

# Medicaid Expansion and the Opioid Epidemic: How does increasing health insurance impact the crisis?

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# Overview

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# Motivation

- "...even if you ignored deaths from all other drugs, the opioid epidemic alone is deadlier than the AIDS epidemic at its peak." - Keith Humphreys (Stanford)
- As the crisis has unfolded, the Patient Protection and Affordable Care Act (ACA) of 2010 began a dramatic reshaping of the American health care system.
- Integral to the law was expansion of health insurance access, including public insurance expansion, and more robust requirements for coverage of mental health and substance use disorder (SUD) treatments.

- I test the impact of the Medicaid Expansion on each subcategory of opioid related mortality
- This study identifies the causal impact of the Medicaid Expansions on opioid mortality (both negative and positive effects by subcategory)
- Understanding these effects is of particular importance given recent legislative proposals to alter or repeal the ACA

- I examine the impact of expanded health insurance on opioid use through two channels:
  - ① Increased access to prescription opioids
  - ② Increased access to treatment
- Medicaid funded opioid prescriptions are known to be resold on the black market (including opioid analgesics and methadone)
- But expansion of health insurance can also remove cost barriers to obtaining treatment

# The Opioid Epidemic

- Up until 1980, pain killers were generally prescribed for post-surgery pain, short-term pain, and to patients with terminal illnesses
- Pharmaceutical companies push back on the idea that pain killers are addictive
- Purdue Pharma began manufacturing OxyContin in 1996 and started to encourage doctors to prescribe pain killers more frequently
- By 2010, OxyContin was the 15th ranked prescription by retail sales (Alpert et al., 2017)

# Access to Opioids

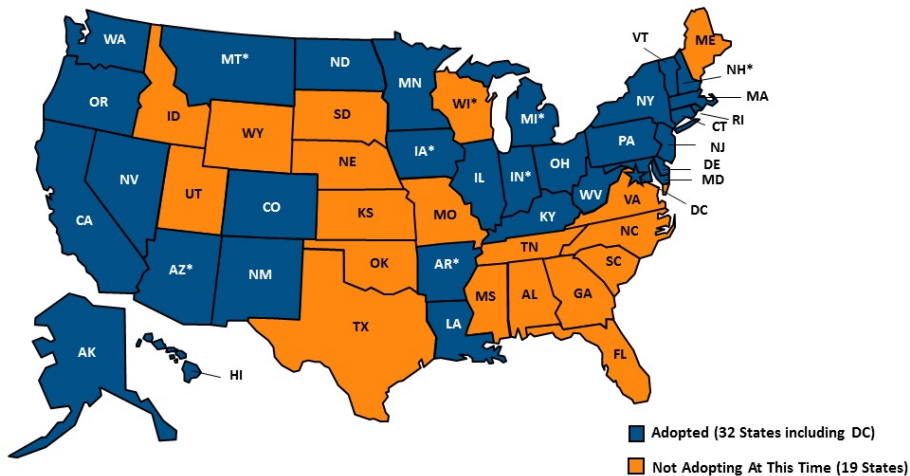
- Many current opioid users were first introduced to opioids via legal medical channels.
- Cicero et al. (2014) find that among heroin users entering treatment, 75% of users first opioid use came in the form of a prescription opioid.
- By 2010, 94% of users selected heroin because prescription opioids were becoming too expensive and/or hard to obtain (Cicero et al., 2014).

# Medicaid Expansions

- Medicaid is the largest source of funding for behavioral health treatment in the United States (Bachrach et al., 2016)
- The ACA defined what health benefits would be offered to the newly eligible expansion population (Alternative Benefit Plans) including treatment for SUDs (Grogan et al., 2016)
- An estimated 1.6 million individuals with substance use disorders received health benefits as a result of the Medicaid expansion (Grogan et al., 2016)
- Frank and Glied (2017) estimate that 220,000 Americans with an opioid use disorder would lose some of all of their insurance coverage as a result of a repeal of the ACA (including behavioral health provisions)
- The decision to expand Medicaid was highly politicized. As such, pre-trends will be carefully examined



# Current Status of State Medicaid Expansion Decisions



NOTES: Current status for each state is based on KCMU tracking and analysis of state executive activity. \*AR, AZ, IA, IN, MI, MT, and NH have approved Section 1115 waivers. WI covers adults up to 100% FPL in Medicaid, but did not adopt the ACA expansion.

