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Opioid Use Disorder and Prescribed Opioid Regimens: Evidence from Commercial and Medicaid Claims, 2005–2015

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Received: 5 December 2018 / Revised: 13 May 2019 / Accepted: 15 May 2019 / Published online: 31 May 2019

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Abstract

Introduction In response to the US opioid crisis, interventions are being implemented to lower opioid prescribing to reduce opioid misuse and overdose. As opioid prescribing falls, opioid misuse may shift from prescriptions to other, possibly illicit, sources. We examined how the percentage of patients with an opioid use disorder (OUD) diagnosis in a given year without a current opioid prescription changed over a decade among commercially insured enrollees and Medicaid beneficiaries. We also examined how the percentages differed by enrollee demographic factors.

Methods We used commercial and Medicaid claims from the IBM MarketScan® databases from 2005 to 2015 to identify enrollees with and without current opioid prescriptions who have been diagnosed with OUD. We measured the percentage of enrollees with OUD without a current opioid prescription by year and demographic factors.

Results We identified 99,396 enrollee-years with OUD covered by commercial insurance and 60,492 enrollee-years with OUD covered by Medicaid. Among enrollees with OUD, the percentage without a current opioid prescription increased from 37% in 2005 to 49% in 2012 before falling back to 39% in 2015 in the commercial population, and increased from 32% in 2005 to 38% in 2015 in the Medicaid population. Differences in percentages were observed by age, sex, race, and region, particularly among young people where 70 to 89% had OUD without a current prescription.

Conclusions Most enrollees with OUD in the data had current opioid prescriptions, suggesting that continuing efforts to reduce misuse of prescribed opioids among patients with prescriptions may be effective. However, a substantial percentage of enrollees with OUD may be obtaining opioids via other, likely illegitimate, channels, particularly younger people, which suggests an opportunity for targeted efforts to reduce opioid diversion.

Keywords Opioid · Opioid use disorder · Medicaid · Private insurance

Supervising Editor: Richard Wang, DO

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Introduction

Abuse and misuse of prescription opioid analgesics is one of the most important public health concerns facing the USA [1–5]. Despite falling rates of opioid prescribing and diversion [5, 6], death rates involving all opioids, and prescription opioids in particular, are three times higher than they were in 1999 [7, 8].

Previous studies found that people who use opioids for nonmedical reasons commonly receive them from sources other than physician prescriptions [9–11]. The 2015 National Survey on Drug Use and Health (NSDUH) estimated that 59% of opioid misusers obtained prescriptions either from friends or from relatives, 36% received them from doctors' prescriptions, and 5% received them from drug dealers or strangers [11]. Among commercially insured individuals with newly diagnosed opioid use

disorders (OUD), approximately 20% were not prescribed opioids before their diagnosis while half had a family member with an opioid prescription [12]. These studies suggest that opioids obtained without prescriptions are a significant source of misuse. In the midst of the current opioid crisis, federal, state, and local guidelines and other policies have been implemented to reduce opioid prescribing. As a result, providers have become more judicious in prescribing opioids [6]. This push towards more judicious prescribing may increase the share of enrollees with OUD who are dependent upon opioids that were not prescribed for them. Therefore, understanding misuse of nonprescribed opioids is important to guide legislation, education, and interventions to combat the opioid crisis [13, 14].

In this study, we estimate the percentage of commercially insured and Medicaid enrollees with an OUD diagnosis without current filled opioid prescriptions, which would suggest that they obtained opioids from another source. We examined these percentages stratified by age, sex, race, region, and relationship to the policy holder to assess this outcome in specific patient groups with the goal of helping policymakers target interventions—for example, with education on the proper disposal of opioids and the dangers of prescribing opioids to patients with, or at risk of developing, OUD.

Methods

We conducted a retrospective descriptive observational study using IBM MarketScan® data from January 2005 through September 2015 to identify enrollees with claims-based evidence of an OUD and to determine whether these enrollees had current filled opioid prescriptions when their OUD diagnoses were recorded. The MarketScan Commercial Claims and Encounters Database contains health insurance claims and enrollment records from employees of many large employers and contributing health plans. The MarketScan Medicaid Multi-State Database contains health insurance claims and enrollment records from Medicaid enrollees in participating states. We used the IBM Redbook™ to identify opioid preparations from National Drug Codes. The MarketScan databases are consistent with the definition of limited data sets under the Health Insurance Portability and Accountability Act Privacy Rule and contain no unencrypted patient identifiers. Because this was a retrospective study using encrypted de-identified data, institutional review board (IRB) approval was deemed exempt by IBM Watson Health. We conducted descriptive analyses using SAS version 9.4 (SAS Institute, Cary NC)

and R version 3.4.1 with the tidyverse version 1.1.1 collection of packages.

The primary outcome was the percentage of enrollees with an OUD who lacked a current filled opioid prescription at the time their OUD was identified. We tracked the proportion of all enrollees with an OUD each year. The diagnoses we used to identify OUDs included opioid abuse, dependence, poisoning, and adverse effects (Table 2). We attempted to limit the sample to patients whose OUD-related claim was based on opioid analgesics. We used MarketScan outpatient and inpatient claims, including those stemming from emergency department (ED) encounters, to identify OUD diagnosis codes in any diagnosis field of the claim.

Upon identifying the enrollee's earliest claim with an OUD diagnosis code during the year, we scanned backwards from the date of the OUD claim for the patient's most recent prior opioid prescription fill claim. If the enrollee's earliest OUD claim during the year fell between the date their most recent prior opioid prescription was filled and within 30 days of that prescription's days' supply running out, we designated the enrollee's OUD that year as stemming from a current opioid prescription. Otherwise, if the enrollee's most recent opioid prescription fill occurred later than could reasonably be attributed to a prior opioid prescription, or if the enrollee had no prior opioid prescription fill, we designated the enrollee's OUD that year as stemming from opioids obtained without a current prescription. If the days' supply of an enrollee's most recent opioid prescription fill prior to their earliest OUD diagnosis during the year was recorded as fewer than 1 or greater than 365, we excluded the enrollee from the analysis for that year: days' supply values outside the range of 1 to 365 are most likely erroneous, and in such cases we would not be able to determine whether an enrollee's opioid prescription was current when their OUD claim occurred.

We limited the sample to enrollees aged 12 to 64 years old with prescription drug coverage and excluded enrollees dually enrolled in Medicare and Medicaid because we did not have Medicare pharmacy claims. We excluded individuals not enrolled for at least 90 days before their first OUD diagnosis of the year to ensure that we had a sufficient look-back period to scan for current opioid prescriptions. Among enrollees whose first OUD diagnosis during the year was recorded within 90 days of the start of the year, we excluded those that had an OUD diagnosis from the previous year within 90 days of their first OUD diagnosis during the current year. For example, if an enrollee had an OUD diagnosis recorded on December 01, 2009, and then another OUD diagnosis recorded on January 20, 2010, the enrollee would be included in the 2009 analysis—and we would scan backwards from December 01, 2009 for a filled opioid prescription—but the enrollee would not be included in the 2010 analysis.

