

Assessing the Relationship between Controlled Substance Prescribing and Opioid Poisoning Toxicology



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Abstract

This study updates previously reported drug overdose deaths in Allen County, Indiana with the purpose to evaluate changes in physician prescribing and drug overdose deaths following introduction of more restrictive Indiana controlled substance prescribing laws. In a retrospective review of drug overdose deaths, 2013-2017, Allen County, IN, autopsy, toxicology, police reports and prescribing data from the Indiana Scheduled Prescription Electronic Collection and Tracking Program (INSPECT) for 12 months preceding death were analyzed. Descriptive and correlational statistical measures were used. A total of 533 drug overdose deaths were reported: 414 deaths with complete records (369 unintentional, 42 intentional, 3 undetermined). Decedents, mean age 42.3 years, were more likely male (60.6%), Caucasian (89.1%) and employed (70.2%). Overdose deaths increased significantly between 2014 (n=53) and 2017 (n=133). Non-prescribed opioids were present in 293 (70.8%) deaths and 298 (72%) deaths involved multiple substances. Fentanyl-related deaths markedly increased (2 (3.2%) in 2013, 67 (50.5%) in 2017) and correlate with police fentanyl seizures. The average number of prescribed controlled substances significantly decreased. Non-prescribed controlled substances including opioids contributed to most deaths. While gains have been made with responsible opioid prescribing, the current crisis is fueled by illicit opioids.

Keywords: Drugs; Toxicology; Overdose; Public health; Drug overdose deaths; Fisher exact tests; Pharmacies

Abbreviations: INSPECT: Indiana Scheduled Prescription Electronic Collection and Tracking Program; FET: Fisher Exact Tests

Introduction

Drug overdose deaths remain a serious public health crisis in the United States. Opioids were involved in two-thirds of the over 70,000 drug overdose deaths in 2017. Deaths involving prescription opioids and heroin remained stable whereas those for all opioids and synthetic opioids increased in 2016-2017. All opioid deaths for Indiana, 2017, (18.8/100,000) were higher than the national rate of 14.9 per 100,000. Similarly, Indiana heroin deaths and synthetic opioids other than methadone deaths exceeded national rates (5.3 vs. 4.9 and 10.5 vs. 9.0/100,000 respectively). About 70 percent of the 67,367 drug overdose deaths in 2018 involved opioids, with decreases in overdose death rates for all opioids (2% decline), prescription opioids (14%) and heroin (4%), and a 10% increase in for synthetic opioids [1]. United States opioid dispensing rates peaked in 2012 (over 255 million, rate 81.3 prescriptions per 100 persons) and declined through 2019 (over

153 million, rate 46.7 prescriptions/100 persons) while Indiana rates were higher (2019, 60.4/100 persons). Allen County dispensing rates (2013, 90.8; 2017, 66.8/100 persons) lower than those reported overall for Indiana [2,3]. Critical functions of the Indiana Scheduled Prescription Electronic Collection and Tracking Program (INSPECT) prescription drug monitoring program are to maintain a patient information warehouse for health care professionals and to provide an important investigative tool for law enforcement. Medical providers are required to check INSPECT at initial visit for patients with chronic non-terminal pain and whenever a controlled substance is prescribed [4]. The current study updates previously reported drug overdose deaths [5] and evaluates changes in Allen County physician prescribing and drug overdose deaths following introduction of more restrictive Indiana controlled substance prescribing laws. Contributions of prescribed and non-prescribed controlled substances to overdose

deaths linking toxicology, coroner reports, INSPECT, and Fort Wayne Police Department data are examined. Temporal changes in physician prescribing patterns and in types of drugs found on toxicology are also evaluated.

Methods

In this retrospective, descriptive, correlational study, all drug overdose deaths in Allen County, Indiana were identified through the Allen County Coroner's Office between January 1, 2013, and December 31, 2017. Those with complete records were included. Coroner medical records and coroner toxicology reports, Department of Health death certificates, police reports and INSPECT reports were included in assessment and analysis. INSPECT was reviewed for 12 months prior to each death, to identify changes in physician prescribing patterns, number of prescribing physicians and number of pharmacies. Toxicology and INSPECT were directly compared to identify whether opioids

present were prescribed. Active opioid and benzodiazepine prescriptions were standardized to morphine and diazepam equivalents respectively [6,7]. This study was approved by the institutional review board of Lutheran Health Network. Statistical analysis: Drug overdose deaths were identified by Allen County Coroner's Office or Fort Wayne Allen County Department of Health death certificates. Descriptive and correlational statistical measures were used to examine and describe the data. Statistical tests performed include independent t-tests, X^2 , and Fisher exact tests (FET). The level of significance was $\alpha = .05$, with p values less than .05 being considered statistically significant. Non-overdose deaths and/or those pending investigation or litigation were excluded. For confidentiality, an identification number was assigned to de-identify data. All data was collected from preexisting information available from medical records, police reports, death certificates, and toxicology reports.

Results

Table 1: Allen County, drug overdose deaths, 2013-2017, drug overdose deaths demographics.

