Access to Health Insurance and Treatment Utilization for Opioid Use Disorder: Evidence From State Medicaid Expansions

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Abstract

Background. Medicaid is a major payer of substance use disorder treatment, yet the impact of Medicaid expansion on the opioid epidemic has not been sufficiently quantified. This study exploits state-level differences in Medicaid expansion to assess the impact of access to health insurance on treatment utilization for opioid use disorder (OUD) for adults in need.

Method. We use admissions data from Treatment Episode Data Sets (TEDS) to fit a multivariate difference-in-difference model, with non-expanding states as controls, adjusting for age, gender, race/ethnicity, education, and other state-level factors.

Results. Medicaid expansion led to substantial gain in OUD treatment utilization. Admissions for substance use disorder among Medicaid beneficiaries increased by 20-33 percentage points in expansion states. Admissions were significantly higher for the newly eligible Medicaid beneficiaries in the 30-34 age group. We also see an increase in treatment admissions for opioid and heroin use among the elderly over the age of 55. Uninsurance rates show a commensurate decline in the expansion states. Finally, we do not find strong evidence of crowding-out of private insurance.

Conclusions. Overall, our findings suggest that Medicaid expansions had a positive impact on the financing and utilization of opioid use treatment.

Background

The opioid epidemic sweeping the country represents a national crisis. Drug overdose deaths have increased dramatically since 1999. The age adjusted drug poisoning death rate has more than tripled from 6.1 per 100,000 in 1999 to 20.7 per 100,000 in 2018 (NCHS Fact Sheet, 2020) ¹. The rate of drug overdose deaths involving synthetic opioids other than methadone (drugs such as fentanyl, fentanyl analogs) increased from 0.3 per 100,000 in 1999 to 9.9 in 2018. Comparatively, deaths related to heroin increased from 0.7 to 4.7 during the same time.

The Centers for Disease Control and Prevention (CDC) estimates that the total economic burden of prescription opioid misuse alone in the US is \$78.5 billion a year, including the costs of healthcare, lost productivity, addiction treatment, and criminal justice involvement. ²

The Patient Protection and Affordable Care Act (ACA) of 2010 significantly expanded federal funding for Medicaid. Under the new law all U.S. citizens and legal residents with incomes up to 138% of the poverty (\$27,724 for a family of three in 2015), including dependent children, would qualify for coverage in any state that participated in the Medicaid program. A significant provision of the ACA is that it designates substance abuse treatment as an essential health benefit (EHB) and removes pre-existing condition barriers.³ This has major implications for the population with addiction, a significant proportion of which is low income. While Medicaid expansion was intended to be national, the 2012 Supreme Court ruling made it optional for states to adopt. About half the states and DC initially participated in the Medicaid

expansion in 2014, although by 2017, 32 states had expanded their program. That number has since gone up to 39 states as of August 2020. Nationally, nearly 3 million⁵ poor uninsured adults fall in the 'coverage gap' which results from states' decision not to expand Medicaid.

A number of studies in the literature⁶⁻⁹ have indicated the effectiveness of substance use disorder treatment in reducing drug use and associated harms including adverse health effects, crime, HIV infection, and unemployment, relative to no treatment. Drug addiction treatment is cost-effective in reducing drug use and is associated with lower health and social costs. According to the National Institute of Drug Abuse (NIDA)¹⁰, the average cost for 1 full year of methadone maintenance treatment is approximately \$4,700 per patient, whereas 1 full year of imprisonment costs approximately \$18,400 per person. According to NIDA's conservative estimates, every \$1 invested in addiction treatment programs yields a return of between \$4 and \$7 in reduced drug-related crime, criminal justice costs, and theft alone.

Substance abuse treatment, which was segregated from general healthcare coverage, has remained largely underfunded. Treatment coverage has thus far been met largely through public funding either by states or through block grants from the federal government. Treatment for substance use remained outside any health insurance coverage – private or public - before the passage of the ACA. Medicaid expansions, along with the essential health benefits (EHB) clause covering mental health and substance use, represent a significant shift from the past in expanding both access and coverage.

There is a large volume of literature on the effects of ACA's private health insurance and dependent coverage expansions on substance use disorder.¹¹⁻¹⁸ However, studies on the effects of Medicaid expansion on treatment for opioid use disorder (OUD) is rather limited, and is often based on very preliminary data. Some recent studies have looked at the effect of health insurance on medication-assisted treatment (MAT) for substance use disorder.¹⁹⁻²² The findings indicate that the number of Medicaid-reimbursed prescriptions for buprenorphine and naltrexone increased in states that expanded Medicaid, although most low-income adults in all states continue to have limited affordable treatment. These studies find an increase in MAT use among out-patient facilities and to a smaller extent among specialty treatment facilities, largely driven by market entry of select MAT providers and their acceptance of Medicaid payments.