We used the MarketScan drug files in conjunction with Redbook to identify filled prescriptions for the following types of opioids, which are classified by the US Drug Enforcement Administration as controlled substances: butorphanol, codeine, dihydrocodeine, fentanyl, hydrocodone, hydromorphone, levorphanol, meperidine, methadone, morphine, oxycodone, oxymorphone, pentazocine, propoxyphene, tapentadol, and tramadol. Prescription fills included for methadone were only for pain management, not treatment of substance use disorders.

For all analyses except those stratified by region (based on states), we restricted the sample to include only enrollees of employers, health plans, and Medicaid agencies that contributed data during every year of the study period. This restriction produces a more consistent sample of enrollees from one year to the next. Among the commercially insured, we further restricted our sample to only include residents of the states whose Medicaid agencies contributed data to the Medicaid database during every year of the study. This restriction facilitates comparison of the commercial and Medicaid enrollees in our sample. Together, these restrictions limited the sample to 77 contributing employers and health plans representing an average of 7.1 million enrollees per year and 4 contributing state Medicaid agencies representing an average of 1.1 million enrollees per year.

We calculated the percentage of enrollees with OUD overall and the percentage of enrollees with OUD without current filled opioid prescriptions by year and insurance status of the enrollee (commercial or Medicaid), and within insurance status by age, sex, region (commercial only), relationship to the employee (commercial only), and race (Medicaid only). Information about the enrollee's relationship to employee is only available in the commercial data, and race is only available in the Medicaid data. Regional analysis for Medicaid is excluded to protect the confidentiality of contributing states. Demographic information was taken from the enrollee's earliest claim with an OUD diagnosis during the year. The observation unit for our analysis is an "enrollee-year," i.e., an enrollee observed in a given year. Thus, the same enrollee may be counted in multiple years and have distinct instances of misuse in multiple years.

Results

Overall

The commercial study sample consisted of 81.1 million enrollee-years including 99,396 with a claims-based OUD diagnosis. The Medicaid sample contained 9.7 million enrollee-years including 60,492 with a claims-based OUD diagnosis. The attrition table for 2005, 2010, and 2015 is provided in the Appendix (Table 3) for reference. Table 1 describes the demographics of the sample. The percentage of the enrolled

population with OUD appeared to increase from 0.05 to 0.25% for commercial and from 0.23 to 0.98% for Medicaid between 2005 and 2015 (Figure 7). The percentages of the enrolled population with OUD by age, insurance status, and race are provided in Figs. 8 and 9. The percentage of individuals with OUD that lacked active filled opioid prescriptions increased for both the commercial and Medicaid populations over the study period (Fig. 1). The percentage of enrollees with commercial insurance that lacked a current filled opioid prescription among those identified as having an OUD increased from 37% in 2005 to 49% in 2012, before falling back to 39% in 2015. The percentage of individuals covered by Medicaid with OUD that did not have an active filled opioid prescription increased from 32% in 2005 to 38% by 2015. The percentage of enrollees with OUD that lacked a current filled opioid prescription by sex and relationship to employee is provided in Fig. 10.

By Age

Figure 2 shows the percentage of enrollees with an OUD and no active filled opioid prescription by insurance source and age. Among 12 to 17 year old patients who were diagnosed with OUD, the percentages of patients not having an active filled opioid prescription were very high. For commercially insured 12 to 17 year olds with OUD, the percentage of enrollees without a prescription peaked in 2010 at 89% and then fell to 80% in 2015. In the Medicaid population, 12 to 17 year olds maintained the highest percentage of patients with OUD without a prescription every year, hovering between 75 and 80%. In the commercial population, the percentage of patients with OUD without a prescription increased substantially for 18–24-year-olds from 68% in 2005 to 83% in 2015. In the Medicaid population, the percentage of patients with OUD without a prescription among 18–24-year-olds followed a pattern similar to that observed in the commercial population, increasing substantially from 46% in 2005 to 66% in 2015; however, the baseline percentage of patients with OUD without a prescription among 18 to 24 year olds was considerably lower in the Medicaid population than in the commercial population. The percentage of patients with OUD without a prescription among 25 to 34 year olds in the commercial population also dramatically increased over the study period, from 37% in 2005 to 53% in 2015, as did the percentage of patients with OUD without a prescription among 25 to 34 year olds in the Medicaid population, which increased from 36% in 2005 to 55% in 2015. Commercial and Medicaid enrollees with OUD between the ages of 35 and 64 years old had a higher percentage of members with an active opioid prescription, with only one-fifth to one-quarter of this group lacking an active opioid prescription.

Table 1 Description statistics of commercial and Medicaid enrollees with an OUD diagnosis.

	Commercial			Medicaid		
	2005	2010	2015	2005	2010	2015
Total unique lives	5241	16,331	41,720	2827	6317	15,618
Percentages						
Age (years)						
Age 12–17	3.7	2.9	1.5	9.4	6.9	4.5
Age 18–24	15.0	16.3	18.7	11.6	11.0	7.1
Age 25–34	10.2	17.8	14.7	21.6	28.5	27.2
Age 35–44	20.2	22.3	20.3	24.4	20.3	22.8
Age 45–54	34.0	26.2	23.4	23.7	22.0	20.5
Age 55–64	16.9	14.5	21.5	9.3	11.4	17.9
Sex						
Male	56.9	56.2	54.2	35.1	33.4	32.5
Female	43.1	43.8	45.8	64.9	66.6	67.5
Race						
White				71.1	73.3	61.9
Black				24.5	20.1	21.7
American Indian/Alaska Native				0.1	0.2	0.2
Hispanic				0.3	0.5	0.6
Asian/Pacific Islander				0.3	0.1	0.3
Other/unknown					0.1	0.1
Missing	NA	NA	NA	3.7	5.8	15.2
Region						
North Central	35.6	21.5	20.4			
Northeast	16.4	17.9	14.9			
South	38.5	44.5	48.6			
West	8.7	16.0	15.9			
Unknown	0.8	0.1	0.1			
Missing				NA	NA	NA
Relationship to employee						
Employee	48.1	46.4	44.7			
Spouse	33.1	34.9	31.9			
Child/other	18.8	18.7	23.4			
Missing				NA	NA	NA

