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State Drug Testing Laws for Opioid Therapy: Implications for Employment-Based Health Plans

By Eden Volkov, Ph.D., Employee Benefit Research Institute; Aaron M. Gamino, Ph.D., Middle Tennessee State University; and Paul Fronstin, Ph.D., Employee Benefit Research Institute

AT A GLANCE

As of 2023, 24 states have passed laws that require physicians to perform urine drug testing of chronic pain patients undergoing opioid therapy. Despite the potential health and financial benefits of testing for employees and employers, there is no evidence to date regarding compliance with these state policies or their second-order effects. In this *Issue Brief*, we use claims data to quantify the impact of the state laws on testing rates of opioid therapy patients and document selection into treatment effects. This research provides key insights for plan sponsors and employers considering cost-effective health benefits designs to support employees with chronic pain. In particular, we find:

- Pain diagnosis rates among group plan enrollees have been relatively flat over time. Eighteen percent of enrollees were diagnosed with chronic pain; this share fell to 13 percent by 2019, before rising to 16 percent in 2021.
- Prescribing opioids for three or more months to chronic pain patients has been less common over time, falling from 10–12 percent being prescribed opioids in 2013 to 1–3 percent in 2021.
- State drug testing laws have no impact on opioid prescribing rates.
- State drug testing laws increase testing rates among chronic pain patients prescribed opioids by 4.7 percentage points (11 percent).
- Effects are largest for enrollees most affected by chronic pain and in need of long-term opioid therapy, such as workers over 45 and those working in physically demanding jobs like construction and durable goods manufacturing.
- Mandatory testing makes healthier patients *more likely* to receive a pain diagnosis but has negligible effects on which patients ultimately undergo opioid treatment once diagnosed.

The cumulative findings indicate that the state laws have increased testing rates, which has coincided with healthier enrollees being more likely to get a pain diagnosis. This suggests providers are more confident in diagnosing healthier enrollees with pain because urine drug testing will allow for better monitoring should they initiate opioid therapy. However, the type of enrollee who receives opioid therapy once diagnosed with pain is not a function of these state laws. In addition, enrollees who have the largest increases in testing rates are those who are most likely to require opioid therapy to treat their chronic pain, showing that urine drug tests are an important diagnostic tool for doctors seeking to responsibly treat employees most in need. As such, there are benefits to incentivizing providers to perform routine testing in states where it is not mandated.

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Introduction

Chronic pain affects more than 100 million people in the United States, and a common method of treatment for chronic pain is prescribing opioids. The United States is currently in the midst of an opioid epidemic, with increased opioid use over the last two decades despite no change in rates of reported pain.[1] The economic burden of opioid abuse, overdose, and dependence is estimated at $78.5 billion, with a third of this, or $28.9 billion, due to substance abuse costs and increased health care utilization (Zhou et al. 2016). In addition to increased health care costs, opioid abuse is costly to employers because it can lead to higher absenteeism and make costly retraining more likely due to higher employee turnover rates. Consistent with these costs associated with opioid abuse, research indicates firms are more likely to substitute workers with technology in areas most impacted by the opioid epidemic (Ouimet et al. 2020).

Policies that help balance the benefits of appropriate care for chronic pain patients with the risks associated with opioid therapy are important for workers who struggle with chronic pain and employers who bear a share of the health care and the full turnover costs associated with opioid abuse. One such policy is currently a Centers for Disease Control and Prevention (CDC) guideline for physicians who prescribe opioids to chronic pain patients: urine drug tests. The CDC recommends urine drug testing to identify risky behaviors, monitor drugs present in the patient's system, and, if necessary, refer them for substance use disorder treatment (Dowell et al. 2016). Prior to the CDC guidelines, researchers had identified the importance of urine testing in addressing the potential problems of opioid misuse (Compton 2007; Trescot et al. 2006). However, mandatory urine testing has not been widely implemented, with physicians instead relying primarily on patient self-reports of drug use despite well-documented evidence of underreporting (Chermack et al. 2000). Compared with other methods of screening, urine screening is noninvasive, samples are easy to store, and the test is relatively low cost at $30 to $60 per test (Heit and Gourlay 2004).

While urine drug testing for chronic pain patients is not standard practice, as of 2023, 24 states have policies that mandate that physicians prescribing opioids perform urine drug tests before initiating opioid therapy and, in some cases, during ongoing therapy. There is variation in the scope of the laws, with 12 state laws applying to all physicians, 7 state laws applying only to providers at pain management clinics, and 5 state laws requiring drug tests for chronic pain patients seeking workers' compensation. There are also differences in whether the state laws require random vs. scheduled screening and the number of screenings required. A common feature is that urine testing is mandated once a minimum of a three-month supply of opioids (long-term opioid therapy) is prescribed.

Even though urine drug testing may be an affordable and effective means to manage treatment of chronic pain safely, there is no evidence causally identifying its effects. Using health care claims data on group plan enrollees with chronic pain and leveraging the variation in the timing of these state-level policies, this report examines whether these state mandates impact testing rates, a policy space that has not yet been studied. This research is novel because the availability of claims data allows us to track urine testing, opioid prescribing, and pain diagnoses, factors that may all change in response to these policies. These findings are important to facilitate future research into the second-order effects of these policies like opioid misuse, adverse employment outcomes, and others. In addition to demonstrating the first-order effects of these state policies, this *Issue Brief* shows how the profiles of all chronic pain patients and the subset who undergo long-term opioid therapy have changed when urine drug testing was mandated. These descriptive findings provide insights into whether making drug testing mandatory leads to selection into chronic pain diagnoses or opioid therapy by providers and/or group plan enrollees. The cumulative findings are important for setting cost-effective health benefits policies for employers.

Background

In 2016, the CDC issued a "guidance for prescribing opioids for chronic pain." As part of this guidance, the CDC stated, "when prescribing opioids for chronic pain, clinicians should use urine drug testing before starting opioid therapy and consider urine drug testing at least annually to assess for prescribed medications as well as other controlled prescription drugs and illicit drugs." This guidance is simply a recommendation for providers and is not binding. However, as of 2023, 24 states do have binding legislation that requires providers that treat pain patients to perform at least one urine drug test prior to initiating long-term opioid therapy, which is generally defined as an opioid prescription of three months or more.[2]

The earliest state to adopt such a policy was Louisiana. In 2008, the Louisiana State Board of Medical Examiners adopted licensing requirements in the state administrative code (LA Admin. Code. Title 48 pt. I 7801 through 7861) that required providers to perform a urine drug test at the start of treatment. To proceed with treatment, the urine screen had to be clear of illicit substances. For patients receiving continued treatment for chronic pain, the board's regulations require quarterly unannounced urine tests. These quarterly tests would provide continued confirmation that the patient is not using illicit drugs or controlled substances without a valid prescription, thereby preempting misuse and adverse health outcomes.

Since 2008, many more states have adopted their own drug-testing policies for pain patients undergoing opioid therapy, with Texas being the most recent state to adopt a policy, in 2022. There is variation across the state policies regarding whether the tests should be random or scheduled and the required testing frequency. Another difference is the scope of these policies. Twelve state laws apply to all physicians, seven state laws apply to pain management clinics, and five state laws require urine drug tests for chronic pain patients seeking workers' compensation. A nearly uniform requirement of all these state policies is that urine drug testing must be initiated for pain patients who are prescribed at least a three-month supply of opioids.

