

# Trends in Opioid Prescribing Following Statewide PDMP Implementation: The Pennsylvania Experience

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## Research Article

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# Abstract

**Background:** The opioid epidemic is a major public health crisis in the United States. Legislators have enacted various strategies to combat this crisis, including the implementation of statewide prescription drug monitoring programs (PDMP). These PDMPs are electronic databases that collect and analyze patient prescription data on controlled substances allowing physicians to review prior prescriptions before prescribing.

**Objective:** To determine opioid prescribing patterns after implementation of a statewide PDMP in Pennsylvania.

**Methods:** After IRB approval, PDMP data was obtained from the Pennsylvania Department of Health. Data obtained included: drug name, days supplied, refill count, and partially filled prescriptions. The study timeline was 3 years, from first quarter 2017 through first quarter 2020.

**Results:** Over the three years post implementation of a PDMP, Pennsylvania saw a 33% decrease in overall quantity of opioid pills prescribed (677,194 absolute), a 9% decrease in partially filled prescriptions (5,821 absolute), and an 18% decrease in the authorized refill (525 absolute). There also was a larger rate of decrease in prescriptions for more than seven days compared to prescriptions for less than seven days (43% vs 27%). However, the rate of decrease in opioid pills prescribed lessened from 14% in the first two years post implementation, to 10% from in the third year. The decrease in opioids partially filled for the first two years averaged 14% per year, while it increased by 23% in the third year. There also was an 8% average decrease in the rate of refills for opioids prescribed for the two years post implementation, while it was only 3% in the third year.

**Conclusion:** There was a 33% decrease in overall quantity of opioid pills prescribed in the three years after the implementation of a PDMP. The first two years after implementation saw the largest decreases in prescribing habits, which slowed in the third year. More data is needed to show the long-term effects of implementing a statewide PDMP.

## 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.<sup>1,2</sup> Data from 2018 showed that approximately 128 people in the U.S. die every day from opioid overdose.<sup>3</sup> A significant effort has been made to try and address this growing concern which has led to the implementation of multiple programs aimed at combating different aspects of the problem. 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.<sup>4</sup>

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. However, existing literature is mixed on the overall success of the PDMP. Several early studies have shown no effect on opioid prescribing, while some have found significant decreases in schedule II opioids following the implementation of a PDMP.<sup>5,6</sup>

Pennsylvania's PDMP was established in August of 2016 and was mandated for use in specific situations in January 1<sup>st</sup>, 2017.<sup>7</sup> Being a new PDMP, little research has been done on the effectiveness of this program and how it compares to other states. The aim of this study is to contribute to the growing knowledge about statewide PDMPs. Specifically, this study aims to outline the three-year change in prescribing habits alongside the implementation of Pennsylvania's PDMP.

## Methods

Data pertaining to opioid prescribing habits as listed below 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 and was recent to 11/24/2020. The PDMP monitors Schedule II through Schedule V controlled substances. 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: Days supplied, quantity, partial fill, and authorized refill count. Quantity was defined as total number of opioid pills prescribed. Partial fill was defined as number of prescriptions for opioids that were only partially filled. Refill count was defined as total number of refills prescribed for opioid medication. 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 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.

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).

## Results

There was a 33% (677,194 absolute) decrease in overall quantity of opioids prescribed from Q1 2017 through Q1 2020 (Figure 1). The largest absolute decrease in prescriptions were from Oxycodone

(258,727 or 29%) and Hydrocodone (236,868 or 39%). During the three years, there was a 9% decrease (5,821 absolute) in partially filled prescriptions and an 18% decrease (525 absolute) in the authorized refill count.

A closer look at the trends revealed a larger rate of decrease in opioids prescribed for more than 7 days compared to those prescribed for less than 7 days (43% vs 27%). Mirroring this finding, prescriptions for more than 22 pills at once saw an average rate of decrease of 37% in pills prescribed, against only a 21% decrease for 21 or fewer pills prescribed (figure 2-3).

However, the rate of decrease in opioid pills prescribed lessened from 14% in the first two years post implementation, to 10% from in the third year. The decrease in opioids partially filled for the first two years averaged 14% per year, while it increased by 23% in the third year. There also was an 8% average decrease in the rate of refills for opioids prescribed for the two years post implementation, while it was only 3% in the third year (Figure 4).

