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Risk Factors of Prescription Opioid Overdose Among Colorado Medicaid Beneficiaries

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Abstract: **This study aims to determine risk factors of opioid overdose among the Colorado Medicaid population. A retrospective nested case-control study was undertaken. Medicaid beneficiaries who had ≥1 medical claim for an emergency department visit or a hospitalization associated with an opioid overdose from July 2009 to June 2014 were defined as cases. Controls were selected using a nearest neighbor matching without replacement. The matched controls were selected on the basis of age, sex, and opioid prescription. One case was matched with three controls. Multivariate conditional logistic regression was used to compare risk factors. A total of 816 cases with 2,448 controls were included. Six factors were associated with opioid overdose: mean morphine dose equivalent (>50 mg/d; odds ratio [OR] = 1.986 [95% confidence interval [CI], 1.509–2.614]), methadone use (switching opioid to methadone vs. no methadone use; OR = 7.230 [95% CI, 2.346–22.286]), drug/alcohol abuse (OR = 3.104 [95% CI, 2.195–4.388]), other psychiatric illness (OR = 1.730 [95% CI, 1.307–2.291]), benzodiazepine use (OR = 2.005 [95% CI, 1.516–2.652]), and the number of pharmacies used by the beneficiary (≥4 pharmacies vs. 1 pharmacy; OR = 1.514 [95% CI, 1.003–2.286]). In conclusion, several factors are associated with opioid overdose. States and communities should ensure the availability of at-home intranasal naloxone for overdose rescue on the basis of the presence of risk factors.**

Perspective: ***This article presents the risk factors of opioid overdose among the Colorado Medicaid population. On the basis of study findings, Colorado Medicaid is currently working with physicians, hospitals, and other health system stakeholders to continue to develop policies to identify and assist this subset of our population. One such policy will be to provide at-home intranasal naloxone for overdose rescue.***

Key words: *Risk factor, opioid overdose, Medicaid, opioid, chronic pain.*

In 2011, drug overdose became one of the leading causes of injury deaths within the United States. Of these deaths where the drugs were specified, opioid analgesics or opioids accounted for three-quarters of prescription drug overdoses.[7] Opioid overdose has become an increasingly impactful epidemic in the United States. The number of patients killed by opioid overdose has tripled from 1999 (approximately 4,000 people) to 2008 (approximately 15,000 people). Approximately half a million emergency department (ED) visits were attributable to opioid overdose in 2009 alone.[3]

Concern for prescription drug abuse in Colorado has been particularly high because the state was ranked in

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the top five states across the nation for nonmedical use of prescription pain medicine.[16] Unfortunately, while other states have experienced declines in prescription drug abuse, Colorado's rates have remained at alarmingly high levels.[15] In 2013, the governor of Colorado created the Colorado Coalition for Prescription Drug Abuse Prevention with the goal of preventing 92,000 Coloradans from abusing opioids by 2016. This group has undertaken such strategies as creating public awareness of the crisis, increasing efforts to improve provider education of safe and effective opioid prescribing, encouraging safe medication disposal, and improving use and accessibility of Colorado's prescription drug monitoring database.

To date, several studies have revealed risk factors that are associated with opioid overdose.[3,6,12,20,22] According to the Centers for Disease Control and Prevention, patients who are male, middle-ages, living in rural counties, or white, American Indian, or Alaska natives are more likely to have an opioid overdose.[3] A recent study,[22] which was conducted among the veteran health administration population, reports risk factors of opioid-related toxicity or overdose including: higher mean morphine equivalent dose (MED), history of opioid dependence, previous hospitalization, and type of opioids. Patients who receive any opioids with >100 MED had approximately a 4.1 times greater risk of serious opioid-related toxicity or overdose compared with those who receive MED of 1 to <20 mg/d. As for types of opioids, hydromorphone or oxycodone are significantly associated with serious opioid-related toxicity or overdose. One study,[6] which was conducted in a private health insured population, indicates greater risk of opioid overdose in patients who use any opioid for a MED >50 mg/d. Another study[21] reports that overlapping opioid prescription and pharmacy shopping, which was defined as ≥4 pharmacies visited, are related to opioid overdose. Other qualitative studies[12,20] suggest potential risk factors of opioid overdoses that include high MED (>50 mg/d), nonadherence, history of methadone use, history of opioid intoxication, history of substance abuse (such as opioid or benzodiazepine abuse), medical and mental health comorbidities, and concurrent benzodiazepine and antidepressant uses.