Urine testing has distinct advantages in reducing prescriptions to abusers, reducing diversion, and increasing adherence. First, the presence of illicit drugs, unprescribed drugs, or higher-than-expected levels of prescribed drugs are potential indicators of drug abuse that can be detected with screening. Ensuring the patient does not take other substances during their treatment for chronic pain can reduce mortality risk; Hall et al. (2008) find that nearly 80 percent of opioid overdoses involve other contributing substances. Requiring pain clinic physicians to screen patients reduces the likelihood that opioid abusers can get physician prescriptions, one of the most common ways of obtaining opioids for abuse (Rosenblum et al. 2007; Jones and Paulozzi 2014).

Second, urine screening has the potential to reduce diversion. The majority of abusers report getting their opioids from a friend or relative (Jones and Paulozzi 2014; Rosenblum et al. 2007). Frequent testing may allow physicians to ensure that prescribed opioids are not at too low of a level in a patient's system. If found, such a discrepancy could indicate the patient failing to take the prescribed dose and instead diverting or saving the drugs. This has the potential to reduce the supply of prescription opioids available for non-medical use and reduce unintentional overdose deaths (Hall et al. 2008; Powell et al. 2015).

A third advantage of urine screening is that it effectively sets minimum requirements for physician monitoring. Increased physician monitoring is linked to a 50 percent reduction in opioid abuse and is associated with an increased likelihood of referring problematic patients to substance use disorder treatment (Green et al. 2012; Manchikanti et al. 2006). Adherence monitoring by physicians has been documented as a deterrent for individuals seeking to obtain a prescription for diversion (Fountain et al. 2000). Monitoring can also lower the risks associated with opioid prescribing by making sure the dosage is right. There are many potentially fatal risks associated with the failure to perform regular urine testing in conjunction with careful titration of methadone in the process of adjusting a patient's dosage (Chou et al. 2014; Hall et al. 2008; Chou et al. 2009).

Despite all the benefits of testing, there are important costs to consider. First, there may be provider moral hazard where pain physicians have a financial incentive to over test. A prominent example of this is the case of a Tennessee-based medical group called Comprehensive Pain Specialists (CPS). CPS operated over 40 pain clinics in 12 states before

shutting down in 2018, ultimately entering a settlement agreement for submitting millions of dollars in false claims for reimbursement to Medicare and Medicaid (TennCare).[3] The claims were for medically unnecessary and/or non-reimbursable drug testing of pain patients. The prosecution of provider moral hazard does suggest that providers do face barriers and risks associated with over-testing, but this is still a cost that health plans should consider. Providing credible evidence supporting the financial and health benefits of drug testing pain patients prescribed opioids is important to justify the added costs for employee health plan providers.

In addition to provider moral hazard, another cost to consider is that these can yield false negatives, which would limit their ability to alert doctors to patients abusing opiates or other illicit substances and refer them to treatment. Because the opiate screen on the urine drug test (UDT) specifically detects morphine, this screen would not detect synthetic opioids, such as fentanyl and methadone, or other opioids that are structurally dissimilar such as buprenorphine, oxycodone, and hydrocodone (McNeil et al. 2023). However, prior research has established that the false negative rate is low at 1.9 percent, indicating that for most cases, urine drug tests can detect patients who are abusing and are therefore effective tools for doctors to refer patients to treatment (Brooke and Daly 2018).

A final cost to consider is that the fear of drug testing could lead patients most at risk of developing opioid addiction to be less likely to go to their doctor for pain medication and potentially turn to illegal opioids. For example, individuals who use recreational marijuana in states where it hasn't been legalized may be discouraged from seeking out medical care for their chronic pain because of the urine drug screen. This is an important cost to consider.

Having documented the potential benefits and costs of requiring urine drug tests for pain patients undergoing opioid therapy, we now turn to describing the data and methods we used to evaluate the impacts of state testing laws on testing rates.

Data, Study Sample, and Methods

Our main data source for the study is the MarketScan® Commercial Claims and Encounters Database (CCAE). Enrollee health insurance eligibility information, as well as medical (inpatient and outpatient) and pharmacy claims, comprise the CCAE. The CCAE contains more than 20 million covered lives with private health insurance.

For each of the years spanning 2013 through 2021, we included all active employees, their spouses, and their dependents, ages 14–64, who were enrolled in their health plan for at least 90 days.[4] We excluded enrollees whose carve-out claims for mental health (MH) and substance abuse (SA) treatment were not included in the dataset. The sample is further limited to enrollees with pain diagnoses, as these are the enrollees impacted by the state urine testing laws. Cancer patients are also excluded from the sample, as they are not subject to the testing requirements that other opioid therapy patients are. Depending on the year, the resulting analytical sample consists of 2.1 to 4.1 million individuals.

We constructed our analytical sample by using diagnosis codes in the inpatient and outpatient claims. Pain diagnoses include back, joint, nerve, musculoskeletal, and other chronic pain. Using the drug claims and REDBOOK data files, we determined yearly opioid prescriptions for our chronic pain sample, excluding prescriptions for buprenorphine, naltrexone, and methadone, as these are opioid antagonists used to treat opioid use disorder and not opioids used to treat chronic pain. Opioids used to treat chronic pain include codeine, hydrocodone, hydromorphone, morphine, oxycodone, oxymorphone, tapentadol, tramadol, and fentanyl. Information regarding the state urine drug testing laws was collected from WestLaw and state registers. This information is summarized in Appendix Figure 1, and a map of the geographical distribution of state policies is shown in Appendix Figure 2. This figure shows that states that passed urine drug testing policies are generally concentrated in the South and Northeast. The states with UDT policies also correspond closely to the set of states that have been hardest hit by the opioid epidemic, suggesting these laws were likely passed with the goal of limiting abuse (Figure A2). The DX9 and DX10 codes used to define pain diagnoses and the CPT4/HCPCS codes used to identify urine drug testing claims are contained in Appendix Table A2.

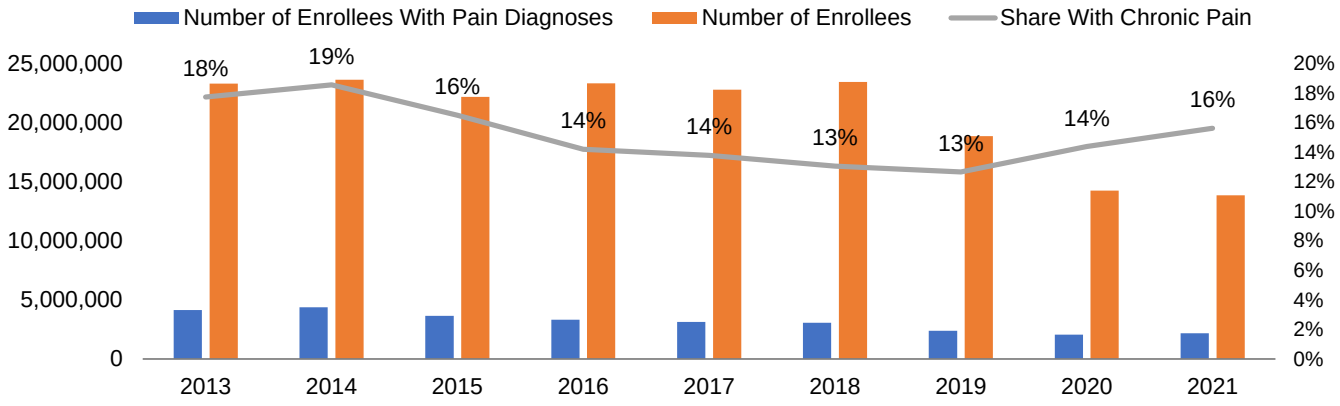
Limitations- There are some limitations to our analysis. First, our estimates for 2020 and 2021 may underrepresent the number of people diagnosed with chronic pain because enrollees may have forgone care or were unable to receive care due to lockdowns in response to the COVID-19 epidemic. Estimates of chronic pain diagnoses and opioid use are underreported to the extent that enrollees are using out-of-network providers, where the health care claim is not being submitted for adjudication.

