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# Investigating the Opioid Epidemic in Illinois: An Analysis of Emergency Room Utilization

MPH CE Project, Spring 2020

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## Abstract

**Introduction:** Between July 2016 and September 2017, emergency department (ED) visits for opioid overdose increased by 30% in the United States (1) and by 66% in Illinois (2). The objective of this study was to monitor the progression of the opioid epidemic in Illinois through an analysis of ED visits for opioid use, abuse, dependence, and overdose between January 2016 and June 2018. We analyze the relative incidence of inpatient hospitalization and death among patient demographics.

**Methods:** Administrative data from 194 non-federal Illinois hospital EDs were obtained from the Illinois Hospital Association Comparative Health Care and Hospital Data Reporting Services database. We isolated ED visits with ICD-10 codes for opioids (3) and looked at patient characteristics. We estimated Poisson regression models to calculate incidence rate ratios (IRRs) for death or hospitalization.

**Results:** We found 130,785 ED visits for opioid use, abuse, dependence, or overdose during the 30-month study period. Comparing the first six months of each year, the average number of opioid-related ED visits increased from 3,935 visits per month in 2016 to 4,462 visits per month in 2018 (13% increase). Of those coded as opioid overdose (n=31,129), 65.6% were male, 52.5% were non-Hispanic white, 55.5% were between 35-64 years old, and 47.1% were Medicaid enrollees. Non-Hispanic blacks were less likely to have opioid-related death compared to non-Hispanic whites (IRR = 0.76, 95% CI = 0.60-0.95). Compared to visits for opioid use, visits coded as opioid overdose resulted in death more frequently (IRR = 2.04, 95% CI = 1.60-2.61) and hospitalization less frequently (IRR = 0.65, 95% CI = 0.56-0.76). Visits coded as opioid dependence resulted in

death less frequently (IRR = 0.65, 95% CI = 0.50-0.85) compared to opioid use. There were no statistically significant differences in hospitalization rates between opioid abuse or dependence and opioid use. Overdose with synthetic opioids had a lower likelihood of death compared to non-synthetic opioid use (IRR = 0.54, 95% CI = 0.32-0.93).

**Conclusions:** Over 30 months, ED visits for opioid overdoses have increased whereas the number for opioid use, abuse, and dependence have remained unchanged. The number of deaths and hospitalizations by overdose primarily reflects trends in heroin use. Publicly available hospital administrative data has a wealth of valuable information for public health officials working to control the opioid epidemic.

## Background & Public Health Relevance

### Introduction

According to the Centers for Disease Control and Prevention (CDC), the number of Emergency Department (ED) visits for opioid overdose are still rising and increased by 30% in all parts of the United States from July 2016 to September 2017 (1). In the Midwest the number of overdoses is estimated to have risen by 70% in the same time period (1). For the state of Illinois specifically, the percent increase was 65.5% (2). The age-adjusted death rate from opioid overdose in Illinois was calculated to be 14.7 per 100,000 in 2016, which was a 37.4% increase from 2015 (4). Within the City of Chicago itself, the increase in the death rate was a whopping 83.9% (11.8 deaths per 10,000 in 2015 compared to 21.7 per 10,000 in 2016) (4).

What has been done to decrease mortality from the opioid epidemic? The City of Chicago has created Healthy Chicago 2.0, an initiative that includes a two-fold plan to address the opioid epidemic (5). Some of the proposed actions in Healthy Chicago 2.0 include monitoring the Heroin Crisis Act of 2015 (a bipartisan Illinois state law that expanded access to opioid addiction treatment and overdose prevention (6)), increasing physician buprenorphine training, and expanding access to naloxone to decrease the likelihood of patients dying prior to even having a chance of reaching the ED (5). At the state level, the Illinois Department of Human Services/Division of Alcoholism and Substance Abuse was given support from the federal government in the form of a State Targeted Response to the Opioid Crisis grant in 2017. From there, the Illinois Opioid Action Plan of September 6, 2017 was created and established a clear goal—"to reduce opioid deaths [in Illinois] by 33% in three years" (7). The plan outlines a total of nine strategies that the State would focus on, including increasing access to care to those with opioid use disorder, including

dissuading health care professionals from high-risk prescribing, and supporting data collection, analysis, and sharing (7).

### Role of the ED in the Opioid Epidemic

Overdose mortality is not the only adverse outcome in this epidemic, however. The opioid burden on EDs has drastically increased with an increase in the number of non-fatal opioid use visits as well, which is correlated to increased addiction prevalence (7). The ED is a unique environment in which there is great potential to reduce opioid mortality. This is not only because many overdose patients are likely to end up in an ED, but also because there is the opportunity for a physician to intervene and prevent a future overdose, especially in those who have a history of overdose or other complications from opioid use (1). On the other hand, although the majority of opioid prescriptions begin at the primary care doctor or surgeon's office, prescribing opioids in the ED can also enable an existing problem of opioid misuse and addiction (8). The ED physician must be careful when providing opioid prescriptions but, at the same time, balance adequately managing their patients' pain levels in providing the best care possible.