Although previous findings[6,22] suggest potential risk factors of opioid overdose, these analyses were conducted in specific populations (veteran and private health insured populations) that often do not generalize well to other US populations such as the Medicaid population. Risk factors of opioid overdose could be different among different subpopulations, insurers, and geographies. With the implementation of the Affordable Care Act in January 2014, states were given the option to receive additional federal funding to expand their Medicaid programs to cover adults younger than 65 years with income up to 133% of the federal poverty level; thus expanding the patient case mix covered by Medicaid. As of 2015, 31 states have expanded their Medicaid programs, which includes Colorado.[8] With an expanded, broader patient population and the growing concern of opioid overuse within the State of Colorado, further understanding of the risk factors within a state Medicaid population is warranted. We conducted this study aiming to determine risk factors associated with opioid overdose measured according to an opioid overdose-related ED visit or hospitalization among the Colorado Medicaid population. Moreover, because intranasal naloxone has become recognized as a medication that can be used as an at-home rescue for opioid overdose, we estimated the eligible population who may benefit from an intranasal naloxone prescription among the Colorado Medicaid beneficiaries. Information from this study could assist policy makers and physicians who treat patients for opioid pain management.

Methods

Data Source

A retrospective nested case-control study was undertaken using the Colorado Medicaid claims database. This database contained patient demographic characteristics, provider information, and claims paid by Medicaid for prescriptions, outpatient and ED visits, inpatient hospitalization, and laboratory and radiology services from July 2008 through June 2014.

Case and Control Selection

Medicaid beneficiaries who had ≥1 medical claim for an ED visit or a hospitalization associated with an opioid overdose from July 2009 to June 2014 were defined as cases. The ED visit or hospitalization for opioid overdose was defined according to the International Classification of Diseases version 9 (ICD-9) including 965.00, 965.02, 965.09, E850.1, E850.2, E935.1, and E935.2. The case index date was defined as the last date of an ED visit or hospitalization for opioid overdose. Cases were required to have at least one year of enrollment before a case index date.

Controls were selected using a nearest neighbor matching without replacement. The matched controls were selected on the basis of age ± one year of matched case, sex, and opioid prescription (within 30 days of case index date). One case was matched with three controls. The control index date was the matched opioid prescription date. Controls were not hospitalized and did not have an ED visit for opioid overdose and had at least one year of enrollment before the control index date.

One year before the index date of cases and controls was used as the time period over which to measure risk factors of opioid overdose.

Potential Risk Factors

On the basis of a review of the literature, potential risk factors for opioid overdose included: higher daily morphine dose equivalents, chronic opioid use, methadone use, history of drug or alcohol abuse, history of other psychiatric illness, history of respiratory illness, history of organ failure, history of HIV infection or AIDS, history of benzodiazepine use, history of naltrexone use, history of buprenorphine or buprenorphine/naloxone

use, number of prescribers, and number of pharmacies.[6,12,20,22] Opioid use was defined as either >30-, >60-, or >90-day supplies of any opioid (yes/no for each cutoff value). Methadone use was classified into 3 categories as: 1) patients starting methadone as the first opioid, 2) patients switching from any other opioid to methadone, and 3) patients using methadone concurrently with another opioid. The concurrent use of methadone and another opioid was defined as at least 30 days of overlap between methadone and another opioid. The history of drug/alcohol abuse and other comorbidities were identified by ICD-9 codes. A list of ICD-9 codes is shown in Table 1. The history of medication use was identified by Medicaid Therapeutic Class code (Table 1).

Estimation of Eligible Population Who May Benefit From a Naloxone Prescription

The number of Medicaid beneficiaries who satisfied each significant risk factor between July 2013 and June 2014 were calculated. The eligible population who may benefit from intranasal naloxone was identified as beneficiaries who received any opioid with MED ≥50 mg and had at least one of the other significant risk factors.

