

An Investigation into Opioid Prescriptions and ED Events in Delaware 2016-2020

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Over the past ten years, Delaware has implemented both the Prescription Drug Monitoring Program (PDMP) and Substance Use Treatment and Recovery Transformation (START) Initiative, now the Opioid Response Provider Network (ORPN) as of 2021, to combat drug abuse, especially opioids due to their prevalence of the opioid epidemic in Delaware, which continues to have one of the highest overdose rates in the United States. The implementation of the PDMP helped to diminish the first wave of the opioid epidemic, which was dominated by prescription opioids. Following this initial wave have been two more, one prominently heroin, and one being prominently more potent synthetic opioids, such as fentanyl. Implementing these programs reduces availability and aids those who struggle with abuse which may lead to a decrease in addiction. Due to these factors, it is hypothesized that there will be a slow decrease in emergency department (ED) events by patients that obtain opioid prescriptions over time.

To evaluate this, data from the pharmaceutical (PC) and medical claims (MC) tables in Delaware Health Information Network's (DHIN) Health Care Claims Database¹ (HCCD) was extracted to form a population to evaluate and compare. The first step in this process was to extract demographic data of the people receiving prescriptions and information on the prescriptions themselves. To ensure data was full, consistent, and only opioid-related prescriptions a few measures were put in place in the search: the prescription must have 1 to 90 days' supply, it had to have been claimed, be filled within 2016 to 2020, and had to have its drug code be within the opioid drug code table within the HCCD. This returned 1,960,380 claims, and after removing the secondary payer claims, left 1,060,010 unique claims for opioid prescriptions in Delaware from 2016 to 2020. Payer claims beyond the first were removed by generating an element that combined a person's identifier code with the date and drug code, then remove any entry that matches that code beyond the first. **One important note about the number of prescriptions in Delaware is the decline since 2016, there has been a 40% decrease by the end of 2020.**



Figure 1- The number of prescriptions filled by month from 2016 to 2020

1. The Delaware Health Care Claims Database (HCCD), powered by DHIN, collects healthcare claims, enrollment, and provider data from Medicare, Medicaid, and the seven largest commercial health insurers in the State of Delaware, making it the single largest repository of claims data Delaware has ever had. <https://dhin.org/healthcare-claims-database/>

The next step was to extract the MC data, including demographic data of the person and the diagnoses of the ED event. Additionally, to ensure only ED events are extracted, the entries were filtered by various fields, including validating the claim’s setting, place of service, procedure, or revenue codes that match those of an ED event and again filtering it down to 2016-2020. In total there were 13,072,390 ED-related claims, which were collapsed into 1,209,311 ED episodes by creating another generated element taking the identifying data and date. Each entry within an episode may be a secondary patient claim or account for different parts of care within one visit, however since any entry beyond the first still refers to the same episode, they are excluded from this study to ensure numbers are not skewed. Finally, there are a little less than 7.5 million entries in MC that could not be included, due to having identifying data redacted², including date of the event, and as such could not be included as they could not be used for comparison. Throughout the rest of this report and in graphs, ED episodes will be referred to as ED events.

Following this, the data is reviewed in three levels of the population with increasingly restrictive parameters:

1. ED events by people who had received an opioid during the study period
2. ED events that occur at any time after their first prescription within 2016-2020
3. ED events that occur during or up to six months past a person’s opioid prescription

Each of these populations is reviewed in two capacities: all ED events regardless of diagnosis and ED events specifically including an opioid-related diagnosis.

1. Comparison of the total and all ED events by people with a prescription

In population one, all ED events of people that received an opioid prescription at some point in time have approximately 613k events that occurred in the 2016 to 2020 time frame, meaning a little over 50% of all ED events in that time frame received an opioid prescription, although not always before an ED event. As an initial point of interest, it can be seen the shape of this population reflects that of the full population, although major increases and decreases appear to be at a smaller scale than that of the total population as can be seen in figure 2. It is important to note that at this time the impact caused by the COVID-19 outbreak in March 2020 has had on this graph.

