

Colorado Prescription Drug Profile

Total Population in 2015: 5,456,584



Overview

Nationally and in Colorado, opioid use disorders have emerged as a significant public health concern. Nearly 224,000 Coloradans misuse prescription drugs each year. In nearly every year for the last 15 years, Colorado's drug overdose rate was significantly higher than the national rate and opioid related overdoses represent a large portion of those deaths. In Colorado, prescription opioid related overdoses have quadrupled since 2000.⁸

This profile summarizes controlled substance prescriptions that Colorado residents received from 2014-2016, prescribing practices and patient behaviors, population-level healthcare encounters and deaths related to opioid overdose among Colorado residents. This information is from several sources: The Colorado Prescription Drug Monitoring Program (PDMP), emergency department visit and hospital discharge databases and death certificates.

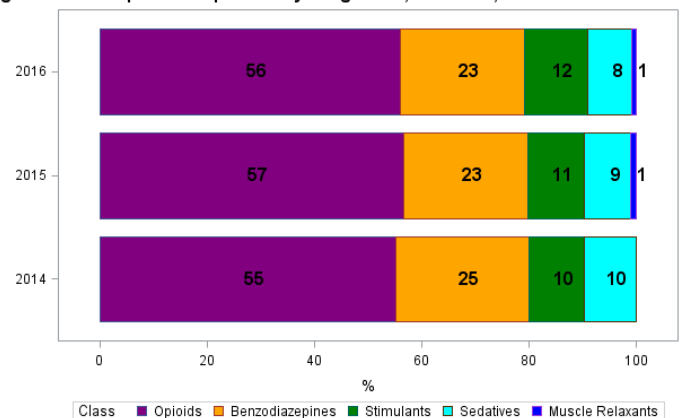
The Colorado PDMP is a secure database that collects information on schedule 2-5 controlled substances prescriptions dispensed by Colorado pharmacies. The PDMP compiles information on patients, prescribers, pharmacies, and the medications prescribed and dispensed. Prescribers and pharmacists registered with the Drug Enforcement Administration (DEA) and the PDMP can access patient information to make informed decisions and ensure appropriate prescribing and dispensing practices for their patients. The PDMP is available to the following Colorado licensed individuals: pharmacists, physicians, physician assistants, advanced practice nurses, dentists, podiatrists, optometrists and veterinarians.¹

In 2014, Colorado legislators passed a bill that aligned Colorado's PDMP with best practice strategies², such as mandating registration for prescribers and pharmacies, daily reporting by pharmacies for dispensed controlled substances, allowing prescribers to delegate access to PDMP records and allowing the Colorado Department of Public Health and Environment to access PDMP data to provide population-level results. In compliance with this legislation, this report describes population-level prescribing and dispensing data of controlled substances, with a focus on opioid prescriptions (also known as opioid analgesics or pharmaceutical opioids), from the Colorado PDMP for Colorado residents.

Dispensed Prescriptions

Controlled substances collected by the PDMP are categorized into five classes: opioids, benzodiazepines, stimulants, sedatives and muscle relaxants. Figure 1 illustrates the amount of schedule 2-4 controlled substances by drug class dispensed to Colorado residents from 2014-2016. Opioid prescriptions represented a majority of prescriptions dispensed, and benzodiazepines represented about a quarter of all prescriptions. The percentage of benzodiazepines and zolpidem prescriptions decreased while the percentage of stimulant prescriptions increased in the three-year period.

Figure 1: Prescriptions Dispensed by Drug Class, Colorado, 2014-2016



Schedule 2-4 Controlled Substances
Muscle Relaxants were not included as a class in 2014
Data Source: Colorado Prescription Drug Monitoring Program, Colorado Department of Regulatory Agencies
Analysis by: Colorado Department of Public Health and Environment, 2016

Prescription Recipients

Table 1 describes general characteristics of controlled substance prescriptions dispensed to Colorado residents. In 2016, Colorado prescribers wrote 98 percent of the prescriptions dispensed to Colorado residents. Prescribers in Arapahoe, Denver, El Paso, and Jefferson counties collectively prescribed 50 percent of all prescriptions dispensed to state residents.