### Aims of this Study

This study is an attempt to provide ED physicians and other important stakeholders in this epidemic with the most recent available data regarding the burden of opioid overdose and other opioid use visits on EDs within Illinois. We looked at data from visits to 201 hospital EDs across Illinois using ICD-10 codes corresponding to either opioid overdose or other opioid use. With data that provide a comprehensive view of ED encounters within the state, we aim to empower public health officials and policy makers with information they need to monitor this epidemic.

## Methods

Administrative data from 201 non-federal Illinois hospital EDs were obtained from the Illinois Hospital Association Comparative Health Care and Hospital Data Reporting Services (COMPdata) database. We looked at records for patient demographics, insurance status, and ED disposition (hospital admission, whether the patient died), and day of ED visit (weekday vs. weekend) for patients of all ages with Illinois zip codes. ICD-10 codes from ED visits from January 2016 through March 2018 (30-month period) were examined for containing an ICD-10 code corresponding to opioid overdose or other opioid use. We classified opioid overdose using ICD-10 codes classified by the CDC's Opioid Overdose Indicator Support Toolkit version 3.0 (3). Other opioid use visits were defined as ED visits containing an ICD-10 T40 code not included in the CDC's classification for overdose and/or an F11 code corresponding to opioid use.

Chi-squared tests were used to determine statistically significant differences between the patient and hospital area for opioid overdose and other opioid use. Bimonthly trends in the number of opioid overdose and other opioid use ED visits over time were calculated by opioid substance (heroin, methadone, or synthetic narcotic).

We estimated a logistic regression model of the likelihood of hospital admission to compare patient and hospital factors. Poisson regression was used to obtain incident rate ratios (IRRs) corresponding to how likely an opioid overdose ED visit resulted in a hospital death. All analyses were conducted using STATA/SE version 15, College Station, Texas.

## Results

There were 50,614 opioid-related ED visits in 2016, 54,027 opioid-related visits in 2017, and 26,144 visits in the first half (Jan-June) of 2018. Of these visits, 11,163 were overdoses in 2016, 13,407 were overdoses in 2017, and the first half of 2018 saw 6,540 overdoses.

### Opioid Classification Breakdown- Table 1

Of all opioid-related ED visits ( $n = 130,785$ ), 23.8% were opioid overdoses, 29.3% were opioid abuse, 39.4% were opioid dependence, and 7.5% were opioid use cases that were otherwise not coded as overdose, abuse, or dependence-related (Table 1). Over the course of time, July-December 2017 had the highest percentage of ED visits for all opioid categories except for opioid abuse, where the period with the most visits was July-December 2016. Comparing the first six months of each year with the second half of each calendar year, there is not a consistent seasonal increase or decrease in the percentage of ED opioid-related visits. Comparing data we have from the first six months of 2018 to the data from 2017, however, the number of opioid-related visits in every category has decreased. However, the number of all opioid visits increased in Jan-June 2018 ( $n = 26,144$ ) compared to the same calendar period the year prior ( $n = 26,131$  in Jan-June 2017).

### Patient Characteristics – Table 1

The majority of opioid-related ED visits were from male patients (Table 1). The two ethnic groups most represented are non-Hispanic whites and non-Hispanic blacks, with non-Hispanic Whites comprising of the majority overall (48.0%). This trend is true within each opioid category as well with the exception of opioid abuse, where non-Hispanic blacks out-numbered non-Hispanic whites (Table 1). The age group with the most opioid-related ED visits was ages 35-64 years (62.9%), with the 20-34 year-olds comprising of the second largest age group (28.3%). Of all opioid-related

ED visits, people ages 65+ made up 7.24% of the visits whereas children and teenagers made up only 1.56% of the visits (Table 1).

Across the board, those who came into the ED for opioid-related reasons were likely to have medical insurance, with only 9.96% having no insurance at all (Table 1). Medicaid was the most common insurance among ED opioid visits, and private insurance was the second-most common. Specifically looking at opioid overdoses, 47% had Medicaid and only 15.5% were uninsured. For opioid abuse, dependence and other use, Medicaid users were the majority of ED visits. The largest proportion of Medicare users were seen in the opioid dependence and other opioid use categories. The greatest proportion of uninsured individuals were found in the opioid overdose and opioid abuse categories, where they comprised 15.5% and 10.6% of each respectively.

Whether it was a weekday or the weekend did not seem to have an impact on how often opioid-related ED visits occurred. The two weekend days make up 28.6% of the seven days in a week, which seems to match with 29% of opioid overdoses arriving the ED on a weekend (Table 1). For the other categories, if anything there may be a slightly lower chance of an ED visit on the weekend compared to expected.

#### [Geographical Trends – Table 1](#)

The majority of opioid-related ED visits for all categories occurred in Cook County (Table 1). According to the United States Census Bureau, Cook County had a population of 5,211,263 as of July 2017 (9). The Collar Counties, consisting of DuPage (population 930,128), Kane (534,667), Will (692,661), Lake (703,520), and McHenry (309,122) Counties, had a combined population of 3,170,098, also in July 2017 (10-14). Using these population numbers, the ratio of people in Cook

County to Collar County is about 1.64. Looking at all opioid-related visits, 58.6% of them occurred in Cook County compared to 16.1% in the Collar Counties (Table 1). This corresponds to a ratio of 3.64, meaning the density of opioid-related ED visits per population is much greater in Cook County compared to the Collar Counties.