## Discussion

Analysis of the PDMP data showed a 33% decrease in overall quantity of opioids prescribed, a 9% decrease in partially filled prescriptions, and an 18% decrease in the authorized refill count, following implementation of a new statewide PDMP. We found a larger decrease in long term prescriptions of opioids versus short term prescriptions, as well as decreasing rates of decline in the third-year post implementation.

Perhaps one of the most clinically significant aspects of the data presented above, is the larger decrease in longer term opioid prescriptions versus short term prescriptions. Currently, as many as one in four patients receiving long-term opioid therapy in a primary care setting struggles with opioid addiction. The longer a patient is on opioids, the higher the likelihood of dependence on the medication and thereby the higher chance of abuse.<sup>8,9</sup>

Multiple nearby states and areas have published similar opioid reductions alongside a statewide PDMP. In New York, the implementation of a PDMP (I-STOP law) saw a significant decrease in rates of potentially problematic patterns of opioid prescribing,<sup>10</sup> as well as a leveling off of prescription opioid mortality.<sup>11</sup> In Pittsburgh, Pennsylvania, a PDMP *use mandate* was associated with fewer patients prescribed opioids in the emergency department than pre-PDMP implementation.<sup>12</sup> One study found a 30% reduction in the self-reported rate of schedule II prescriptions among patients reporting pain as a reason for a visit.<sup>6</sup> Data from the state of Florida demonstrated that after the implementation of the PDMP, the Oxycodone-caused mortality abruptly declined 25%<sup>13</sup>, opioid prescriptions declined 1.4%, opioid volume decreased 2.5%, and MME per transaction decreased 5.6%.<sup>14</sup>

Since PDMPs are the most researched program established to combat the opioid crises, there exist multiple studies that investigate the various aspects of what makes a good PDMP. Since PDMPs vary by

state, it would make sense that certain states will see significant effectiveness and others would not. Multiple studies have shown decreases in opioid-related overdoses and deaths, especially the more “robust” a PDMP is.<sup>15-20</sup> “Robustness” with regards to a PDMP may include facets such as: a use and registration mandate, delegate access, proactive reporting, no prescriber immunity for failing to query the PDMP, as well as reporting data to multiple neighboring states.<sup>21</sup> Currently, Pennsylvania’s PDMP includes a registration and comprehensive use mandate, proactive reporting, delegate access, but does not provide prescriber immunity for failing to query the PDMP.<sup>22</sup> This enhances our understanding that effective PDMPs need to be comprehensive and robust to have a significant effect in combating the opioid crises.

The implementation of statewide have brought along some significant challenges for prescribers and others both intentionally and unintentionally. For example, three studies have found an association between PDMP implement and heroin overdose death rates.<sup>23,24</sup> This is hypothesized to be due to the intended consequences of lowering prescription opioids in the general public.<sup>25</sup> This is mirrored in a qualitative study done in Philadelphia and San Francisco which documented the transition from prescription opioids users to heroin. They found that most heroin users were originally prescribed opioids but found heroin to be a more available and inexpensive option when the supply of opioids became too small and too costly.<sup>26</sup> Cases like this show the importance that practitioners have in referring and encouraging those at risk for opioid abuse to seek treatment at treatment centers or by other evidence-based treatment methods.

Healthcare providers have also outlined the problems with implementing and integrating a statewide PDMP – especially a mandatory one – on workflow and time sensitive situations.<sup>27</sup> Any online database that is required to be queried in specific situations can lead to uncertainty if the program is not working properly and does not adequately address what prescribers should do when presented with opioid prescribing history of their patients. If policymakers wish to effectively implement a PDMP, it is vital that the program be integrated smoothly into daily workflow and has a contingency plan in case the program is not accessible. Also needed is support for including trends data and enhanced patient profiles that include additional data beyond controlled substances prescribed. This process could be optimized by including frequent and effective collaboration between all stakeholders involved.<sup>28</sup>

## **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, the paper looked at opioid trends following - and not directly prior to – its implementation. It is necessary to note that while the trends of opioids prescribed showed a decrease, this may not be purely related to the PDMP. Increased education, the PDMP use and registration mandate, and the mandate for electronic prescribing of controlled substances, among other public health measures, could have also influenced the observed trend.