Table 1: Characteristics of Controlled Substance Prescriptions Dispensed, Colorado, 2014-2016

Characteristics	2014	2015	2016
Number of Prescriptions Dispensed	7,312,225	7,666,635	7,461,760
Number of Unique Patients	1,405,573	1,453,019	1,428,252
Number of Unique Prescribers	36,461	42,385	42,371
Number of Unique Pharmacies	966	1,048	1,089
Estimated Median Distance Traveled by the Patient to the Prescriber (miles)	6.7	7.1	7.0
Estimated Median Distance Traveled by the Patient to the Pharmacy (miles)	2.7	2.7	2.7

Schedule 2-4 Controlled Substances

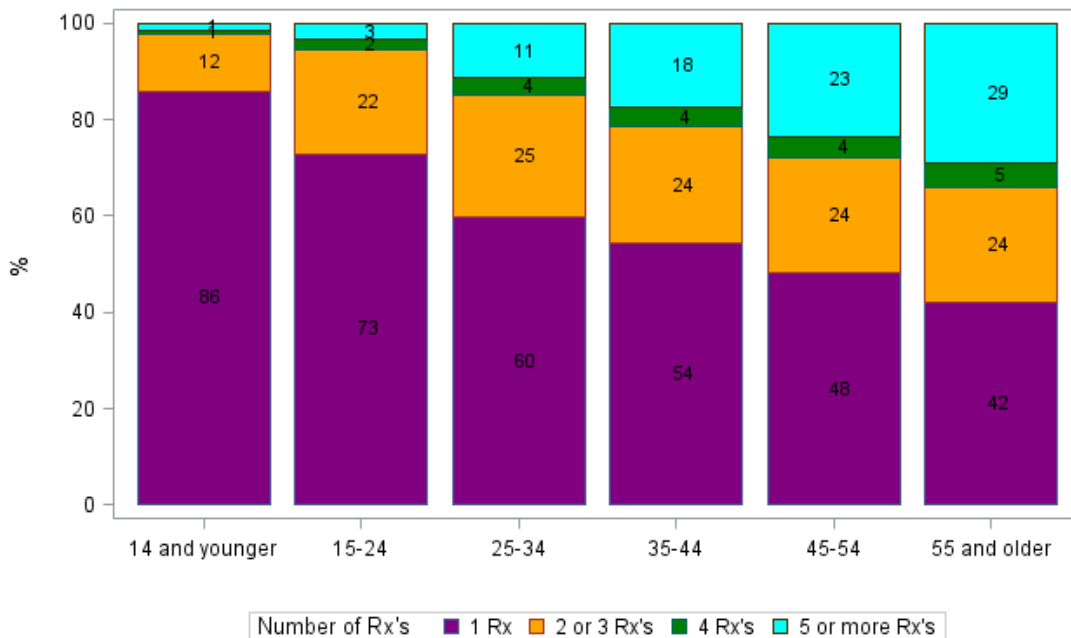
In 2014 NPI was used to identify unique prescribers and pharmacies as DEA numbers were not available until 2015

Data Source: Colorado Prescription Drug Monitoring Program, Colorado Department of Regulatory Agencies

Analysis by: Colorado Department of Public Health and Environment, 2016

Although some might have legitimate reasons for receiving multiple prescriptions, research has suggested that more prescriptions per individual is associated with increased risk of substance use disorders.³ Figure 2 describes the number of opioid prescriptions per patient, by age group. In 2016, the number of prescriptions per recipient ranged from 1 to 184 (median=1.0; mean=3.8) and the number of opioid prescriptions per patient increased with age.

Figure 2: The Number of Opioid Prescriptions Dispensed Per Patient by Age Group, Colorado, 2016



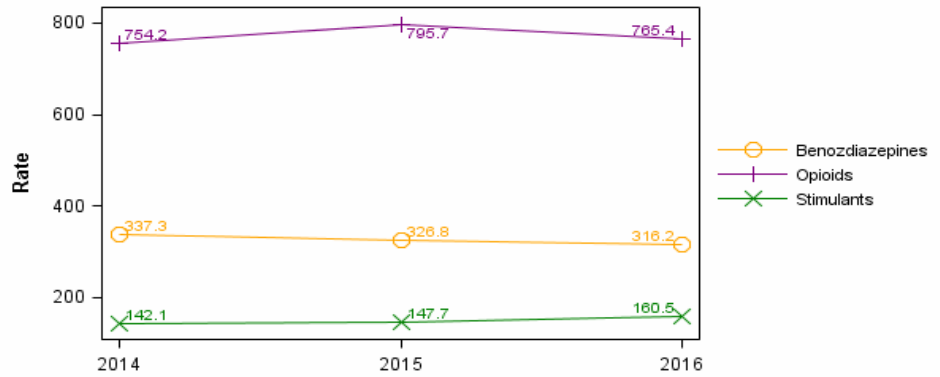
Schedule 2-4 Opioid Prescriptions

Data Source: Colorado Prescription Drug Monitoring Program, Colorado Department of Regulatory Agencies

Analysis by: Colorado Department of Public Health and Environment, 2016

Prescription rates indicate the volume of controlled substance prescriptions per 1,000 residents. Figure 3 shows prescription rates for three classes major drug classes by year. Variation in prescribing rates by drug class is clear. During this reporting period in Colorado, opioid prescription rates peaked in 2015 but decreased in 2016. Benzodiazepine prescription rates decreased while stimulant prescription rates increased in the three-year period.