Medicaid is a major payer of substance use disorder treatment, yet the impact of Medicaid expansion on the opioid epidemic has not been sufficiently quantified.

Medicaid expansion became effective on January 1, 2014, however many states were late adopters. By January 2017, about 32 states and DC had expanded their program, while 18 states chose not to. (Appendix Table 1A provides a list of all the Medicaid expansion states between 2009 and 2017). This study exploits state-level differences in Medicaid expansion to assess the impact of access to health insurance, on treatment utilization for OUD among adults in need. We use administrative data on treatment admissions from the Treatment Episodes Data Set (TEDS), matched with states' insurance

coverage for the period 2009 through 2017, the latest year the data was published by Substance Abuse and Mental Health Services Administration (SAMHSA).

Methods

The TEDS admissions data are collected annually by state substance abuse agencies at the request of the SAMHSA. They contain substance abuse treatment admissions from all facilities that receive any government funding (including state agency funding and federal block grants). Due to difficulties in obtaining data, private facilities that treat non-publicly insured individuals and those receiving no federal or state funds are excluded. TEDS covers about 85% of total admissions to eligible providers, which represents about 67% of the entire population of treatment admissions to all known providers.²³ Thus, while TEDS is not expected to represent a random subset of the *entire* population of treatment admissions, the population captured by TEDS is more likely to be low-income and low-education relative to treatment admissions in purely private facilities.

The data is provided at the patient level, and includes information on the primary substance use reported during admission, along with client demographics, insurance status, payment source, source of referral, and other treatment characteristics. We employ data from 2009 to 2017 that are aggregated by state of residence and year. We exclude the population below the age of 19 and admissions referred by the criminal justice system, as they are not likely to be directly affected by Medicaid expansion and the latter are unlikely to be voluntary.

Health insurance status is not a core variable in TEDS. Only a subset of states voluntarily provide this information to SAMHSA. This forces us to drop states that lack information about insurance status and those with substantial missing values. After accounting for missing data our maximum, sample size based on insurance status is 31 states in any year. Appendix Table 2A reports the states included in our study. Our analysis is conducted using sub-sample data based on insurance status: Medicaid insurance, Uninsured, and Private Insurance.

Our outcome variable is the number of treatment admissions for three categories of admissions: opioid use only, opioid + heroin use, and all substance use. The second category is important because a large percentage of prescription drug users move to heroin use when prescriptions drugs are no longer readily available. We categorize opioids to include “non-prescription methadone” and “other opiates and synthetics” as defined in a previous study²⁴ (See Appendix part A for a complete definition). TEDS lists up to three substance of abuse per admission. Our estimations are based on admissions in which the substances in the listed category are the primary cause of admission.

We matched the TEDS admission records to several additional state-level socioeconomic variables based on year and state where the admission took place. Summary statistics are reported in Table 1.

Methodology

The basis of our empirical strategy is to assess whether admissions for OUD differed between expansion and non-expansion states between the period before and after Medicaid expansion. We fitted a multivariate difference-in-difference model, with non-expanding states as controls, adjusted for age, gender, race/ethnicity, and education, and other state-level factors.

$$(1) Y_{st} = \alpha_0 + DD_{st} \beta_1 + X'_{st} \delta_1 + \alpha_s + \gamma_t + \varepsilon_{st}$$

Where Y_{st} represents the outcome of interest, number of treatment admissions, for state s in year t . X'_{st} is a vector of control variables including economic and demographic factors. The effect of policy, represented by the difference-in-difference variable DD , is estimated by comparing changes in outcomes for Medicaid expansion and non-expansion states over 2009-2017. DD is set to zero before the implementation of Medicaid expansions for all states. DD takes the value of 1 for the states adopting Medicaid expansion (treatment group) from the year of adoption and is zero for all other states (control group) and years before the law.