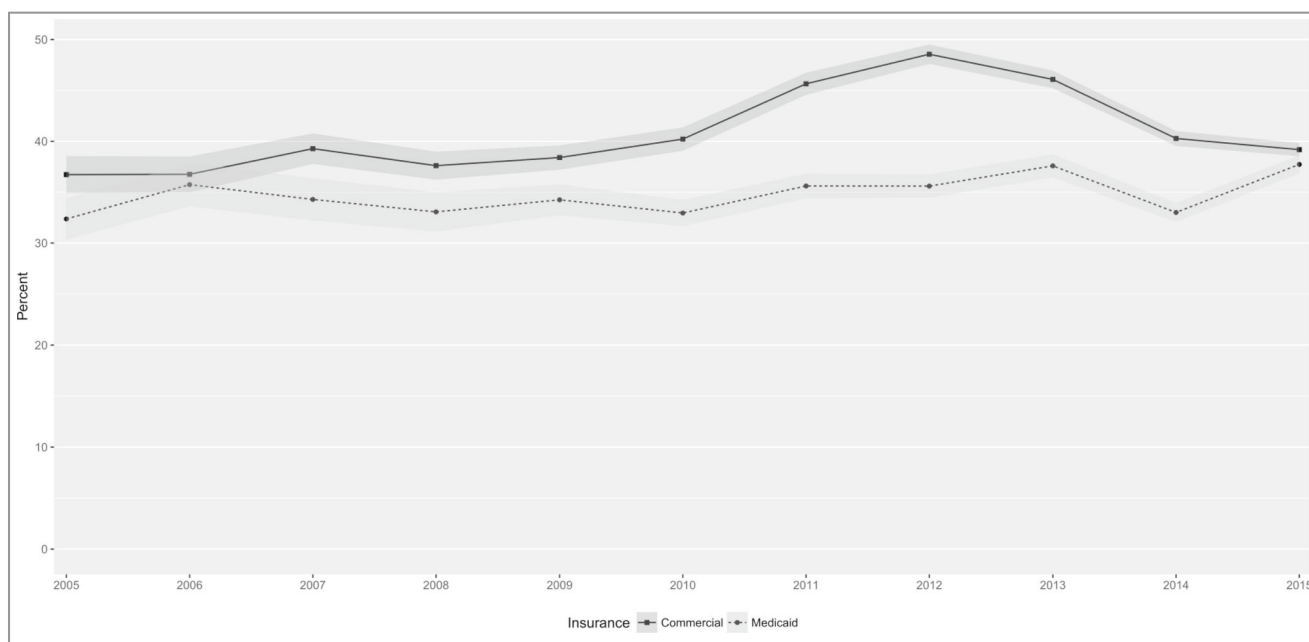
NA not available in data set

By Sex

Among commercially insured patients with OUD, the percentage of enrollees lacking current filled opioid prescriptions at the time their OUD was diagnosed was similar for males and females, but it was consistently higher for males by approximately 15 percentage points (Fig. 3). Among Medicaid enrollees, the percentage of enrollees with OUD lacking current filled opioid prescriptions was similar for males and females, but with percentages slightly higher for females from 2010 onward. The latter observation in Medicaid patients appeared to be driven by a difference in the age composition of enrollees by sex: males skewed older than females, and older enrollees had a lower percentage of OUD lacking a current prescription than younger enrollees (data not shown).

By Race

When analyzing the percentage of patients with OUD without a filled opioid prescription by race, small sample sizes yielded volatile estimates for races other than white and black, and so we only present results by race for white enrollees and black enrollees. Among white Medicaid enrollees, those without current filled opioid prescriptions appeared to represent a steadily increasing share of enrollees with diagnosed OUD, climbing from 29% in 2005 to 43% in 2015; among black Medicaid enrollees, the percentage was reversed, with percentages falling from 47% in 2005 to 35% in 2015 (Fig. 4). OUD diagnosis increased as a percentage for both white and black enrollees over the study period, but at an apparently faster pace for white enrollees (Fig. 9).



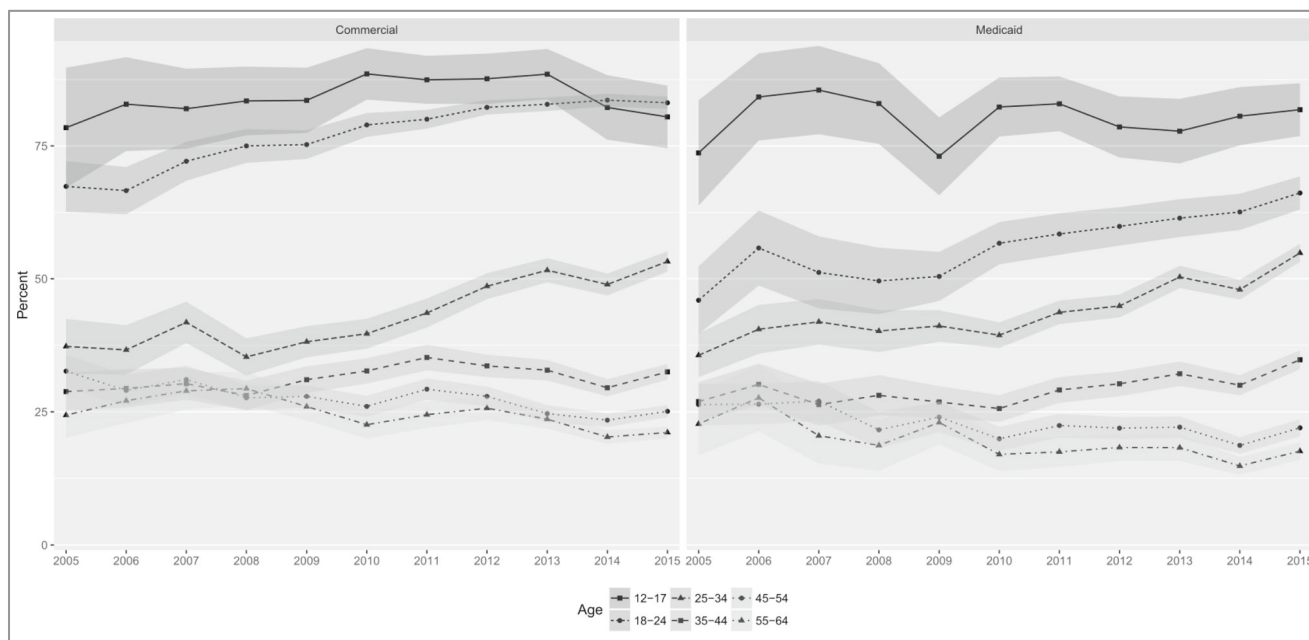
Shaded regions around lines represent 95% pointwise confidence bands.

