Trends in Opioid Prescribing by County Following Pennsylvania PDMP Implementation.

CHAIM MILLER (✉ cxm285@students.jefferson.edu)

Rothman Orthopaedic Institute Foundation for Opioid Research & Education Philadelphia

MATTHEW B. SHERMAN

Rothman Institute

ASIF M. ILYAS

Rothman Institute

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Abstract

Background: The opioid epidemic has hit all corners of the United States but has disproportionately affected geographical areas to varying extents over the last thirty years. Rural areas have had higher rates of opioid prescribing than urban areas. However, urban counties have higher rates of opioid overdose deaths than rural counties. This study aims to outline the trends in opioid prescribing between rural and urban counties in the state of Pennsylvania since the implementation of a statewide prescription drug monitoring program (PDMP).

Methods: Data pertaining to opioid prescribing habits as listed below were obtained from the Pennsylvania Department of Health who administers the PDMP in Pennsylvania. Study data that were of interest and provided by the PDMP were: Drug name, quantity of prescriptions, average daily morphine milligram equivalents (MME), and days supplied. Urban and Rural categorizations were provided by The Center for Rural Pennsylvania, a legislative agency of the Pennsylvania General Assembly. The timeline for this study analyses began from Q1 2017 through Q1 2020. T-tests were used to compare the county information

Results: Opioid prescriptions from 2017 to 2020 decreased on average by 35% (SD= 0.13) in rural counties and 33% (SD= 0.10) in urban counties (P= 0.114). Change in average daily MME was 0.13 (SD=0.06) in the rural group and 0.14 (SD=0.03, p=0.229). Days supplied per prescription showed no significant changes between rural and urban counties with regards to; less than 3 days, 4-7 days, 8-21 days, and 31+ days. A significant decrease was seen in the 22–30-day subgroup between the rural (0.36 SD=0.08) and urban counties (0.31 SD=0.04 p=0.003).

Conclusion: No significant changes were seen in the decline of opioid prescribing habits between rural and urban counties in Pennsylvania from 2017 to 2020. This compounds on similar state-specific studies showing no significant difference in the rate of decline between rural and urban counties.

Introduction:

From 1999 to 2017, almost 218,000 people have died from opioid-related overdoses, with more than 11 million people having misused prescription opioids in 2017 alone.^{1,2} Data from 2018 showed that approximately 128 people in the U.S. die every day from an opioid overdose.³ A significant effort has been made to try and address different aspects of the problem by implementing targeted legislative programs. Among the 38 states with available prescription opioid-related overdose death data, 17 states saw a decline between 2017–2018 and none experienced a significant increase.⁴

The burden of the opioid crisis has disproportionately affected certain demographics and geographical areas. Multiple studies have shown a higher rate of opioid prescribing in more rural communities, speculated to be due to lower access to medical care and supply.^{5–9} Contextual studies have shown a prevalence for prescription opioids in rural counties vs synthetic opioids and heroin use which is more prevalent in urban counties.¹⁰ This exposes the unique challenges legislators face when tasked with tailoring their opioid response. Most rural areas with the highest rates of opioid use tend to be former factory communities that have since declined financially and lack medication-assisted treatment centers for opioid use disorder.¹¹ Urban communities can suffer from lack of access to proper medical care as well, however, the widespread availability of inexpensive and un-pure synthetic opioids have caused the opioid overdoses death rate to overtake rural communities in recent years.^{12, 13}

Physician prescribing of opioids has been declining nationally since 2012 but has still been statistically higher for rural vs urban areas.¹⁴ A prominent way states are tackling this crisis is by implementing a state-wide prescription drug monitoring program (PDMP). State PDMPs are electronic databases that collect and analyze patient prescription data on controlled substances and allow physicians the ability to access that information before prescribing. To date, all 50 states have implemented or are in the process of implementing a PDMP. PDMPs provide researchers and policymakers with a unique picture of opioid prescribing trends. This study uses PDMP data in the state of Pennsylvania to outline the trends of opioid prescribing in rural and urban areas over three years.