The second-most common location for opioid-related ED visits within Illinois was in Downstate regions, which essentially comprise of everywhere else in Illinois that is not part of Chicago or the Collar Counties. Though not a perfect estimation, if we take the difference in the estimated population in the state of Illinois (12,802,023 in July 2017 (15)) and the sum of the populations of Cook and Collar Counties, we get an estimated population for Downstate of 4,420,662. This means that the population ratio between Cook and Downstate would roughly be 1.18, which is much lower than the ratio of opioid visits in Cook and Downstate, which is calculated to be 2.31. Again, there is a greater density of opioid-related ED visits occurring in Cook County compared to the rest of Illinois.

#### [Trends in Opioid-Related ED Visits – Figure 1](#)

Opioid overdose ED visits have been on the rise overall, with dramatic spikes occurring around April-June of 2016, December 2016-February 2017, and August-October 2017. In raw numbers, visits for opioid dependence made up the majority of ED visits, followed by abuse, overdose, then use. The number of opioid use visits has remained fairly consistent over the studied time period and does not ebb and flow in the same manner as the other three opioid categories. The three categories of dependence, abuse, and overdose all have the same increasing trend in visit at around May-June 2016, but then afterwards the categories of dependence and abuse do not follow the trend seen in overdoses as closely. Comparing the beginning of year 2016 to June of 2018, neither

opioid dependence visits nor opioid abuse visits have increased to the same magnitude that the number of opioid overdose ED visits has.

#### Overdose by Opioid Type – Figure 2

In Figure 2, we can see the primary driver of the trend in opioid overdoses is heroin. Methadone and synthetic opioid overdoses are a small portion and have remained relatively stable over the years. Much like the trends in seen in the overall number of opioid-related ED visits, the number of opioid overdose ED visits tends to oscillate. The difference between the number of all opioid overdoses and heroin overdoses has been virtually static over time, implying the number of overdoses from all other non-heroin opioids has not changed significantly from 2016 to 2018.

#### Likelihood of Death – Table 1, Table 2, and Figure 3

Of the many visits to the ED for opioid-related reasons, only a small percentage of them result in death in the ED. A visit for opioid dependence was least likely to result in death, with only 0.46% of visits resulting in death (Table 1). However, 0.74% of all opioid visits and 1.32% of opioid overdose visits resulted in death. This means overdose resulted in death almost twice as often compared to all opioid visits.

Looking at the statistically significant findings in Table 2 for all opioid-related deaths, non-Hispanic blacks died from opioids less compared to non-Hispanic whites (IRR = 0.76). Deaths among 35-64 year-olds and 65+ year-olds were 1.45 times and 3.29 times more likely compared to 20-34 year-olds respectively. Additionally, there appeared to be a slight increased chance of death if a person came to the ED on a weekend compared to a weekday (IRR = 1.17).

Opioid overdose was associated with 2.04 times increased risk of death compared to all non-overdose, non-abuse, and non-dependence opioid use as a reference (Table 3). On the other hand, opioid dependence was associated with a decreased risk of death compared the same reference (IRR = 0.65). Additionally, synthetic opioids were associated with decreased occurrence of death compared to all other non-synthetic opioids (IRR = 0.54); however, remember that synthetic opioids comprise of a very small portion of all opioid use.

Heroin is still responsible for the vast majority of all opioid overdose deaths seen by Illinois EDs (Figure 3). The trend in all opioid overdose deaths follows closely the trend in heroin overdose deaths. In our database, deaths by overdose for the two other opioid types we looked at, methadone and synthetics, were often equal to zero, meaning no deaths occurred in certain months (Figure 3). Overall, the number of overdose deaths by opioids appears to be about the same in 2018 as it was in 2016.

#### Likelihood of Hospital Admission – Table 1, Table 2, Figure 4

If opioid use and/or overdose does not result in death, another common disposition from the ED is hospital admission. Of all opioid-related ED visits, 41.7% of them resulted in hospital admission, with the greatest proportion of admissions occurring among opioid dependence visits at 55.5% (Table 1). Opioid overdose visits had the least hospital admissions, with only 25.1% resulting in admission. Males were statistically significantly less likely to be admitted after an opioid-related ED visits (IRR = 0.94, Table 2). Those who were more likely to be admitted included 35-64 year-olds and 65+ year-olds compared to 20-34 year-olds.

Medical insurance type had an impact on a patient's likelihood of hospital admission, with patients who had Medicare being more likely admitted compared to those with private insurance (IRR = 1.24, Table 3). Being uninsured made it less likely the ED visit resulted in hospital admission (IRR = 0.55). Geographically, being in Cook County was associated with a greater likelihood of being admitted after an opioid-related ED visit.

If the opioid-related ED visit was for an opioid overdose, the patient was less likely to be admitted to the hospital (IRR = 0.65, Table 3). Integrating this information with the greater likelihood of death in opioid overdose, perhaps decreased admission rate is merely the result of patients dying in the ED and, therefore, ineligible for admission. As it was with opioid-related deaths, heroin use is the primary cause of opioid-related hospital admission from the ED relative to other opioid types (Figure 4).

