



Report Highlights

- There was an overall decrease in the rate of opioid prescribing in Montana from 2014-2019
- The average daily dose of opioids per person in Montana declined from 58 to 42 MMEs from 2014-2019
- Short-acting hydrocodone was the most frequently prescribed opioid in Montana
- The Montana Injury Prevention Program continues to support the Montana Prescription Drug Registry as a tool to monitor opiate prescribing and to support patient care

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Opioid Prescribing Practices in Montana, 2014-2019

Introduction

Drug poisonings in Montana have consistently been among the top five causes of injury-related deaths for at least the last two decades; over 2,000 Montanans died between 1999 and 2018. Unlike national trends which have seen significant increases in drug-related and opioid overdose deaths, Montana has seen a decline in both overall drug-related deaths as well as opioid-involved deaths from 2014 to 2019. While this trend is encouraging, a total of 712 Montanans died during the five-year time period and opioids accounted for over one-third (37.5%) of those drug-related deaths.^{1,2}

Montana Department of Public Health and Human Services (DPHHS) partnered with the Montana Board of Pharmacy to analyze data from the Montana Prescription Drug Registry (MPDR) and report on opiate-related prescribing practices between 2012 and 2017. These data were used to inform policies and programs that promote appropriate prescribing of opiate medications.³ The partnership has continued and has led to this updated analysis of opioid prescribing practices in Montana.

The Montana Prescription Drug Registry

The MPDR was authorized by the Montana Legislature in 2011 and became functional in November 2012 as an online tool that provides a list of controlled substance prescriptions (medications that can cause physical and mental dependence) to health care providers to improve patient care and safety.⁴ All pharmacies with an active Montana license, both in state and out of state, are required to report to the MPDR and must submit detailed prescription information on all controlled substances dispensed to Montana patients.^{5,6} Pharmacies under the auspices of the Indian Health Service began voluntarily reporting to the MPDR in 2014, and the Veterans Administration began in 2016.⁷

Methods

This report looks at MPDR data from years 2014 through 2019. MPDR data provided by the Montana Board of Pharmacy were analyzed through a memorandum of understanding between DPHHS and the Department of Labor and Industry. All prescriptions dispensed by pharmacies licensed in Montana from 2014 through 2019 were included in the data.

A probabilistic linkage program developed by the Centers for Disease Control and Prevention (CDC), Link Plus (Version 2.0), was used to link MPDR records by patient name, sex, and birthdate. Cases that were not exactly matched were manually reviewed for inclusion eligibility. Unique identifiers were then assigned to each individual. Patients without a

reported sex or with sex listed as “unknown” were excluded from sex-stratified analyses. Data for individuals aged <18 years for calendar years 2014-2017 were also excluded from analyses due to a change in coding methodology.

Prescribing rates were calculated per 1,000 residents using yearly population estimates for Montana residents from the Bridged Race Population Estimates produced by the National Center for Health Statistics.⁸ Prescribing rates were examined overall, by age group and by sex.

Data were analyzed using SAS 9.4 with code provided by CDC’s Opioid Overdose Indicator Support Toolkit (Version 2.0).⁹ Standardized dosage information was derived using the CDC-provided 2018 MME conversion file to calculate Morphine Milligram Equivalents (MME).¹⁰ MMEs represent “the amount of morphine an opioid dose is equal to when prescribed, often used as a gauge of the abuse and overdose potential of the amount of opioid that is given at a particular time.”¹¹ The 2016 CDC opioid prescribing guidelines recommended that clinicians prescribe the lowest effective dose of an opioid and cautioned against increasing dosages to ≥ 90 MMEs/day without justification. An established body of scientific evidence now exists showing that overdose risk increases with higher opioid dosages.¹¹