Figure 3: Prescription Rates per 1,000 Residents by Major Drug Class, Colorado, 2014-2016



Schedule 2-4 Controlled Substances
 *2016 population estimates were not available, therefore 2015 estimates were used
 Source: Vital Statistics Program, Colorado Department of Public Health and Environment and the Colorado Prescription Drug Monitoring Program, Colorado Department of Regulatory Agencies
 Analysis by: Colorado Department of Public Health and Environment, 2016

Population-Level Indicators of Prescribing Practices and Patient Behaviors

The information on controlled substances in the PDMP is useful in identifying prescribing practices and patient behaviors that can increase risk for overdose.^{2,4} According to the CDC, potential risk factors for prescription drug misuse include high-dose prescribing, multiple provider episodes, long duration opioids, and overlapping opioid and benzodiazepine prescriptions.⁴ Understanding these risk factors may help providers better assist their patients in pain management while also protecting their health and safety. These measures are provided in Table 2 and explained in further detail on the following page.

Table 2: High Risk Prescribing Practices and Patient Behaviors, 2014-2016

	2014	2015	2016
PDMP Indicator	Colorado	Colorado	Colorado
Percent of patients receiving more than 90 morphine milligram equivalents	10.3%	8.9%	8.7%
Percent of patients receiving more than 120 morphine milligram equivalents	6.3%	5.5%	5.2%
*Rate of multiple provider episodes per 100,000 residents	60.8	43.1	32.0
Percent of patients prescribed long duration opioids who were opioid-naïve	16.0%	15.3%	13.5%
Percent of patient prescription days with overlapping opioid prescriptions	22.3%	21.6%	21.2%
Percent of patient prescriptions days with overlapping opioid and benzodiazepine prescriptions	12.1%	11.9%	11.3%

Schedule 2-4 Controlled Substances
 Excludes Buprenorphine and other drugs commonly used for treatment
 *2016 rates are calculated with 2015 population estimates as 2016 estimates are not yet available
 Annual rates are based on the average of two biannual rates; Annual percentages are based on average of quarterly percentages
 Data Source: Vital Statistics Program, Colorado Department of Public Health and Environment and the Colorado Prescription Drug Monitoring Program, Colorado Department of Regulatory Agencies
 Data Analysis by: Colorado Department of Public Health and Environment, 2016



PDMP Indicator Definitions

Percent of Patients Receiving High Dosage Prescriptions

Morphine is considered the standard measure for managing pain and is therefore used as a reference for calculating opioid prescription doses. Higher dosages are associated with an increased risk of opioid use disorder and overdose.^{4,5} In 2014, the Colorado Quad-Regulator Boards of Dental, Medical, Nursing, and Pharmacy suggested limiting dosages to less than 120 mg morphine equivalents (MME) per day to reduce negative outcomes⁵, and in 2016, the Center for Disease Control and Prevention's (CDC) prescribing guidelines recommended opioid dosages should not exceed 90 MME per day.⁶ Although there is variability regarding safe dosage thresholds, assessing dosage can help to identify problematic prescribing practices and patients who may be at risk for substance use disorders.



Table 3: Estimated Doses for Commonly Prescribed Opioids

	Oxycodone	Hydrocodone
90 MME	60 mg	90 mg
120 MME	80 mg	120 mg

Rate of Multiple Provider Episodes (MPEs)

The use of multiple prescribers and pharmacies is associated with high risk drug-related behaviors and adverse events. The number of prescribers and pharmacies a patient visits is often used as a proxy measure for “doctor shopping”.^{4,6} The CDC definition was used for this report which defines MPE as receiving opioid prescriptions from five or more prescribers and pharmacies in a six-month period.



