3.87	63	3.47	15	0.83
Gender										
Male	1068	58.27	1101	61.06	1173	64.95	1250	69.10	1367	75.69
Female	739	40.32	683	37.88	613	33.94	537	29.68	418	23.15
Missing	26	1.42	19	1.05	20	1.11	1.22	1.22	1.16	1.16
	M	SD	M	SD	M	SD	M	SD	M	SD
Age	48.00	12.00	48.18	11.38	48.23	10.91	48.93	10.76	51.43	10.45
20-29	62	3.42	39	2.19	33	1.84	26	1.45	7	0.39
30-39	457	25.22	424	23.82	421	23.48	375	20.86	260	14.53
40-49	485	26.77	508	28.54	525	29.28	539	29.98	509	28.45
50-59	465	25.66	495	27.81	510	28.44	540	30.03	578	32.31
60 or over	343	18.93	314	17.64	304	16.95	318	17.69	435	24.32

Persons of Interest within Prescriber Practices

In order to determine which prescriber characteristics were associated with a higher number of POIs within their practice, we began by calculating the number of POIs within each prescriber practice during 2013 using both the IPLA and BJA definition of a POI. We calculated the number of POIs for all practices using provider DEA numbers as well as for the subset of prescribers for whom licensure data were available.

During 2013, there were 41,593 providers in the complete INSPECT data set. Using the IPLA definition of a POI, the majority of providers (98.61%) had no POIs in their practice while 572 providers (1.38%) had from 1 to 7 POIs within their practice (see Table 19). For practices with a POI, the median number of POIs within practices was 1.00 while the average number of POIs within practices was 1.15 (SD = 0.50). When POIs were defined using the BJA definition, most providers (89.67%) had no POIs in their practice. A total of 4,296 providers had one or more POIs within their practice (see Table 20). The number of POIs within these practices ranged from 1 to 99 with the median number of POIs being 1.00 and the mean number of POIs within practices being 2.09 (SD = 1.0).

For 2013, licensure data were available on 18,121 prescribers. Similar to findings within the overall sample when POIs were defined using the IPLA definition, most providers (97.07%) had no POIs within their practice. For the 531 practices with a POI the number of POIs within these practices ranged from 1 to 3 (see Table 21). In practices with a POI, the median number of POIs was 1 while the mean number of POIs within practices was 1.12 (SD = 0.38). When POIs were defined using the BJA definition, most providers (79.05%) had no POIs in their practice (see Table 22). In practices with POIs, the number of POIs ranged from 1 to 27. The median number of POIs was 1 while the mean number of POIs within practices was 2.07 (SD = 2.21).

Table 19. POIs within All Practices Using IPLA Definition

	2011		2012		2013	
	N of prescribers	%	N of prescribers	%	N of prescribers	%
0 persons of interest	38,525	97.56	40,967	97.88	41,021	98.61
1	842	2.13	734	1.75	508	1.22
2	100	0.25	113	0.27	49	0.12
3	18	0.05	28	0.07	12	0.01
4	3	0.01	6	0.01	1	0.00
5	0	0.00	2	0.00	1	0.00
6	0	0.00	1	0.00	0	0.00
7	0	0.00	0	0.00	1	0.00
11	1	0.00	0	0.00	0	0.00
12	0	0.00	1	0.00	0	0.00
14	0	0.00	1	0.00	0	0.00
15 persons of interest	1	0.00	0	0.00	0	0.00

Table 20. POIs within All Practices Using BJA Definition

	2011		2012		2013	
	N of prescribers	%	N of prescribers	%	N of prescribers	
0 persons of interest	34,854	88.26	36,478	87.16	37,297	89.67
1	2,739	6.94	3,076	7.35	2637	6.34
2	874	2.21	1,035	2.47	790	1.90
3	337	0.85	425	1.02	320	0.77
4	206	0.52	242	0.58	178	0.43
5	117	0.30	143	0.34	109	0.26
6	68	0.17	97	0.23	82	0.20
7	67	0.17	81	0.19	53	0.13
8	47	0.12	54	0.13	30	0.07
9	41	0.10	37	0.09	19	0.05
10	32	0.08	33	0.08	16	0.04
11	23	0.06	22	0.05	14	0.03
12	15	0.04	19	0.05	8	0.02
13	17	0.04	20	0.05	7	0.02
14	13	0.03	21	0.05	7	0.02
15	10	0.03	11	0.03	2	0.00
16	3	0.01	13	0.03	7	0.02
17	5	0.01	14	0.03	2	0.00
18	1	0.00	5	0.01	0	0.00
19	2	0.01	6	0.01	2	0.00
20	4	0.01	4	0.01	2	0.00
21	1	0.00	0	0.00	4	0.01
22	2	0.01	3	0.01	2	0.00
23	3	0.01	3	0.01	0	0.00
24	0	0.00	1	0.00	1	0.00
25	2	0.01	1	0.00	0	0.00
26	1	0.01	2	0.00	0	0.00
27	0	0.00	1	0.00	1	0.00
28	0	0.00	2	0.00	0	0.00
29	2	0.01	0	0.00	0	0.00
31	0	0.00	1	0.00	0	0.00
34	1	0.00	0	0.00	0	0.00
57	0	0.00	0	0.00	1	0.00
68	0	0.00	0	0.00	1	0.00
72	1	0.00	0	0.00	0	0.00
76	0	0.00	1	0.00	0	0.00
99	0	0.00	0	0.00	1	0.00
159	1	0.00	0	0.00	0	0.00
160	0	0.00	1	0.00	0	0.00
162	1	0.00	0	0.00	0	0.00
176 persons of interest	0	0.00	1	0.00	0	0.00