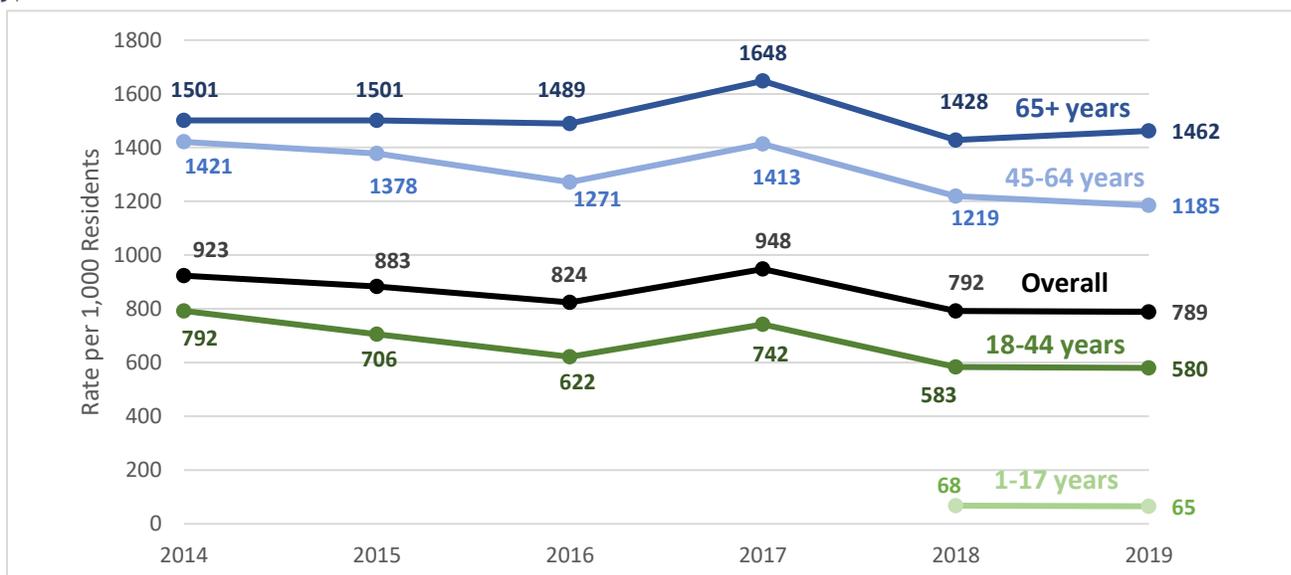
Joinpoint Regression Program was used to analyze trends for significance (version 4.7.0.0; National Cancer Institute).¹²

Results

Drug Rates

From 2014-2019, the overall opioid prescription rate (excluding buprenorphine) decreased significantly from 923 per 1,000 persons in 2014 to 789 in 2019 representing a 20.9% decrease. After a slight increase in prescription rates in 2017, rates returned to the previous trend and continued to decline from 2018 to 2019 (Figure 1). The decreasing trend was consistent across all age groups. Montanans aged 18 to 44 years saw the biggest decline over the five-year period, with a reduction of 26.8%. The rate of opioid prescriptions for all years increased with increasing age (Figure 1).

Figure 1. Opioid prescribing rates per 1,000 residents, by age group—Montana Prescription Drug Registry, 2014-2019



The opioid prescription rate was greater among females compared to males. Women, on average, had 221 more prescriptions per 1,000 residents each year from 2014 to 2019. The prescription rates declined among both sexes during this time period, though not nearly to the same degree (3.0% decline for males and 11.7% decline for females) (Data not shown).

Drug Types

The majority of opioid prescriptions each year (87-89%), consisted of four drugs: Hydrocodone, Oxycodone, Morphine, and Tramadol. The most frequently prescribed opioid in Montana was short-acting Hydrocodone. However, the percentage of Hydrocodone prescriptions declined from 54% of all opioid prescriptions in 2014 to 41% in 2019. In contrast, short-acting Tramadol increased in prescribing frequency from 5% to 18% over the same timeframe (Figure 2).

Figure 2. Most frequently prescribed opioids by proportion of all opioids prescribed per year—Montana Prescription Drug Registry, 2014-2019*

Rank	Year					
	2014 (%)	2015 (%)	2016 (%)	2017 (%)	2018 (%)	2019 (%)
1	Hydrocodone (54)	Hydrocodone (46)	Hydrocodone (50)	Hydrocodone (43)	Hydrocodone (43)	Hydrocodone (41)
2	Oxycodone (23)	Oxycodone (24)	Oxycodone (26)	Oxycodone (24)	Oxycodone (24)	Oxycodone (24)
3	Morphine (6)	Tramadol (11)	Morphine (7)	Tramadol (15)	Tramadol (16)	Tramadol (18)
4	Tramadol (5)	Morphine (7)	Tramadol (4)	Morphine (6)	Morphine (6)	Morphine (6)