Results

Prevalence of Chronic Pain Among Group Plan Enrollees

The total number of enrollees in the MarketScan data, the total number of enrollees in our chronic pain sample, and the share of the overall sample diagnosed with chronic pain are shown for each year from 2013–2021 in Figure 1. The number of enrollees in the MarketScan data has fallen over time from a high of approximately 24 million in 2013 to a low of approximately 14 million in 2021. As the overall number of enrollees in group health plans has fallen, so has the number diagnosed with chronic pain. However, the age and gender composition has remained constant over time, indicating the profile of pain patients is not affected by the decline in enrollees over time. Figure 1 shows that the share of group plan enrollees being diagnosed with chronic pain remained relatively flat from 2013–2021. In 2013, 18 percent of enrollees were diagnosed with chronic pain, and this share fell to 13 percent by 2019 before rising to 16 percent in 2021 (Figure 1). This pattern of relatively flat pain diagnosis rates among group plan enrollees is consistent with the pattern of pain diagnosis over time in the general population reported by the CDC.

Figure 1
Pain Diagnoses Among Group Plan Enrollees, 2013–2021



Source: Employee Benefit Research Institute estimates based on administrative enrollment and claims data.

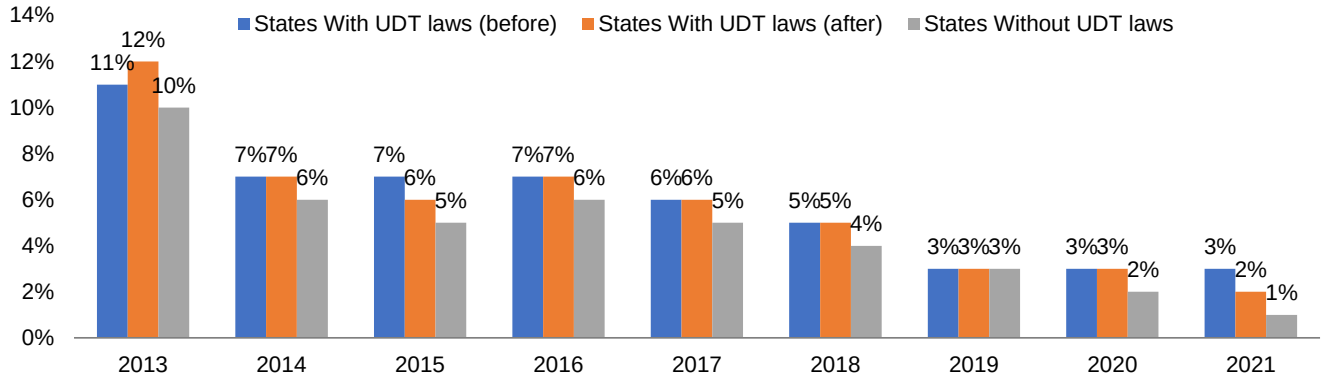
Share of Enrollees With Chronic Pain Undergoing Opioid Therapy (Prescribed Opioids for 3+ Months)

Figure 2 uses a sample of enrollees in the first year they are diagnosed with chronic pain and shows how the share of these enrollees undergoing opioid therapy has changed over time and by whether they are living in a state with a urine drug testing law. The results show that regardless of state law status, the likelihood that a chronic pain patient is prescribed three or more months of opioids has fallen over time. After falling from 10–12 percent in 2013 to 6–7 percent in 2014, opioid prescribing rates stabilized until 2016, after which they fell to 5–6 percent in 2017 and ultimately to 1–3 percent in 2021. This precipitous decline in opioid prescribing after 2016 is consistent with news reports documenting that doctors were much more reluctant to prescribe opioids to their pain patients after the CDC issued its 2016 guidelines recommending more stringency on the part of pain physicians.[5]

Figure 2 also shows that in all years except 2013, mandating urine drug testing had no impact on opioid prescribing rates. Figure 2 further shows that even before mandating urine drug tests, states that pass these laws have higher

opioid prescribing rates on average than those that don't pass these laws (5.8 percent vs. 4.7 percent), indicating that there are some unobserved differences in how providers are choosing to treat pain patients in states that pass drug testing laws vs. those that don't.

Figure 2
Share of Enrollees Prescribed 3 or More Months of Opioids



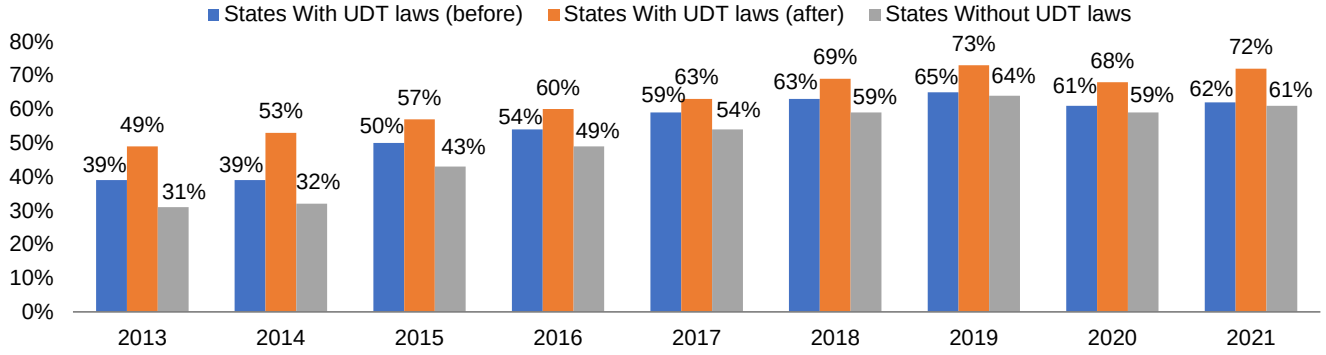
Source: Employee Benefit Research Institute estimates based on administrative enrollment and claims data.

Urine Drug Testing Rates Among Enrollees With Chronic Pain Undergoing Opioid Therapy

The results in Figure 3 indicate that, independent of state law status, urine drug testing rates among chronic pain patients undergoing opioid therapy rose from 2013–2021. However, when comparing testing rates before and after a state adopted a urine drug testing law, the average yearly increase in testing rates was 8 percentage points, which is higher than the upward secular trend in testing rates among enrollees in states that have not adopted these policies. From 2013–2021, testing rates increased an average of 3.3 percentage points per year in states that did not pass these policies, suggesting that mandatory urine drug testing laws increase testing rates by 4.7 percentage points.

A limitation of this study is that, by restricting the sample to chronic patients who undergo long-term opioid therapy, we are not capturing those with chronic pain who are screened away from opioids with urine testing. Given that most laws require testing of chronic pain patients who are undergoing long-term opioid therapy, with only a few requiring testing prior to initiating therapy, we believe this is the best sample to use, despite this limitation. Furthermore, Figure 2 provides strong evidence that screening chronic pain patients has no impact on opioid prescribing, so there is less of a concern that we are missing a significant subset of pain patients.

