Opioid Seizures by Law Enforcement in Relation to Emergency Room Visits

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Objective

To evaluate the relationship between heroin and non-heroin opioid seizures reported by law enforcement and the number of ER visits due to heroin and non-heroin opioid poisoning in selected counties in Missouri.

Introduction

In 2016, there were approximately 63,000 deaths nationally due to drug overdose. This trend continues to increase with the provisional number of US deaths for 2017 being approximately 72,000 [1]. This increase in overdose deaths is fueled largely by the opioid class of drugs. The opioid epidemic began in the 1990s with a steady rise in prescription opioid overdoses. However, after 2010 a rise in heroin overdose deaths also began to occur. In addition to the heroin deaths increasing, there was a sharp rise in overdose deaths due to synthetic opioids including illicitly manufactured fentanyl beginning in 2013 [2]. In Missouri, ER visits follow similar trends with heroin overdose visits greatly increasing after 2011. While PDMPs help function as data sources that provide information on the licit drug supply, they cannot give much knowledge on the illicit supply. Because of this, drug seizure data from law enforcement can provide a much-needed tool in understanding the supply of illicit substances and their impact on a county's morbidity.

Methods

Data sources used in this analysis include the El Paso Intelligence Center (EPIC) drug seizure database thanks to cooperation by the Midwest HIDTA (High Intensity Drug Trafficking Area) office and Missouri Highway Patrol. ER Visit Data was retrieved from the Missouri Patient Abstract System, which includes ER visits for non-federal hospitals. Data was aggregated on a quarterly basis from 2014-2016 resulting in 12 observations (n) for every county observed. A subset of counties were selected and reviewed based on both high counts and high rates of ED visits for opioid overdoses [3]. The counties reviewed were Franklin, Greene, Jefferson, St. Francois, St. Louis City and St. Louis County. The majority of these counties were located in the greater St. Louis Are with Greene and St. Francois counties being notable exceptions. Greene County contains the city of Springfield and is located in southwest Missouri. St. Francois is the most rural county in our subset and is located south of the St. Louis area. For each county, the number of ER Visits were compared to the number of drug seizures reported by law enforcement facilities in EPIC. Numbers were compared for both heroin and non-heroin opioids. Records were identified as a heroin overdose or non-heroin opioid overdose based on CDC drug poisoning guidance [4]. If an ER discharge record contained codes for both heroin and a non-heroin opioid, the record was counted in the heroin column only. This method avoided counting records twice.

The Spearman correlation coefficient was calculated in SAS to determine if there was a possible relationship between seizures and ED visits at the county level due to the relatively few data points, the presence of outlier observations in the seizure numbers, as well as violations of statistical normality among the county seizure data. The Spearman Correlation Coefficient is a better alternative in this case to the commonly used Pearson Correlation Coefficient due to its ability to handle skewed data and outliers [5]. As with the Pearson Correlation Coefficient, a score of 0 is read as the variables have no discernable relationships, and scores of 1 or -1 denote a perfect linear relationship between the observed variables (positive and negative respectively).

Results

Initial results showed correlational effects between ED visits and seizures to be generally moderate or weak on the county level. The strongest relationships observed were found in St. Louis City for both heroin (R=-0.455) and non-heroin opioids (R=-0.51) as well as Jefferson County for both heroin (R=0.536) and non- heroin (R=0.50). St. Louis County also had a notable relationship for heroin seizures and heroin ED visits with R=-0.55. P values were also calculated to test if correlation values differed significantly from the null hypothesis of R=0 (i.e. no correlation). In all examined cases, there was no p value that was less than the standard cutoff of 0.05 which indicates none of the results are markedly different given the null hypothesis of R=0 is true [6].

Of particular interest is the contrast in results between St. Louis City and Jefferson County. St. Louis City had a moderate negative relationship with seizures and ED visits with ED Visits tending to decrease as drug seizures increased. Whereas, Jefferson County had a moderate positive relationship with ED Visits increasing alongside drug seizures. Due to their close geographic proximity, it is likely that both counties influence one another. Further evaluation is required to gauge regional effects.

Conclusions

Due to the complexity of the opioid epidemic, the value of having varied data sources cannot be understated. While the correlational effects observed here are not indicative of a strong relationship between ED visits and drug seizures, further evaluation and research of both data sources is highly recommended. As additional data is gathered in the future, stronger analyses than the Spearman Correlation Coefficient may be used to further explore the relationship between drug overdose morbidity and law enforcement seizure data. Other relationships may also be explored such as drug seizures in relation to drug overdose mortality.

References

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Correlation for Non-Heroin Opioid Drug Seizures to Non-Heroin Opioid ED Visits 2014-2016

County	Spearman Correlation Coefficient	Probability > |R| Under H0:Rho=0 ('p value')
FRANKLIN	-0.151	0.64
GREENE	-0.004	0.99
JEFFERSON	0.50	0.095
ST. FRANCOIS	0.034	0.92
ST. LOUIS CITY	-0.51	0.092
ST. LOUIS COUNTY	-0.232	0.47

Correlation for Heroin Seizures to Heroin ED Visits 2014-2016

County	Spearman Correlation Coefficient	Probability > |R| Under H0:Rho=0 ('p value')
FRANKLIN	0.398	0.20
GREENE	0.26	0.42
JEFFERSON	0.536	0.07
ST. FRANCOIS	0.355	0.257
ST. LOUIS CITY	-0.455	0.137
ST. LOUIS COUNTY	-0.55	0.066