Table 21. POIs within Practices with Licensure Data Using IPLA Definition

	2011		2012		2013	
	N of prescribers	%	N of prescribers	%	N of prescribers	%
0 persons of interest	15,388	94.95	16,787	95.51	17,590	97.07
1	707	4.36	652	3.71	475	2.62
2	93	0.57	193	1.10	47	0.26
3	17	0.10	27	0.15	9	0.05
4	2	0.01	6	0.03	0	0.00
5 persons of interest	0	0.00	2	0.01	0	0.00

Table 22. POIs within Practices with Licensure Data Using BJA Definition

	2011		2012		2013	
	N of providers	%	N of providers	%	N of providers	%
0 persons of interest	12,386	76.42	12,984	73.87	14,324	79.05
1	2,179	13.44	2,555	14.54	2,278	12.57
2	759	4.68	901	5.13	730	4.03
3	281	1.73	385	2.19	290	1.60
4	187	1.15	215	1.22	161	0.89
5	101	0.62	135	0.77	100	0.55
6	59	0.36	88	0.50	76	0.42
7	58	0.36	72	0.41	52	0.29
8	42	0.26	46	0.26	27	0.15
9	38	0.23	33	0.19	19	0.10
10	25	0.15	29	0.16	12	0.07
11	21	0.13	18	0.10	13	0.07
12	13	0.08	18	0.10	7	0.04
13	16	0.10	17	0.10	7	0.04
14	12	0.07	19	0.10	5	0.03
15	8	0.05	11	0.06	2	0.01
16	3	0.02	13	0.07	6	0.03
17	3	0.02	12	0.07	2	0.01
18	0	0.00	5	0.03	0	0.00
19	2	0.01	3	0.02	2	0.01
20	3	0.02	4	0.02	1	0.00
21	1	0.00	0	0.00	3	0.02
22	2	0.01	3	0.02	2	0.01
23	3	0.02	3	0.02	0	0.00
24	0	0.00	1	0.00	1	0.00
25	1	0.00	1	0.00	0	0.00
26	1	0.00	2	0.01	0	0.00
27	1	0.00	1	0.00	1	0.00
28	0	0.00	2	0.01	0	0.00
29	1	0.00	0	0.00	0	0.00
31	0	0.00	1	0.00	0	0.00
34 persons of interest	1	0.00	0	0.00	0	0.00

Currently, no criteria are available that can be used to determine whether a prescriber is or is not prescribing opioids inappropriately. One possible way to explore this issue is by examining providers who have POIs in their practice. Providers with more POIs in their practice may potentially be engaging in inappropriate opioid prescribing or other behaviors attractive to POIs, or may simply have larger practices or practices that specialize in the treatment of chronic pain. Using the frequency of POIs within practices described above, we created three categories to describe opioid providers: prescribers of non-interest (P0), prescribers of potential interest (P1-2), and prescribers of interest

(P3+). We defined P0 as all prescribers who had no POIs in their practice. We defined P1-2 as all prescribers who had 1 to 2 POIs in their practice. We defined P3+ as all prescribers who had 3 or more POIs in their practice. Tables 23 and 24 provide a breakdown of the frequency of P0, P1-2, and P3+ within practices using both the IPLA and the BJA definitions for POIs for the entire 2013 INSPECT data set as well as just for those providers for whom licensure data were available.