SOURCE: "Status of State Action on the Medicaid Expansion Decision," KFF State Health Facts, updated January 1, 2017.

<http://kff.org/health-reform/state-indicator/state-activity-around-expanding-medicaid-under-the-affordable-care-act/>

Table 9: Medicaid Expansion under the ACA

State	Expansion Date
California	7/1/2011
Connecticut	4/1/2010
District of Columbia	7/1/2010
Minnesota	3/1/2011
New Jersey	4/14/2011
Washington	1/3/2011
Arizona	1/1/2014
Arkansas	1/1/2014
Colorado	1/1/2014
Delaware	1/1/2014
Hawaii	1/1/2014
Illinois	1/1/2014
Iowa	1/1/2014
Kentucky	1/1/2014
Maryland	1/1/2014
Massachusetts	1/1/2014
Michigan	4/1/2014
Nevada	1/1/2014
New Hampshire	8/15/2014
New Mexico	1/1/2014
New York	1/1/2014
North Dakota	1/1/2014
Ohio	1/1/2014
Oregon	1/1/2014
Rhode Island	1/1/2014
Vermont	1/1/2014
West Virginia	1/1/2014
Alaska	9/1/2015
Indiana	2/1/2015
Montana	1/1/2016
Louisiana	7/1/2016
Pennsylvania	1/1/2015

Source: Maclean and Saloner (2017)

# Opioid Use Disorder Medications

- Successful treatment for opioid use disorder often includes long term medication maintenance (ASAM, 2017)
- The American Society of Addiction Medicine (ASAM) guidelines recommend: psychosocial treatment and opioid use disorder medications used in concurrence (Grogan et al. 2016). Such treatments (both inpatient and outpatient) and medications can be prohibitively costly for the uninsured.
- Buprenorphine (Suboxone) and Methadone are the mostly commonly prescribed FDA approved medications. Both are effective in managing withdrawal symptoms and reduce the risk of relapse.

- A full course of buprenorphine maintenance costs about \$6,000 per patient per year (Wen et al., 2017)
- Opioid use disorder medications help manage the body's dependence on opioids and are more difficult to abuse than other types of opioids
- Suboxone is generally considered more difficult to abuse than methadone

# Methadone

- "Methadone is an opioid prescribed for pain management and is also provided through opioid treatment programs to treat opioid use disorders." (Faul et al., 2017).
- The average annual cost of methadone maintenance is \$4,700 per patient (National Institute on Drug Abuse, 2012).
- Methadone can slow breathing and affect heartbeat. Methadone carries significant risk of overdose as it provides pain relief for about 4-8 hours but stays in the body for up to 59 hours (FDA, 2006)
- From 1999-2014, the rate of methadone related overdose death per 100,000 increased by 600% (Faul et al., 2017).
- Faul et al. (2017) find that in 2014, the methadone prescribing rate for Medicaid enrollees was about double that of Commercial Claims and Encounters enrollees. (CCE - sample of privately insured patients)

# Medicaid Expansion

- 2 recent papers examine the impact of the Medicaid expansion on SUD treatment utilization: Maclean and Saloner (2017) find a 33 percent increase in prescriptions used to treat opioid use disorder in expanding states relative to non-expanding states
- Wen et al. (2017) find a 70 percent increases in Medicaid-covered buprenorphine prescriptions in 2014 in expanding states
- Maclean and Saloner (2017) examine mortality as well, they find no impact of Medicaid expansion on total alcohol poisoning and drug-related overdose deaths