Methods:

Opioid prescribing habits were obtained from the Pennsylvania Department of Health (PA DOH) who administers the PDMP in Pennsylvania. A request for data was filed and approved by the PA DOH along with IRB approval for this project. Data was delivered on 11/24/2020 and recent to Q1 of 2020. The PDMP monitors Schedule II through Schedule V controlled substances. These substances

are defined by the United States Drug Enforcement Administration.¹⁵ As of January 1, 2017, all prescribers who are licensed, registered, or otherwise lawfully authorized to distribute, dispense, or administer a controlled substance, other drug, or device in the course of professional practice or research in the Commonwealth are required to register with and query the PDMP in certain situations.

Study data that were of interest and provided by the PDMP were: Drug name, the number of prescriptions, average daily MME, and days supplied. Notes provided by the PA DOH included: values between 1 and 5 have been suppressed, If the value from only one group (e.g. county) during any given quarter required suppression, the next lowest value has also been suppressed, and authorized refill count data reflects the number of prescriptions with an authorized refill. Data was suppressed in this case to maintain confidentiality.

Data provided by the PA DOH is categorized by quarters, each equaling 3 months of the year. Since the PA PDMP was implemented later in August of 2016, the fourth quarter of 2016 was ignored, and the study analyses began from Q1 2017 through Q1 2020.

Urban and Rural categorizations were provided by The Center for Rural Pennsylvania, a legislative agency of the Pennsylvania General Assembly. The Center for Rural Pennsylvania states, “A county or school district is rural when the number of persons per square mile within the county or school district is less than 284. Counties and school districts that have 284 persons or more per square mile are considered urban.” Data was analyzed by 2010 census data. Pennsylvania has 48 rural counties and 19 urban counties.¹⁶

Differences and percent changes along the timelines listed above were used to assess how the number of opioid prescriptions changed over time. All statistical analyses were done using Microsoft Excel (Version 16.43). T-tests were used to compare the county information.

Results:

Opioid prescriptions from Q1 2017 to Q1 2020 decreased on average by 35% (SD = 0.13) in rural counties and 33% (SD = 0.10) in urban counties (P = 0.114) (Table 1). Change of Daily MME over the timeline was 0.13 (SD = 0.06) in the rural group and 0.14 (SD = 0.03, p = 0.229) (Table 2). Days supplied per prescription showed no significant changes between rural and urban counties with regards to; less than 3 days, 4–7 days, 8–21 days, and 31 + days. A significant decrease was seen in the 22–30-day subgroup between the rural (0.36 SD = 0.08) and urban counties (0.31 SD = 0.04 p = 0.003) (Table 3).

Table 1

Change in opioid prescriptions based on quantity supplied. Displayed are the average rate of decline between rural and urban counties during the three-year period of Q1 2017 to Q1 2020.

Quantity	Rural	Urban	P Value
< 21 (% Difference)	0.21 (0.16)	0.19 (0.09)	0.469
22 – 60 (% Difference)	0.37 (0.06)	0.35 (0.03)	0.162
60 – 90 (% Difference)	0.34 (0.08)	0.31 (0.05)	0.057
90+ (% Difference)	0.44 (0.09)	0.42 (0.06)	0.164

Table 2

Change in opioid daily MME. Displayed are the average rate of decline in prescribed daily MMEs between rural and urban counties during the three-year period of Q1 2017 to Q1 2020.

Variable	Rural	Urban	P Value
Average MME (% Difference)	0.13 (0.06)	0.14 (0.03)	0.229

Table 3

Change in opioid prescriptions based on days supplied. Displayed are the average rates of decline of prescriptions for number of days supplied between rural and urban counties during the three-year period of Q1 2017 to Q1 2020.

Day Supply	Rural	Urban	P Value
Less than 3 Days (% Difference)	0.23 (0.20)	0.25 (0.13)	0.773
4 – 7 Days (% Difference)	0.27 (0.09)	0.28 (0.05)	0.535
8 – 21 Days (% Difference)	0.45 (0.08)	0.44 (0.06)	0.343
22 – 30 Days (% Difference)	0.36 (0.08)	0.31(0.04)	0.003
31+ Days (% Difference)	0.55 (0.17)	0.50 (0.09)	0.149

Discussion:

The opioid epidemic in the United States has hit communities disproportionately, differing based on geography, race, sex, gender, and age. As opioid prescription rates have been declining in the past few years, more data is needed to outline the effect of certain policies in targeting the problem effectively. This study aimed to outline the demographical changes taking place in Pennsylvania, one of the hardest-hit states in the opioid epidemic. In 2018, Pennsylvania was one of the states with the highest age-adjusted drug overdose death rate.¹⁷ No significant change was found between urban and rural communities in the rate of decline of overall opioid prescriptions in Pennsylvania. Very little variation existed between the groups with regards to the number of pills prescribed, MMEs, and days supplied.