Percent of Patients Prescribed Long Acting/ Extended Release (LA/ER) Opioids who were Opioid-Naïve

Opioid naïve patients may be more vulnerable to adverse effects of LA/ER opioids such as respiratory depression and overdose. For this metric, opioid naïve refers to patients who did not fill an opioid prescription in the previous 60 days. Time-scheduled opioids are associated with greater total average daily dosages and increased risk for long term use.^{4,6}



Percent of Patient Prescription Days with Overlapping Prescriptions

Both benzodiazepines and opioids are central nervous system depressants that can compromise the respiratory system. Benzodiazepines enhance the effects of opioids so the concurrent use of benzodiazepines and opioids can increase the risk of adverse events.^{4,6,7} This indicator measures the duration of overlapping prescriptions. Longer duration of overlapping prescriptions may raise concerns of the potential drug interactions and resulting side effects.



Morbidity and Mortality

While many people benefit from opioids for pain management, increased use of prescription pain relievers has led to increases in associated morbidities and mortalities, including opioid use disorder and overdose. Opioid overdose related emergency department (ED) visits, hospitalizations and fatal overdoses have increased nationally and in Colorado over the last decade.^{3,4,8}

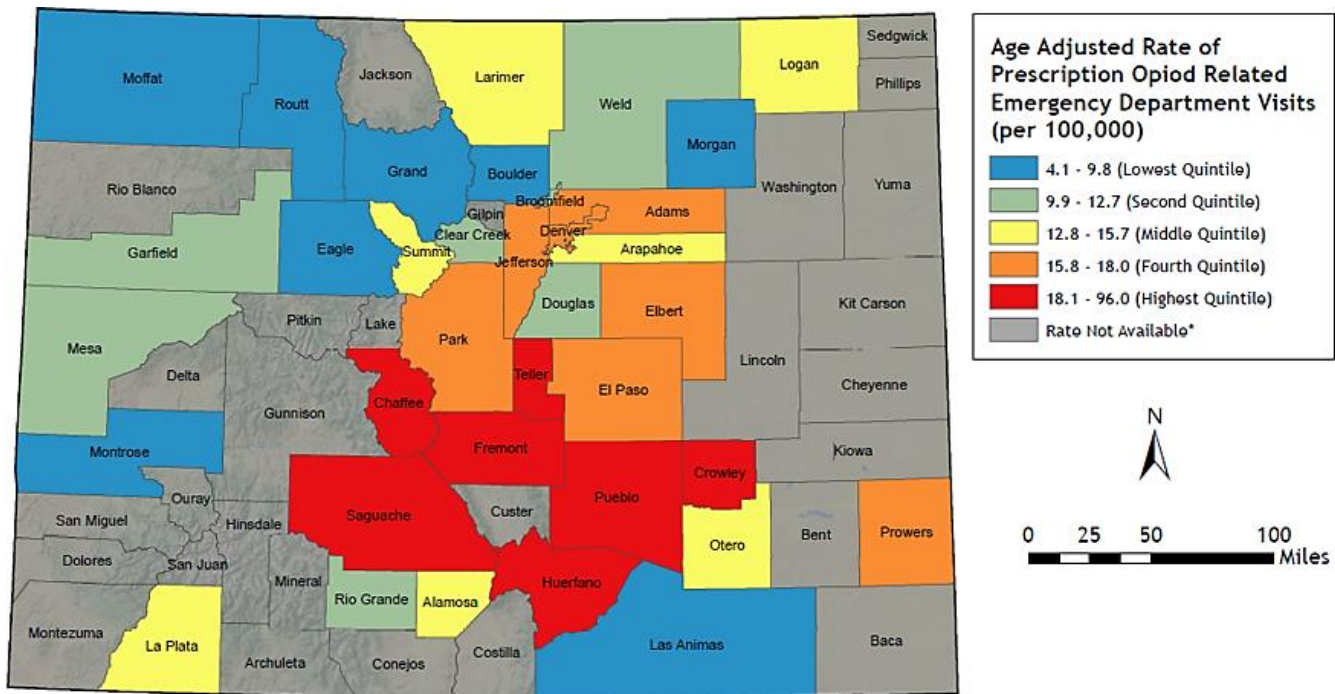
Emergency Department Visits Related to Prescription Opioid Overdose

From 2012-2014, Coloradans made 2,404 visits per year to ED's related to prescription opioid poisoning.⁹ Throughout the state, ED visit rates per 100,000 residents ranged from 4.1 in Routt County to 96 in Huerfano County.

Colorado Opioid ED Visit Statistics

Count: 2,404
 Crude Rate: 15.2
 Colorado Age-Adjusted Rate (CI): 15.2 (14.6-15.8)

Figure 4: Age-Adjusted Opioid Analgesic ED Visit Rates by County, Colorado, 2012-2014



Hospitalization Data Related to Prescription Opioid Overdose

In 2013, 21 percent of the drug poisoning hospitalizations in Colorado were related to prescription opioid poisoning.⁹ From 2012-2014 Colorado experienced 3,090 hospitalization visits related to prescription opioids. Hospitalization rates per 100,000 residents ranged from 5.1 in Clear Creek County to 59.7 in Huerfano County.