Figure 3
Share of Enrollees With Chronic Pain Who Were Prescribed 3 or More Months of Opioids and Are Getting a Urine Drug Test (UDT)

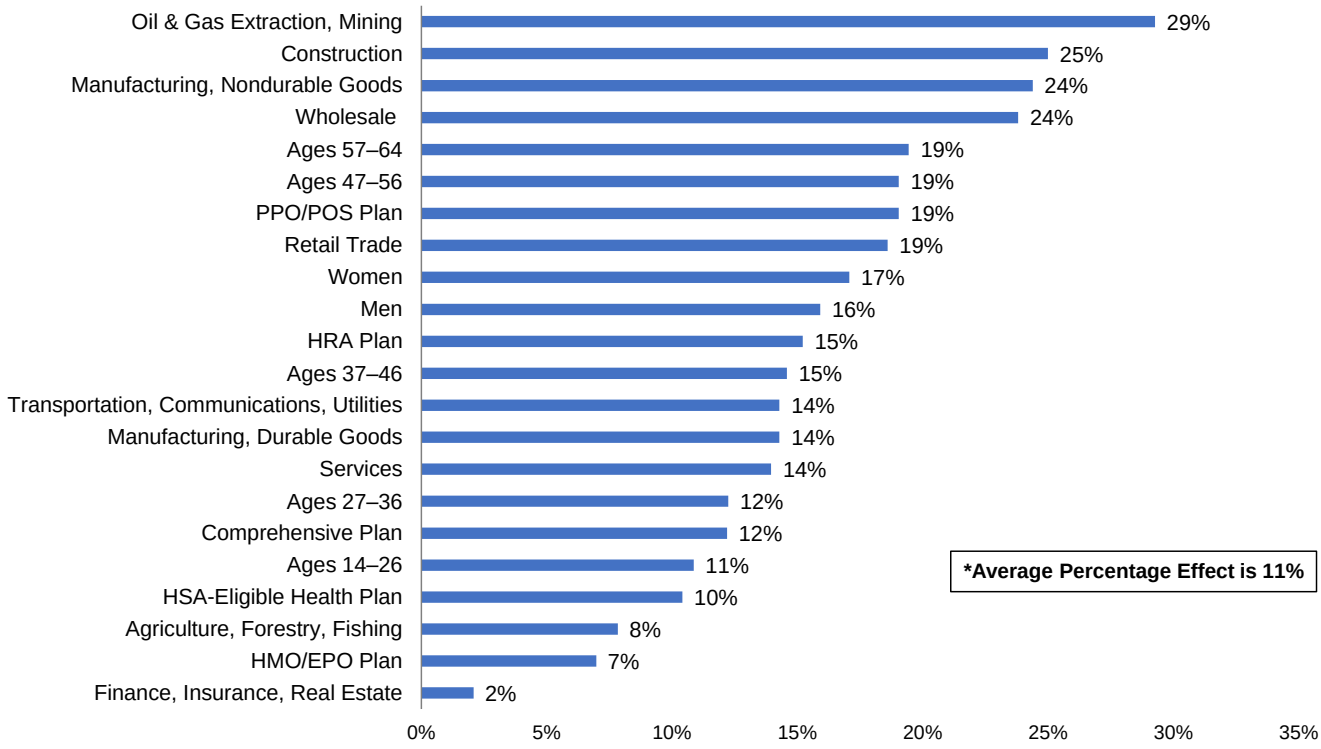


Source: Employee Benefit Research Institute estimates based on administrative enrollment and claims data.

Variation in Treatment Effects by Enrollee Characteristics

In Figure 4, we show that there is variation in the effects of state policies mandating urine drug testing for pain patients undergoing long-term opioid therapy based on the enrollee characteristics. The average effect of these laws is an 11 percent increase in testing rates, which is based on the 4.7 percentage point effect shown in Figure 3 and the pretreatment mean of testing being 43 percent. The enrollees with above average treatment effects are older. The treatment effect for those ages 47–56 is 19 percent, and the treatment effect for those ages 57–64 is 24 percent, while the treatment effect for younger enrollees ranges from 11–15 percent, with effects increasing based on age. Older enrollees are also the most likely to be prescribed opioids for chronic pain, with over 1 in 10 enrollees over the age of 45 undergoing opioid therapy for chronic pain.[6] Treatment effects are also the largest for employees in the wholesale, durable goods manufacturing, construction, and oil and gas extraction industries, where the effects range from 24 percent to 29 percent respectively. Just like older workers, employees in these industries have the highest rates of diagnosed and prescribed opioid use. The cumulative results in Figure 4 indicate that these laws have the biggest effects on groups most in need of opioid therapy to treat their chronic pain, showing that doctors are targeting testing to those most in need.

Figure 4
Percentage Effect of Urine Drug Test (UDT) Laws on Testing Rates, by Enrollee Characteristics



Source: Employee Benefit Research Institute estimates based on administrative enrollment and claims data. Treatment effects calculated as a difference-in-differences model, where treatment is having a UDT policy. The model also controls for state and year fixed effects.

Chronic Pain Patient Characteristics by State Law and Opioid Treatment Status

In the final component of our analysis, we evaluate whether passing a urine drug testing law impacts the type of enrollees who are diagnosed, the type of enrollees who seek out treatment for chronic pain, and whether those diagnosed with chronic pain are prescribed three or more months of opioids. The results in columns (1) and (3) in Figure 5 show that enrollees diagnosed with chronic pain in states that do and do not require urine drug testing are very similar on many dimensions. Sixty percent are female, 3 percent have a comprehensive health plan, 10–13 percent have a health maintenance organization (HMO)/exclusive provider organization (EPO) health plan, 14–15 percent are ages 14–26, 14–15 percent are 27–36, 21 percent are 37–46, 28 percent are 47–56, and 22 percent are 57–64.

However, there are also a few differences in the profiles of enrollees diagnosed with chronic pain in states with mandatory drug testing that indicates testing contributes to higher diagnosis rates for healthier enrollees. Specifically, chronic pain patients in states that require urine drug testing are 15 percent more likely to be employed by a large firm, 10 percent less likely to have a preferred provider organization (PPO)/point-of-service (POS) plan, 12 percent more likely to have a health savings account (HSA)-eligible health plan, and nearly twice as likely to have a health reimbursement arrangement (HRA).[7]

Figure 5 also shows which chronic pain enrollees ultimately receive opioid therapy and how making urine drug testing mandatory impacts this selection process. Columns 2 and 4 show that, regardless of state law status, pain patients who are treated with opioids are more likely to have a comprehensive plan (50–67 percent), less likely to have an HSA-eligible health plan (30–38 percent), much less likely to be under 37, and more likely to be 37 and older. Consistent with being older and unhealthier, the share of pain patients with HSA-eligible plans falls. The selection into opioid therapy among pain patients is similar among states with urine drug testing laws and those without, indicating that these laws don't influence the decision to undergo opioid treatment once diagnosed. Still, there is some evidence that these laws influence the decision to receive the initial pain diagnosis. In summary, mandatory testing contributes to healthier patients being more likely to receive a pain diagnosis but has limited effects on the type of enrollee who undergoes opioid treatment once diagnosed.