Although opioid prescriptions have been declining nationally since the early 2010's,¹⁸ few studies have analyzed the trends of decline in opioid prescribing on a geographical basis. A study done in Kentucky showed significant downward trends in residents with an opioid prescription from 2012–2015, however, no significant change was seen between geographical settings.¹⁹

The availability of prescription and semi-synthetics opioids (hydromorphone, hydrocodone, and oxycodone) as well as deaths related to these opioids is a problem that has been associated primarily with rural communities. Factors that are hypothesized to be contributing to this include the higher availability of prescription narcotics, less developed social networks, unique provider relationships with their patients, and the rapid succession of stable financial opportunities.^{20,21} Federal resources have been lacking as well. Drive times to federal Opioid Treatment Centers (OTC) are significantly higher in rural areas.²²

Urban counties also face unique challenges addressing the opioid epidemic. Drug overdose deaths were higher in urban counties than rural counties in 2017, mostly due to the disproportionate use of heroin and synthetic opioids.²³ Urban counties suffer from similar issues as the remote rural counties such as lower family income, education level, unemployment rate, and mental health disorders. The availability and inexpensive cost of synthetic opioids provide a unique challenge to policymakers aimed at combating the opioid crisis in urban communities.

The Health Resources and Services Administration (HRSA) is a prime example of the federal Government supporting rural communities to fight the opioid epidemic. Millions of dollars have been allocated to address the need for stronger health care resources in rural counties including over eleven million in Pennsylvania alone.²⁴ Other initiatives of HRSA include increasing telehealth availability for those seeking treatment remotely, increasing funding for poison control centers, and increasing education among prescribers and consumers alike.

Other significant measures placed in Pennsylvania over the last decade have impacted opioid prescribing in the state. The implementation of a statewide PDMP showed prescribers and law enforcement agencies patients who were at risk of opioid use disorders. Alongside the 2016 CDC report, which updated its policy on opioid prescribing, the PA Department of Health (PA-DOH) created a series of prescribing guidelines for target audiences including, but not limited to: dentists, emergency departments, providers of treatment for non-chronic cancer pain, and Obstetrician/Gynecologists.²⁵ Various public health measures were implemented in the mid-2010s which included the DEA 360 program. MAT was advanced in the hospital setting as well, where physicians were allowed to begin methadone/buprenorphine treatment for patients hospitalized for opioid-related or non-opioid-related issues.

Included in these measures are targeted programs aimed at reducing the supply of heroin and synthetic drugs, especially in urban areas. One of which was the DEA's 15th Take-Back Day. This took place at 217 collection sites across Pennsylvania and collected 37,290 pounds of prescription drugs. Approximately half of the total was collected in the Philadelphia metropolitan area and surrounding counties.²⁶ The DEA also increased the intensity of their physician investigations, as Pennsylvania ranked second among the highest number of physician arrests in opioid related cases.²⁷

Limitations:

Pennsylvania's PDMP was the first program to effectively track opioids prescribed and filled within the state. Due to incomplete data prior to its implementation, this study looked at opioid trends following - and not directly prior to – its implementation. It is unclear what the trends were already present geographically in the state.

Currently, data is only available for 3-years post-implementation in Pennsylvania at the time of this study. While no significance in geographical areas was shown, longer-term studies are needed to adequately trend the effectiveness of opioid legislation.

Conclusion:

Pennsylvania has seen equivalent decline in rural and urban communities, displaying progress into the targeted approach of combating the opioid epidemic. Due to the differing needs within geographical areas, successful opioid programs assess, target, and provide for the specific communities they intend to serve.

Abbreviations

Prescription Drug Monitoring Program (PDMP), Morphine Milligram Equivalents (MME).

Declarations

Ethics approval and consent to participate:

Study approval was given by the Pennsylvania Department of Health who houses the PDMP

Consent for publication:

Not Applicable

Availability of data and material:

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests:

The authors declare that they have no competing interests.

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CONFLICTS OF INTEREST

None of the authors or their family members have conflicts of interest related to the execution of the study or production of the manuscript.

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