# Other Policy Changes

- Most state legislatures have responded to the opioid epidemic.
- Given policies that were designed to curb drug related overdose deaths, controlling for such changes in state law help eliminate any potential confounding impact resulting from policy change unrelated to the Medicaid expansions.
- For this reason, I include controls for Prescription Drug Monitoring Programs (PDMPs), Naloxone Access Laws (NALs) and Good Samaritan Laws (GSLs).
- In progress: include controls for Medical Marijuana Laws and 3 states that have adopted Pill Mill Laws

# Primary Data - Wonder CDC multiple cause-of-death data

- I examine a 17 year panel of data covering 1999-2016
- The Wonder CDC multiple cause-of-death data is a nearly universal database of death certificates in the U.S.
- Following Rees et al. (2017), I classify all opioid related overdose deaths by International Classification of Disease, Tenth Revision (ICD-10) codes as including: T40.0 (opium), T40.1 (heroin), T40.2 (other opioids), T40.3 (methadone), T40.4 (other synthetic narcotics) and T40.6 (other/unspecified narcotics).
- I examine each category individually to examine the two separate mechanisms I described



# Identification Strategy

I estimate the following Poisson Regression:

$$\ln(\lambda_{st}) = \alpha_0 + \alpha_1 \text{Medicaid}_{st} + X_{st}\beta + \mu_s + \delta_t + \epsilon_{st}$$

$\lambda_{st}$  represents the number of opioid-related deaths in state  $s$  and year  $t$   
 $\text{Medicaid}_{st}$  is an indicator variable equal to 1 if the expansion of Medicaid was in effect in state  $s$  and year  $t$  (equal to zero otherwise)

$X_{st}$  is a vector of controls including: other changes in pertinent laws (NALs, GSLs, PDMPs), population, demographics (age and race), unemployment

$\mu_s$  state fixed effects

$\delta_t$  year fixed effects

# Controlling for Changes in Medicaid Benefits

- The ACA led to changes in benefits, specifically for Medicaid enrollees
- I use survey data from Grogan et al. (2016) which identifies 31 states (plus D.C.) in which Medicaid programs funded all medications used to treat opioid use disorder
- "Medicaid programs in all states and the District of Columbia ( $n = 51$ ) provided coverage for buprenorphine...However, there was much less widespread coverage for oral naltrexone ( $n = 34$ ) and methadone ( $n = 32$ )" (Grogan et al, 2016)

# Controlling for Changes in Medicaid Benefits

- Using this model I attempt to separate the effects of changes in Medicaid benefits across states from the effects of the Medicaid expansion
- I estimate the following equation:

$$\ln(\lambda_{st}) = \alpha_0 + \alpha_1 \text{Medicaid}_{st} * MAT_s + \alpha_2 \text{OtherExpandingStates}_{st} + X_{st}\beta + \mu_s + \delta_t + \epsilon_{st}$$

$MAT_s$  is an indicator variable equal to 1 if buprenorphine and methadone are covered by Medicaid in state  $s$  and equal to zero otherwise

# Identification Strategy

$$\ln(\lambda_{st}) = \alpha_0 + \alpha_1 \text{Medicaid}_{st} + \alpha_2 \text{Uninsured}_s^{\text{Pre}} * \text{Post}_t + \alpha_3 \text{Medicaid}_{st} * \text{Uninsured}_s^{\text{Pre}} * \text{Post}_t + X_{st}\beta + \mu_s + \delta_t + \epsilon_{st}$$

$\text{Uninsured}_s^{\text{Pre}}$  is the uninsured rate in state  $s$  in 2013 and  $\text{Post}_t$  is an indicator equal to 1 in 2014 and subsequent years (equal to zero otherwise).

