

## ORIGINAL RESEARCH

## Health Policy

# Changes in emergency department use associated with Medicaid expansion under the Affordable Care Act: A comparison of waiver and traditional expansion states

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**Abstract**

**Objective:** To determine whether changes in emergency department use associated with Medicaid expansions differed between states undergoing waiver and traditional expansions.

**Methods:** Design: This study was a cross-sectional difference-in-difference and event studies of Medicaid Expansion among states that expanded during or after 2014. Setting: We used a nationally representative cross-sectional survey from all 50 United States and the District of Columbia from 2010 to 2016. Participants: Adults aged 19–65 years with incomes <138% of the federal poverty level were included. Main Outcomes and Measures: Main outcomes were self-reported emergency department (ED) utilization in the last 12 months.

**Results:** Individuals in states across all expansion types were not more likely to report any ED use in the previous year (2.8 percentage point increase [0.0–5.5],  $P = 0.052$ ) but were more likely to report visiting an ED 2 times or more in the previous year (2.0 [0.0–4.1],  $P = 0.049$ ) than those in non-expansion states. Individuals in states undergoing traditional expansions likewise were not more likely to report any ED use (2.2 [−0.7 to 1.5],  $P = 0.136$ ) but were more likely to report visiting an ED 2 times or more in the previous year (2.3 [0.1–4.4],  $P = 0.038$ ). Conversely, individuals in waiver states were more likely to report increase in any ED use (5.6 [0.3–11.0],  $P = 0.038$ ), but were not more likely to report use of EDs 2 times or more in the previous year (0.8 [−3.2–4.9],  $P = 0.688$ ). The differences between traditional and waiver states in any ED use and ED use 2 times or more in the previous 12 months were not statistically significant ( $P = 0.215$  and  $P = 0.501$ , respectively).

**Conclusions:** Three years after expanding Medicaid under the Affordable Care Act, there is little evidence of differences between traditional and waiver expansion states in changes in any ED use or intensive ED use. Future studies should investigate longer term changes in ED use.

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**KEYWORDS**

Affordable Care Act, emergency departments, healthcare delivery, insurance coverage, Medicaid

## 1 | INTRODUCTION

### 1.1 | Background

After the Supreme Court ruled Medicaid expansion under the Affordable Care Act (ACA) optional for states in 2012, states that chose to expand their Medicaid programs have done so in different ways. Although most have undergone a traditional expansion following the original statutory guidelines of the ACA, others have chosen undergo expansions using section 1115 waivers, in which they request permission to expand their programs outside of the ACA and Centers for Medicare & Medicaid Services (CMS) guidelines. States that have used waivers have altered their Medicaid programs in a variety of ways, including by using health savings accounts, allowing premium assistance (use of Medicaid funds to purchase private market plans), and requiring enrollment in Medicaid Managed Care Organizations<sup>1</sup> (see Supporting Information [Appendix Table SA1](#)).

Studies examining the effect of Medicaid expansions under the ACA suggest that increases in insurance coverage have led to increases in the use of health care services and important improvements in health outcomes among those newly covered. These gains include improvement in self-reported health measures,<sup>2–12</sup> mental health,<sup>5,6,13,14</sup> and chronic disease management<sup>10,15–21</sup> as well as decreased all-cause mortality.<sup>22–24</sup> As time goes on and individuals are able to reap the benefits of long-term insurance coverage, improvements in observed health outcomes may increase.<sup>25</sup>

A concern before the implementation of the ACA's Medicaid expansions was that expanding coverage would lead to unsustainable increases in emergency department use, potentially overwhelming systems that were already strained.<sup>26</sup> Studies to date have provided mixed evidence on the effects expanding Medicaid on rates of emergency department (ED) utilization. Among studies using large national or state-wide databases, some have found either no change or even decreases in ED utilization among Medicaid beneficiaries post-expansion,<sup>3,4,7,27,28</sup> whereas others have found increased utilization consistent with these predictions.<sup>29–33</sup> More recently, a study using 4 years of post-expansion data and examining 4 states (2 of which had expanded Medicaid, 2 of which had not), found decreases in ED utilization among individuals in the states that had expanded Medicaid.<sup>34</sup>

By comparison, relatively little work has been done to examine how these changes might differ by type of Medicaid expansion. One study examined changes in health coverage and outcomes up to 2 years post-expansion in 3 states: Arkansas (that expanded its Medicaid program using a waiver), Kentucky (that expanded its Medicaid program traditionally), and Texas (that did not expand). This study found that, although individuals in the expansion states reported decreased

ED use 2 years post-expansion compared to individuals in the non-expansion state; there were no differences in reported ED use between individuals in the traditional and waiver expansion states.<sup>3</sup>