All specifications control for state (s) and year (t) fixed effects. State fixed effects account for unobserved time-invariant state heterogeneity and control for statistical and policy endogeneity. Time fixed effects control for trends. We estimate this specification using a Poisson regression model with robust standard errors clustered at the state level. The discrete nature of the outcome variable as a count of admissions makes the Poisson probability distribution especially suitable. Secondly, the Poisson framework does not suffer from the “incidental parameters” problem and can accommodate fixed effects well.²⁵

Results

Table 1 reports the summary statistics for treatment admissions in expanding states and non-expanding states for the study period 2009-2017. Expanding and non-expanding states are broadly comparable across patient-level characteristics, with an average age of 32 years and about 67% male. Treatment admissions in non-expansion states include a higher percentage of whites and college-educated. This is probably related to lower levels of public insurance coverage in those states. Only 15% of admissions are covered through Medicaid in the non-expansion states compared to twice the amount (30%) in the expansion states. 70% of admissions in the non-expansion states are uninsured and 7% had private insurance. Comparatively, the uninsured admission rate in Medicaid expansion states is significantly lower at 48%, and private insurance rates are at 11%. The average admissions per 100,000 population are higher for all categories of substance use for the expansion states.

We first run a difference-in-difference model specified in equation (1) to test for differences in treatment admissions per 100,000 population in the years immediately preceding expansion (2009-2013), for patients insured through Medicaid. The comparison groups were based on states' expansion and non-expansion status post-2013. Treated = 1 for all states that expanded Medicaid post-2013 and zero otherwise. The coefficient estimates reported in Table 2 are statistically indistinguishable from zero,

indicating no significant difference in Medicaid patient admissions between the expansion and non-expansion states pre-Medicaid expansion.

Table 1: Summary statistics for expansion and non-expansion states: 2009-2017

		2009-2017	
Variable	Definition	Medicaid Expansion	No Medicaid Expansion
Age	Age of admission	32.09	31.82
Male	Client is Male	0.67	0.66
White	Client is White	0.64	0.69
Black	Client is Black	0.18	0.13
Hispanic	Client is Hispanic	0.08	0.10
No High School	Client has less than 12 years of education	0.05	0.04
High School	Client is a high school graduate	0.18	0.19
College	Client is a college graduate	0.17	0.23
Private Insurance	Client has private health insurance	0.11	0.07
Medicaid	Client is insured through Medicaid	0.30	0.15
Medicare	Client is insured through Medicare	0.11	0.06
Uninsured	Client is uninsured	0.48	0.70
Total Admissions	Total Admissions for all substance use per 100,000	664.96	544.31
Opioid	Opioid Admissions per 100,000	55.04	51.91
Opioid + Heroin	Opioid + Heroin Admissions per 100,000	213.26	88.81
N		149	124

Table 2: Pre-Medicaid Expansion Comparisons (2009-2013)

	(1)	(2)	(3)
	Opioid Use Admissions	Opioid + Heroin Use Admissions	All Substane Use Admissions
Treated	0.0630	0.00920	0.0159
	(0.170)	(0.243)	(0.211)
<i>State Fixed Effects</i>	Y	Y	Y
<i>Year Fixed Effects</i>	Y	Y	Y
<i>N</i>	204	204	204

Notes: Dependent variable represents a count of the number of substance-use disorder admissions per 100,000 population aggregated for each state and year. Model is estimated using fixed-effects Poisson regression on the Medicaid insurance admissions sample for expansion and non-expansion states. Standard errors in parentheses are robust and clustered at the state level, and significance is denoted by *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. All regressions include full set of controls.

Table 3 presents the estimates of the Poisson model specified in Equation (1) for the Medicaid insurance sample using the full sample from 2009-2017. The difference-in-difference estimate indicates that states that enacted Medicaid expansion saw significant increases in treatment admissions relative to the reference group i.e. the non-expanding states. Total substance use admissions in expanding states were higher by 33.2%, while Opioid and Opioid + Heroin related admissions increased by 20.6% and 26.2% respectively in this period.

Patient characteristics and state level controls show some interesting results. Admissions were significantly higher in the newly Medicaid eligible 30-34 age group across all three substance use categories and start to fall by age 50. Surprisingly, admissions for opioid use and opioid + heroin use show an uptick in the elderly population above 55 year. More treatment admissions are male than female. Whites and married are significantly more likely to be admitted for opioid use. This might relate to the accessibility of prescription drugs. Admissions are higher among the non-college educated and significantly lower for college graduates.