Fig. 1 Percent of enrollees with an opioid use disorder lacking a current opioid prescription, by insurance status. Shaded regions around lines represent 95% pointwise confidence bands.

By Region

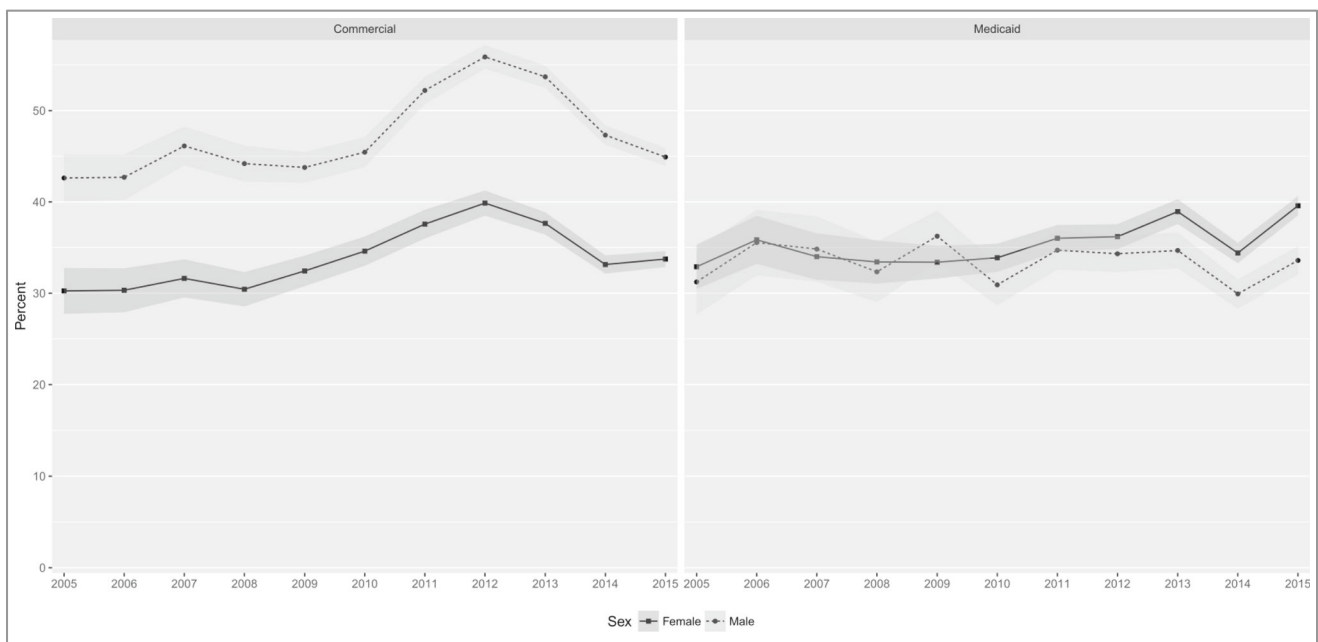
Percentages by region are shown for the commercial insured population in Fig. 5. The Northeast had the highest percentage

of patients with OUD without an active filled opioid prescription over the entire study period. The South and the West had lower percentages of patients with OUD and without an active filled opioid prescription than other regions.



Shaded regions around lines represent 95% pointwise confidence bands.

Fig. 2 Percent of enrollees with an opioid use disorder lacking a current opioid prescription, by insurance status and age. Shaded regions around lines represent 95% pointwise confidence bands.



Shaded regions around lines represent 95% pointwise confidence bands.

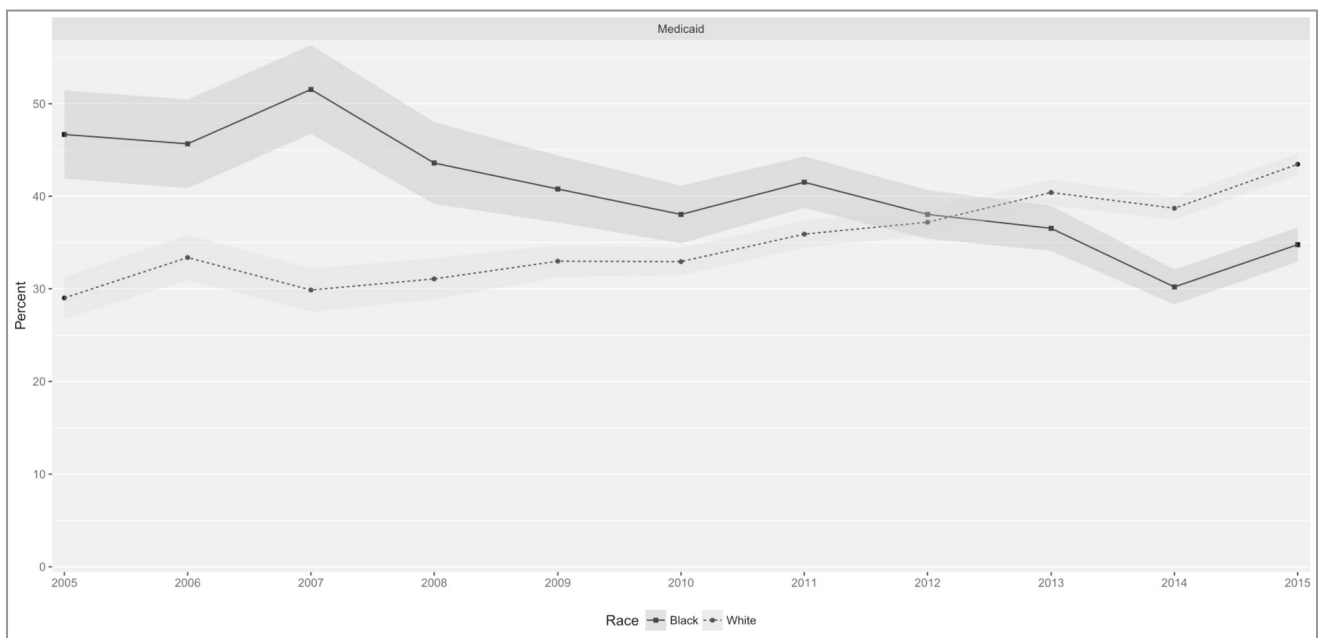
Fig. 3 Percent of enrollees with an opioid use disorder lacking a current opioid prescription, by insurance status and sex. Shaded regions around lines represent 95% pointwise confidence bands.

By Relationship to Employee

Children of commercially insured employees had a higher percentage of unfilled opioid prescriptions at the time of their OUD diagnosis than their parents (Fig. 6).