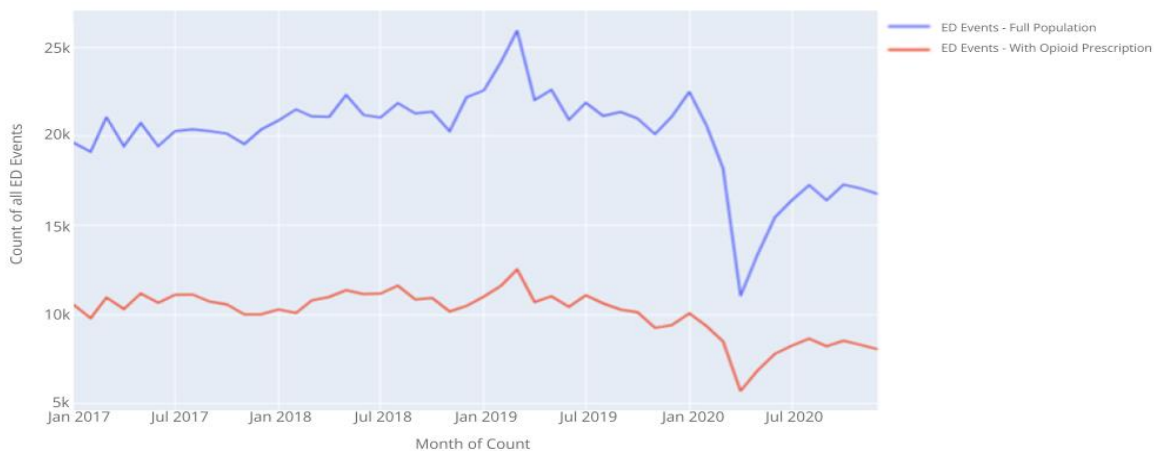


Figure 2- Graph of the monthly count of ED events per population, the blue line being all ED events, red line being ED events that have an opioid prescription in the time frame

2. Identifying data is redacted from these claims because of SAMHSA concerns. This mainly affects the Medicaid MCO population.

When considering the demographics of these populations, overall a similar distribution in genders can be seen, with the total population having 57.8% of all ED events being from female patients and the population that receives a prescription being 64% from female patients. When looking at the age groups of the populations, there are some differences present. In the prescription population, age groups younger than 20 make up 8.1% of yearly ED events at most, despite the 0-9 age group alone making up 12.1% of yearly ED events minimum for the full population. This is similar to that of both age groups younger than 20, as they make up 1.5% of all prescriptions on average. The age groups that have the most ED events are the 20-29, 30-39, and 50-59-year-olds, making up 19.1%, 20.6%, and 19.0% of ED events for the population respectively. These percentages are different than those of the age groups' prescription counts, where the same age groups make up 6.3%, 13.2%, and 25.9% of the prescriptions respectively.

Comparing the number of opioid-related ED events is where the counts become closer, with those who receive a prescription making up 65-70% of all opioid-related ED events. In addition to that, the demographic data had some differences, with males now making up 56.5% and 59.1% of opioid-related ED events for those who receive a prescription and the total population respectively. As for age groups, 20-29, 30-39, and 40-49-year-olds increase for those who receive a prescription, making up 22.0%, 34.4%, and 19.0% (up from 16.4% of all ED events) of all opioid ED events respectively. Besides 20-49-year-olds, other age groups declined to lower percentages, for example, 50-59-year-olds making up 16.1% of opioid-related ED events. ***Looking at these numbers, it seems that males aged 30-39 are the most inclined to have an opioid-related ED event if they receive an opioid prescription.***

2. ED events that occur after a person's first prescription in the time frame (Post Prescription)

The next population, ED events that occur after a person's first prescription, has approximately 384k ED events, meaning that 229k of the ED events viewed in the previous comparison occurred in 2016 or before a person's first prescription in the timeframe of 2017 to 2020. With the implementation of START at the end of 2018, this became a point of separation to create two smaller populations for comparison: ED events by people whose first prescription was from 2017-2018 (Pre) and whose first prescription was 2019-2020 (Post.) As mentioned, the year 2016 was excluded to have both groups encompass the same amount of time. There were 358k ED events by the Pre group and 26k by the Post group in the total four-year time frame. Using this information, a comparison between these two groups was made to see if there is a difference in time after receiving a prescription to an ED event. This approach was taken to see if the policy has changed the amount of time from the first prescription to potential issues that may be seen as an ED event. To compare the two groups with such a difference in population, a monthly rate of ED events over the number of unique people who have had a prescription for that long in the population was calculated. Pre had a consistent population of 78k unique people, whereas Post had a maximum of 11k unique people at months after a prescription is 0, to a minimum of 1.1k at months after a prescription is 23. Looking at Figure 3, there is an initial high rate of ED events occurring after the first prescription for Post, but then the rates for Pre and Post seem to hold a similar rate at 12 months after a person receives a prescription. ***One potential reasoning for this may be that, with prescriptions being given out less freely, the people in the Post group have a greater population of problematic users and with the smaller population it is isolated and amplified.***