Data Analysis

Descriptive statistics were used to describe demographic characteristics and medical history of cases and controls. Multivariate conditional logistic regression was used to compare risk factors between cases and controls conditioned on matched factors of age, sex, and adjusted for Charlson Comorbidity Index (CCI).[4] To explore risk factors for opioid overdose, we took two steps of analyses to determine the association between risk factors and opioid overdose. First, the multivariate conditional logistic regression was performed for each of the potential risk factors conditioned on age and sex, and adjusted for CCI (separate risk factor models). Then, another conditional logistic regression model was built by including all statistically significant risk factors from the first step together and conditioned on age and sex, and adjusted for CCI (combined significant risk factors model). The adjusted odd ratios with 95% confidence interval of each risk factor were estimated. All analyses were conducted using SAS version 9.1 (SAS Institute Inc, Cary, NC).

This study was approved by the Colorado Multiple Institute Review Board on the basis of Colorado Multiple Institute Review Board policies and regulations and in accordance with Office of Human Research Protections and Food and Drug Administration guidelines (protocol number 14-2066).

Results

The baseline characteristics are shown in Table 2. A total of 816 cases with 2,448 matched controls were included. Among those, 70.1% were female. Approximately one-third (36.6%) received an opioid MED of 21 to 50 mg/d, whereas the MED for many controls (41.1%) was also 21 to 50 mg/d. Most cases (88.4%) were diagnosed as chronic bodily pain, whereas chronic

Table 1. Codes to Identify Potential Risk Factors

Disease/Condition	Subdisease/Condition	ICD-9 Code
Cancer	-	140.xx to 239.xx, 338.3
Chronic bodily pains	-	710.xx to 739.xx, 338.2x, 338.4
Headache/migraine	-	339.xx, 346.xx, 349.xx
Neuropathy	-	330.xx to 337.xx, 350.xx to 359.xx
Acute pain	-	338.11, 338.12, 338.18, 338.19, 800.xx to 959.xx
Drug/alcohol abuse	-	303.xx, 304.xx
Other psychiatric illness	Depression	311.xx, 296.2x, 296.3x
	Bipolar disorder/mixed mania	296.0x, 296.1x, 296.4x to 296.9x
	Schizophrenia	295.xx
	Anxiety/panic/obsessive compulsive	300.xx
	Personality disorder	301.xx
	Other psychosis	297.xx to 299.xx
Respiratory illness	COPD	496.xx
	Emphysema	492.xx
	Asthma	493.xx
	Sleep apnea	327.2x, 780.51, 780.53
Organ failure	Renal dysfunction	584.xx, 585.xx, 586.xx, 588.xx
	Liver dysfunction	570.xx to 573.xx; 070.xx
	Heart failure	428.xx
HIV/AIDs	-	042.xx to 044.xx

Medication Class	Medicaid Therapeutic Class Codes
Benzodiazepine	H2F
Naltrexone	H3T
Buprenorphine or buprenorphine/naloxone	H3W

Abbreviation: COPD, chronic obstructive pulmonary disease.

Table 2. Baseline Characteristics of Cases and Controls

Baseline Characteristic	Cases (N = 816)		Controls (N = 2,448)	
	N	%	N	%
Age				
<18 Years	55	6.7	161	6.6
19–24 Years	69	8.5	198	8.1
25–34 Years	176	21.6	541	22.1
35–44 Years	148	18.1	446	18.2
45–54 Years	186	22.8	543	22.2
55–64 Years	161	19.7	503	20.5
≥65 Years	21	2.6	56	2.3
Sex				
Male	244	29.9	732	29.9
Female	572	70.1	1,716	70.1
Mean morphine dose equivalents				
No opioid use	115	14.1	746	30.6
1–20 mg	31	3.8	200	8.2
21–50 mg	299	36.6	1,007	41.1
51–100 mg	232	28.4	391	16.0
101–150 mg	58	7.1	55	2.2
151–175 mg	35	4.3	20	0.8
201–250 mg	18	2.2	11	0.4
251–300 mg	8	1.0	6	0.2
301–350 mg	8	1.0	4	0.2
>350 mg	12	1.5	8	0.3
Methadone use				
Patients starting methadone as the first opioid	12	1.5	11	0.4
Any switch from another opioid to methadone	41	5.0	11	0.4
Concurrent use of opioid with methadone	26	3.2	16	0.7
Chronic opioid use				
>30 Days supplied	548	67.2	961	39.3
>60 Days supplied	505	61.9	820	33.5
>90 Days supplied	472	57.8	720	29.4
Pain diagnosis				
Cancer	139	17.2	336	14.4
Chronic bodily pains	714	88.4	1,549	66.4
Headache/migraine	161	19.9	191	8.2
Neuropathy	204	25.2	264	11.3
Acute pain	507	62.7	938	40.2
No conditions/missing	60	7.4	532	21.7
2 Conditions	298	36.5	759	31.0
3 Conditions	217	26.6	257	10.5
≥4 Conditions	78	9.6	66	2.7
Comorbidities and history of other medication use				
Emergency visit or hospitalization with opioid overdose	205	25.1	0	0.0
Drug/alcohol abuse	271	33.2	163	6.7
Other psychiatric illness	492	60.3	629	25.7
Respiratory illness	242	29.7	402	16.4
Organ failure	267	32.7	318	13.0
HIV/AIDs	6	0.7	2	0.1
Benzodiazepine use	426	52.2	534	21.8
Naltrexone use	3	0.4	6	0.2
Buprenorphine and naloxone or buprenorphine use	10	1.2	7	0.3