### 1.2 | Importance

Although these studies provide important evidence for how ACA Medicaid expansions has affected ED utilization, to date, no national-level study has examined whether changes in ED healthcare utilization or outcomes have differed by type of Medicaid expansion, nor how utilization in states undergoing each type of expansion compares to utilization in states that did not undergo expansion. Early studies examining the effects of Medicaid expansion at the national level did not capture the experiences of states that used waivers since they adopted their programs later, and later studies, which encompass the period in which states expanded using waivers, pool states that expanded via either a traditional or waiver approach. Although use of waivers has been politically controversial, with some arguing they may inappropriately restrict access to care,<sup>34</sup> whether or not changes in ED utilization or outcomes post-ACA expansions have differed between states undergoing traditional versus waiver expansions has not been studied.

### 1.3 | Goals of this investigation

The purpose of this study was to assess if changes in ED utilization associated with Medicaid expansion differed between states undergoing traditional versus waiver expansions.

## 2 | STUDY DATA AND METHODS

### 2.1 | Study design

This cross-sectional study used difference-in-difference and event-study analysis methods to compare ED utilization between expansion and non-expansion states in the 4 years prior to expansion (2010–2013) relative to 3 years post-expansion (2014–2016). When estimating the models, we differentiated between states that chose to expand using waivers versus states that chose to undergo traditional expansion (see [Table 1](#) for information on how we classified states and Supporting Information [Appendix Table SA1](#) for information on the features of expansion in states using waivers). The post-expansion period was defined based on each state's date of Medicaid expansion. Consistent with prior work, 4 states (New York, Delaware, Massachusetts, and

**TABLE 1** Expansion status of states as of September 2016<sup>a</sup>

Non-expansion	Expansion	
	Traditional	Waiver
Alabama	Arizona	Arkansas
Florida	Alaska	Indiana
Georgia	California	Iowa
Idaho	Colorado	Michigan
Kansas	Connecticut	Montana
Maine	Hawaii	New Hampshire
Mississippi	Illinois	
Missouri	Kentucky	
Nebraska	Louisiana	
North Carolina	Maryland	
Oklahoma	Minnesota	
South Carolina	New Jersey	
South Dakota	New Mexico	
Tennessee	Nevada	
Texas	North Dakota	
Utah	Ohio	
Virginia	Oregon	
Wisconsin	Washington	
Wyoming	West Virginia	

<sup>a</sup>We excluded individuals living in the District of Columbia, Delaware, Massachusetts, New York, and Vermont from analysis as these states already provided Medicaid or similar coverage to adults with incomes up to 100% of the federal poverty line or greater during 2010–2013. This is consistent with previous work.<sup>10</sup> We also excluded Pennsylvania and Rhode Island from this analysis, because they underwent a waiver expansion followed by a conversion to traditional coverage and vice versa.

Vermont) and the District of Columbia were excluded, as these states already offered Medicaid coverage similar to the expansion level prior to 2014.<sup>9,10</sup> Pennsylvania and Rhode Island also were excluded from analysis, as these states initially underwent a waiver expansion followed by a traditional expansion and traditional expansion followed by waiver expansion, respectively.

## 2.2 | Participants

Our study sample consisted of all adults 19–64 years old with incomes less than 138% of the federal poverty level, consistent with the income eligibility criteria for Medicaid coverage under ACA expansions.

## 2.3 | Data sources/measurement

We used data from the National Health Interview Survey (NHIS), a large, nationally representative health information survey conducted annually, for health insurance, utilization, and outcome measures.<sup>35</sup>

## 2.4 | Variables

Our main outcomes of interest were ED utilization measures available within the NHIS dataset, including whether respondents had any visit to an ED in the past 12 months (any ED use) and whether they had visited an emergency department two times or more in the past

### The Bottom Line

With the Affordable Care Act (ACA), states were given the option to expand Medicaid either traditionally (following the ACA guidelines) or alter the program using waivers. Looking at intensive emergency department utilization (more than 2 visits in the last 12 months), there was a 2% increase with expansion overall; however, there was no real difference in utilization between traditional and waiver expansions.

12 months (intensive ED use) (see Supporting Information [Appendix Table SA2](#) for exact wording).<sup>35</sup> We chose 2 or more visits to represent intensive ED use, because 2 or more ED visits by an individual annually more likely represents discretionary ED use, consistent with previous work.<sup>36</sup>

## 2.5 | Study size

Our sample consisted of 37,658 individuals; 20,912 of whom resided in expansion states and 16,746 of whom resided in states that had not expanded by 2016. Among those residing in expansion states, 17,646 respondents resided in states undergoing traditional expansions, whereas 3266 resided in states undergoing waiver expansions.