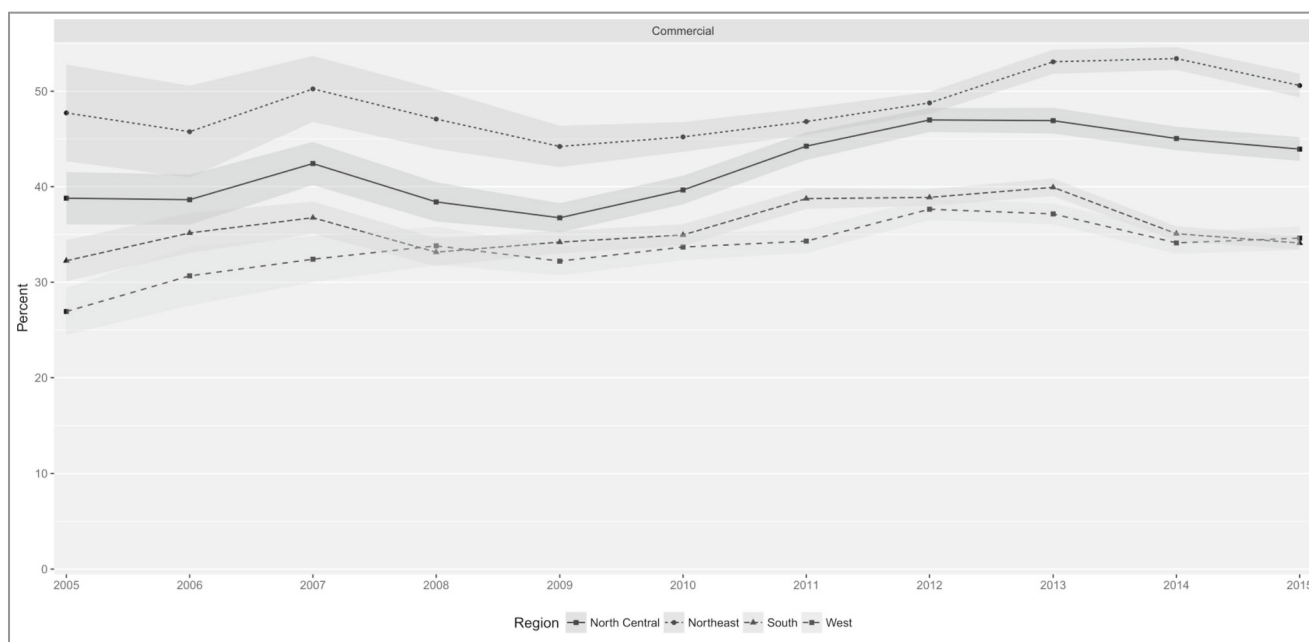
Discussion

This study documented an increase in OUD diagnosis without current filled opioid prescriptions accompanying apparent increases in overall OUD percentages between



Shaded regions around lines represent 95% pointwise confidence bands.

Fig. 4 Percent of Medicaid enrollees with an opioid use disorder lacking a current opioid prescription, by race. Shaded regions around lines represent 95% pointwise confidence bands.

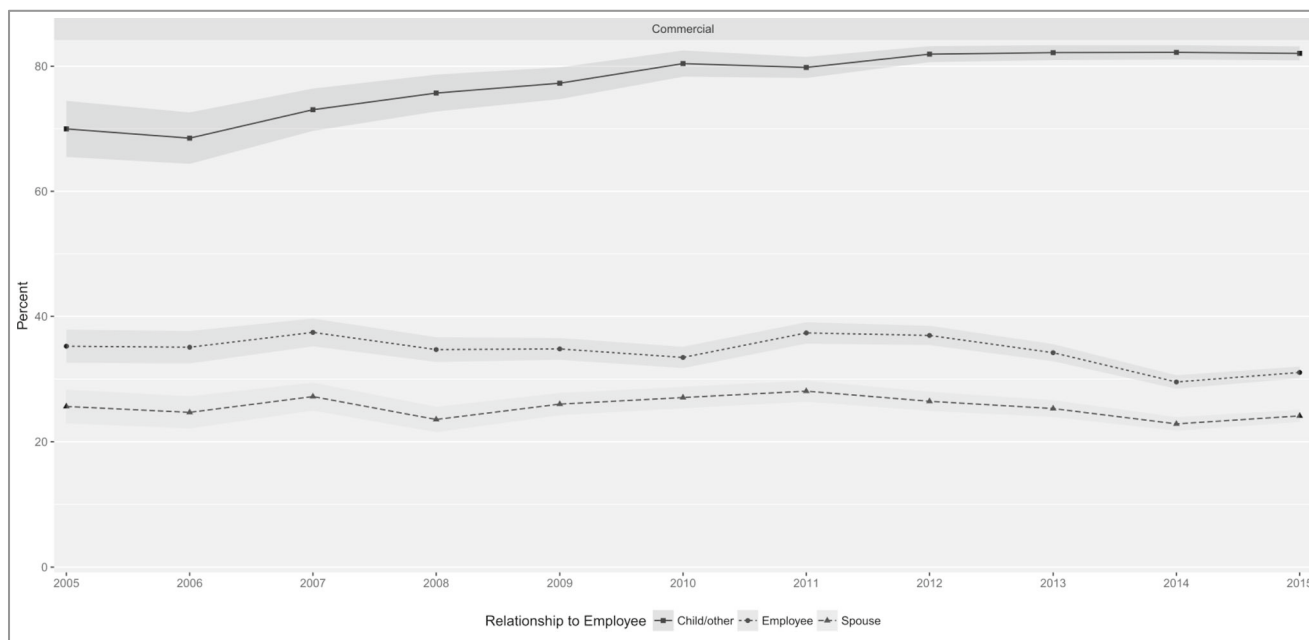


Shaded regions around lines represent 95% pointwise confidence bands.

Fig. 5 Percent of commercial enrollees with an opioid use disorder lacking a current opioid prescription, by region. Shaded regions around lines represent 95% pointwise confidence bands.