bodily pain was indicated within 66.4% of controls. All cases had more comorbidities than controls.

Separate risk factor models, which were conditioned on age, sex, and adjusted for CCI, indicated that several factors were significantly associated with opioid overdose. The factors included: MED (>50 mg/d vs. ≤50 mg/d), methadone use, history of drug/alcohol abuse, history of other psychiatric illness, history of organ failure, history of benzodiazepine use, history of chronic opioid use, number of prescribers, and number of pharmacies used (Table 3).

All significant risk factors were included in a combined significant risk factor model. The model indicated only six factors that were significantly associated with opioid overdose. They included MED, methadone use (switching opioid to methadone vs. no methadone use), history of

Table 3. Adjusted Odds Ratio for Each Potential Risk Factor for Separate Risk Factor Models and Combined Significant Risk Factors Model

	Adjusted Odds Ratio (95% Confidence Interval)	
Risk Factor	Separate Risk Factor Models	Combined Significant Risk Factors Model
Mean morphine dose equivalents		
>50 mg/d versus ≤50 mg/d	2.616 (2.074–3.301)	1.986 (1.509–2.614)
Methadone use		
Methadone nonuse	Reference	Reference
Starting methadone as the first opioid	4.922 (1.684–14.389)	3.062 (0.813–11.542)
Switching opioid to methadone	12.239 (4.585–32.670)	7.230 (2.346–22.286)
Concurrent use of opioid	4.088 (1.866–8.863)	0.679 (0.247–1.867)
History of drug/alcohol abuse	4.714 (3.454–6.434)	3.104 (2.195–4.388)
History of other psychiatric illness	2.228 (1.751–2.834)	1.730 (1.307–2.291)
History of respiratory illness	0.795 (0.607–1.039)	N/A
History of organ failure	1.566 (1.177–2.084)	1.352 (0.962–1.901)
History of HIV/AIDs	5.264 (0.846–32.762)	N/A
History of benzodiazepine use	2.991 (2.358–3.795)	2.005 (1.516–2.652)
History of naltrexone use	0.986 (0.178–5.449)	N/A
History of buprenorphine and naloxone or buprenorphine use	3.080 (0.978–9.699)	N/A
History of chronic opioid use		
≥30 days supplied versus <30 days supplied	2.607 (1.962–3.464)	1.020 (0.588–1.768)
≥60 days supplied versus <60 days supplied	2.698 (2.079–3.511)	1.100 (0.531–2.279)
≥90 days supplied versus <90 days supplied	2.755 (2.137–3.550)	1.346 (0.757–2.392)
Number of prescribers		
2 versus 1	1.164 (0.830–1.633)	0.901 (0.609–1.333)
3 versus 1	1.619 (1.131–2.317)	1.043 (0.674–1.614)
≥4 versus 1	2.436 (1.820–3.260)	1.331 (0.905–1.956)
Number of pharmacies		
2 versus 1	1.624 (1.217–2.165)	1.184 (0.844–1.661)
3 versus 1	2.462 (1.758–3.447)	1.468 (0.970–2.220)
≥4 versus 1	3.495 (2.567–4.758)	1.514 (1.003–2.286)

Abbreviation: N/A, not applicable.
NOTE. The separate risk factor models were multivariate conditional logistic regression for each of the potential risk factors conditioned on age and sex and adjusted for the CCI. The combined significant risk factors model was another conditional logistic regression model that included all statistically significant risk factors from the separate models together and conditioned on age and sex, and adjusted for the CCI.

drug/alcohol abuse, history of other psychiatric illness, history of benzodiazepine use, and the number of pharmacies used (≥4 pharmacies vs. 1 pharmacy). The adjusted odds ratios for significant risk factors are shown in Table 3.