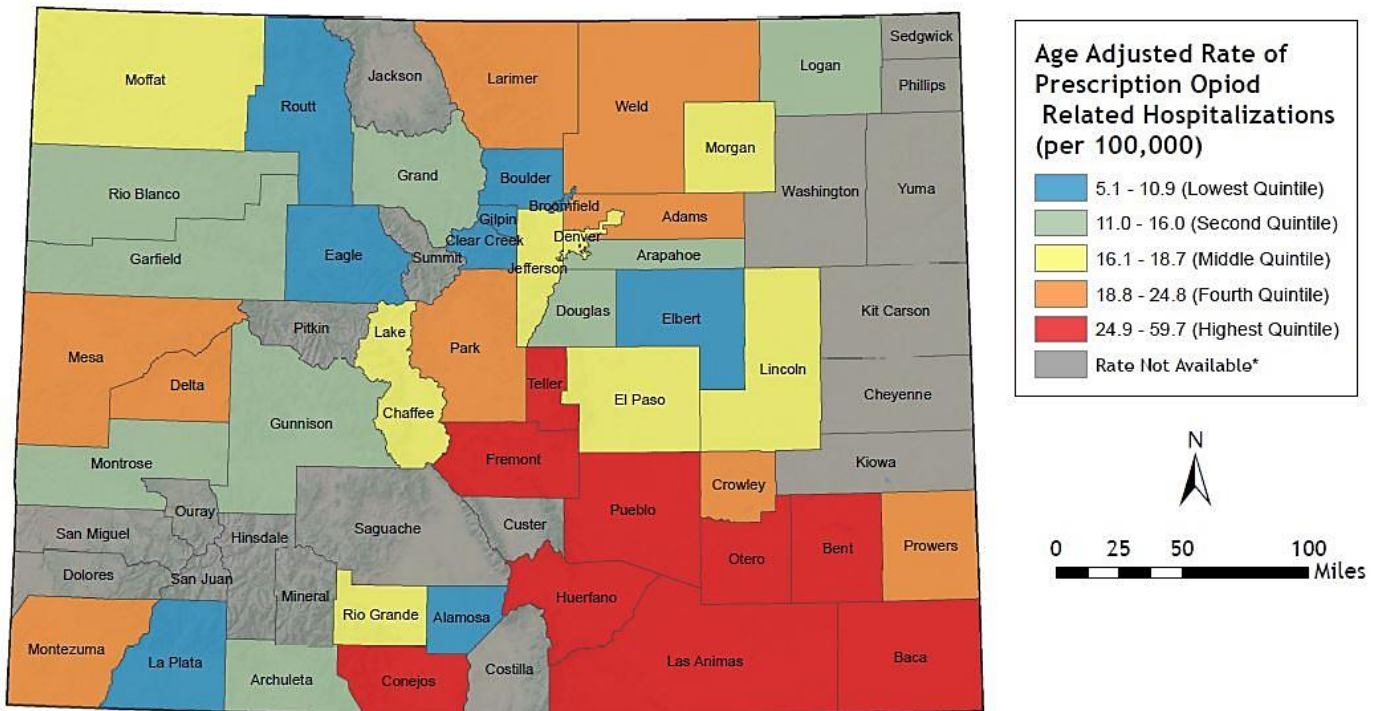
Colorado Opioid Hospitalization Statistics

Count: 3,090

Crude Rate: 19.5

Colorado Age-Adjusted Rate (CI): 18.6 (18.9-20.1)

Figure 5: Age-Adjusted Opioid Analgesic Hospitalization Rates by County, Colorado, 2012-2014



Death Certificate Data Related to Prescription Opioid Overdose

In Colorado in 2015, 37 percent of all drug poisoning deaths involved prescription opioids. Opioid related poisoning deaths tripled from 1.9 in 2000 to 5.8 per 100,000 in 2015.^{8,9} From 2013-2015 Colorado had 962 opioid related deaths. Opioid mortality rates ranged from 2.7 per 100,000 in Park County to 13.5 per 100,000 in Las Animas County (Figure 6).