Currently, data is only available for 3-years post implementation in Pennsylvania at the time of this study. While a significant decrease has been shown, longer term studies are needed to address the lasting impact of a PDMP on opioid prescribing habits.

## **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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### **Authors' contributions:**

All listed authors contributed equally to the study.

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## Figures

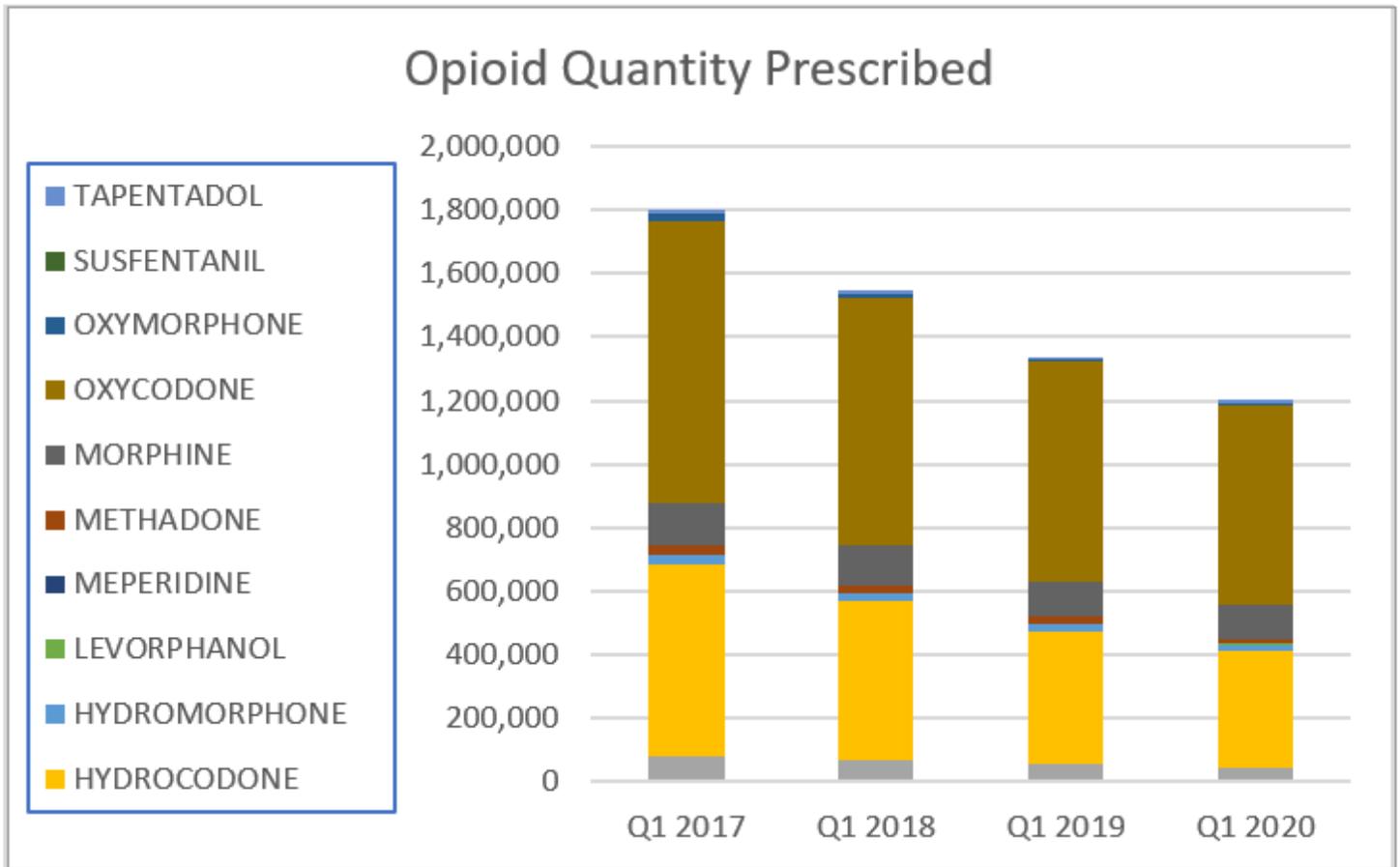
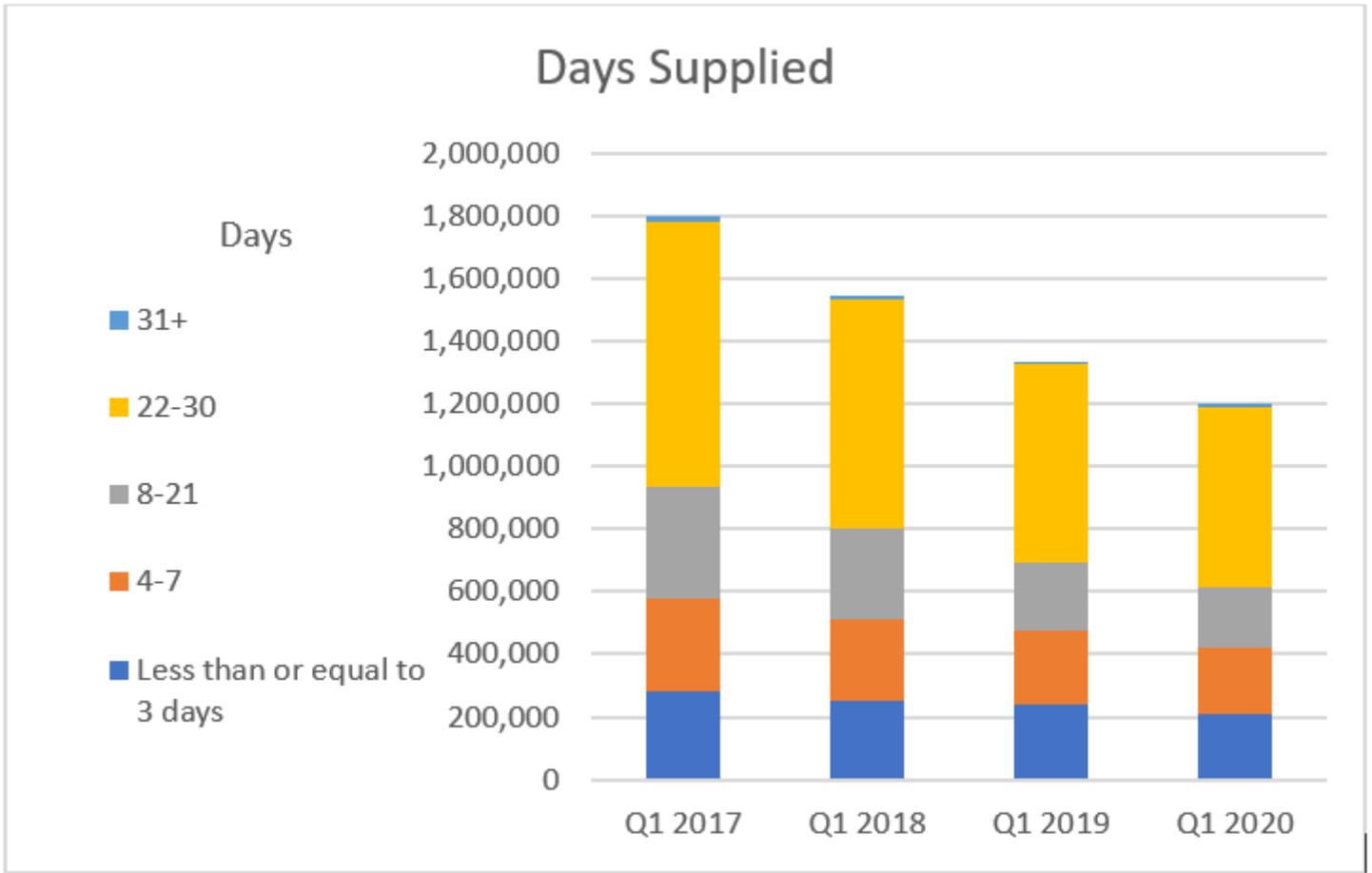