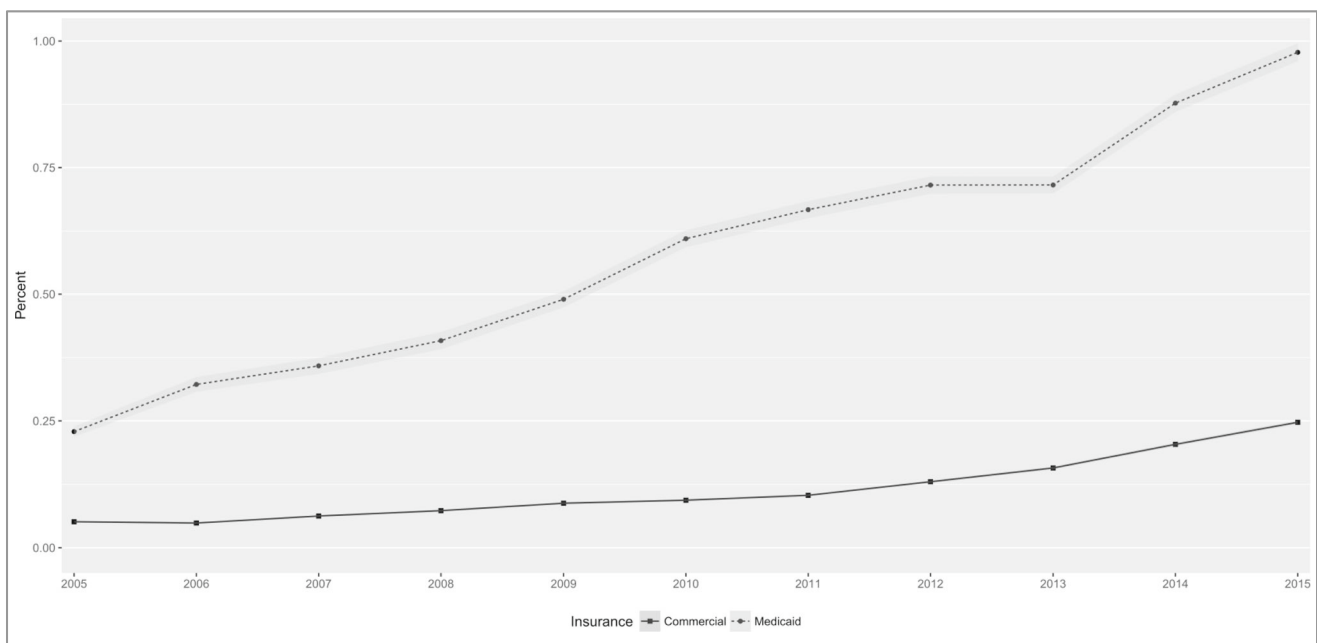
2005 and 2015, particularly for whites and 18 to 34 year olds. On average across all years and both insurance types in the study, 39% (95% confidence interval 37–40%) of patients (annual average) with an OUD did not have a current filled opioid prescription. Despite an apparent

greater increase in the percentage of OUD diagnosis among the Medicaid population, the commercial population had a higher percentage of patients with OUD and lacking a current prescription, although the gap narrowed in recent years.



Shaded regions around lines represent 95% pointwise confidence bands.

Fig. 6 Percent of commercial enrollees with an opioid use disorder lacking a current opioid prescription, by relation to employee. Shaded regions around lines represent 95% pointwise confidence bands.



Shaded regions around lines represent 95% pointwise confidence bands.

Fig. 7 Percent of Medicaid enrollees with a distinct instance of an OUD, by race. Shaded regions around lines represent 95% pointwise confidence bands.

Larger percentages of enrollees younger than 35 years old appeared to be obtaining opioids either by diversion from family or friends or from other illegitimate distribution sources compared with those aged 35 or older. Previous research found that young people more commonly use prescribed opioids for nonmedical use [9]. Our findings suggest that they might misuse someone else's opioid prescription or may obtain opioids through other illegitimate sources, such as drug dealers. Wu et al. (2008) reported that roughly 10% of adolescents aged 12–17 years old had engaged in recreational use of opioids at some point in their lives, with the average age of first use being 13 [2]. McCabe et al. (2012) found that 13% of adolescents self-reported recreational use of opioids and up to 80% of recreational abusers used opioids leftover from a previous prescription [15]. This indicates that focusing diversion reduction interventions on younger individuals [16] or on adults with children aged 12–17 years old could yield significant benefits. However, despite the lower percentages of OUD without an opioid prescription among older individuals, many more older individuals were diagnosed with OUDs. Therefore, interventions aimed at reducing the acquisition of diverted opioids among older enrollees may also yield significant benefits.

McCabe et al. (2013) found that adolescents who abused opioids obtained illicitly had a significantly higher likelihood of developing a substance use disorder later in life [17]. This finding is supported by other

research that found nonmedical use of opioid prescriptions is an important risk factor for onset and recurrence of psychopathology [16] and for developing depression, bipolar disorder, and/or an anxiety disorder [18]. This makes addressing the high percentages of adolescents presenting with OUDs without an opioid prescription even more vital. Providers can play a crucial role in reducing diversion, particularly for adolescents who are most likely to misuse other people's prescriptions. They can provide patient education regarding appropriate drug security and drug disposal for adults who receive opioid prescriptions and who have adolescent dependents. They can alert them to the dangers of diversion either by their dependents or by friends of their dependents. They can also follow the prescribing guidelines of the Centers for Disease Control and Prevention (CDC) to reduce the number of pills potentially available for diversion [19].

The percentage of OUD without an active prescription was higher among males than females in the commercial population. This finding is consistent with earlier research [20] and may suggest that males are more likely to take risks to obtain opioids, which would be consistent with literature from the psychology field showing that males have greater risk-taking tendencies generally [21]. These trends were less pronounced in the Medicaid population overall, although that may be due to differences in the age composition of males and females in Medicaid.

The racial differences in the Medicaid population were meaningful. As the percentage of enrollees with OUD that did not have active opioid prescriptions fell among black enrollees over nearly the entire study period, percentages among white enrollees were steadily increasing, possibly due to an increase in OUD without a current prescription among middle-aged whites. This is consistent with recent research documenting a rise in mortality among middle-aged, white individuals [22]. Black individuals are more likely to lack primary care providers, potentially making it more difficult for them to obtain opioid prescriptions [23, 24].

Our study revealed regional differences in the source of prescription opioids for the population with commercial insurance. For example, the Northeast had a higher percentage of enrollees with a diagnosis of OUD lacking a current filled prescription, and the South and West had lower percentages of such enrollees among the regions. It is possible that the higher percentage of apparent illicit use of opioids in the Northeast among those with an OUD may indicate that prescribers in the Northeast have become more judicious in their prescribing behavior and that patients who misuse prescription opioids may, therefore, seek illicit means to obtain them. This is consistent with previous research that found opioid prescribing to be lower in the Northeast than in other regions of the country [25, 26]. However, beyond the scope of the current analysis, it might be informative for future studies to investigate how Medicaid expansion might have contributed to opioid prescriptions in those states.