## Discussion

Based on the data presented in this paper, the opioid epidemic in Illinois is ongoing if not worsening based on the stable number of ED visits for any opioid-related concern over time. Additionally, the overall trend shows increasing numbers of opioid overdoses and heroin use cases seen in EDs. If we use this data to project upcoming years in a linear fashion, we unfortunately can expect the number of opioid overdoses specifically related to heroin use to continue to rise.

How can the State of Illinois combat a continuing rise in opioid overdoses seen in EDs? One approach would be to address and reduce prescription opioid use, with the hope of encouraging proper use of medication to prevent overdose. Some strategies currently being studied include targeted opioid education for patients. Educators vary from pharmacists (16, 17) to computer programs (18) and in-person therapists (19) to improve overall awareness of opioids and the dangers of their use. A strategy targeting prescribers involves the development of new decision-making algorithms to help reduce the number of opioid prescriptions given to patients in the first place (20, 21). These methods are still relatively new and undergoing further research to determine outcomes and efficacy.

While being judicious with prescription opioids certainly should help with the gross number of overdoses seen, the epidemic in Illinois is a predominantly a heroin issue, however. The majority of opioid overdose cases seen in the ED are coded as having been related to heroin. With heroin being an illicit substance, interventions aimed at prescribing behaviors of doctors miss the largest cause of mortality and hospital admission in the ED. A more effective way to prevent mortality would be to make naloxone, the life-saving medication for someone who is in an opioid overdose, more widely available. Thus, efforts such as the formulation of an over-the-counter version of

naloxone (22) may be more effective at preventing death. Faster reversal of overdose could result in possibly faster recovery and less time in hospitalization as well. Of course, this intervention would still not prevent the initial opioid overdose but hopefully can mitigate the ramifications.

One limitation of this study is the lack of specific patient identifiers for each ED visit. This means we cannot tell which ED visits correlate with opioid overdose re-offenders. Because addiction is a notoriously difficult disease, it would not be surprising for some of these ED visits to be by the same person for their second, third, or nth opioid overdose. It follows then that one way to reduce re-presentation to the ED for opioid overdose would be to have a way for these patients to start opioid addiction treatment in the ED. As mentioned before, the ED is a unique setting where providers encounter opioid patients known to be high-risk users based on a presentation of overdose or other adverse effect of opioid substances. Thus, EDs should have the ability to start patients on addiction treatment. It is encouraging to see EDs all over the country implementing systems to directly connect patients with opioid addiction treatment medications, with promising success (23). Public health leaders should be encouraging their efforts and support the creation of more gateways to addiction treatment, as well as supporting all the infrastructure necessary to keep a patient in addiction treatment.

What do efforts within Illinois look like so far? As primary investigator, I had the privilege of attending the Cook County Opioid Summit held at Stroger Hospital in February of 2019 (24). With the vast majority of opioid cases occurring within Cook County borders, the summit was a chance for interdisciplinary stakeholders from all over the City of Chicago to convene and discuss advances and methods to curb the opioid crisis. One method by which the Cook County Health—

the City of Chicago’s county-sponsored health care network—is working to combat the epidemic is through an emphasis on community-based behavioral health (CBBH), an area in healthcare that unfortunately had recently seen a decrease in funding. The creation of CountyCare, a no-cost Illinois Medicaid managed health care plan, was partially in response to decreased public options for CBBH. With currently existing resources for CBBH within the Cook County Health system, there has been a shift to integrate behavioral health within primary care services offered through Cook County Health. Part of increased access to behavioral health includes access to medical-assisted treatment (MAT) for opioid addiction, which consists of taking an opioid agonist medication daily to subdue the body’s physiological and chemical cravings for opioids without the risk for overdose and death. To monitor patient adherence to addiction treatment and minimize lost-to-follow-up cases, the Collaborative Research Unit at Cook County Health has created software to keep track of appointments and alert a case worker the instant someone is marked as “no show.” The overarching goal is to enroll as many eligible patients as possible for addiction treatment with MAT and CBBH and to keep as many of these patients within the programs for as long as possible until they reach addiction in remission.

Synthetic opioids deserve special mention when examining the crisis within Chicago, because the incidence of fentanyl is increasing. According to the talk given by Dr. Zakariya, the Medical Examiner at the Cook County Health Opioid Summit, there were 827 cases of fentanyl seen in 2018, which made fentanyl the second most common drug seen after only alcohol (24). This number is an increase from 669 cases in 2017, when fentanyl was not yet a top three drug seen in the examiner’s office. Fentanyl is especially dangerous because when laced with heroin it can cause unsuspecting users to overdose when they get more opioid than they anticipate.

Unfortunately our data was not able to capture fentanyl specifically as we assume these cases were ICD-10 coded under “synthetic opioid” if and when providers knew of a patient’s fentanyl use, and there is no way to distinguish fentanyl within the numbers for synthetic opioids from other types of synthetics. As routine drug testing becomes more sophisticated and detection of fentanyl becomes easier, we need to deepen our understanding of how to prevent fentanyl-related overdoses from reoccurring because these patients are at higher risk for mortality from their opioid use.