During the eligible population estimation period (July 2013 to June 2014), the number of Colorado Medicaid beneficiaries receiving any opioid with a MED ≥50 mg and at least one of the other significant risk factors was 7,820 beneficiaries (Table 4). The most common statistically significant risk factors within the Colorado Medicaid beneficiary population were: history of other psychiatric illness, history of benzodiazepine use, and MED >50 mg/d.

Table 4. The Number of Eligible Population Who May Benefit From Naloxone Prescription

Risk Factor	Number of Beneficiaries During Eligible Population Estimation Period
Switching opioid to methadone	555
History of drug/alcohol abuse	16,461
History of other psychiatric illness	83,283
History of organ failure	35,732
History of HIV/AIDs	1,404
History of benzodiazepine use	36,800
Mean morphine dose equivalents >50 mg/d	28,916
Mean morphine dose equivalents >50 mg/d plus any one or more risk factor of those above	7,820

Conclusions

This study produced robust mathematical models to identify risk factors associated with opioid overdose. Our findings indicated that several factors including MED >50 mg/d, methadone use, history of drug/alcohol abuse, other psychiatric illness, benzodiazepine use, and the number of pharmacies were associated with a twofold or greater risk of opioid overdose among Colorado Medicaid beneficiaries.

The strongest factor associated with opioid overdose was a history of switching opioid prescription to methadone compared with no history of methadone use. The risk of overdose in such patients was seven times greater than that in patients with no history of methadone use. This finding was supported by previous qualitative research, which suggested that patients who rotated

from another opioid to methadone were at greater risk of opioid overdose.[12] Of note, a history of switching an opioid prescription to methadone was a relatively rare event in the study population (1.6%) across cases and controls combined. One study showed that high poverty populations compared with affluent populations are associated with higher methadone abuse and overdose[19]; Medicaid beneficiaries seeking to switch from another opioid to methadone should be cautiously considered by prescribers.

Another strong factor associated with opioid overdose was history of alcohol/drug abuse, which showed approximately a threefold greater risk of opioid overdose. This finding was also similar to previous studies that indicated that a history of substance abuse was a strong risk factor of opioid overdose[22] or opioid overdose-related death.[2] Zedler and colleagues[22] revealed that substance abuse increased risk of opioid-related toxicity or overdose approximately 1.4 times compared with nonsubstance abuse, whereas a study by Bohnert and colleagues[2] indicated approximately 39.5% of patients who died with opioid-related causes had a diagnosis of substance use disorders, whereas only 9.8% of patients who died from other causes had a diagnosis of substance use disorders ($P < .001$).

Previous studies[2,6,22] reported that MED >50 mg/d was associated with opioid overdose or opioid overdose-related death. Patients receiving MED >50 mg/d had a 2.2- to 8.9-fold increase in overdose risk. Our findings confirmed the fact that risk of opioid overdose is the dose–response relationship. Among Colorado Medicaid beneficiaries, patients receiving a MED >50 mg/d had approximately a twofold increase in opioid overdose risk.

On the basis of our findings, Colorado Medicaid is currently working with physicians, hospitals, and other health system stakeholders to develop policies necessary to provide access to intranasal naloxone, joining 21 other states that have passed legislation or provided training to increase access to intranasal naloxone use in the event of an overdose.[17] Coverage consists of two vials of naloxone 1 mg/mL with two intranasal mucosal atomizing devices, which are recommended by previous practice guidelines.[1,12] On the basis of our findings, the projected number who could be eligible (receiving any opioids with a MED >50 mg/d plus one or more risk factor) for the intranasal naloxone was approximately 7,820 beneficiaries. On the basis of the average wholesale price of existing naloxone ($10.17 per vial)[18] and market price of a mucosal atomization device (MAD300; Teleflex, Morrisville, NC), which was approximately $5.00 per piece,[13] the potential cost of intranasal naloxone would be $237,258 per year. In addition, we estimated the potential cost of intranasal naloxone for beneficiaries who received any opioid with a MED >50 mg/d plus no additional risk factors for policy considerations. We found that the potential cost of intranasal naloxone in such beneficiaries was $877,311. It should be noted that the estimated costs included only naloxone acquisition cost and cost of the mucosal atomization device. Other costs such as clinician time, shipping, or storage costs were not included in our estimation.