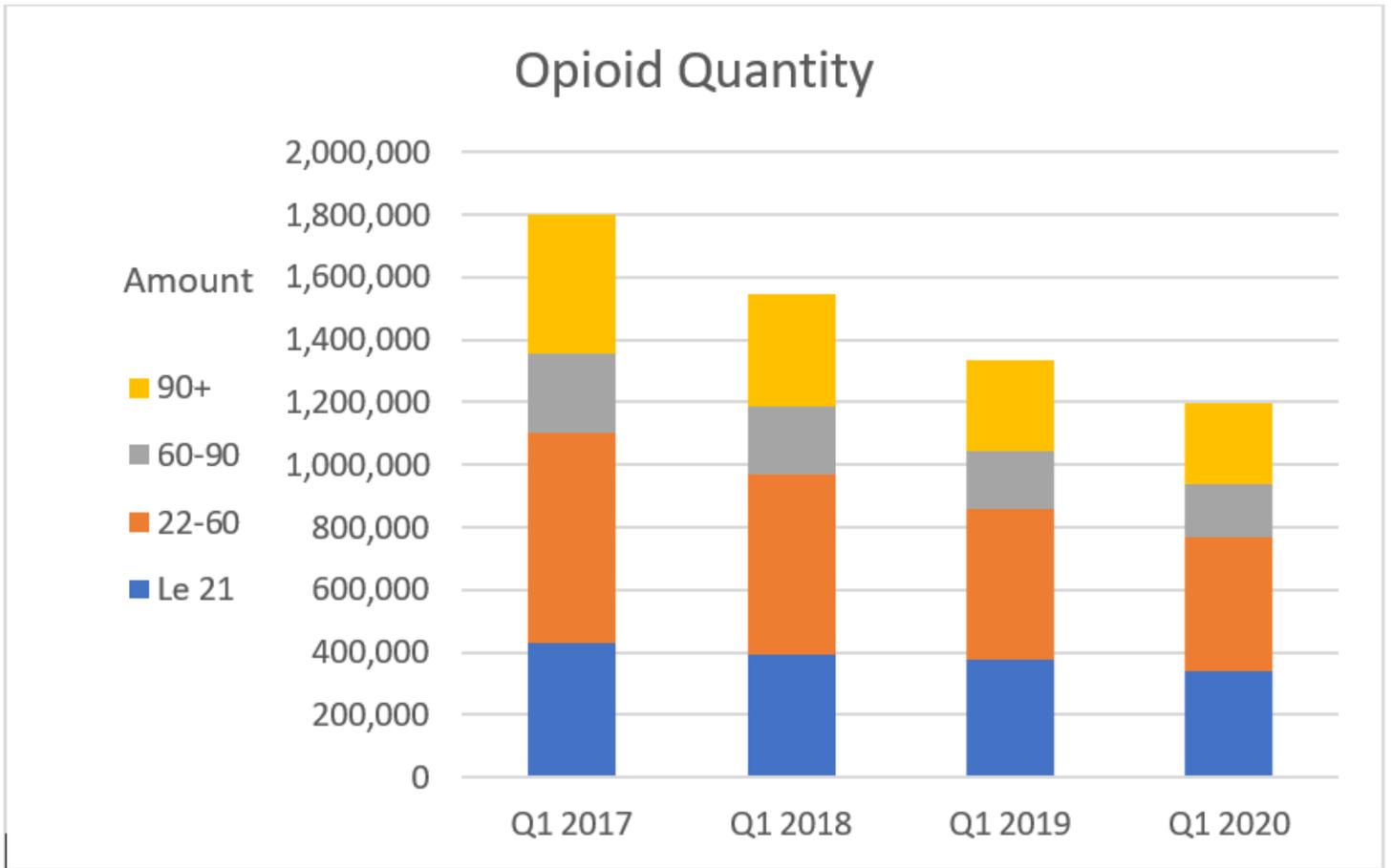
Figure 1

Opioid quantity of pills prescribed between Q1 2017 until Q1 2020. Pennsylvania's PDMP was required for use in specific instances on January 1st, 2017.