Colorado Opioid Death Statistics

Count: 962

Crude Rate: 6

Colorado Age-Adjusted Rate (CI): 5.8 (5.4-6.1)

Figure 6: Age-Adjusted Opioid Analgesic Death Rates by County, Colorado, 2013-2015

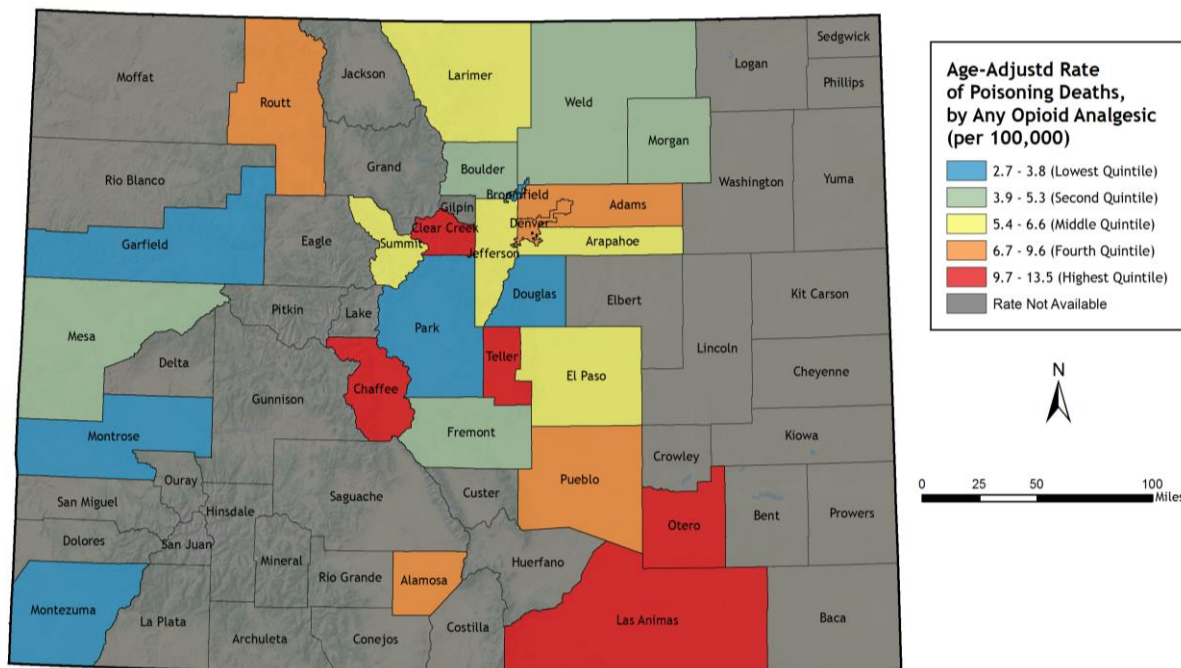
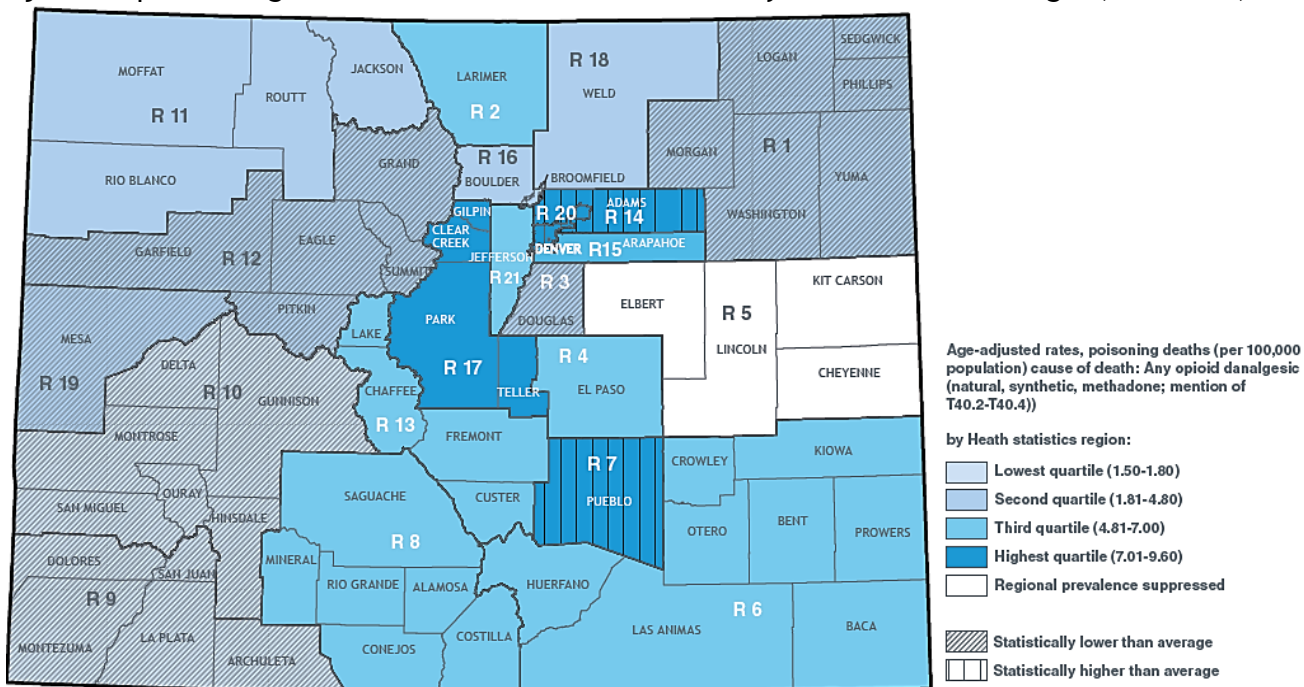