## 2.6 | Statistical analysis

Two-tailed *t*-tests were used to calculate differences between sample demographics between respondents in expansion and non-expansion states and between respondents in traditional versus waiver expansion states. We then used ordinary least squares regressions and linear probability models to generate difference-in-difference estimates of the effects of expansions on ED use. Our estimates compare changes in ED use in states that expanded relative to those that did not expand coverage. In the first set of models, we examined the effect of any type of Medicaid expansion relative to non-expansion. These models had ED utilization as an outcome and included indicators of the state of residence of the individual, the survey year, and an indicator of whether a state had expanded its Medicaid program in that year. The coefficient on the indicators of Medicaid expansion is the difference-in-difference estimate of the effect of expansion on the study outcome. In the second set of models, we differentiated between states that had expanded via a traditional or waiver expansion when coding which states had expanded in a given year. Regressions were adjusted for several confounders available in the NHIS dataset, including age, gender, and family type. For the second set of models, we used a Wald test to determine if differences between coefficients in states undergoing traditional or waiver expansions were statistically significant. The NHIS complex survey design was taken into account by using Stata's survey commands to weight according to sampling design.

**TABLE 2** Sample characteristics by state Medicaid expansion status, 2010–2013

Characteristic	Expansion states (n = 20,912)	Non-expansion states (n = 16,746)	P value of difference	Traditional expansion states (n = 17,646)	Waiver expansion states (n = 3,266)	P value of difference
Male (%)	42.2	42.6	<b>&lt;0.01</b>	42.5	40.7	0.10
Age (mean ± SD), years	35.2 ± 13.9	35.9 ± 13.6	0.25	35.2 ± 13.9	35.8 ± 13.5	0.60
Family composition (%)			<b>0.04</b>			<b>&lt;0.01</b>
One adult, no children <18	9.6	9.7		9.4	10.8	
Multiple adults, no children <18	14.8	16.2		14.6	15.6	
One adult, 1+ children <18	11.6	11.9		10.8	16.1	
Multiple adults, 1+ children <18	64.0	62.2		65.2	57.6	

Two-tailed *t* tests were used to approximate the given *p* values.

*P* values <0.050 are bolded.

**TABLE 3** Difference-in-difference estimates of the effects of Medicaid expansion on ED utilization, overall and by state Medicaid expansion type

Outcome	Mean of outcome in expansion states pre-expansion	All expansion states adjusted difference-in-difference <sup>a</sup>		Traditional expansion states adjusted difference-in-difference <sup>a</sup>		Waiver expansion states adjusted difference-in-difference <sup>a</sup>		Difference between traditional and waiver expansion states <sup>b</sup>	
		Estimate (95% CI)	<i>P</i> value	Estimate (95% CI)	<i>P</i> value	Estimate (95% CI)	<i>P</i> value	Estimate	<i>P</i> value
ED use, past 12 months (y/n)	30.0	2.8 (0.0–5.5)	<b>0.052</b>	2.2 ([–0.7]–5.1)	0.136	5.6 (0.3–11.0)	<b>0.038</b>	3.4	0.215
ED use ≥2x, past 12 months	15.6	2.0 (0.0–4.1)	<b>0.049</b>	2.3 (0.1–4.4)	<b>0.038</b>	0.80 ([–3.2]–4.9)	0.688	1.5	0.501

*P* values <0.050 are bolded.

Abbreviation: CI, confidence interval; ED, emergency department.

<sup>a</sup>Two-tailed *t*-tests were used to approximate the given *P* values.

<sup>b</sup>Wald tests were used to approximate the given *P* values.

Statistical weights for pooled years of analysis were adjusted by dividing by the number of pooled years, per NHIS guidelines.<sup>37</sup> Standard errors were clustered at the state-level. To determine whether our estimates were biased by differential trends across state groups prior to expansion, we tested for differential trends prior to expansion among expansion versus non-expansion states, as well as between waiver and traditional expansion states using an event-study design. All analysis was done using Stata/IC software, version 14.0, in Stanford University's Federal Statistical Research Data Center. This study was deemed exempt by the Stanford University institutional review board.

### 3 | STUDY RESULTS

#### 3.1 | Sample demographics

Compared to individuals in expansion states, individuals in non-expansion states were more likely to be male (*P* < 0.01) and to reside in household consisting of multiple adults with no children under the age of 18 years (*P* = 0.04) than households with other compositions. Among those residing in expansion states, individuals in waiver expan-

sion states were more likely to live in households with only 1 adult (*P* < 0.01) (Table 2).