Table 23. Prescribers of Non-Interest, Prescribers of Potential Interest, and Prescribers of Interest by POI Definition within All Practices

	IPLA POI Definition		BJA POI Definition	
	N	%	N	%
P0	41,021	98.62	37,297	89.67
P1-2	557	1.34	3,427	8.24
P3+	15	0.04	869	2.09

Table 24. Prescribers of Non-Interest, Prescribers of Potential Interest, and Prescribers of Interest by POI Definition within Practices with Licensure Data

	IPLA POI Definition		BJA POI Definition	
	N	%	N	%
P0	17,590	97.07	14,324	79.05
P1-2	522	2.88	3008	16.60
P3+	9	0.05	789	4.35

Focusing specifically on providers for whom licensure data were available in 2013, we explored whether any available demographic variables would differentiate the three groups of providers. In terms of license, MDs made up the largest percentage of providers across all three groups regardless of whether the IPLA or BJA definition for POI was used. Looking within P0s, P1-2s, and P3+s with IPLA-defined POIs in their practice, the P0 group was characterized by containing only MDs and PAs. Within practices that contained BJA-defined POIs, there was a more diverse mix of providers who were categorized as being P3+s. The license types which characterized the largest percentages of P3+s with BJA-defined POIs in their practice were MDs (62.2%) and NPs (12.7%; see Tables 25 and Table 26).

In terms of gender, across all groups of providers males were more strongly represented than females. We did note that as POIs increased within practices, the percentage of male providers also increased (see Table 27).

Regarding age, P3+s with IPLA-defined POIs were significantly younger than both P0s ($t = 1.46$, $p = .02$) and P1-2s ($t = -1.46$, $p = .02$). P3+0s with BJA-defined POIs in their practice were significantly younger than P0s ($t = 2.27$, $p < .001$) but of a similar age to P1-2s ($t = 1.05$, $p = .069$; see Table 28).

Table 25. Prescribers of Non-Interest, Prescribers of Potential Interest, and Prescribers of Interest by License Type Using IPLA definition of POI

	MD		DO		Dentist		DPM		NP		PA		DVM	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
P0	10,379	59.9	876	5.0	2726	15.5	252	1.4	2,662	15.1	556	3.2	139	0.8
P1-2	332	63.6	49	9.4	52	10.0	10	1.9	48	9.2	31	5.9	0	0.0
P3+	7	77.8	0	0.0	0	0.0	0	0.0	0	0.0	2	22.2	0	0.0

Table 26. Prescribers of Non-Interest, Prescribers of Potential Interest, and Prescribers of Interest by License Type Using BJA definition of POI

	MD		DO		Dentist		DPM		NP		PA		DVM	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
P0	8,350	58.3	675	4.7	2287	16.0	211	1.5	2,248	15.7	414	2.9	139	1.0
P1-2	1,877	62.4	177	5.9	438	14.5	51	1.7	362	12.0	103	3.4	0	0.0
P3+	491	62.2	73	9.3	53	6.8	0	0.0	100	12.7	72	9.1	0	0.0

Table 27. Prescribers of Non-Interest, Prescribers of Potential Interest, and Prescribers of Interest by Gender

	IPLA POI Definition				BJA POI Definition			
	Males		Females		Males		Females	
	N	%	N	%	N	%	N	%
P0	10,664	61.5	6,665	38.5	8,519	60.4	5,595	39.6
P1-2	380	73.2	139	26.8	1,984	67.0	978	33.0
P3+	7	77.8	2	22.2	548	70.2	233	29.8

Table 28.

	IPLA POI Definition		BJA POI Definition	
	M	SD	M	SD
P0	49.22	11.86	49.70	11.93
P1-2	47.77	11.35	47.43	11.38
P3+	46.67	14.56	46.38	11.22

We examined the mean number of dispensations attributed to providers within each prescriber category using both the IPLA and BJA definitions of POIs. When POIs were defined using the IPLA definition, P0s had significantly fewer dispensations ($t = -226.45$, $p < .001$) than P1-2s or P3+s ($t = -484.02$, $p = .027$). The median number of prescriptions within prescriber categories increased as the number of POIs increased. When prescriber categories were defined using the BJA definition of POIs, we determined the mean number of dispensations for P0s was significantly less than those for P1-2s ($t = -271.33$, $p < .001$) and P3+s ($t = -599.18$, $p < .001$) while P1-2s had significantly fewer dispensations than did P3+s ($t = -327.85$, $p < .001$). The median number of dispensations for each prescriber category increased as the number of POIs increased (see Table 29).

Table 29. Number of Opioid Dispensations by Prescriber Category

	IPLA POI Definition			BJA POI Definition		
	M	SD	Median	M	SD	Median
P0	231.98	553.09	61.00	167.62	389.60	37.00
P1-2	458.43	824.23	272.5	438.95	785.61	210.00
P3+	716.00	211.49	666.0	766.80	1294.23	406.00

We reviewed the average number of patients who received opioids within each category of prescriber. Using the IPLA definition of POIs, providers in the P0 group had opioids dispensed to fewer patients than both the P1-2 ($t = -174.53$, $p < .001$) and P3+ groups ($t = -598.67$, $p < .001$) while the P1-2 group had opioids dispensed to fewer patients than the P3+ group ($t = -424.16$, $p < .001$). A similar pattern was noted when POIs were defined with the BJA definition with P0s having fewer patients with opioid dispensations than P1-2s ($t = -109.44$, $p < .001$) and P3+s ($t = -318.29$, $p < .001$) and P1-2s having fewer patients with opioid dispensations than P3+s (-208.86, $p < .001$; see Table 30).