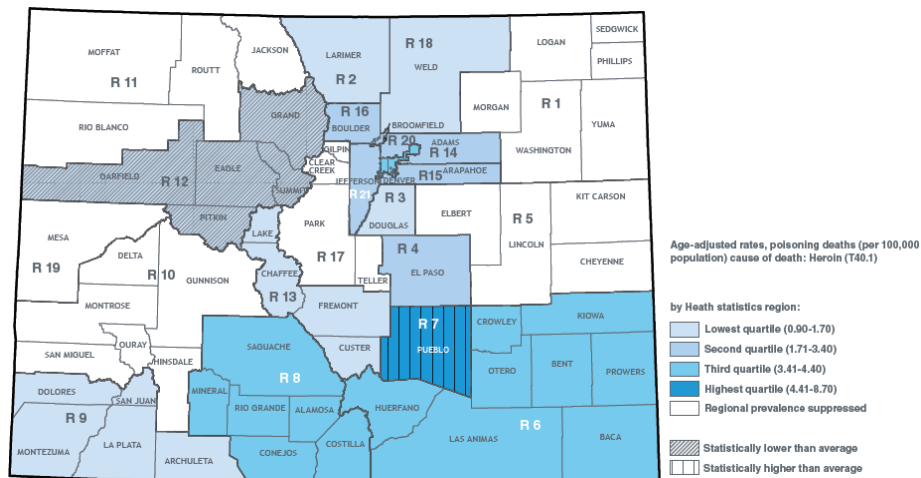
Figure 7: Age-Adjusted Opioid Analgesic Related Overdose Death Rates by Health Statistics Region, Colorado, 2013-2015



Heroin-Related Overdose Death Rates

The prevalence of heroin, an illicit opiate, is also increasingly prevalent in Colorado. As heroin use increases, so do the adverse effects associated with heroin use and addiction. The rate of heroin related deaths has increased from 0.8 deaths per 100,000 in 2000 to 2.9 per 100,000 in 2015. According to the Denver Metro Treatment Client Survey, 70 percent of survey respondents reported that prescription painkillers played a role in their decision to use heroin.¹⁰ Figure 8 shows heroin related mortality rates in Colorado by Health Statistics Region from 2013 to 2015⁸.

Figure 7: Age-Adjusted Heroin Related Overdose Death Rates by Health Statistics Region, Colorado, 2013-2015



Data Limitations

Data in this report should be interpreted with caution for several reasons. First, the accuracy of the indicators based on PDMP data is limited by the completeness and quality of the data when entered into the system. Another limitation of using the PDMP for population-level analyses is that it does not include provider type or information on the patient's medical condition. In addition, the indicators do not capture whether the dispensed medications were taken as prescribed or taken by the prescribed patient. This report references specific thresholds for indicators using absolute values which results in identifying patients at risk for substance use disorder or overdose, whether or not that is true. It should be noted that not all individuals who breach the threshold are at risk for substance use disorder or overdose and those below the threshold may still be at risk. Therefore, interpretation of these measures are limited due to the lack of contextual information regarding the prescriptions. A more comprehensive approach and complete evaluation of the economic, environmental and societal influences is necessary to appropriately interpret PDMP data and put the opioid epidemic into context.

Hospitalization and emergency department data are obtained through medical billing codes, which vary in their completeness. These records may not provide all information regarding the specific drug or drugs that were associated with a non-fatal overdose. Further, the required billing codes for hospitalization and emergency department visits changed in 2015, and as CDPHE continues to refine the case definitions with the new coding scheme, only 2012-2014 data were used in these analyses. These data represent health care encounters, not individuals.

