Early Medicaid Expansions and Drug Overdose Mortality in the USA: a Quasi-experimental Analysis

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INTRODUCTION

The widespread availability of prescription and illicit opioids is thought to be a key driver of the rise in drug overdose mortality in the USA.[1] The role of health insurance in increasing access to prescription opioids has thus emerged as a key policy issue. Policymakers and commentators have raised concerns that Medicaid expansions—such as those implemented as part of the Affordable Care Act (ACA)—may have caused the rise in drug overdose mortality, citing more deaths from drug overdose in states that expanded Medicaid versus those that did not.[2]

Assessing whether insurance expansions helped cause the rise in drug overdose mortality is challenging in the midst of a national crisis. The availability of opioids[1] and drug overdose mortality rates[3] were already increasing prior to the ACA. In addition, the crisis has evolved like an epidemic and assessing root causes is difficult during periods of accelerating growth in disease rates.

We examined the effect of Medicaid expansions on drug overdose mortality using early Medicaid expansions in Arizona, Maine, and New York from 2001 to 2002. All three states expanded coverage up to 100% of the federal poverty line for childless adults. Arizona and New York further expanded coverage to 200% and 150% of the federal poverty line, respectively, for parents with dependent children. These expansions occurred on the eve of the national rise in drug overdose mortality, making it possible to investigate whether insurance expansions served as an underlying cause.

METHODS

We used publicly available, state-level data on age-adjusted, drug overdose mortality rates (ICD 10: X40-X44, X60-X64, X85, Y10-Y14) from 1999 to 2008 for 25–64 year-olds from the US Centers for Disease Control (https://wonder.cdc.gov/mortSQL.html). Like prior work,[3] we focused on all drug overdose deaths given the well-known underreporting of opioid-attributable deaths and the fact that over 60% drug overdose deaths are likely attributable to opioids.[4] The starting year (1999) corresponded to the beginning of the ICD-10 era, while the ending year (2008) was chosen on the basis of prior work examining the health consequences of the same early Medicaid expansions.[5]

We estimated difference-in-differences models comparing changes in drug overdose mortality in early expansion states versus non-expansion states. We adjusted for state-fixed effects to account for time-invariant differences between states; year-fixed effects to adjust for national secular trends; and poverty and unemployment rates (obtained from the University of Kentucky Center for Poverty Research, UKCPR; http://www.ukcpr.org/data). Models were weighted by population and standard errors were corrected for state-level. Replication data, code, and other materials are available in the Harvard Dataverse (https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/9ZS4KR).

RESULTS

Unadjusted gaps in drug overdose mortality rates were stable between expansion and non-expansion states prior to Medicaid expansions, but grew faster in non-expansion states thereafter (Fig. 1a). A similar pattern was seen when restricting control states to non-expanding neighbors (New Hampshire, Pennsylvania, New Mexico, Nevada, Fig. 1b).