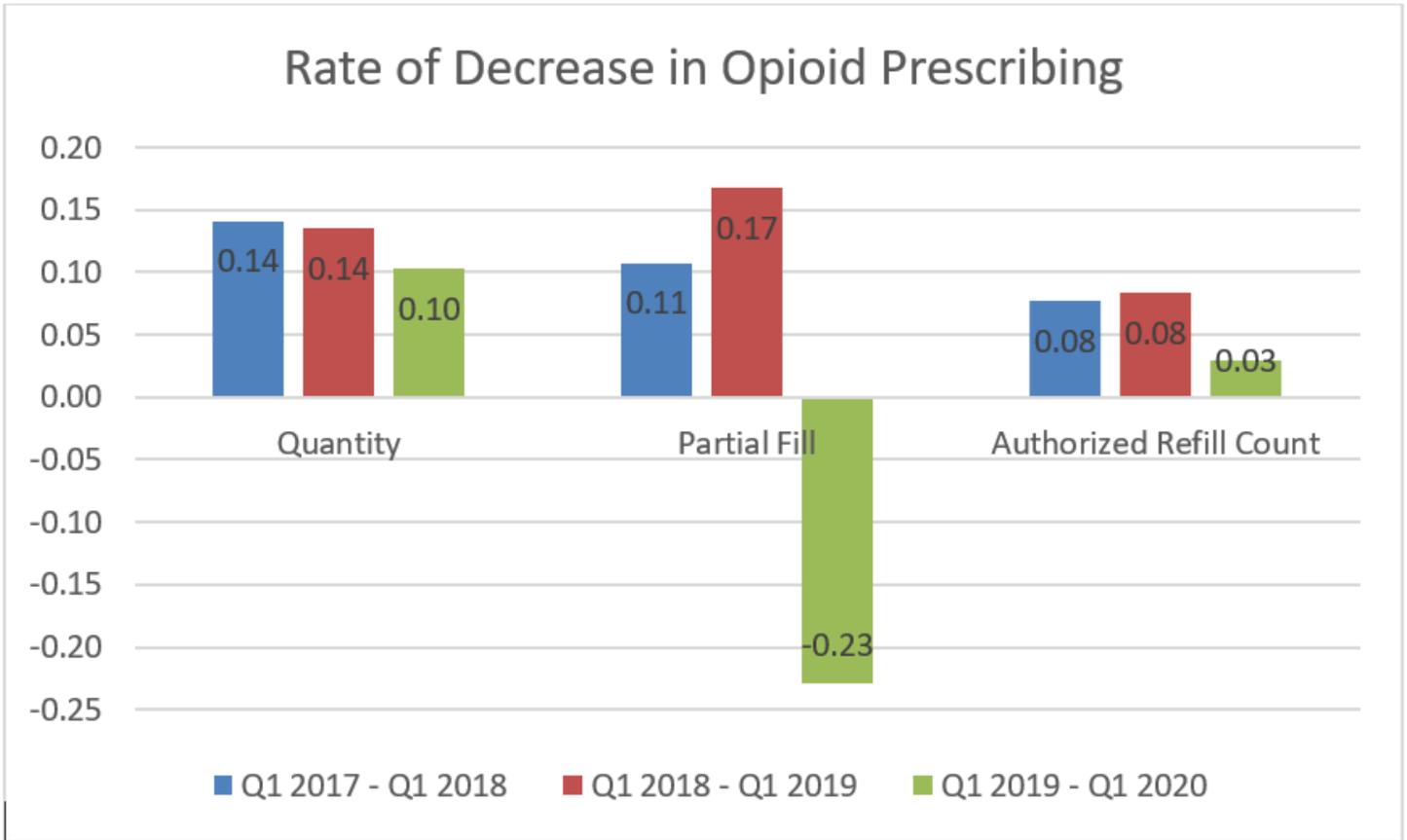
**Figure 2**

Days supplied for opioid prescriptions between Q1 2017 until Q1 2020.



**Figure 3**

Opioid pill quantity prescribed between Q1 2017 until Q1 2020.



**Figure 4**

Rate of decrease for opioid prescribing habits between Q1 2017 until Q1 2020.