Overall, the response by the public and health officials to the opioid epidemic has been encouraging. It is important, however, to point out how this epidemic as portrayed by our data is different from others that are still current public health concerns. For instance, the racial majority of patients who came to the ED for opioid-related concern was non-Hispanic White at 48.0%, and the large proportion of non-Hispanic Whites paints the opioid epidemic as one that affects the overall racial majority. Additionally, the overwhelming majority of patients in this study had medical insurance, with less than 10% not having any insurance at all and almost half having Medicaid. This may be an artifact of only those with medical insurance are willing to see medical care at an ED for cost reasons. But even among those who came in for overdose and therefore were most likely brought to an ED regardless of if they could afford it, only 15.5% of those were uninsured, and almost half had Medicaid. While these numbers suggest not having medical insurance is not the greatest barrier for these patients, simply having insurance does not mean one can find regular medical care with it, and it definitely does not guarantee access to addiction treatment or rehabilitation services. More should be done to look at insurance coverage of addiction medicine and increased availability of such services at affordable margins.

## Figures and Tables

<b>Table 1.</b> <b>Patient Characteristics for Emergency Department Visits for ICD10 Coded for Opioid Overdose or Other Opioid Use, 194 Illinois Hospitals, 1/2016-6/2018</b>					
	<b>Percent Opioid Overdose <i>n</i> = 31,129</b>	<b>Percent Opioid Abuse <i>n</i> = 38,258</b>	<b>Percent Opioid Dependence <i>n</i> = 51,555</b>	<b>Percent Opioid Use <i>n</i> = 9,843</b>	<b>All Opioid <i>n</i> = 130,785</b>
<b>Period</b>					
Jan-June 2016	17.94	20.18	19.49	19.35	19.31
July-Dec 2016	17.92	20.41	19.68	18.51	19.39
Jan-June 2017	19.31	19.77	20.42	20.44	19.98
July-Dec 2017	23.76	20.14	20.72	21.50	21.33
Jan-June 2018	21.01	19.50	19.70	20.20	19.99
<b>Sex</b>					
Male	65.58	66.12	56.56	58.15	61.62
<b>Race/Ethnicity</b>					
Non-Hispanic White	52.60	39.67	51.20	48.53	47.96
Non-Hispanic Black	29.57	43.33	34.14	39.12	36.12
Hispanic	8.18	9.04	7.66	6.99	8.13
Unknown or Other	9.65	7.97	7.01	5.35	7.79
<b>Age (years)</b>					
0-19	3.02	1.42	0.77	1.65	1.56
20-34	34.16	28.03	25.31	26.22	28.28
35-64	55.46	64.92	65.88	63.19	62.92
65+	7.35	5.62	8.04	8.94	7.24
<b>Insurance</b>					
Private	21.92	20.53	20.48	19.13	20.74
Medicaid	47.08	54.98	50.95	51.15	51.22
Medicare	14.04	12.28	20.39	19.21	16.42
Uninsured	15.54	10.57	6.36	8.77	9.96
Unknown	1.43	1.64	1.81	1.74	1.67
<b>Illinois County Area</b>					
Cook	50.45	66.85	57.84	55.76	58.56
DuPage, Kane, Will, Lake, or McHenry County (Collar)	16.73	13.11	18.42	13.70	16.11
Downstate	32.82	20.04	23.74	30.55	25.33
<b>Weekend Visit</b>	28.92	26.94	26.49	27.11	27.25

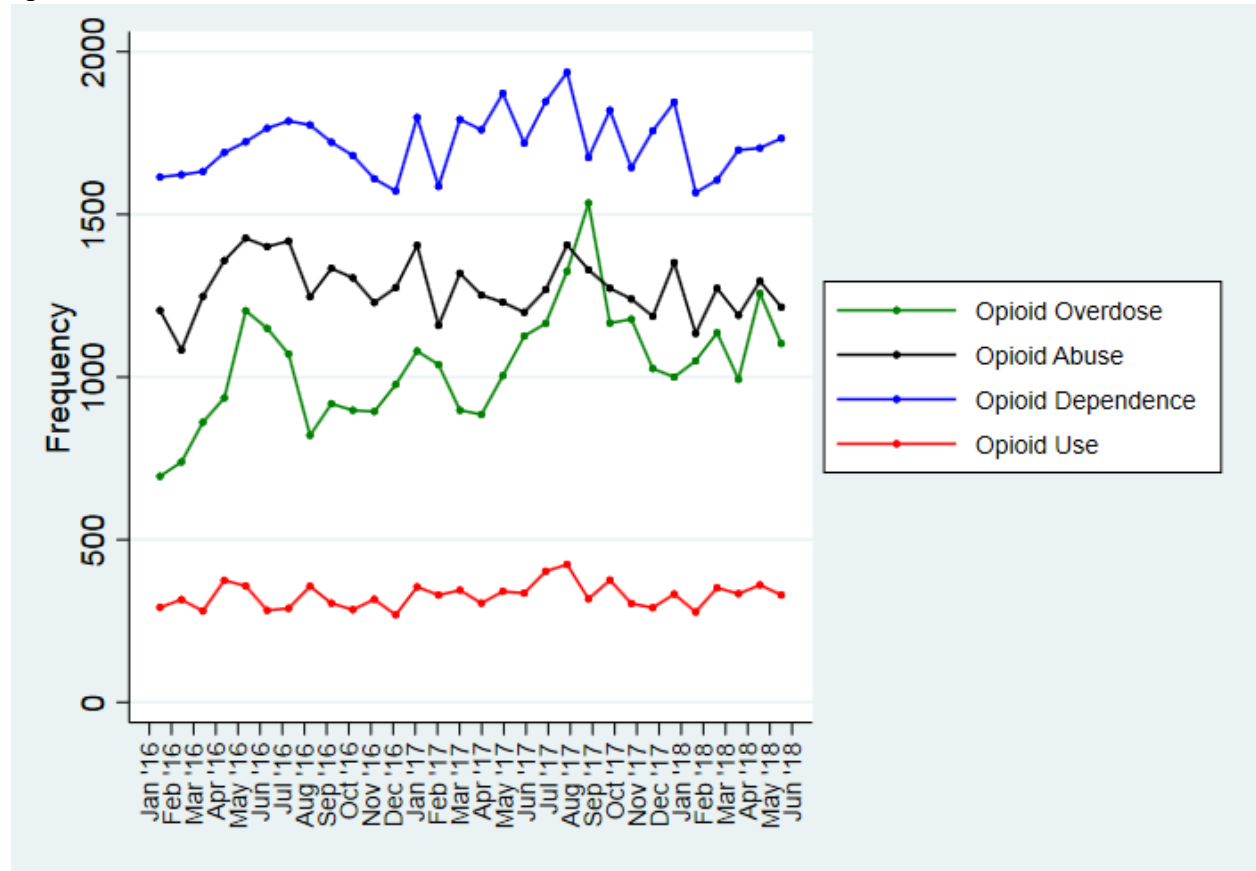
Admitted to Hospital from ED	25.08	37.52	55.46	38.79	41.73
Died in ED	1.32	0.67	0.46	0.68	0.74