Figure 5
Characteristics of Chronic Pain Patients by Urine Drug Test (UDT) Law and Chronic Opioid Treatment Status

Enrollee Characteristics	No UDT Law, Pain (1)	No UDT Law, Pain and 90+-Day Prescription for	UDT Law, Pain (3)	UDT Law, Pain and 90+-Day Prescription for Opioids (4)
Female	59%	57%	60%	58%
Employed at a Large Firm	75%	76%	86%	88%
Comprehensive Plan	3%	6%	3%	5%
HMO/EPO Plan	13%	13%	10%	10%
PPO/POS Plan	68%	68%	61%	63%
HRA Plan	9%	8%	17%	15%
HSA-Eligible Health Plan	8%	5%	10%	7%
Ages 14–26	15%	2%	14%	2%
Ages 27–36	15%	9%	14%	8%
Ages 37–46	21%	21%	21%	21%
Ages 47–56	28%	37%	28%	37%
Ages 57–65	22%	31%	22%	32%

Source: Employee Benefit Research Institute estimates based on administrative enrollment and claims data.

Conclusion

Our findings show that state efforts to increase urine drug testing of chronic pain patients undergoing long-term opioid therapy have been successful at increasing testing rates. State policies mandating testing are associated with a 4.7 percentage point increase in testing rates. Furthermore, these state drug testing laws have no impact on rates of long-term opioid therapy among chronic pain patients. Prescription of long-term use of opioids for chronic pain has been falling over time, regardless of state law status, especially after CDC guidance issued in 2016 that encouraged providers to be more conservative when prescribing opioids for pain. Understanding whether urine drug testing helps pain physicians make better treatment decisions, discerned by examining reduced misuse and overdose mortality, is an important next question to answer. If increased testing can reduce adverse health outcomes, encouraging these tests through higher reimbursement rates for providers or lower cost sharing for enrollees are cost-effective ways for group health plan sponsors to support a healthy and productive work force.

Our results also indicate that doctors have increased testing rates the most for enrollees with the highest rates of chronic pain and opioid therapy use, indicating that these tests are important diagnosis tools for physicians treating patients who need care the most. Furthermore, healthier enrollees are more likely to get a pain diagnosis once urine drug testing is mandated, but the type of patient who is ultimately treated with long-term opioid therapy once

diagnosed is unaffected by these policies. This evidence suggests that urine drug testing provides greater assurance to pain physicians who may have been on the fence about giving a pain diagnosis to a healthier enrollee due to the risk of opioid abuse should they begin opioid treatment. However, once the diagnosis is made, the provider's decision regarding who should undergo long-term opioid therapy is unaffected by mandatory urine testing. In states with and without mandatory urine drug testing laws, the unhealthier and older enrollees are the most likely to undergo long-term opioid therapy once diagnosed with chronic pain. These results indicate that prescribers are generally reluctant to prescribe opioids to younger pain patients, given the higher rates of abuse.[8]

The findings in this *Issue Brief* are novel in that they are the first documented evidence of state-level policies' efficacy in increasing testing of chronic pain patients. This evidence of the first-order effects of the state-level urine drug testing can be used to further research into the health and employment effects of urine drug testing. This report also shows drug testing doesn't encourage overprescribing to younger and more vulnerable patients, an important risk to consider. Taken together, these results are promising and indicate that urine drug testing can be an important and powerful tool for allowing employees with pain diagnoses to receive appropriate care while remaining safe. Not only could testing have clear benefits to workers, but also to employers through reduced health care spending and reduced employee turnover. For these reasons, additional research is needed to document these downstream benefits.

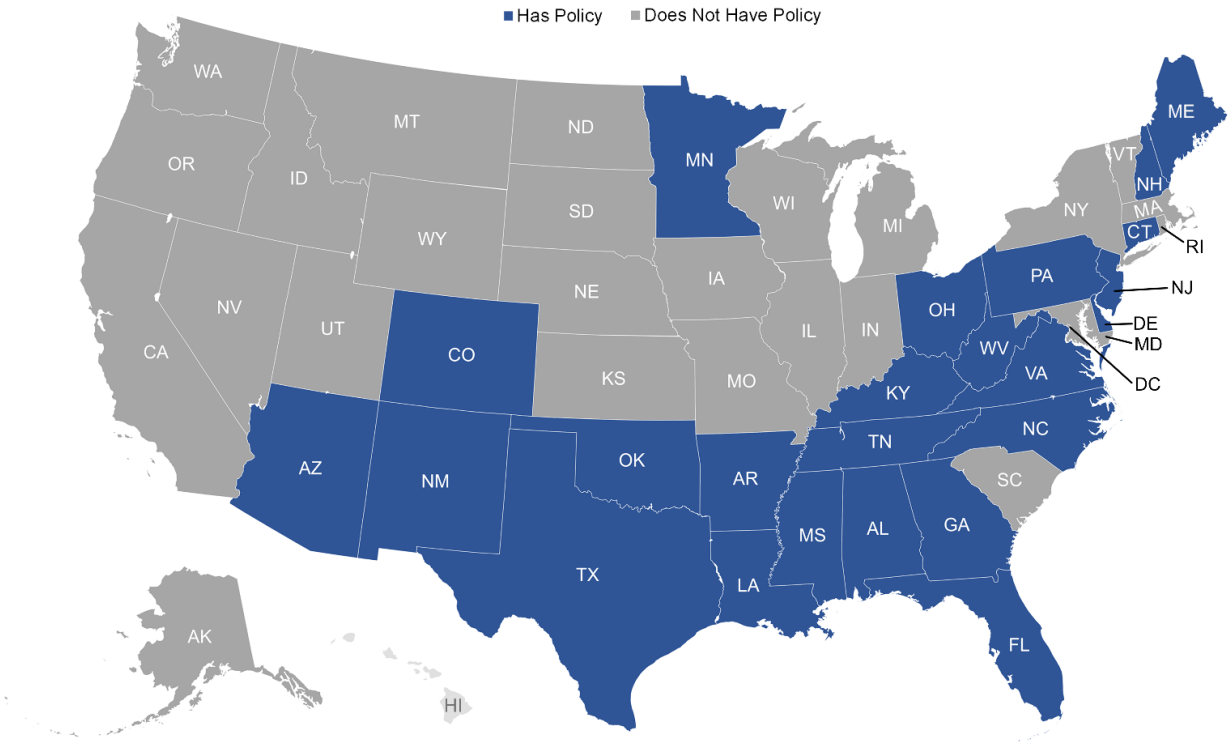
Appendix

Appendix Figure 1
State Urine Drug Test (UDT) Laws

State	Clinic UDT Law Start	Clinic UDT Law End	Provider UDT Law Start	Provider UDT Law End	Workers' Compensation UDT Start	Workers' Compensation UDT End
Alabama	12/29/2013					
Arizona	1/1/2019					
Arkansas			7/22/2015			
Colorado					2/14/2022	
Connecticut			10/1/2019			
Delaware			4/1/2017			
Florida	3/16/2011	3/26/2012				
Georgia			7/13/2012			
Kentucky			3/4/2013			
Louisiana	1/1/2008				2/20/2020	
Maine			3/24/2018			
Minnesota					7/13/2015	
Mississippi			10/28/2018			
New Hampshire			5/3/2016			
New Jersey			3/1/2017			
New Mexico			11/30/2016			
North Carolina					5/1/2018	
Ohio	6/20/2012					
Oklahoma			7/1/2015		9/12/2016	
Pennsylvania			11/27/2019			
Tennessee	9/30/2011					
Texas	11/9/2022					
Virginia			3/15/2017			
West Virginia	5/1/2016					