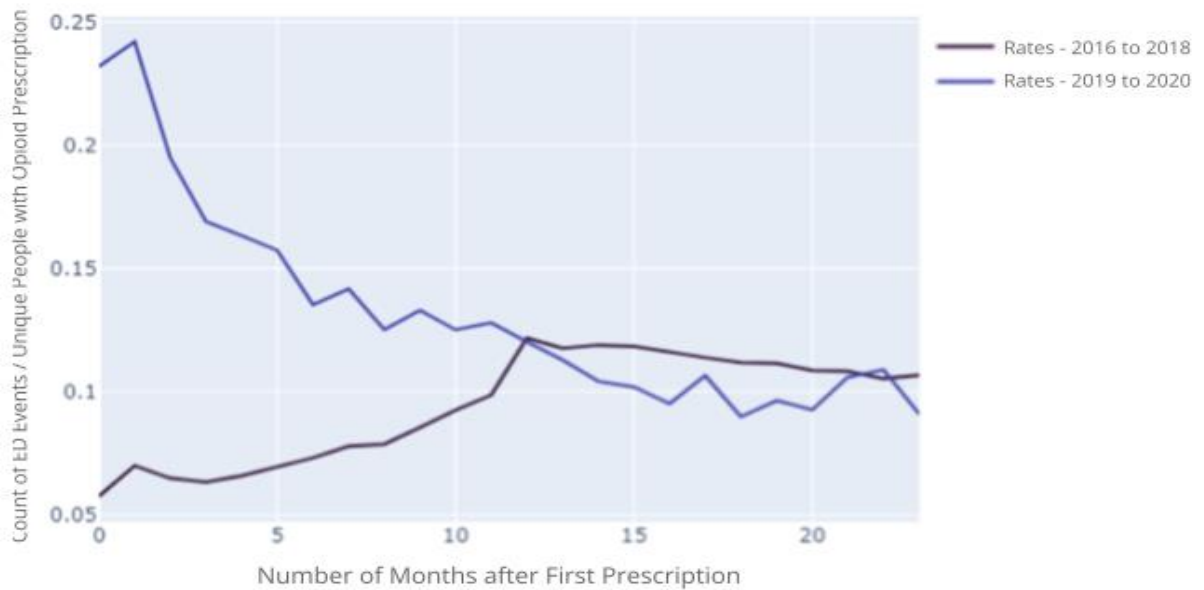


Figure 3- Rate of ED events / Number of unique persons by number of months after their first prescription

When looking at the demographics for this population as a whole, again females make up a greater percentage of the ED events, this time holding 64.8% of them. As with genders, age reflects that of population one, with the 20-29 age group making up 18.2%, 30-39 age group making up 21.2%, and the 50-59 age group making up 20.1%. Looking at the demographics of Pre and Post, Pre maintains the 65.2% female population, however, Post drops to 59.2% female. Additionally, there are two age groups with differences in percentage greater than three percent: the 10-19, 40-49, and 50-59 age groups. The 10-19 age group makes up 3.5% in Pre to 8.8% of Post and with the 50-59 age group holding 20.3% in Pre, while only holding 16.1% in Post. Aside from these two age groups, the differences between Pre and Post do not vary by more than 3%.

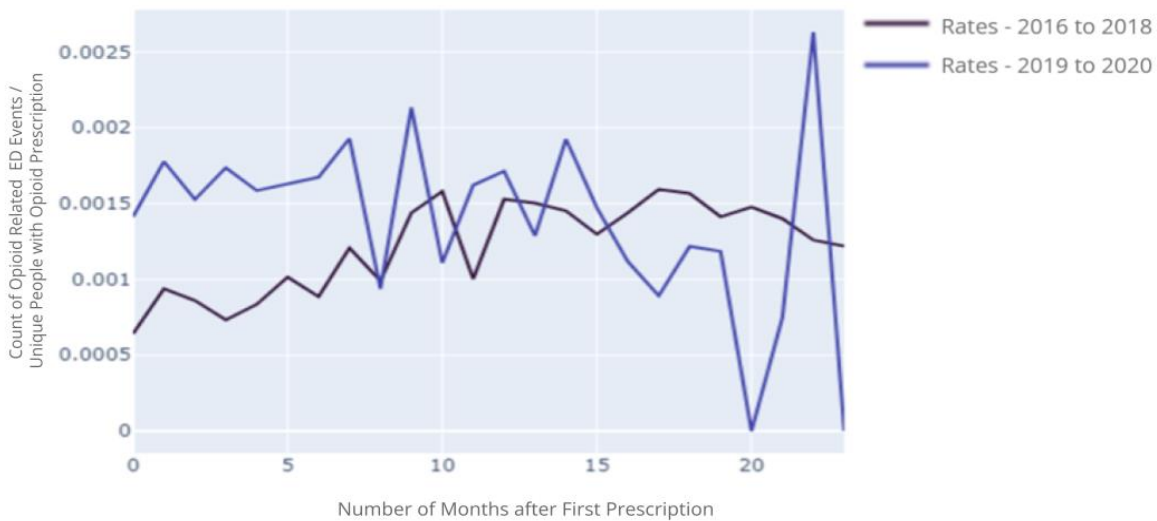


Figure 4- Rate of opioid related ED events / Number of unique persons by number of months after their first prescription