\*All Pearson's Chi-squared coefficients have  $p < 0.001$ .

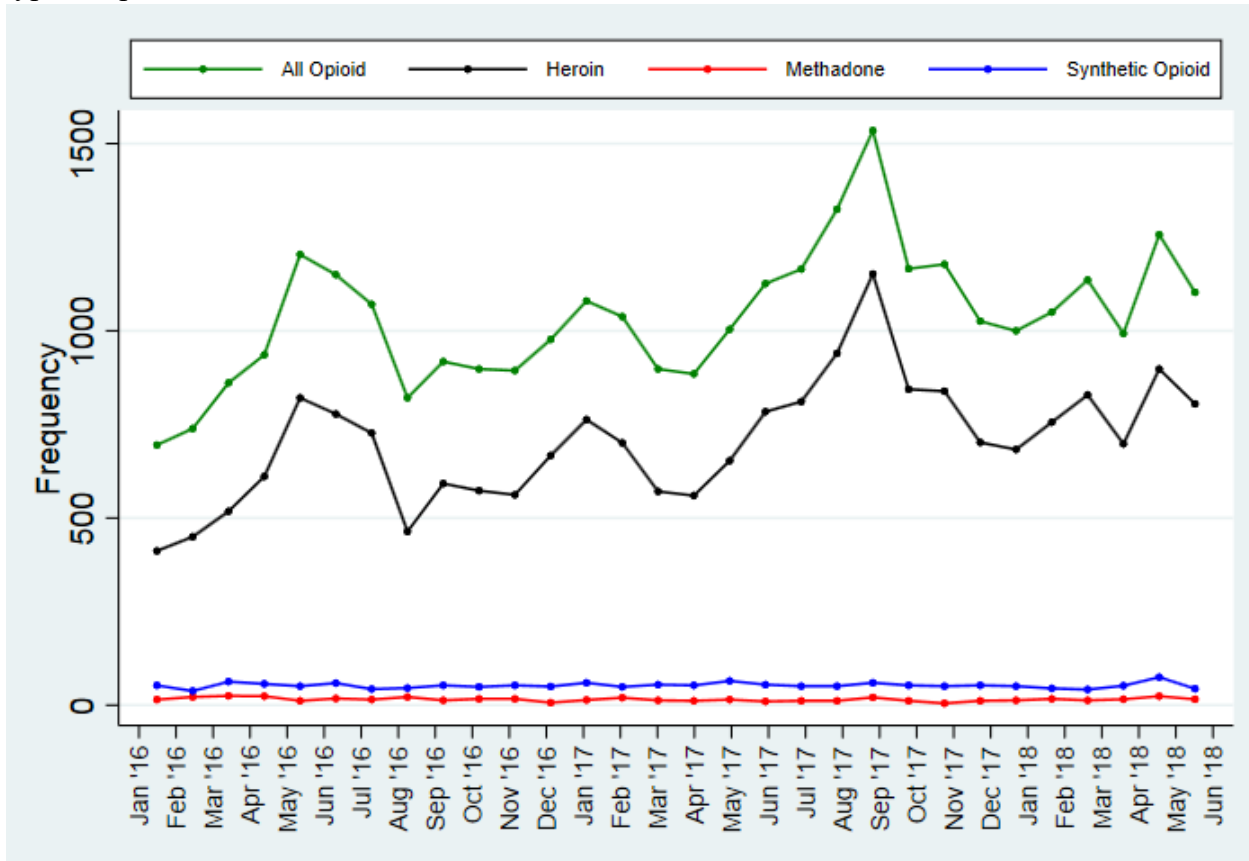
	<b>Deaths IRR (95% CI)</b>	<b>Hospital Admission IRR (95% CI)</b>
<b>Period</b>		
Jan-June 2016	1.13 (0.95-1.35)	1.04 (0.98-1.11)
July-Dec 2016	0.91 (0.75-1.10)	0.98 (0.92-1.04)
Jan-June 2017	0.93 (0.77-1.13)	0.97 (0.94-1.01)
July-Dec 2017	0.89 (0.74-1.07)	<b>0.97 (0.94-0.99)</b>
Jan-June 2018	Reference	Reference
<b>Sex</b>		
Male	0.94 (0.83-1.07)	<b>0.94 (0.91-0.97)</b>
Female	Reference	Reference
<b>Race/Ethnicity</b>		
Non-Hispanic White	Reference	Reference
Non-Hispanic Black	<b>0.76 (0.60-0.95)</b>	1.01 (0.94-1.09)
Hispanic	0.77 (0.52-1.13)	1.01 (0.88-1.15)
Unknown or Other	1.16 (0.78-1.70)	0.99 (0.91-1.08)
<b>Age (years)</b>		
0-19	0.71 (0.35-1.44)	0.98 (0.86-1.12)
20-34	Reference	Reference
35-64	<b>1.45 (1.23-1.70)</b>	<b>1.27 (1.22-1.33)</b>
65+	<b>3.29 (2.60-4.18)</b>	<b>1.44 (1.35-1.55)</b>
<b>Insurance</b>		
Private	Reference	Reference
Medicaid	0.89 (0.74-1.07)	0.96 (0.86-1.07)
Medicare/Medicare Disability	0.87 (0.68-1.12)	1.24 (1.12-1.37)
Uninsured	0.79 (0.60-1.04)	<b>0.55 (0.48-0.63)</b>
<b>Illinois County Area</b>		
Cook	Reference	Reference
DuPage, Kane, Will, Lake, or McHenry County (Collar)	1.04 (0.80-1.35)	<b>0.91 (0.84-0.99)</b>
Downstate	0.92 (0.71-1.19)	<b>0.85 (0.77-0.93)</b>
<b>Day of ED Visit</b>		
Weekday	Reference	Reference
Weekend	1.17 (1.02-1.35)	0.99 (0.98-1.01)
<b>Opioid Code</b>		
Opioid Overdose	<b>2.04 (1.60-2.61)</b>	<b>0.65 (0.56-0.76)</b>
Opioid Abuse	1.04 (0.81-1.33)	0.92 (0.82-1.04)