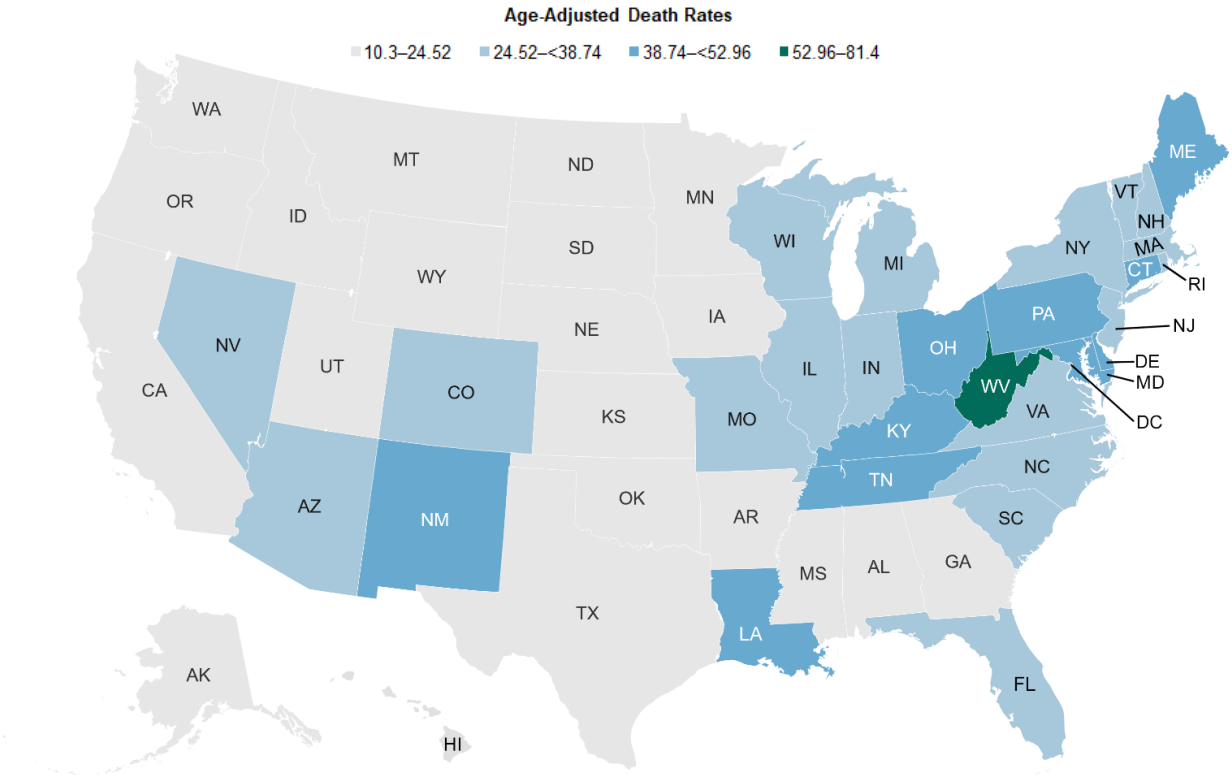
Source: Information compiled using WestLaw and state registers.

Appendix Figure 2
Geographical Distribution of State Urine Drug Testing (UDT) Laws



Source: Information compiled using WestLaw and state registers. Data indicate presence or lack of policy by 2023.

Appendix Figure 3
Drug Overdose Deaths per 100,000 Population by State, 2020



Source: CDC, National Center for Health Statistics. Original chart available at https://commons.wikimedia.org/wiki/File:US_map_of_drug_overdose_deaths_per_100,000_population_by_state.png.

Appendix Figure 4

International Classification of Diseases (ICD), Current Procedural Terminology (CPT), and Healthcare Common Procedure Coding System (HCPCS) Codes for Urine Drug Testing (UDT) and Chronic Pain Conditions