	Number, n	Percentage, %
Sex		
Male	323	60.6
Female	210	39.4
Marital status		
Never married	211	39.6
Married	122	22.9
Divorced	148	27.8
Employment status		
Employed	374	70.2
Unemployed	68	12.8
Education		
High school, unfinished	89	16.7
High school graduate	271	50.8
Some college	97	18.2
Race / Ethnicity		
White	475	89.1
Black	49	9.2
Substances involved		
Single	149	28
Multiple	384	72
Location of death		
Residence	366	68.7
Other	131	24.6
Other people present		
Yes	308	57.8
No	212	39.8
Totals represent available data in each section, totals may not match between sections and percentages may not add to 100%.		

Total number of reported drug overdose deaths 2013-2017, was 533. Of these, 414 deaths (369 unintentional, 42 intentional, 3 undetermined) had sufficient data for analysis. Demographic information is summarized in Table 1. Mean age 42.3 (+13.8) years, 60.6% (n=323) male, 89.1% (n=475) Caucasian and 70.2% (n=374) were employed at time of death. Most deaths involved more than one substance, occurred at the decedent's place of residence (68%, n=366) and more than half occurred with other people present (57.8%, n= 308). Average number of annual opioid prescriptions dropped by more than half (18.1 to 8.2, 2013-2017, p=0.00001), whereas average number of providers and pharmacies were stable. Between 2014 and 2017, decedents'

average daily opioid dose, in morphine equivalents, dropped from 82.0 to 37.6 mg (p= 0.00001).

Overdose deaths, most commonly involving opioids and benzodiazepines, more than doubled (62 deaths in 2013, 133 in 2017) (Table 2). Fentanyl-related deaths markedly increased (2 (3.2%) deaths in 2013, 67 (50.5%) in 2017) and fentanyl amounts seized during police actions more than doubled. Multiple substances were involved in 72% (n= 384) deaths. During 2015, 51.9% toxicology reports included both opioid and benzodiazepine. Almost 75.5% of deaths involved non-prescribed controlled substances and only 18% of decedents had an active opioid prescription (Table 2).

Table 2: Allen County, drug overdose deaths, 2013-2017, opioids with active prescriptions or from illicit source drug overdose deaths.

	2013 n=62	2014 n=53	2015 n=77	2016 n=88	2017 n=133
Prescription substances					
Active prescription (Rx) at time of death, average number	1.07	1.43	1.18	0.98	0.41
Active Rx, but not present on toxicology report, % of deaths	31.80%	20.00%	19.20%	29.30%	18.60%
Not prescribed drugs, on toxicology, % deaths	77.30%	62.50%	75.00%	84.50%	78.00%
Active co-Rx opioid + benzodiazepine, %deaths	18.20%	22.50%	21.20%	15.50%	5.10%
Opioid + benzodiazepine on toxicology, % deaths	34.10%	42.50%	51.90%	43.10%	25.40%
Not prescribed opioid on toxicology, % deaths	63.60%	62.50%	69.20%	72.40%	78.00%
Not prescribed benzodiazepine on toxicology, % deaths	18.20%	22.50%	25.00%	36.20%	18.60%
Illicit opioids					
Heroin					
Present on toxicology, % deaths	15.90%	25.00%	25.00%	25.90%	27.10%
Amount seized in police action, grams	150	157.5	339.8	247.6	711
Fentanyl					
Present on toxicology, % deaths	3.20%	5.00%	32.70%	36.20%	50.80%
Amount seized in police action, grams	0	0	15.3	10.3	1504.4

Discussion

Drug overdose deaths in Allen County, Indiana more than doubled, 2013-2017, despite a prescribing decrease by more than one-half and reduction in daily dose prescribed. Benzodiazepine-opioid co-prescribing decreased. Despite declining opioid prescribing trends nationally, Indiana rates remain higher. Allen County prescribing rates are lower than Indiana overall, but still above national rates [3]. Opioids, including prescribed, continue as a major contributor to overdose deaths, yet controlled substance prescribing has significantly decreased. These findings are consistent with national trends; after peaking 2011, a steady decline is reported in prescription opioid volumes, and in benzodiazepine-opioid co-prescribing. Volume decreases correlate with changes in clinical practice and

progressively more restrictive legislation since 2012 [8]. In the current study, a driver for increases in drug overdose deaths is the marked increase in illicit opioids, consistent with national data. In 2017, illicit or non-prescribed fentanyl was present in more than half of drug overdose deaths, and these deaths markedly increased over 2013-2017. Heroin related deaths also increased. In United States, 2013 to 2019, synthetic opioid death rates increased sharply in 2019 about one-half of all overdose deaths involved synthetic opioids [9]. Several studies report significant increases in deaths involving synthetic opioids between 2015 and 2017, with decreased prescription opioid involvement and increased fentanyl related deaths, including illicitly manufactured fentanyl [10-17]. The current study demonstrates a favorable shift in physician opioid prescribing habits and a declining

role for prescription opioids. The majority of overdose deaths involve illicit controlled substances; the majority of these, illicit fentanyl. Responsible opioid prescribing, ongoing enhancement of collaboration between law enforcement, public health officials and physicians, through a multifaceted, multidisciplinary approach are all essential to best provide individuals and families access to optimal care.

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