Table 2: Poisson Results, State Level, 1999-2016

	Mean of dependent variable		
<i>Panel A: Heroin</i>			201.86
Medicaid Expansion	-0.445** (0.219)	-0.312** (0.149)	-0.355** (0.145)
Coefficient Interpretation	-0.36	-0.27	-0.30
<i>Panel B: Methadone</i>			140.14
Medicaid Expansion	0.367*** (0.0827)	0.194*** (0.0721)	0.135* (0.0723)
Coefficient Interpretation	0.44	0.21	0.14
<i>Panel C: Other Narcotics</i>			112.89
Medicaid Expansion	-0.284** (0.130)	-0.240* (0.141)	-0.300** (0.124)
Coefficient Interpretation	-0.25	-0.21	-0.26
<i>Panel D: All Opioids</i>			819.74
Medicaid Expansion	-0.113 (0.114)	-0.0238 (0.0693)	-0.0370 (0.0711)
Coefficient Interpretation	-0.11	-0.02	-0.04
Controls : Population	Yes	Yes	Yes
Age and Demographics	No	Yes	Yes
Unemployment Rate	No	Yes	Yes
Other Pertinent Laws	No	No	Yes
N	846	846	846

Notes: Population weighted estimates. Model includes year fixed effect and state fixed effect. Pertinent Laws include Naloxone Access Laws, Good Samaritan Laws and Prescription Drug Monitoring Programs. Standard errors in parentheses are clustered at the state level. \* p<0.10, \*\* p<0.05, \*\*\* p<0.01

# Interpretation of Results

- Results in table 2 suggest that the implementation of Medicaid expansion following the ACA has resulted in about a 30 percent reduction in heroin deaths and a 26 percent reduction in other unspecified narcotics related deaths.
- Expansion of Medicaid is associated with a 14.5 percent increase in methadone related deaths.
- Grouping each subcategory, I find that the Medicaid expansion had a negative impact on opioid deaths though the coefficient is not statically significant. This may be explained by opposite effects by subcategory. For example, my results suggest that the expansion of Medicaid would lead to a decrease of 61 heroin related deaths and an increase of 20 methadone related deaths in a given state, in a given year.

Table 3: Medicaid Expansion Interaction, State Level, 1999-2016

	All Opioids	Heroin	Other Opioids	Methadone	Synthetic	Other Narcotics
Medicaid*MAT	-0.0269 (0.0915)	-0.388** (0.173)	-0.184* (0.0995)	0.189*** (0.0671)	0.291* (0.158)	-0.0132 (0.146)
Coefficient Interpretation	-0.03	-0.32	-0.17	0.21	0.34	-0.01
Other Expanding States	-0.00428 (0.0787)	-0.0122 (0.191)	-0.0126 (0.133)	0.126 (0.126)	0.0833 (0.145)	-0.679* (0.403)
Coefficient Interpretation	0.00	-0.01	-0.01	0.13	0.09	-0.49
Mean of Dependent N	819.74 846	201.86 846	363.43 846	140.14 846	136.49 846	112.89 846

Notes: Population weighted estimates. Models include year fixed effect and state fixed effect. Controls include the natural log of the state population, age and demographic controls and the unemployment rate. Standard errors in parentheses are clustered at the state level. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

# Data - Medicaid State Drug Utilization

- Next I consider prescription outcomes obtained from the Medicaid State Drug Utilization data
- I assemble a 10 year panel of data (2006-2016) containing methadone prescriptions reimbursed by Medicaid at the state quarterly level.
- I consider the following outcomes: number of prescriptions, Medicaid amount reimbursed and units reimbursed. Medicaid State Drug Utilization data separates prescriptions by utilization type (fee for service or managed care) and by product code. I aggregate the data to state, quarter level observations

$$Y_{s,t} = \sum_{i,j} Y_{s,t,i,j}$$

Where  $Y_{i,j,s,t}$  is the number of prescriptions of product code  $i$ , of utilization type  $j$  (fee for service or managed care), in state  $s$  in quarter  $t$