Table 3: Medicaid Treatment Admissions (2009-2017)

	(1)	(2)	(3)
	Opioid Use Admissions	Opioid + Heroin Use Admissions	All Substane Use Admissions
DD	0.206*	0.262**	0.332**
	(0.119)	(0.111)	(0.137)
Age	-0.482	-0.229	0.408
	(0.373)	(0.420)	(0.368)
Age_square	0.00746	0.00390	-0.00554
	(0.00572)	(0.00593)	(0.00512)
Age 18_20	0.000210	0.0000671	0.000237*
	(0.000172)	(0.000123)	(0.000140)
Age 21_24	-0.000118	0.000111	-0.000139
	(0.000268)	(0.000145)	(0.000189)
Age 25_29	0.000215	0.000181	0.000307*
	(0.000235)	(0.000118)	(0.000171)
Age 30_34	0.000482***	0.000144*	0.000306***
	(0.000112)	(0.0000829)	(0.000106)
Age 35_39	0.000572	0.000324	0.000223
	(0.000437)	(0.000283)	(0.000321)
Age 40_44	0.0000625	0.000460*	0.000240
	(0.000306)	(0.000242)	(0.000265)
Age 45_49	-0.000403	-0.000662**	-0.000391
	(0.000343)	(0.000276)	(0.000287)
Age 50_54	-0.000848***	-0.000730***	-0.000611**
	(0.000325)	(0.000258)	(0.000263)
Age 55plus	0.00244***	0.00266***	0.00124
	(0.000744)	(0.000902)	(0.000770)
Unemployed	0.0466	0.0654	0.104*
	(0.0559)	(0.0497)	(0.0573)
Male	2.075**	2.048*	2.617***

	(0.841)	(1.136)	(0.888)
White	3.402***	1.498	1.332
	(1.282)	(1.774)	(1.693)
Black	-0.181	2.098	1.728
	(1.496)	(2.121)	(1.962)
Hispanic	1.251	2.158	-0.0244
	(2.379)	(2.887)	(2.947)
Married	3.235***	0.580	-0.434
	(0.990)	(1.490)	(1.403)
No High School	2.993*	1.250	3.215**
	(1.686)	(1.721)	(1.267)
High School	0.847	4.513**	0.668
	(1.151)	(1.765)	(1.335)
College	-1.995**	-4.790***	-0.475
	(0.874)	(1.655)	(1.274)
<i>State Fixed Effects</i>	Y	Y	Y
<i>Year Fixed Effects</i>	Y	Y	Y
<i>N</i>	257	257	257

Notes: Dependent variable represents a count of the number of substance-use disorder admissions per 100,000 population aggregated for each state and year. Model is estimated using fixed-effects Poisson regression on the Medicaid insurance admissions sample for expansion and non-expansion states. Standard errors in parentheses are robust and clustered at the state level, and significance is denoted by *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

Next, we turn to Medicaid expansion effects on all uninsured admissions, in the expansion states relative to the non-expansion states. As suspected, the difference-in-difference estimates reported in Table 4 are negative and significant for all three categories of substance use, implying that the number of uninsured admissions was lower in states with Medicaid expansion compared to states without expansion.

Table 4: Uninsured Treatment Admissions (2009-2017)

	(1)	(2)	(3)
	Opioid Use Admissions	Opioid + Heroin Use Admissions	All Substance Use Admissions
DD	-0.415***	-0.163***	-0.293**
	(0.136)	(0.0609)	(0.138)
<i>State Fixed Effects</i>	Y	Y	Y
<i>Year Fixed Effects</i>	Y	Y	Y
<i>N</i>	257	257	257

Notes: Dependent variable represents a count of the number of substance-use disorder admissions per 100,000 population aggregated for each state and year. Model is estimated using fixed effects Poisson regression on the uninsured admission sample for expansion and non-expansion states. Standard errors in parentheses are robust and clustered at the state level, and significance is denoted by *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. All regressions include full set of controls.

The percentage of uninsured among patients seeking admission for all substance use, opioid use, opioid + heroin use was 29%, 41.5%, and 16% lower respectively, in the expansion states.

Finally, to study the effects of Medicaid expansion on private insurance rates, we run a pre- and post-analysis on the expansion states (treatment group) setting treated=1 starting in the year of expansion. A negative effect would suggest evidence of “crowding-out” of private insurance as public insurance rates rise due to the expansion of Medicaid.

Table 5: Crowding out of Private Insurance Rate in Medicaid Expansion States (2009-2017)

	(1)	(2)	(3)
	All Substance Use Admissions	Opioid Use Admissions	Opioid + Heroin Use Admissions
<i>Post</i>	-0.181***	-0.110	0.116
	(0.0675)	(0.0720)	(0.112)
<i>State Fixed Effects</i>	Y	Y	Y
<i>Year Fixed Effects</i>	Y	Y	Y
<i>N</i>	149	149	149

Notes: Dependent variable represents a count of the number of substance-use disorder admissions per 100,000 population aggregated for each state and year. Model is estimated using fixed-effects Poisson regression on the privately insured admissions sample for expansion states pre- and post-Medicaid expansion. Standard errors in parentheses are robust and clustered at the state level, and significance is denoted by *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. All regressions include full set of controls.