Category	Code
Presumptive UDT Codes	G0477, G0478, G0479, 0007U, G0430, G0431, G0434, H0003, 80100, 80101, 80104, 80300, 80301, 80302, 80304, 80303, 80305, 80306, 80307
Definitive UDT Codes	83925, 80364, 80102, 80152, 80154, 80160, 80166, 80323, 80324, 80325, 80326, 80329, 80330, 80331, 80332, 80333, 80334, 80335, 80336, 80364, 80102, 80152, 80154, 80160, 80166, 80323, 80324, 80325, 80326, 80329, 80330, 80331, 80332, 80333, 80334, 80335, 80336, 80337, 80338, 80339, 80340, 80341, 80342, 80344, 80345, 80346, 80347, 80348, 80349, 80350, 80351, 80352, 80353, 80354, 80355, 80356, 80357, 80358, 80359, 80360, 80361, 80362, 80363, 80365, 80366, 80367, 80368, 80369, 80370, 80371, 80372, 80373, 80374, 80375, 80376, 80377, 82101, 82520, 82646, 82649, 82742, 83925, 83992, G0481, G0482, G0483, G6037, 0006U, G0480, G0659, G6031, G6032, G6034, G6036, G6037, G6041, G6042, G6043, G6044, G6045, G6048, G6050, G6053, G6056
Back Pain	ICD-9: 720.1, 720.2, 720.81, 720.89, 720.9, 721.0, 721.1, 721.2, 721.3, 721.41, 721.42, 721.5, 722.0, 722.10, 722.11, 722.2, 722.30, 722.31, 722.6, 722.83, 723.0, 723.1, 723.2, 723.3, 723.5, 723.6, 724.00, 724.01, 724.02, 724.03, 724.09, 724.1, 724.8, 756.10, 756.11, 756.12, 756.13, 756.14, 756.15
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Joint Pain	ICD-9: 710.0, 710.1, 710.2, 710.3, 710.4, 710.8, 710.9, 711.00, 711.01, 711.02, 711.03, 711.04, 711.05, 711.06, 711.24, 711.25, 711.26, 711.27, 711.28, 711.29, 711.30, 711.49, 711.50, 711.51, 711.52, 711.53, 711.54, 711.55, 711.74, 711.75, 711.76, 711.77, 711.78, 711.79, 711.80, 711.99, 713.0, 713.1, 713.2, 713.3, 713.4, 713.5, 713.6, 714.0, 714.1, 714.2, 714.30, 714.31, 714.32, 714.33, 715.00, 715.04, 715.09, 715.10, 715.11, 715.12, 715.13, 715.33, 715.34, 715.35, 715.36, 715.37, 715.38, 715.80, 716.00, 716.01, 716.02, 716.03, 716.04, 716.05, 716.24, 716.25, 716.26, 716.27, 716.28, 716.29, 716.49, 716.50, 716.51, 716.52, 716.53, 716.54, 716.85, 716.86, 716.87, 716.88, 716.89, 716.90, 717.0, 717.1, 717.2, 717.3, 717.40, 717.41, 718.00, 718.01, 718.02, 718.03, 718.04, 718.05, 718.26, 718.27, 718.28, 718.29, 718.30, 718.31, 718.65, 718.70, 718.71, 718.72, 718.73, 718.74, 718.94, 718.95, 718.97, 718.98, 718.99, 719.00, 719.01, 719.02, 719.03, 719.04, 719.05, 719.24, 719.25, 719.26, 719.27, 719.28, 719.29, 719.40, 719.41, 719.45, 719.46, 719.47, 719.49, 719.50, 719.51, 719.52, 719.53, 719.54, 719.78, 719.79, 719.80, 719.81, 719.82, 719.83, 720.0, 726.10, 726.5, 729.5, 733.90
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Nerve Pain	ICD-9: 337.0, 337.1, 353.0, 353.1, 353.2, 353.3, 353.4, 353.5, 353.6, 353.8, 353.9, 354.0, 354.1, 354.2, 354.3, 354.4, 354.5, 354.8, 354.9, 355.0, 355.1, 355.2, 355.3, 355.4, 355.5, 355.6, 355.7, 355.71, 356.0, 356.1, 356.2, 356.3, 356.4, 356.8, 356.9, 357.0, 357.1, 357.2, 357.4, 357.5, 357.6, 357.7, 357.8, 357.81, 377.33, 377.34, 377.41, 531.3, 723.4, 724.3, 727.2, 729.2
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Musculoskeletal Pain	ICD-9: 725.x, 726.0, 727.00, 728.11, 729.0, 781.99, 830.0, 831.00, 832.00, 833.00, 834.00, 835.00, 836.0, 863.80
	ICD-10: M25.729, M35.3, M60.10, M60.9, M61.00, M61.10, M62.10, M62.89, M62.9, M65.00, M65.30, M65.4, M65.80, M65.849, M65.879, M65.9, M66.10, M66.239, M66.249, M66.259, M66.269, M66.339, M66.349, M66.369, M66.829, M66.879, M66.88, M66.9, M67.80, M67.88, M67.90, M70.039, M70.10, M70.20, M70.30, M70.30, M70.40, M70.40, M70.50, M70.60, M70.70, M70.98, M71.00, M71.20, M71.30, M71.50, M71.80, M71.9, M72.6, M72.9, M75.00, M75.100, M75.120, M75.20, M75.30, M75.30, M75.40, M75.50, M75.80, M75.80, M76.10, M76.20, M76.40, M76.50, M76.60, M76.829, M76.899, M76.899, M76.899, M77.00, M77.10, M77.20, M77.9, M79.0, M79.1, M79.609, M79.7, M79.81, M79.A19, M79.A29, M79.A3, M79.A9, R29.818, R29.898, R29.898, R29.90, R29.91, R68.89, S01.409A, S03.00XA, S03.00XA, S03.00XS, S03.01XA, S03.01XS, S03.02XA, S03.02XS, S03.03XA, S03.1XXA, S03.40XA, S03.41XA, S03.42XA, S03.43XA, S03.8XXA, S03.9XXA, S03.9XXS, S11.90XA, S11.90XA, S11.90XA, S11.90XA, S11.90XA, S11.90XA, S11.90XA, S11.90XA, S11.90XA, S13.101A, S13.101A, S13.101A, S13.101A, S13.111A, S13.111A, S13.121A, S13.121A, S13.131A, S13.131A, S13.141A, S13.141A, S13.151A, S13.151A, S13.161A, S13.161A, S13.171A, S13.171A, S13.181A, S13.181A, S13.20XS, S13.4XXA, S13.5XXA, S13.8XXA, S13.9XXS, S21.109A, S21.209A, S23.101A, S23.101A, S23.20XA, S23.20XA, S23.20XS, S23.3XXA, S23.41XA, S23.420A, S23.421A, S23.428A, S23.429A, S23.8XXA, S23.9XXA, S23.9XXS, S29.019A, S31.000A, S31.000A, S31.000A, S31.000A, S31.000A, S31.000A, S33.101A, S33.101A, S33.2XXA, S33.2XXA, S33.2XXA, S33.2XXA, S33.30XS, S33.39XA, S33.39XA, S33.39XA, S33.39XA, S33.5XXA, S33.6XXA, S33.8XXA, S33.8XXA, S33.8XXA, S33.8XXA, S33.8XXA, S33.8XXA, S33.8XXA, S33.8XXA, S33.9XXA, S33.9XXS, S39.011A, S41.009A, S41.009A, S41.009A, S41.109A, S41.109A, S41.109A, S43.006A, S43.006A, S43.016A, S43.016A, S43.026A, S43.026A, S43.036A, S43.036A, S43.086A, S43.086A, S43.109A, S43.109A, S43.206A, S43.206A, S43.306S, S43.409A, S43.419A, S43.429A, S43.439A, S43.499A, S43.50XA, S43.80XA, S43.80XA, S43.80XA, S43.80XA, S43.90XS, S46.019A, S46.119A, S46.819A, S46.919A, S46.919S, S51.009A, S51.009A, S51.009A, S51.009A, S51.009A, S51.009A, S53.006A, S53.006A, S53.016A, S53.016A, S53.026A, S53.026A, S53.033A, S53.096A, S53.096A, S53.106A, S53.106A, S53.116A, S53.116A, S53.136A, S53.136A, S53.146A, S53.146A, S53.196A, S53.196A, S53.409A, S53.419A, S53.429A, S53.439A, S53.449A, S53.499A, S53.499S, S56.919A, S56.919S, S61.009A, S61.009A, S61.209A, S61.209A, S61.409A, S61.509A, S61.509A, S61.509A, S61.509A, S61.509A, S61.509A, S61.509A, S63.006A, S63.006A, S63.006S, S63.016A, S63.016A, S63.026A, S63.026A, S63.036A, S63.036A, S63.046A, S63.056A, S63.056A, S63.066A, S63.066A, S63.076A, S63.076A, S63.096A, S63.096A, S63.106A, S63.106A, S63.116A, S63.116A, S63.126A, S63.126A, S63.259A, S63.259A, S63.269A, S63.269A, S63.279A, S63.279A, S63.289A, S63.299A, S63.329A, S63.509A, S63.519A, S63.529A, S63.599A, S63.629A, S63.639A, S63.649A, S63.659A, S63.8X9A, S63.8X9A, S63.90XA, S63.90XS, S66.919A, S66.919A, S66.919S, S71.009A, S71.009A, S71.009A, S71.009A, S73.006A, S73.006A, S73.006S, S73.016A, S73.016A, S73.026A, S73.026A, S73.036A, S73.036A, S73.109A, S73.109S, S73.119A, S73.129A, S73.199A, S76.919A, S76.919S, S81.009A, S81.009A, S81.009A, S81.009A, S81.009A, S81.009A, S81.009A, S83.006A, S83.006A, S83.006S, S83.106A, S83.106A, S83.106S, S83.116A, S83.116A, S83.126A, S83.126A, S83.136A, S83.136A, S83.146A, S83.146A, S83.196A, S83.196A, S83.209A, S83.209S, S83.219A, S83.289A, S83.30XA, S83.419A, S83.429A, S83.509A, S83.60XA, S83.8X9A, S83.90XA, S83.90XS, S86.019A, S86.819A, S86.919A, S91.009A, S91.109A, S91.109A, S91.309A, S91.309A, S91.309A, S91.309A, S91.309A, S93.06XA, S93.06XA, S93.06XS, S93.106A, S93.119A, S93.119A, S93.129A, S93.129A, S93.306A, S93.306A, S93.306S, S93.316A, S93.316A, S93.316A, S93.316A, S93.326A, S93.326A, S93.336A, S93.336A, S93.336A, S93.336A, S93.409A, S93.419A, S93.429A, S93.439A, S93.499A, S93.519A, S93.529A, S93.609A, S93.609S, S93.629A, S93.699A, S96.919A, S96.919A, S96.919S, T14.90, T14.90, T14.90, T14.90, Z89.019, Z89.029, Z89.119, Z89.129, Z89.209, Z89.219, Z89.229, Z89.239, Z89.419, Z89.429, Z89.439, Z89.449, Z89.519, Z89.619, Z89.629, Z89.9, Z96.60, Z96.619, Z96.629, Z96.639, Z96.649, Z96.659, Z96.669, Z96.698, Z97.10
Other Chronic Pain	ICD-9: 338.29, 338.4, 729.1
	ICD-10: G89.29, G89.4, M60.9, M79.1, M79.7

References

Boling, D. "Comprehensive Pain Specialists And Former Owners Agree To Pay $4.1 Million To Settle Fraud Allegations," 2021. U.S. Attorney's Office, Middle District of Tennessee, Press Release. Available at https://www.justice.gov/usao-mdtn/pr/comprehensive-pain-specialists-and-former-owners-agree-pay-41-million-settle-fraud.