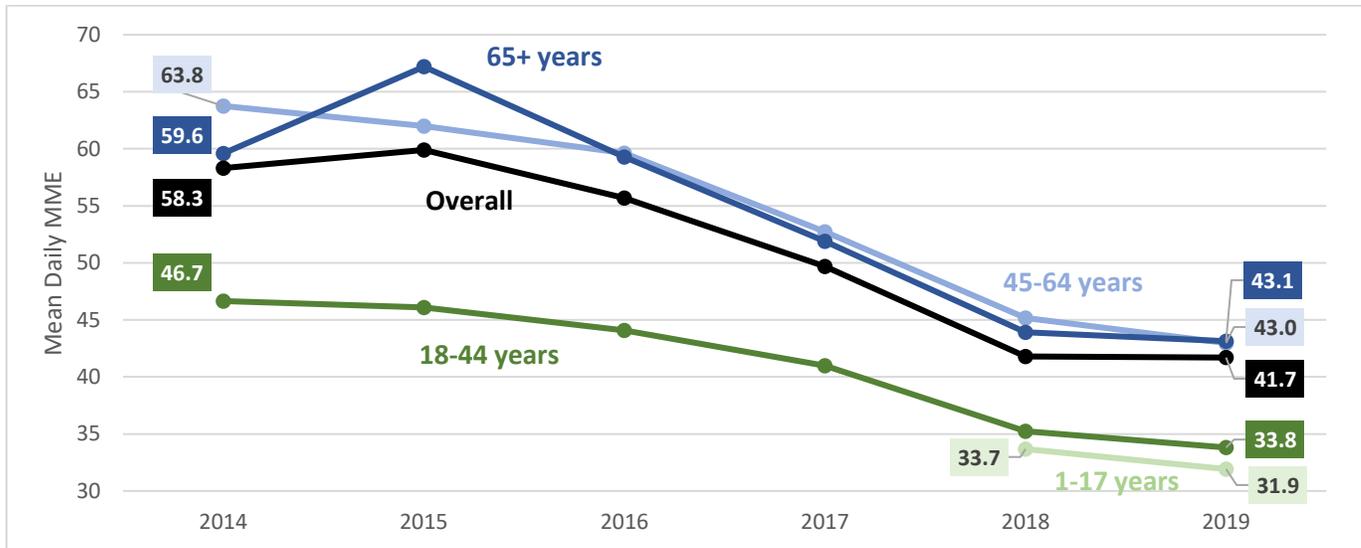
*Buprenorphine excluded

Another prescription opioid that has shown a marked change in prescribing during this study period was buprenorphine. Buprenorphine is used primarily in the treatment of opioid use disorders. For this purpose, providers need to be trained and obtain an x-waiver in order to prescribe it. Starting in 2016, there was a major effort to increase the number of x-waivered Buprenorphine prescribers across the state. This led to a dramatic rise in prescriptions in 2017 that has continued to grow since. Buprenorphine prescriptions increased from 27 per 1,000 Montana residents in 2014 to 81 in 2019 (Data not shown).

Average daily MME and high MME

Overall, the average daily MME declined from 58.3 MMEs in 2014 to 40.3 MMEs in 2019. Similar to the prescribing rate trends, all ages and sexes declined in daily MMEs over the six-year time period. Older age groups had higher daily MMEs than younger age groups (Figure 3).

Figure 3. Mean daily MME by age—Montana Prescription Drug Registry, 2014-2019



Both men and women saw a statistically significant decrease in average daily MME from 2014 to 2019; there was a 32.3% decrease for males (65.4 to 44.3 MMEs) and a 27.4% decrease for females (55.9 to 40.6 MMEs) (Data not shown). Males had higher average daily MMEs than females across all study years. This difference was statistically significant early on, but by 2019 the difference between men and women was no longer significant.

All age groups saw a decrease in the proportion of patients with high and very high MMEs (≥ 90 MME and ≥ 180 MME, respectively) from 2014 to 2019. Montanans aged 18 to 44 years had the biggest changes, with high MMEs declining by 56.7% and very high MMEs by 78.5%. Males consistently had a greater percentage of high and very high MME prescriptions compared to females. Nevertheless, both MME categories significantly declined for both sexes from 2014 to 2019 (Table 1).