Our results reported in Table 5 show some evidence of decline in private insurance coverage in the expansion states among total substance use admissions, however, the difference is insignificant for opioid use and opioid + heroin admissions.

Discussion

In this study, we examine the effects of state-level Medicaid expansions that occurred under the ACA of 2010, on treatment for opioid use disorder. Using a difference-in-difference model to study the effects of Medicaid expansions, we find a substantial increase in treatment admission for opioids and opioids + heroin, as well as for all substance use put together (20.6%, 26.2%, and 33.2% respectively). This is significant because Medicaid expansions reached populations with lower income and education, and non-elderly adults who previously had little access to insurance. Increased coverage through Medicaid reduces the financial burden of treatment for substance use for this population, making patients more likely to seek treatment. The increase in insurance coverage through Medicaid led to an almost commensurate decrease in uninsurance rate in the expansion states. The percent uninsured among the treatment admissions were lower by 29% for all substance use, 41.5% for opioid use, and 16% for opioid use + heroin use in the expansion states. It is interesting to note that the percentage uninsured for opioid use, which mostly includes prescription drugs, is significantly lower.

We find substantial increases in treatment admissions in the 30-34 age group. This represents the newly Medicaid eligible young adults, as under the ACA dependent coverage already provided insurance to young adults below 26 years since 2010. Our results also show an increase in admissions for opioid and heroin use in the elderly population over the age of 55. This is supported by the findings from a previous study²⁶ that looked at the effect of Medicare Part D on opioid use and treatment admissions among the elderly.

Finally, our pre- and post-Medicaid expansion analysis shows some declines in private insurance rates among admissions for total substance use, but we do not find the same evidence for opioid and opioid + heroin use admissions in the Medicaid expansion states. Thus, the evidence on Medicaid expansion crowding-out private insurance is not very strong.

Our study has its limitations. Our results are based on three years of data post-Medicaid expansion, which formally began in 2014. Our analysis includes a subset of states which is dictated by the reporting of data in the TEDS dataset, where insurance status was missing for a number of states.

In conclusion, cost and accessibility have been significant deterrents to receiving treatment for addiction. Expansion of coverage through Medicaid expansions, removal of pre-existing conditions barriers, and designating substance abuse treatment as essential health benefit (EHB) takes away some of the impediments to seeking care. Although the ACA did not set out to address the opioid crisis our country is grappling with, the results from our study point to the beneficial outcomes of Medicaid expansion on treatment for substance abuse. These findings provide further reasoning for the need to safeguard the ACA and to expand Medicaid in all states.

Conclusion

Literature on the effects of Medicaid expansion so far, are mostly based on very preliminary data. This study uses the most current data on admissions for OUD treatment to assess the effects of Medicaid expansion, including upto 3 years of data since the policy went into effect. Our results show that Medicaid expansions led to substantial gains in OUD treatment utilization. Treatment utilization increased significantly among all Medicaid beneficiaries, and especially the newly eligible 30-34 age group. We also find a concerning increase in treatment admissions among the elderly Medicaid beneficiaries, over the age of 55. Uninsurance rates show a commensurate decline in the expansion states. There is some evidence of crowding out of private insurance for substance use as a whole, however the evidence is not significant for OUD admissions. Although the ACA did not set out to address the opioid crisis, our findings suggest that Medicaid expansions can potentially alleviate the opioid epidemic by providing access to treatment for OUD, among adults in need.

Abbreviations

ACA: Affordable Care Act

EHB: Essential Health Benefit

TEDS: Treatment Episode Data Set

MAT: Medication for Addiction Treatment

OUD: Opioid Use Disorder

SAMHSA: Substance Abuse and Mental Health Services Administration

NIDA: National Institute of Drug Abuse

Declarations

Availability of data and materials

All data used for this study are available on request.

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Contributions

AD conceptualized the study; acquired, analyzed and interpreted the data; prepared the first draft. WO and BG helped with the analysis of the data. All authors approved the submitted manuscript.

Ethics declarations

Ethics approval and consent to participate

Not applicable

Consent for publication

All authors provide consent for publication.

Competing interests

All authors declare that they have no competing interests.

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