Chermack, S. T., J. Roll, M. Reilly, L. Davis, U. Kilaru, and J. Grabowski. "Comparison of Patient Self-reports and Urinalysis Results Obtained Under Naturalistic Methadone Treatment Conditions," 2000. *Drug and Alcohol Dependence* 59 (1), 43–49.

Chou, R., R. A. Cruciani, D. A. Fiellin, P. Compton, J. T. Farrar, M. C. Haigney, C. Inturrisi, J. R. Knight, S. Otis-Green, S. M. Marcus, D. Mehta, M. C. Meyer, R. Portenoy, S. Savage, E. Strain, S. Walsh, and L. Zeltzer. "Methadone Safety: A Clinical Practice Guideline from the American Pain Society and College on Problems of Drug Dependence, in Collaboration with the Heart Rhythm Society," 2014. *Journal of Pain* 15 (4), 321–337.

Chou, R., G. J. Fanciullo, P. G. Fine, J. A. Adler, J. C. Ballantyne, P. Davies, M. I. Donovan, D. A. Fishbain, K. M. Foley, J. Fudin, A. M. Gilson, A. Kelter, A. Mauskop, P. G. O'Connor, S. D. Passik, G. W. Pasternak, R. K. Portenoy, B. A. Rich, R. G. Roberts, K. H. Todd, C. Miaskowski, and the American Pain Society-American Academy of Pain Medicine Opioids Guidelines Panel. "Clinical guidelines for the use of chronic opioid therapy in chronic noncancer pain, 2009." *Journal of Pain* 10, 113–130.

Compton, P.. "The Role of Urine Toxicology in Chronic Opioid Analgesic Therapy," 2007. *Pain Management Nursing* 8 (4), 166–172.

Dowell, D., K. Zhang, R. K. Noonan, and J. M. Hockenberry. "Mandatory Provider Review and Pain Clinic Laws Reduce the Amounts of Opioids Prescribed and Overdose Death Rates," 2016. *Health Affairs* 35 (10), 1876–1883.

Florence C. S., C. Zhou, F. Luo, and L. Xu. The Economic Burden of Prescription Opioid Overdose, Abuse, and Dependence in the United States, 2013. *Med Care.* 2016;54:901–906

Fountain, J., J. Strang, M. Gossop, M. Farrell, and P. Griffiths. "Diversion of Prescribed Drugs by Drug Users in Treatment: Analysis of the UK Market and New Data from London," 2000. *Addiction* 95 (3), 393–406.

Green, T. C., M. R. Mann, S. E. Bowman, N. Zaller, X. Soto, J. Gadea, C. Cordy, P. Kelly, and P. D. Friedmann. "How Does Use of a Prescription Monitoring Program Change Medical Practice?," 2012. pp. 1314–1323.

Hall, Brooke, and Sarah Daly. "HelpDesk: How accurate are point-of-care urine drug screens in patients taking chronic opioid therapy?," 2018. *The Journal of Family Practice* 67.3: 177-177.

Hall, A. J., J. E. Logan, R. L. Toblin, J. a. Kaplan, J. C. Kraner, and A. E. Crosby. "Pharmaceutical Overdose Fatalities," 2008. *JAMA* 300 (22), 2613–2620.

Heit, H. A. and D. L. Gourlay. "Urine Drug Testing in Pain Medicine," 2004. *Journal of Pain and Symptom Management* 27 (3), 260–267

Jones, C. M. and L. J. Paulozzi. "Blood Culture Use in the Emergency Department in Patients Hospitalized for Community–Acquired Pneumonia," 2014. *JAMA Internal Medicine* 174 (5), 803–806.

Manchikanti, L., R. Manchukonda, K. S. Damron, D. Brandon, C. D. McManus, and K. Cash. "Does Adherence Monitoring Reduce Controlled Substance Abuse in Chronic Pain Patients?," 2006. *Pain Physician* 9 (1), 57–60

McNeil S. E., Chen R. J., and Cogburn M. "Drug Testing," 2023.. StatPearls, available at https://www.ncbi.nlm.nih.gov/books/NBK459334/

Substance Abuse and Mental Health Services Administration. "Opioid Misuse Increases Among Older Adults," 2017. SAMHSA. Available at https://www.samhsa.gov/data/sites/default/files/report_3186/Spotlight-3186.html.

Ouimet, P., E. Simintzi, and K. Ye. "The impact of the opioid crisis on firm value and investment," 2020. Available at SSRN 3338083.

Powell, D., R. Liccardo, P. E. Taylor, R. L. Pacula, and E. Taylor. "How Increasing Medical Access to Opioids Contributes to the Opioid Epidemic: Evidence from Medicare Part D," 2015. NBER Working Paper Series.

Rosenblum, A., M. Parrino, S. H. Schnoll, C. Fong, C. Maxwell, C. M. Cleland, S. Magura, and J. D. Haddox. "Prescription Opioid Abuse Among Enrollees into Methadone Maintenance Treatment," 2007. *Drug and Alcohol Dependence* 90 (1), 64–71.

Trescot, A. M., M. V. Boswell, S. L. Atluri, H. C. Hansen, T. R. Deer, S. Abdi, J. F. Jasper, V. Singh, A. E. Jordan, B. W. Johnson, R. S. Cicala, E. E. Dunbar, S. Helm, K. G. Varley, P. K. Suchdev, J. R. Swicegood, A. K. Calodney, B. a. Ogoke, W. S. Minore, and L. Manchikanti. "Opioid Guidelines in the Management of Chronic Non-cancer Pain," 2006. *Pain physician* 9 (1), 1–39.

Whitehead, S. and A. Miller. "CDC's new opioid guidelines are too little, too late for chronic pain patients, experts say," 2023. *NBC News*. Available at https://www.nbcnews.com/health/health-news/cdcs-new-opioid-guidelines-little-late-chronic-pain-patients-rcna74248.

Endnotes

[1] Centers for Disease Control and Prevention. "Guideline for prescribing opioids for chronic pain." *Journal of pain & palliative care pharmacotherapy* 30.2 (2016): 138–140.

[2] Information on state laws comes from West Law and is cross-referenced using state registers.

[3] See Boling (2021).

[4] This is done to exclude enrollees who cannot be prescribed 90 or more days of pain medication because they are not on the plan long enough.

[5] See Whitehead and Miller (2023).

[6] Author's calculation based on claims data.

[7] Enrollees in better health sort into plans with lower deductibles and higher premiums (HRA and HSA-eligible health plans).

[8] See Substance Abuse and Mental Health Services Administration (2017).

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