Table 30. Mean Number of Patients to whom Opioids were Dispensed by Prescriber Category

	IPLA POI Definition			BJA POI Definition		
	M	SD	Median	M	SD	Median
P0	88.98	134.69	38.00	62.28	93.13	25.00
P1-2	263.51	229.71	204.00	171.72	176.05	120.00
P3+	687.67	210.62	651.00	380.57	253.83	333.00

In general, providers who have more POIs in their practice appear to be predominantly MDs, appear to be somewhat younger, appear to be writing more prescriptions for opioids, and appear to be writing opioid prescriptions to a larger number of patients. Unfortunately, given the lack of demographic and practice-level data on providers, it is not possible to determine whether providers with POIs in their practice are in fact behaving inappropriately or whether the nature of their practice tends to attract POIs.

Conclusions

In 2013, Indiana pharmacies dispensed over 10.6 million controlled substances. Opioid analgesics were the most frequently dispensed controlled substances followed by benzodiazepines and central-nervous system stimulants. Overall, individuals who received controlled substances during 2013 were typically female, 50 years of age or older, and living in larger metropolitan areas.

In discussing controlled substances, particularly opioid analgesics, an area of concern is doctor-shopping. Through analyzing INSPECT data using two definitions of doctor-shopping (or person of interest/POI), we noted the definition used clearly impacts the number of individuals categorized as potential POI's. We noted potential doctor-shoppers are more likely to be younger and have filled a higher number of opioid prescriptions than individuals characterized as non-shoppers.

Finally we examined the opioid prescribing patterns of controlled substance providers. Generally, more dispensations of opioid analgesics are attributable to MDs than any other profession with prescription privileges. A small group of providers is responsible for the largest number of opioid dispensations and this group is composed predominantly of male MDs. While no definition exists to categorize providers into groups who may or may not be engaging in inappropriate opioid prescribing behavior, we did explore whether differences existed among providers who did or did not have doctor shoppers within their practices. Most providers had no doctor shoppers within their practices. Using available demographic data, we determined providers with doctor-shoppers in their practice compared to those with no doctor-shoppers were typically MDs, male, and slightly younger had more opioid dispensations attributable to them and prescribed opioids to a greater number of patients.

Based on this initial analysis of the INSPECT data, we offer the following conclusions and recommendations:

1. Improvements in the quality and completeness of the licensure data need to be made to allow for better linking of the information with the INSPECT data. Having detailed licensure data would enable more fine-grained provider-level analyses. We also would recommend that IPLA consider gathering additional demographic information from controlled substance providers, such as their specialty, where appropriate, and other practice-level variables (e.g., size of practice, percent of patients on Medicaid/Medicare, etc.) to assist in determining factors that impact the dispensation of controlled substances.
2. Because no commonly accepted definition exists for what constitutes a problem patient or a problem prescriber of controlled substances, we recommend IPLA partner with the PDMP Center of Excellence at Brandeis University to collaborate with researchers and policymakers involved in the evaluation and development of standardized, nationally-recognized definitions for problem patients and problem prescribers.
3. Until a better definition is developed, we recommend IPLA consider adopting the BJA definition of a doctor-shopper or POI. The BJA definition is less restrictive than the definition currently in use by IPLA and the probability that more providers will be identified as a POI in their practice may help to raise awareness among all prescribers about issues related to doctor-shopping. Additionally, because the BJA definition of POIs will raise the number of POIs identified in INSPECT, we recommend IPLA collaborate with other state agencies committed to addressing the prescription drug epidemic—including, but not limited to, the Indiana State Department of Health, the Indiana Division of Mental Health and Addiction and the Indiana Criminal Justice Institute) in the development of interventions that will target POIs in cases where they may be using opioids inappropriately as well as interventions to help inform prescribers about best practices when working with individuals who may be potential doctor-shoppers and best practices regarding the prescription of opioid analgesics and other controlled substances.

In conclusion, the findings from this study offer an additional perspective on the value of using INSPECT as a tool in the State of Indiana's efforts to address the growing state-wide prescription drug epidemic. Data can provide powerful insights both on the nature and scope of the problem but also identify potential directions for policy changes which may help to stem the tide of the epidemic.

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