Lastly, limitations of death certificate data may result in reporting bias. Deaths reported as multi-drug toxicity lack the specificity to know exactly what substance caused death. CDPHE does not collect toxicology reports for unintentional overdose deaths and therefore cannot determine whether drugs that were not indicated on the certificate represent negative test results or whether the drug was not part of the testing

Conclusion

The PDMP is a critical tool in the fight to protect health and safety of Coloradans while supporting clinical practice. Although use of the PDMP is not mandatory for prescribers, in 2014 Colorado physicians queried 414,549 patient records. In 2016, the number of queries increased 64 percent to 681,348, demonstrating the value of the PDMP as a clinical decision making tool.

Prescription drug misuse is a public health crisis and the PDMP is one tool that can be used to evaluate initiatives designed to change patient and provider behavior to reduce prescription drug misuse and the associated adverse health outcomes. However, the misuse of prescription drugs is a multidimensional problem. A balanced approach to this work includes an understanding of the need to preserve access to medications for the management of care and meeting patient expectations while decreasing the misuse and diversion of controlled substances.

Additional Data Resources

Violence and Injury Prevention Network: <http://vipreventionnetworkco.com/p/prescription-drug-overdose.html>
Colorado Consortium for Prescription Drug Abuse Prevention: <http://www.corxconsortium.org/>
Colorado Prescribing Guidelines: https://www.colorado.gov/pacific/dora/Medical_News
CDC Prescribing Guidelines: <http://dx.doi.org/10.15585/mmwr.rr6501e1>
Take Meds Seriously: <http://takemedseriously.org/>
Rise Above Colorado: <https://www.riseaboveco.org/>

References

1. Health Information Designs (HID), LLC. Colorado Prescription Monitoring Program. <http://www.hidesigns.com/copdmp>. Accessed January 19, 2016.
2. Clark T, Eadie J, Knue P, Kreiner P, Strickler G. Prescription drug monitoring programs: an assessment of the evidence for best practices. Boston, Massachusetts: PDMP Center of Excellence, 2012. http://www.pewtrusts.org/~/media/assets/0001/pdmp_update_1312013.pdf. Accessed January 19, 2016.
3. Paulozzi L, Kilbourne EM, Shah NG, et al. A history of being prescribed controlled substances and risk of drug overdose death. *Pain Medicine*. 2012;13(1):87-95. DOI: <https://doi.org/10.1111/j.1526-4637.2011.01260.x>
4. Dowell D, Haegerich TM, Chou R. CDC guideline for prescribing opioids for chronic pain - United States, 2016. *MMWR Recomm Rep*. 2016; 65(No. RR-1):1-49. DOI: <http://dx.doi.org/10.15585/mmwr.rr6501e1>.
5. Prescription Drug Monitoring Program- Training and Technical Assistance Center (PDMP TTAC). Morphine Milligram Equivalents Calculator. http://www.pdmpassist.org/pdf/bja_performance_measure_aid_mme_conversion_tool.pdf. Published May 1, 2013. Accessed January 19, 2016.
6. Colorado Department of Regulatory Agencies (DORA). Policy for Prescribing and Dispensing Opioids. https://www.colorado.gov/pacific/dora/PDMP_News. Accessed January 19, 2016.
7. Substance Abuse and Mental Health Surveillance Administration (SAMHSA). The Drug Abuse Warning Network (DAWN): Benzodiazepines in Combination with Opioid Pain Relievers of Alcohol: Greater Risk of more Serious ED Visit Outcomes. 2014. <https://www.samhsa.gov/data/sites/default/files/DAWN-SR192-BenzoCombos-2014/DAWN-SR192-BenzoCombos-2014.pdf>. Accessed January 15, 2016
8. Rosenthal A, Bol K, Gabella B. Examining opioid and heroin-related drug overdose in Colorado. *Health Watch*. 2016; 100. <http://www.chd.dphe.state.co.us/Resources/pubs/Colorado-Opioid-and-Heroin-Overdose.pdf>. Accessed December 2, 2016.
9. Take Meds Seriously. The Problem: Colorado Statistics. <http://takemedseriously.org/the-problem/colorado-statistics/>. Accessed January 19, 2016.
10. Colorado Consortium of Prescription Drug Abuse Prevention. Heroin In Colorado: Preliminary Assessment. 2017. <http://www.corxconsortium.org/wp-content/uploads/Heroin-in-Colorado-FINAL-4.3.17.pdf>

Contact Information

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