Opioid Dependence Other Opioid Use	<b>0.65 (0.50-0.85)</b> Reference	1.30 (1.16-1.46) Reference
Synthetic Opioid Use Synthetic Opioid All Other Opioid Use	<b>0.54 (0.32-0.93)</b> Reference	

**Figure 1:** Number of ED Visits per month between Jan '16 and Jun '18 for each category of opioid ICD-10 code in Illinois



**Figure 2:** Number of ED visits for opioid overdose per month between Jan '16 and Jun '18 by type of opioid involved in Illinois



**Figure 3:** Deaths by Opioid Overdose Type

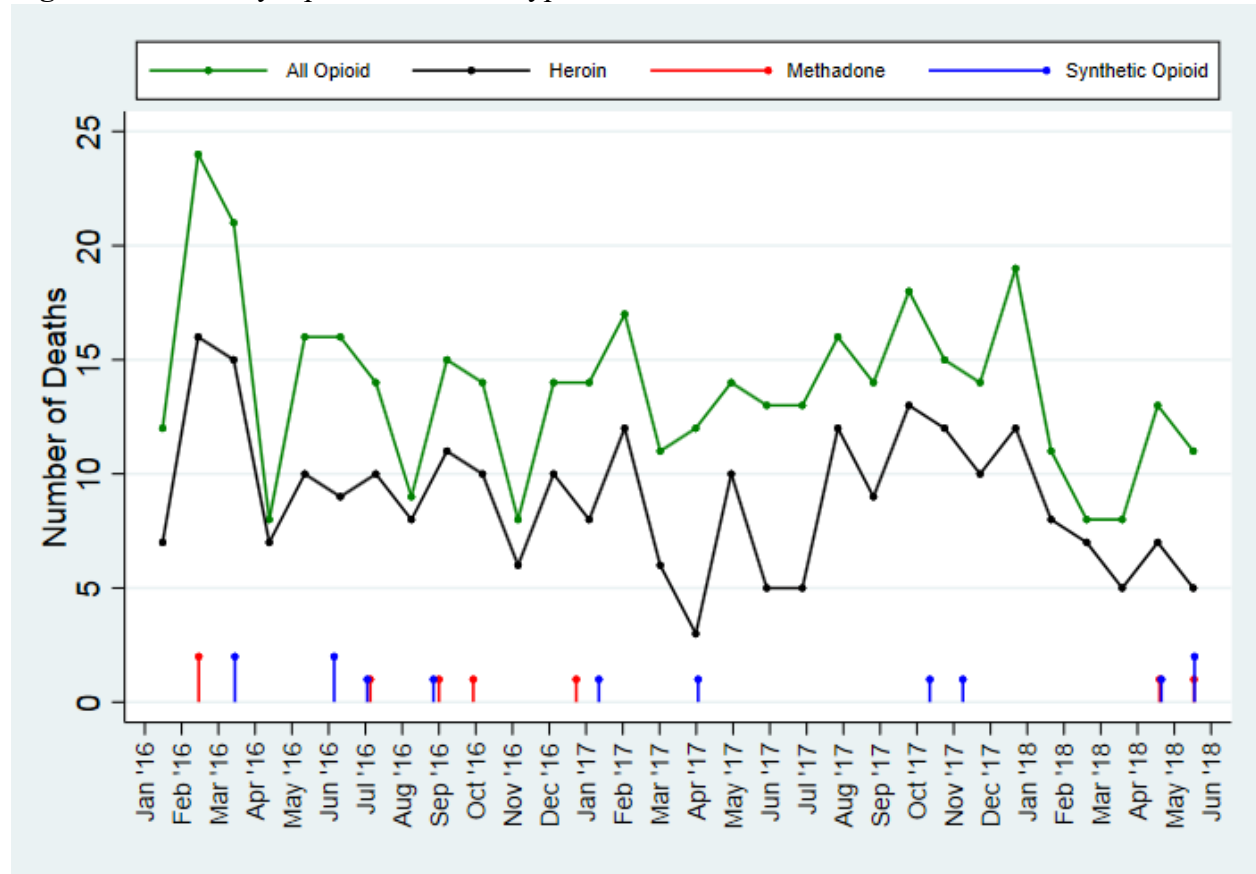
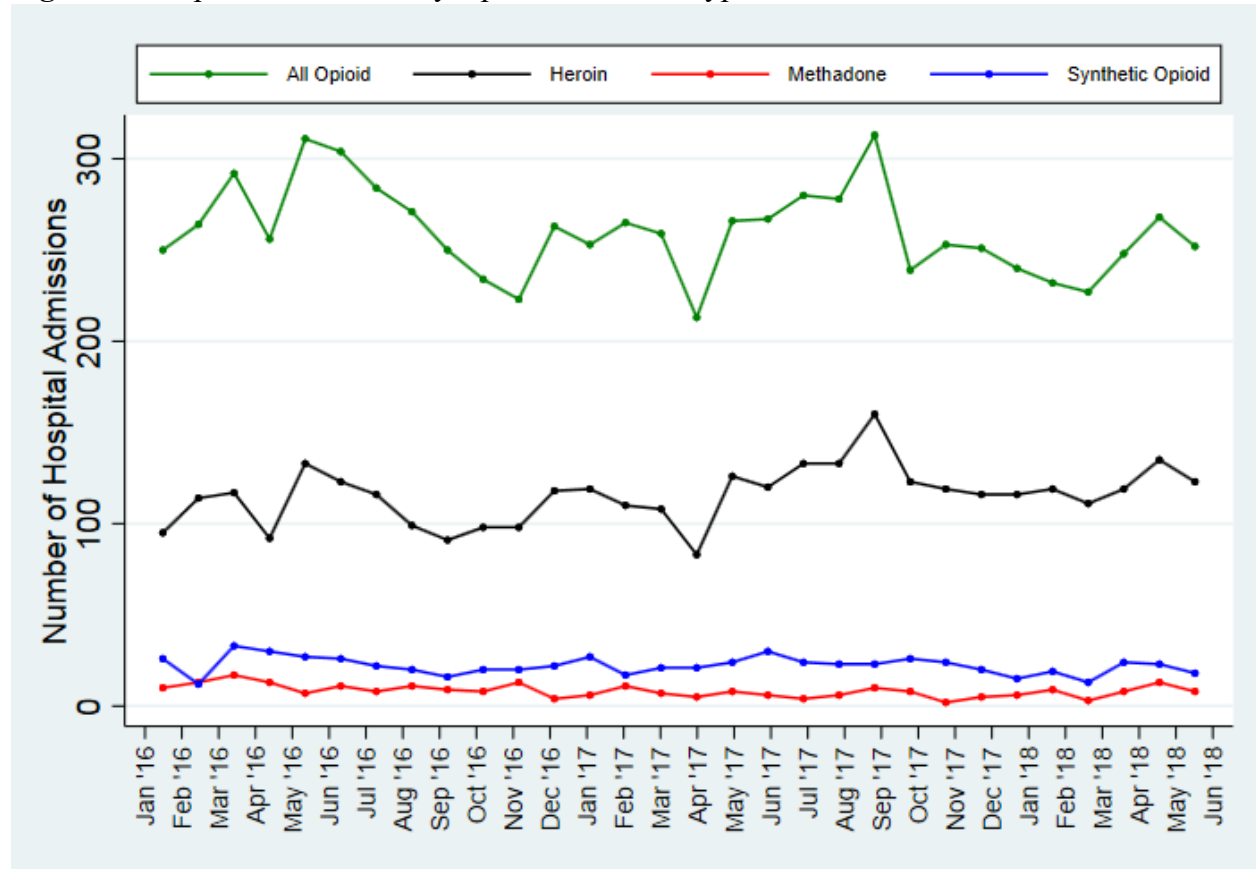


Figure 4: Hospital Admissions by Opioid Overdose Type



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