Table 1. Percent of patients prescribed high (≥ 90 MME) and very high (≥ 180 MME) opioid doses—Montana Prescription Drug Registry, 2014-2019

Year	≥ 90 MME						Percent Change [†] 2014-2019
	2014	2015	2016	2017	2018	2019	
Overall	11.9	11.5	11.2	9.1	7.3	6.8	-42.9
Sex							
Male	13.7	13.3	12.6	10.0	8.2	7.5	-45.3
Female	11.5	11.2	10.8	8.8	6.9	6.5	-43.1
Age (years)							
1-17	*	*	*	*	1.6	1.5	
18-44	7.4	6.6	6.2	5.0	3.7	3.2	-56.7
45-64	15.0	14.1	13.8	10.9	8.8	8.1	-46.4
65+	11.8	12.5	11.8	10.1	8.7	8.3	-29.9
Year	≥ 180 MME						Percent Change [†] 2014-2019
	2014	2015	2016	2017	2018	2019	
Overall	4.8	4.9	4.1	3.2	2.0	1.9	-60.8
Sex							
Male	5.6	5.7	4.8	3.7	2.4	2.2	-61.3
Female	4.5	4.6	3.9	3.1	1.8	1.8	-59.9
Age (years)							
1-17	*	*	*	*	0.3	0.3	
18-44	2.4	2.1	1.7	1.3	0.6	0.5	-78.5
45-64	6.3	5.9	5.1	3.7	2.4	2.1	-67.3
65+	4.7	5.6	4.6	3.9	2.7	2.7	-41.8

* Data for the >18 age group for the years 2014-2017 are not available due to a change in coding methodology

† Significant percent changes (at the $p \geq 0.05$ level) are in **bold**

Limitations

While assigning unique identification numbers to each patient in the PDMP, some cases were not able to be linked to an individual even after manual inspection. These individuals were excluded from the dataset.

Variables in the Montana Drug Registry were used to reassign a National Drug Code (NDC) to each prescription, which is a 10- or 11-digit 3-segment number that is a universal product identifier for drugs in the United States. This number provides information on the specific strength, dosage form, and formulation of a prescription.¹³ During the reassignment process, there was a possibility of misrepresenting the NDC or missing it entirely, leading to underreporting.

Bulk orders of prescriptions to clinics and other health centers were also included in the dataset. Occasionally these orders were listed under the name of the person who ordered them, and not the facility itself. This led to instances where it appeared as though a single individual was receiving a very large prescription. These were excluded from the dataset, however, smaller orders tied to rural and frontier clinics (that were listed under an individual) were harder to



identify. Though every effort was taken to remove these during the cleaning process, it is possible that bulk orders associated with an individual's name were included.

The inclusion of the Veterans Administration data in 2016 and onward may have influenced overall trends. In 2017, 4.8% of Montanans were enrolled in the VA healthcare system.¹⁴

Conclusions

An overall decline in the number of opioids prescribed, as well as the strength of prescriptions, occurred from 2014 to 2019. Though there was a slight increase in prescriptions in 2017, the following two years showed a statistically significant decline once more in line with the trend seen prior to 2017.

While females continued to have higher numbers of opioid prescriptions than males, men were prescribed higher average daily MMEs than women. The daily average MMEs declined for both males and females across the study period, and the difference between the two sexes decreased over time. As noted by the CDC, the lower the daily MME, the less likely an overdose.¹¹ The number of opioid prescriptions, as well as average daily MMEs, were higher in older age groups than in younger age groups. All age groups (for years where data were available) showed declines in both the number of prescriptions as well as average daily MMEs. High (≥ 90 MME) and very high (≥ 180 MME) doses declined for all age groups over time as well.

The most frequently prescribed opioid in Montana across all years was short-acting Hydrocodone. In 2014, Hydrocodone was reclassified from a Schedule III drug (moderate to low potential for abuse) to Schedule II (high abuse potential) and there has been a marked decline in short-acting Hydrocodone prescription rates. Tramadol, a Schedule IV drug (low abuse potential), is increasing in prescription rates as short-acting Hydrocodone decreases.

There has been a decrease in overall opioid prescribing since at least 2012 when the MPDR was created. The Montana Injury Prevention Program (MIPP) at DPHHS recommends that all providers register with the Prescription Drug Registry and use it as a tool to monitor opiate prescribing and to support patient care. In addition to this, MIPP supports the Montana Medical Association's efforts to train physicians about proper prescribing practices and worked with the Board of Pharmacy to select a new PDMP software. This new software will be combined with RxCheck—a nationwide prescription drug information sharing system that securely integrates with electronic health records. These activities, along with others outlined in the state's [Substance Use Disorder Task Force Strategic Plan](#), aim to reduce the morbidity and mortality associated with opioid misuse and overdose.¹⁵

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