Table 6: Methadone - Medicaid State Drug Utilization Data

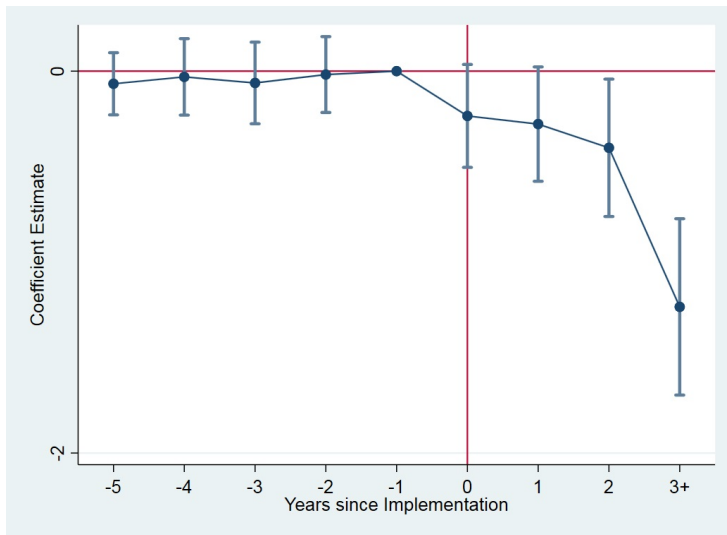
Dependent	Log Number of Prescriptions	Log Number of Prescriptions	Log Medicaid Amount Reimbursed	Log Medicaid Amount Reimbursed	Log Units Reimbursed	Log Units Reimbursed
<i>Panel A: Expansion</i>						
Medicaid Expansion	0.405*** (0.130)	0.304** (0.117)	0.357** (0.144)	0.181 (0.160)	0.315*** (0.113)	0.215* (0.117)
<i>Panel B: Interaction</i>						
Medicaid*MAT	0.572*** (0.149)	0.377** (0.141)	0.533*** (0.178)	0.223 (0.187)	0.447*** (0.129)	0.268* (0.139)
Other Expanding States	-0.0463 (0.149)	-0.0269 (0.191)	-0.109 (0.185)	-0.0112 (0.201)	0.00172 (0.124)	0.0256 (0.146)
Population Weighted Mean of Dependent Before Transformation	No 5,183.41	Yes 5,183.41	No 107,727.00	Yes 107,727.00	No 569,722.10	Yes 569,722.10
N	2,009	2,009	1,857	1,857	1,475	1,475

Notes: Medicaid State Drug Utilization data 2006-2016, state, quarterly Level. Model includes quarterly fixed effect, state fixed effect and control for the natural log of population. Quarterly Population data from Bureau of Economic Analysis Personal Income Summary 2010-2016. Annual Population data used as a proxy (2006-2010) from NCHS Bridged Race Population Estimates. Standard errors in parentheses are clustered at the state level. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

# Medicaid State Drug Utilization Results

- Previous studies have shown increases in buprenorphine prescriptions in expanding states relative to non-expanding states
- Results in table 6 show that the Medicaid expansion was associated with a 21-40 percent increase in methadone prescriptions reimbursed by Medicaid depending on the outcome considered (number of prescriptions, amount reimbursed or units reimbursed).
- The coefficient of interest increases in the interaction model. Methadone prescriptions increased in states in which Medicaid covers methadone and Medicaid was expanded.

# Figure 2: Event Study - Effect of Medicaid Expansion on Heroin Deaths



## Figure 3: Event Study - Effect of Medicaid Expansion on Methadone Deaths

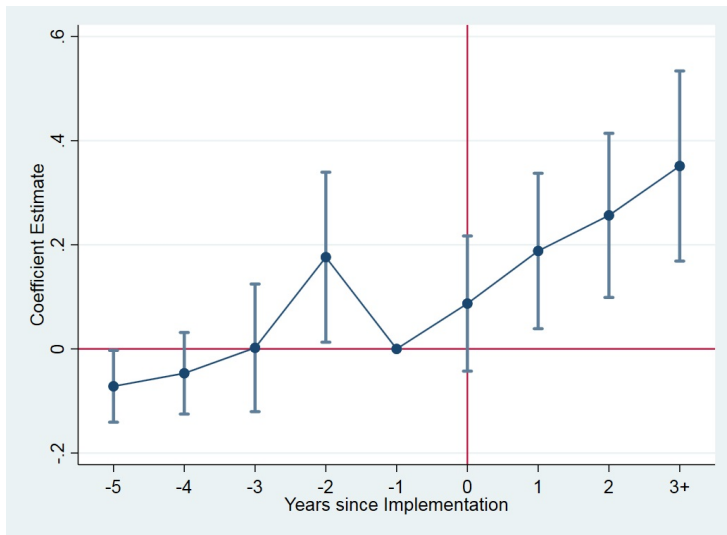


Figure 4: Event Study - Effect of Medicaid Expansion on Methadone Deaths: 2014 Expanding States Only