In addition to the implication of these findings for Colorado Medicaid, the findings are also important to the Colorado medical community. Physicians or health care providers should be aware of and apply the findings to manage patients who received any level of opioids. Patients who received opioids >50 mg of morphine or MED per day with one of the other risk factors should be closely monitored for opioid overdose. Further, physicians could evaluate whether or not patients receiving >50 mg of morphine or MED per day could manage their pain through alternative interventions. Many interventions are currently ongoing in Colorado to address this issue of opiate abuse where our data could be helpful. In 2013, The Colorado Consortium for Prescription Drug Abuse Prevention was developed to establish a coordinated, statewide response to reduce the abuse and misuse of prescription drugs with a goal to prevent 92,000 Coloradans from misusing opioids by 2016. The Consortium serves as a backbone, providing infrastructure that links many agencies, organizations, health professions, associations, task forces, and programs that are currently addressing prescription drug abuse. The Consortium has taken numerous steps to educate physicians on proper opioid prescribing, which includes promotion of several other initiatives occurring in the state.

In 2015, Colorado's Medicaid Accountable Care Collaborative launched a care model, the Chronic Pain Disease Management Program that uses telehealth technology to assist primary care medical providers who treat chronic pain and reduce opiate misuse among Medicaid members. The Colorado Program was modeled after the Project Extension for Community Healthcare Outcomes program, which was conceived by the University of New Mexico. The Program brings the expertise of pain management specialists into primary care settings through video conferences that are designed to assist primary care medical providers in the management of their Medicaid members with chronic pain. In addition, the Consortium promotes the University of Colorado's School of Public Health's pain management continuing education courses. These courses are designed to provide guidelines and tools to improve chronic pain management and are designed for a variety of health care professions. Physicians who enroll in the online offering receive discounts on malpractice insurance. Other educational endeavors have included partnering with the Center for Personalized Education for Physicians and their programs related to addressing physician performance issues, including any related to management of opioid issues.[5]

A policy of prescribing intranasal naloxone to high-risk patients not only has potential clinical benefits but could have potential financial benefits to Colorado Medicaid because it may avert costly opioid-related ED events or hospitalizations. A recent study[9] showed that the mean cost of an opioid-poisoning event was $4,255 including events that required emergency room visits or hospitalization. Only 56 opioid poisoning events would need to be averted for the naloxone program to be cost-neutral (assuming that 7,820 high-risk beneficiaries received naloxone). This rate of events averted (56 of 7,820 beneficiaries) may be achievable and therefore would further

support prescribing intranasal naloxone to high-risk patients.

Several limitations of this study should be addressed. First, the identification of diagnosis and disease conditions were determined according to ICD-9 codes. These data were only reflective of the diagnoses that were documented by the provider. Second, misclassification in our study cohort could exist because patients may have also overdosed with concomitant benzodiazepines which may have not been reported within our claims data. It is important to highlight that polysubstance abuse, particularly with benzodiazepines, has been found to be a strong predictor of opiate overdose.[11,14] In an evaluation of drug overdose deaths in the ED from the National Vital Statistics System, Jones et al[10] found that concomitant benzodiazepine use in opioid analgesic overdose deaths significantly increased from 18% of opioid analgesic overdose deaths in 2004 to 31% in 2011 ($P < .0001$). Third, our analyses used data from a claims database; the actual demographic characteristics, medication histories, and medication utilization of Medicaid beneficiaries may differ from the population analyzed because of eligibility criteria and incomplete data within the database. Fourth, there were some unobserved risk factors such as ethnicity, geographic region of Colorado, and socioeconomic data, which might affect the findings. Fifth, because this study was conducted within the Colorado Medicaid population, generalizability of the findings outside of this population should be carefully considered. Last, this study was also done using primarily pre-expansion data, so these data may not be reflective of the risks of the full expansion population.

In conclusion, our findings indicated that several factors were associated with opioid overdose among the Colorado Medicaid population. They included MED >50 mg/d, methadone use, history of drug/alcohol abuse, other psychiatric illness, benzodiazepine use, and the number of pharmacies used. States and communities should ensure the availability of at-home intranasal naloxone for overdose rescue on the basis of the presence of risk factors.

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