Looking at opioid-related ED events in this group in figure 4, similar rates of ED events by the number of months after a prescription for Pre and Post, with exception to 20 months after and up, this exception being due to an already small number of ED events with an also small population, which leads to more sporadic increases and decreases in the rate. Looking at the demographics of opioid-related ED events in the population, again males make up a greater percentage of ED events than females, making up 55.7% of the population. The age groups of opioid-related ED events in this population have two groups with some noteworthy characteristics. The first of these is the 20-29-year-old age group, which makes up 23.1% of the population in 2017-2018, however decreases to 18.3% in 2019-2020. The other group of interest is again the 30-39-year-old age group, which we see making up 34%, a similar percentage to that of population one's opioid-related ED events. ***As with population one, it appears that males aged 30-39 are the most inclined to have an opioid-related ED event. Another point worth noting is that 20-29-year-olds may be benefiting from the introduction of these programs given the decrease of 4.8% of the population with opioid-related ED events.***



Figure 5- Rate of ED events / number of people with an active prescription during the month

3. ED events that occur during or shortly after an opioid prescription (Active Prescription)

The final level is ED events that occur during or up to six months after a prescription. This range was chosen as looking at only during the active prescription was deemed too narrow and after considering some time ranges, six months was the decided upon range. This range was chosen as it allowed for a range for someone to potentially use any opioids they may have held onto from the prescription, without looking for events indefinitely. Additionally, only ED events that occur in 2017 and onwards are recorded, as 2016 events may not have full accuracy without having late 2015 prescription data. This grouping has approximately 206k ED events, meaning 178k ED events did not occur during the calculated active prescription window or were removed due to being 2016 events. When looking at the number of ED events per month of this group, there is a steady decline in the number of ED events but is important to recall that, as Figure 1 shows, the number of prescriptions is also decreasing. Due to this, a

rate was calculated by month by putting the number of ED events over the number of people with an active prescription at some point during that month. Figure 5 shows that the rate for this group remains within 0.01 of 0.07 from 2017 until it began to decline in mid-2019. This potential decline was then disrupted by the beginning of the COVID-19 outbreak in March 2020, however, it appears that the rate returned to the declined rate of 0.6 rather than the higher rate of 2017 to 2019, although figure 2 shows that the number of ED events declines following the beginning of COVID-19 overall. Additionally, as with figure 2, the impacts of COVID-19 are unknown on the findings of this graph.

As with the two other groups, the gender graphs of ED events during active prescriptions remain relatively consistent with the other populations as 64.3% of ED events are female. With age groups, the major groups to look at are 20-29 & 30-39 as they both decline over time and 60-69, 70-79, & 80-89 which increase over time. With the 20-29 age group making up 17.1% of the ED events for the population in 2017 and steadily decreasing down to 11.7% of the ED events in 2020. Similarly, the 30-39 age group makes up 22.4% of the ED events in 2017 but decreases down to 18% in 2020. Contrasting to these two age groups, the age groups that are 60+ only make up 15.5% of the ED events in 2017, but increase up to 26.5% of the ED events in 2020.

Looking at the opioid ED events of this group, there are some visible differences. First, as with the total ED events, the decline in ED events is present, however, rather than a steady rate until 2019, the decline appears to be present from 2017 onwards, including into 2020. Like with the active prescription population as a whole, the demographics of opioid-related ED events are different than what the larger populations showed. For the genders of people with opioid-related ED events, males still hold a greater percentage at 53.7%, however, this is the smallest percentage of all populations. Additionally, when looking at the age groups, like with the opioid-related events of population two, the 20-29-year-old population makes up 20.6% of the ED events in 2017-2018, while only making up 13.4% of the ED events in 2019-2020. Additionally, like with all ED events of the population, the 60-69 age group steadily increases from 2017 to 2020, starting at 7% in 2017 and increasing up to 16.9% in 2020. Additionally, as with populations one and two, the 30-39 age group is the most common, making up 30.2% of ED events. ***As with prior populations, it appears that males 30-39 years old are the most inclined to have an opioid-related ED event during an active prescription. Additionally, it may appear that 20-29-year-olds are using the programs as the decrease in ED event presence by the age group can be seen in all ED events and opioid-related ones.***

Final thoughts & takeaways

- Based on the demographics across each population of people that receive a prescription, males aged 30-39 may be the most likely to have an opioid-related ED event.
- While 20-29-year-olds are typically having more ED events, it appears that they may be more careful while they have an opioid prescription than other high ED event count age groups.
- Following the implementation of START (now ORPN) in late 2018, there appears to be a slow improvement in the number of ED events by those with prescriptions.
 - Disruption due to COVID-19 makes it difficult to say with certainty.
- The monthly rates of Post from population two may indicate that following the implementation of START and further restriction of opioid prescriptions, those that may misuse or have issues with opioids have a greater presence when compared to the full population than in the Pre population.