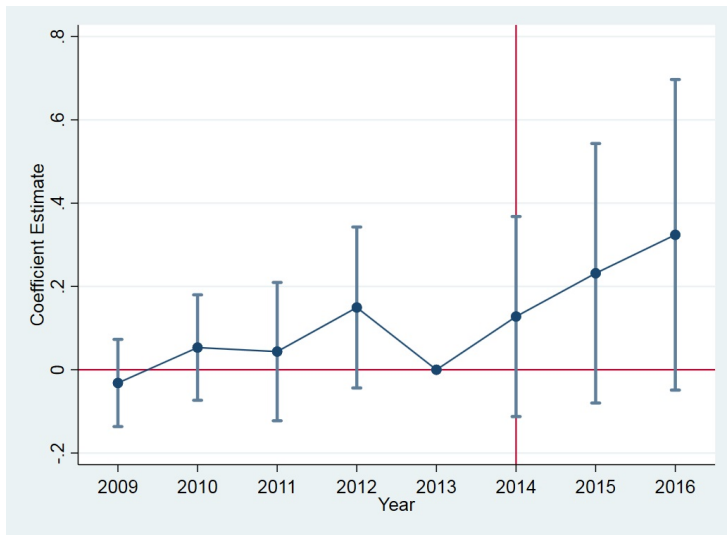


Figure 5: Event Study - Effect of Medicaid Expansion on Heroin Deaths: 2014 Expanding States Only

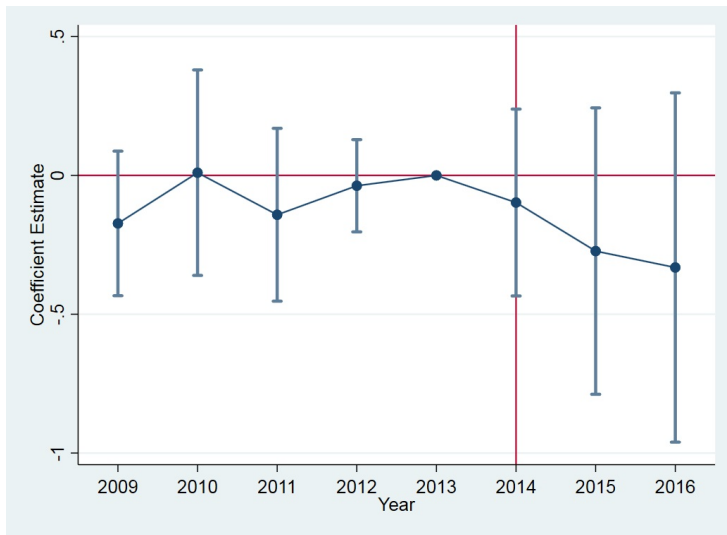


Figure 6: Event Study - Effect of Medicaid Expansion on Other/Unspecified Narcotics Deaths: 2014 Expanding States Only



- Summary of robustness checks
  - Robustness to functional form: OLS and Negative Binomial
  - Robustness to population weighting: re-estimate unweighted models
  - Control for changes in Medicaid benefits by state
  - Drop early expanding states and late expanding states
  - Drop each individual treatment state
  - Include a variable for 2 year lead



# Conclusion

- My findings suggest the implementation of Medicaid expansion resulted in about a 30% reduction in heroin deaths, a 26% reduction in other unspecified narcotics deaths and a 14.5% increase in methadone related deaths
- Reducing out of pocket cost and increasing access to treatment (inpatient, outpatient and prescriptions for opioid use disorder) may be the most effective way to combat the opioid crisis.
- Mounting evidence points to the shortcoming of other policies implemented to address the crisis (supply side, adverse effects of substitution across opioid types)