Difference-in-differences estimates (Table 1) confirmed this pattern. Drug overdose mortality rates were, on average, lower by 3.7 deaths per 100,000 per year in expansion states relative to non-expansion states after policy implementation through 2008 ($\beta = -3.7$; 95% CI, -5.6, -1.9; $p < 0.001$). Estimates were similar after additional adjustment for state-specific linear time-trends (to account for differential pre-policy trends) and other social policy measures (state minimum wage, welfare and food stamp programs generosity, and state
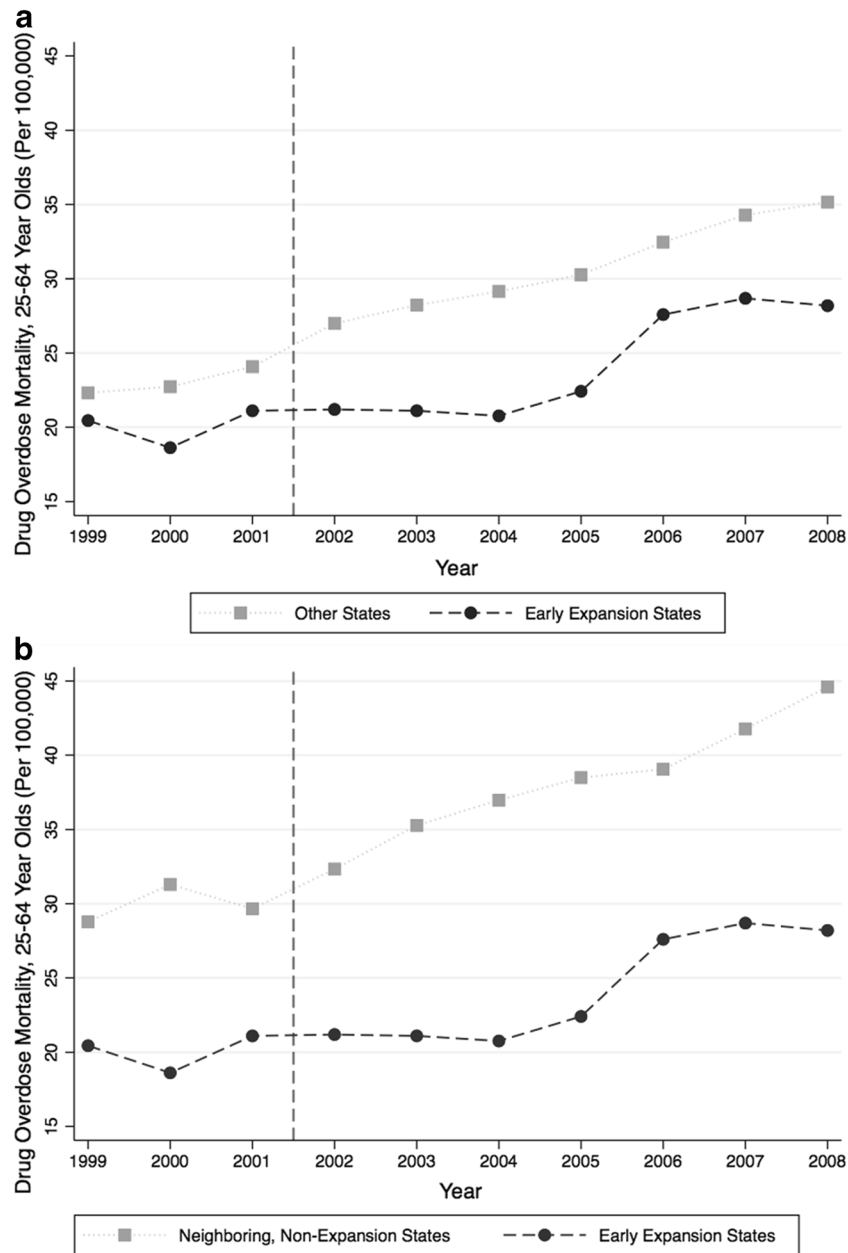
Figure 1 Trends in drug overdose mortality. Notes: drug overdose mortality rates for 25–64 year-olds (age adjusted, per 100,000) for states expanding Medicaid early (Arizona, Maine, New York) versus (a) all other states (plus District of Columbia) and (b) non-expanding, neighboring states (New Hampshire, Pennsylvania, New Mexico, Nevada). The vertical line at 2002 represents the first year after Medicaid expansion (Arizona and New York expanded in late 2001, Maine in late 2002).

Supplemental Security Income—all obtained from the UKCPR) ($\beta = -4.0$; 95% CI, -7.8, -0.2; $p = 0.04$). Restricting the control group to the non-expanding neighboring states also yielded similar results ($\beta = -4.4$; 95% CI, -6.9, -1.3; $p = 0.005$).

DISCUSSION

Drug overdose mortality rates rose less sharply in three states that expanded Medicaid in the early 2000s as compared to states that did not. These findings suggest that Medicaid expansions were unlikely to have

contributed to the subsequent rise in drug overdose deaths and may, in fact, have been protective.

Limitations of our approach include the small number of expansion states and the difficulty of generalizing findings to subsequent Medicaid expansions, which occurred in the accelerating phase of the epidemic.

Nonetheless, these findings should offer further reassurance to policymakers concerned that Medicaid expansions have caused the rise in drug overdose mortality. The striking results suggest there may be important lessons to be learned from this historical episode. In particular, future work should examine mechanisms

Table 1 Difference-in-Differences Estimates

	(1)	(2)	(3)
Estimate (β)	− 3.73	− 3.99	− 4.42
	[− 5.60, − 1.86]	[− 7.82, − 0.16]	[− 6.91, − 1.93]
	$p < 0.001$	$p = 0.042$	$p = 0.005$
N (state-years)	510	510	70
N (states and D.C.)	51	51	7

Notes: Estimates from difference-in-differences least squares models, reflecting the differential change in age-adjusted drug overdose mortality for 25–64 year-olds (per 100,000) in expansion versus non-expansion states (denoted by β). All models adjust for state fixed effects, year fixed effects, and state-year unemployment and poverty rates and are weighted by state population of 25–64 year-olds. 95% CI, adjusted for clustering at the state level, in square brackets. Column [2] additionally includes state-specific linear time trends and state-year measures of social program generosity (state minimum wage in dollars per hour, welfare generosity as measured by the monthly maximum benefits from welfare and food stamp programs for a four-person family, and maximum monthly state Supplemental Security Income—all obtained from the UKCPR). Column [3] is identical to Column [1] except here we restricted the control states to non-expanding neighboring states

underlying these findings, which may include improved financial security and mental health upon obtaining insurance,[6] or increased access to treatment for substance use disorders.

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Compliance with Ethical Standards:

Conflict of Interest: *The authors declare that they have no conflict of interest.*

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