Our study has important limitations, including the fact that this is a cross-sectional, population-based descriptive analysis where only associations can be established and further validation might be necessary. First, our analysis is limited to patients with an OUD-related diagnosis on an insurance claim. Many people with OUD do not receive treatment and will and, therefore, not be captured by an analysis of insurance claims [27, 28]. Patients who paid for OUD-related medical services with cash or who received services through other sources (e.g., programs offered by an employer) will also not be captured by our analysis. Second, the OUD diagnoses may not represent prescription opioid use alone: although we attempted to limit OUD diagnoses to those related to prescription OUD, some diagnosis codes are not precise enough to distinguish heroin use from prescription opioid use. Third, there is the possibility that we misclassified some patients' OUDs as stemming from opioids obtained from a source other than the enrollee's prescription; this could happen if an enrollee received an opioid prescription but did not misuse it until over 30 days after the days' supply period

had elapsed. Finally, our study was limited to an analysis of enrollees in four states in order to make the enrollee composition as consistent as possible over time and between the two payer groups. However, in a sensitivity analysis (using the same approach in the results presented here), we broadened the sample to include all MarketScan contributors, which included contributors from all 50 states for commercial insurance and up to 14 states in a year for Medicaid. Our sensitivity analysis yielded similar trends as our primary analysis (data not shown).

Conclusion

We found that for many subgroups (particularly for adolescents), the percentage of individuals with OUD without a current opioid prescription was high, but that for young adults were increasing. Across all subgroups (with the exception of adolescents and young adults), however, the majority of individuals with OUD in every year had current opioid prescriptions. This suggests that opioids prescribed for pain continue to lead to the development of dependence and misuse. Policymakers at the federal, state, and local levels, as well as professional societies and medical practices, have an opportunity to implement and expand interventions to limit potentially inappropriate opioid prescribing.

A sizeable minority of enrollees diagnosed with OUD did not have current filled opioid prescriptions at the time their OUD appeared on an insurance claim, even as the percentage of enrollees with OUD increased among the commercial and Medicaid populations. Thus, efforts to curtail opioid diversion and the use of illicit opioids could significantly reduce OUD prevalence, especially as it pertains to adolescents and young adults. A multi-pronged approach can help address the opioid crisis that includes prescribing interventions for medical providers along with outreach, education, and improved health literacy for patients and family members to reduce misuse, diversion, and illicit drug use.

Acknowledgments The authors wish to acknowledge Cory Pack of Truven Health Analytics, an IBM Company, for programming support.

Compliance with Ethical Standards

Conflicts of Interest None. This paper has not been subject to the Congressional Budget Office's regular review and editing process. The content is solely the responsibility of the authors and does not necessarily represent the official views of the Congressional Budget Office, Office of the Assistant Secretary for Planning & Evaluation, or the US Department of Health & Human Services.

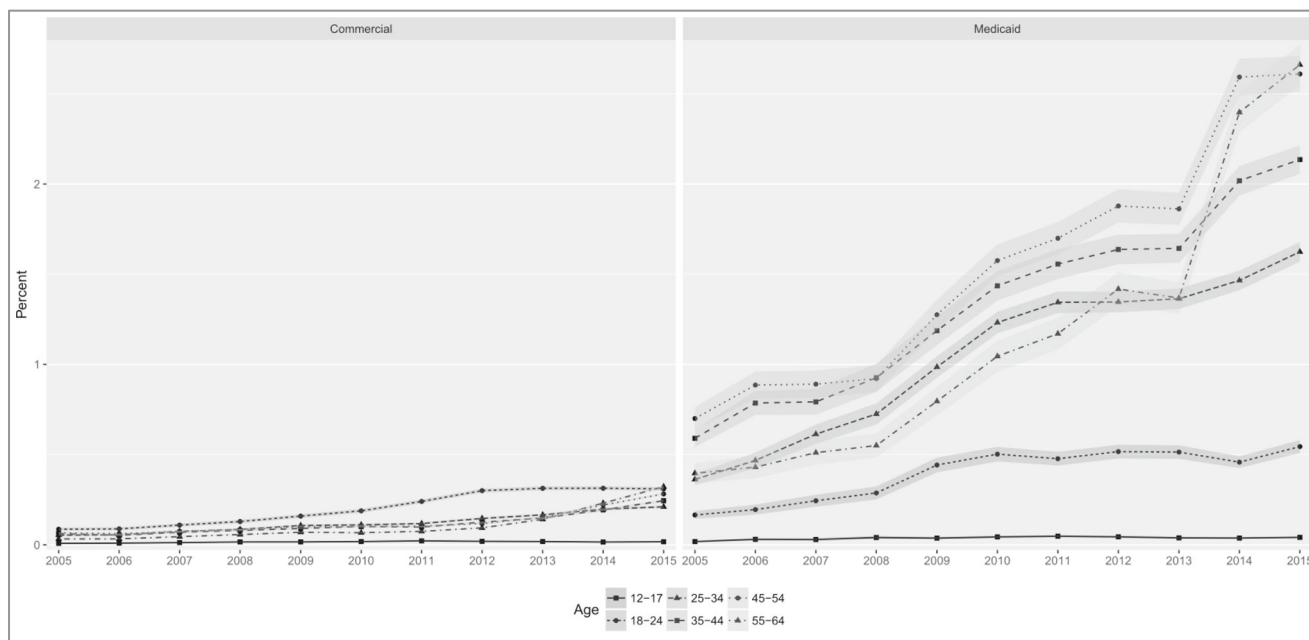
Appendix

Table 2 Diagnosis codes to identify opioid use disorders: International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM).

ICD-9-CM diagnosis code	Description
30400	OPIOID DEPENDENCE-UNSPEC
30401	OPIOID DEPENDENCE-CONTIN
30402	OPIOID DEPENDENCE-EPISOD
30403	OPIOID DEPENDENCE-REMISS
30470	OPIOIDOTHER DEP-UNSPEC
30471	OPIOIDOTHER DEP-CONTIN
30472	OPIOIDOTHER DEP-EPISOD
30473	OPIOIDOTHER DEP-REMISS
30550	OPIOID ABUSE-UNSPEC
30551	OPIOID ABUSE-CONTINUOUS
30552	OPIOID ABUSE-EPISODIC
30553	OPIOID ABUSE-IN REMISS
96502	POISONING BY METHADONE
E8501	ACC POISON-METHADONE
E8502	ACC POISON-OPIATES NEC
E9352	ADV EFF OPIATES
E9351	ADV EFF METHADONE