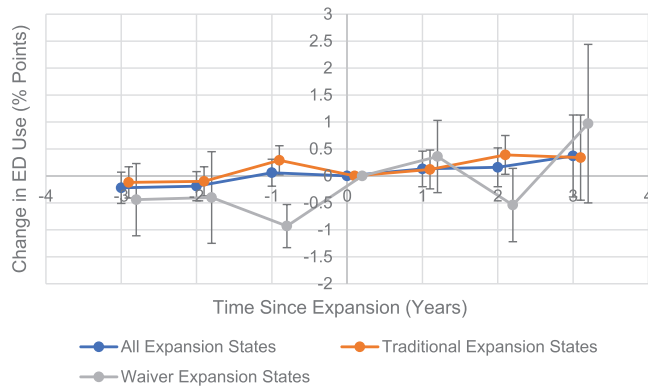
#### 3.2 | Changes in ED utilization

##### 3.2.1 | Comparing expansion to non-expansion

In analyses pooling both types of expansions, individuals in expansion states were not more likely to report any ED use in the previous year after expansion relative to the change in non-expansion states (2.8 percentage point increase [0.0–5.5], *P* = 0.052). Although the estimate is positive, it is not statistically significant. They were more likely to report visiting an ED 2 times or more in the past year (2.0 [0.0–4.1], *P* = 0.049) (Table 3).

##### 3.2.2 | Comparing traditional and waiver expansions

Individuals in traditional expansion states were more likely to report visiting an ED 2 times or more in the previous year than those in



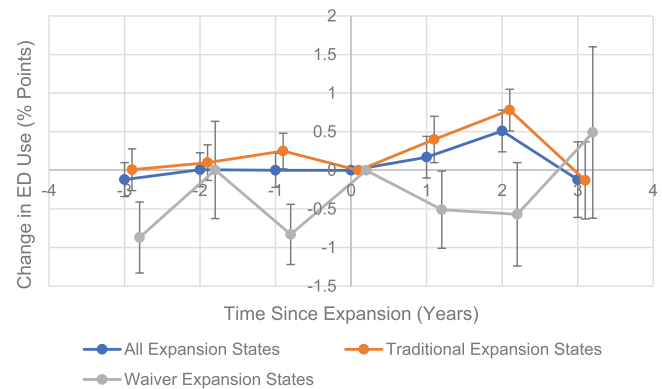
**FIGURE 1** Pre- and post-event analysis for any ED use in the last 12 months. Change in any ED use by individuals in all expansion, traditional expansion, and waiver expansion states relative to expansion, where 0 on the X axis represents time of expansion, 1 represents 1 year since expansion, -1 represents 1 year before expansion, and so on. The Y axis represents percentage point change in any ED use among individuals eligible for Medicaid.

non-expansion states (2.3 [0.1–4.4],  $P = 0.038$ ), but were not more likely to report any ED use (2.2 [–0.7–5.1],  $P = 0.136$ ) after expansion than those in non-expansion states. Among individuals in waiver states, by contrast, individuals were more likely to report any ED use (5.6 [0.3–11.0],  $P = 0.038$ ), but were not more likely to report use of EDs 2 times or more (0.8 [–3.2–4.9],  $P = 0.688$ ). The differences between traditional and waiver states in the effects of expansion on any ED use and ED use 2 times or more in the previous 12 months were not statistically significant ( $P = 0.215$  and  $P = 0.501$ , respectively) (Table 3).

For our analyses of all expansion state and of traditional expansion states relative to non-expansion states, coefficients from our event study for all pre-expansion years were small and were not statistically significant, indicating no evidence of parallel trends assumption violation for the variables we examine (Figures 1 and 2). This is consistent with previous work using the NHIS dataset to look at outcomes from years 2010 to 2013.<sup>11</sup> In the case of states expanding under a waiver, however, we find some evidence of differential pre-trends that may bias our estimates (Figures 1 and 2 and Supporting Information Appendix Tables SA3–SA5).