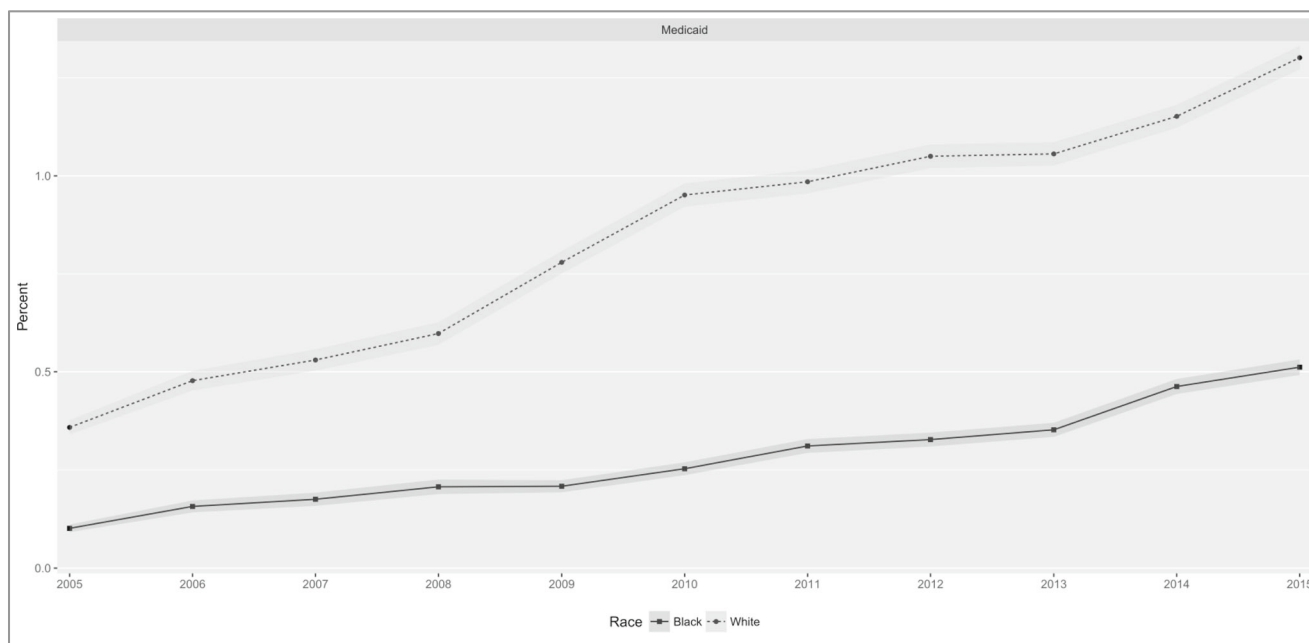
Table 3 Attrition showing final sample for 2005, 2010, and 2015.

	2005		2010		2015	
	Commercial	Medicaid	Commercial	Medicaid	Commercial	Medicaid
Drug coverage and age between 12 and 64	17,479,787	3,846,147	32,808,946	3,594,443	23,358,364	6,413,114
Continuously contributing clients in same states	9,166,542	2,165,128	32,808,946	3,594,443	13,753,709	2,339,972
Continuously enrolled for 1 year	4,795,008	756,918	6,935,822	681,596	8,143,609	1,016,907
Evidence of opioid misuse	5241	2827	16,331	6317	41,720	15,618
Not a dual	5241	2827	16,331	6317	41,720	15,618
No invalid most recent opioid RX	5241	2827	16,331	6317	41,720	15,618
Not missing age or sex	5241	2827	16,331	6317	41,720	15,618
Not missing plan type	5219	2827	15,641	6304	67,249	48,790
Not missing race		2722		5937		43,759



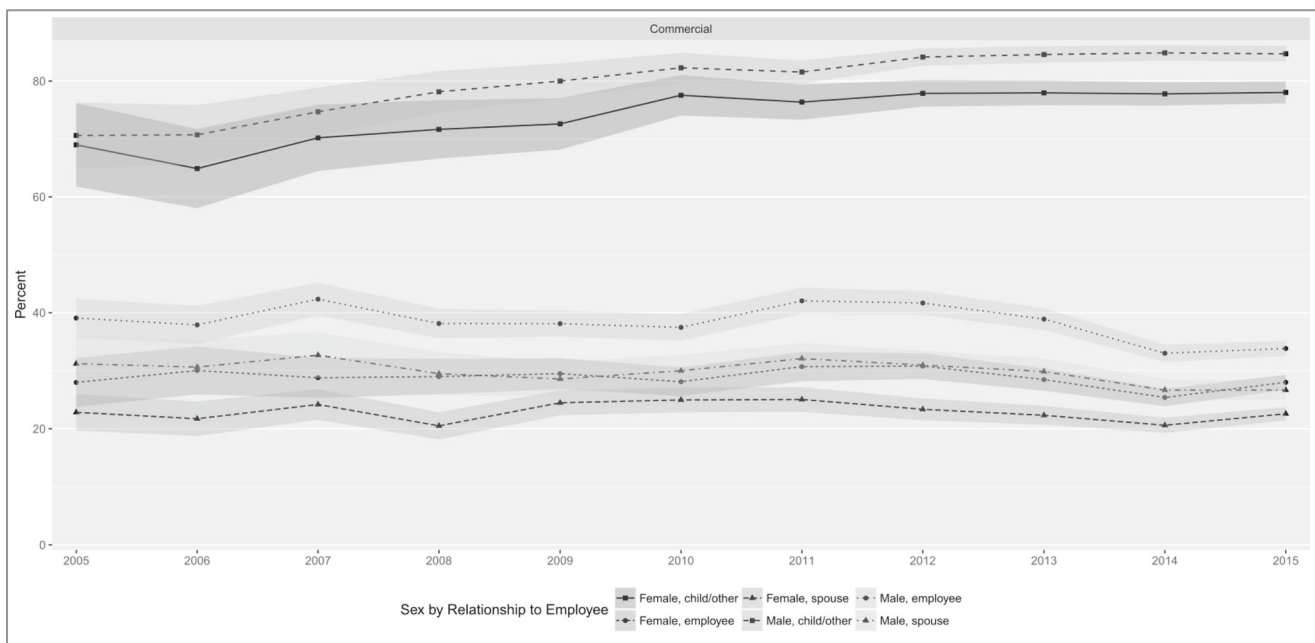
Shaded regions around lines represent 95% pointwise confidence bands.

Fig. 8 Percent of enrollees with a distinct instance of an OUD, by insurance status. Shaded regions around lines represent 95% pointwise confidence bands.



Shaded regions around lines represent 95% pointwise confidence bands.

Fig. 9 Percent of enrollees with a distinct instance of an OUD, by insurance status and age. Shaded regions around lines represent 95% pointwise confidence bands.



Shaded regions around lines represent 95% pointwise confidence bands.

Fig. 10 Percent of commercial enrollees with an opioid use disorder lacking a current opioid prescription, by sex and relationship to employee. Shaded regions around lines represent 95% pointwise confidence bands.

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