#### 4 | LIMITATIONS

Our study has several important limitations. First, we were not able to control for additional individual-level variables such as race or education in our regressions, because these variables were in a separate restricted NHIS file that we did not have access to. We also did not adjust for quarter-fixed effects in our regressions, as previous work has done,<sup>10</sup> but rather yearly fixed effects and did not control for economic factors, such as unemployment, that may have affected our outcome measures across individual states. Despite this, our estimates are similar to studies using the same dataset that do control for these additional factors.<sup>9,10</sup> This reduces the concern that are esti-



**FIGURE 2** Pre- and post-event analysis for two or more ED visits in the last 12 months. Change in ED use 2 or more times by individuals in all expansion, traditional expansion, and waiver expansion states relative to expansion, where 0 on the X axis represents time of expansion, 1 represents 1 year since expansion, -1 represents 1 year before expansion, and so on. The Y axis represents percentage point change in ED use 2 or more times among individuals eligible for Medicaid.

mates are biased due to the absence of these controls, although future work should include these variables when able. Third, we were not able to account for differences between individuals who may have gotten increased insurance coverage under private marketplaces, rather than through expanded Medicaid coverage, as these changes happened under the ACA simultaneously. Other co-existing trends that we were unable to account for include other dynamic healthcare marketplace changes, including how potential changes in primary care visits or expanding advanced practice provider care might impact ED utilization. Like any survey data, NHIS data is self-reported and therefore subject to recall bias. Survey data can also be prone to selection bias. However, the NHIS dataset is regarded as a nationally representative study and therefore we expect selection bias to affect our results minimally. We used linear probability model to estimate our binary outcomes, which are bounded by a probability of 0–1. Linear probability models cannot meet the assumption of 0–1 probability; however, they perform well in these scenarios and have frequently been used in this type of work.<sup>9,10</sup> Finally, from our event study, we can determine that we cannot rule-out the presence of differential pre-trends for waiver states relative to those not expanding Medicaid (see Supporting Information). Due to the existence of these pre-trends and the relatively small sample size for waiver states and resulting imprecise estimates, we are not able to say with certainty either that any changes we detect are due solely to the effect of Medicaid expansion under the ACA or that changes exist that we are unable to detect.

#### 5 | DISCUSSION

Our results do not provide evidence that, across all expansion states, Medicaid expansion was associated with a statistically sig-

nificant increase in any self-reported ED use in the previous year in the 3 years post-expansion relative to non-expansion states. We did find, however, that across all expansion states, Medicaid expansion was associated with a statistically significant 2.0 percentage point increase in self-reported ED use 2 times or more in the past year.

Overall, our study is consistent with studies indicating that Medicaid expansion resulted in increases in ED use as well as anecdotal evidence from ED physicians. After the ACA was passed, ED physicians in expansion states reported a perceived increase in ED visits by Medicaid recipients.<sup>38</sup> Two phenomena could explain this perceived increase. First, overall ED utilization could have remained the same but more patients visiting the ED may have had Medicaid coverage. In addition, those who gained Medicaid coverage may have used the ED more frequently than they did when they were uninsured. Our study finds evidence of the latter effects and is consistent with results from the Oregon Medicaid Experiment and several other studies that show individual rates of ED use increase with Medicaid coverage.<sup>29-32,39</sup> This includes follow-up studies from the Oregon Medicaid Experiment which showed that these effects persisted over time.<sup>39</sup>

Several studies have shown no change or even decreases in individual ED use after Medicaid insurance expansions. Of these studies, only one study uses national-level data and uses administrative claims data, which is subject to different forms of bias than the self-reported data we use.<sup>28</sup> The other studies showing no change or decreased use come from smaller studies examining only a few states.<sup>3,4,33,34,40</sup> This suggests that changes in ED use associated with insurance expansions likely differs state by state based on other factors such as availability of outpatient care for those with new coverage or the specifics of increased coverage in that state. Evidence from the Massachusetts health insurance expansions, for example, which preceded the ACA expansions, found evidence of declines in individual rates of ED use by about 2%–5%<sup>40,41</sup> following expansions in coverage. However, as the Massachusetts health reform expanded insurance to individuals across all income levels, not just those below a poverty threshold, we would expect our results to be more similar to those of the Oregon Medicaid Experiment, which similarly expanded coverage only to low-income adults.

Only one other study has examined changes in intensive ED use following Medicaid expansion. This study found decreased frequent ED use (defined in their study as more than 4 ED visits per year) among Medicaid beneficiaries in the state of New York post-Medicaid expansion.<sup>33</sup> Our results are not necessarily inconsistent with this result as these authors used a higher number of ED visits as their definition of “frequent use” and examined only the state of New York and therefore were not able to capture national trends.

Importantly, our results did not produce strong evidence of differences between traditional and waiver expansion states in the effects of expansion on ED use. While our results show that reports of any ED use increased in states undergoing waiver but not traditional expansions and that reports of ED use 2 times or more in the past year increased

in states undergoing traditional but not waiver expansions, these differences in the effects of expansion were not statistically significant between the two groups. This is consistent with previous work that has used a smaller sample of three states (one state that did not expand Medicaid, one that expanded traditionally, and one that expanded using a waiver) which found no statistically significant difference between the state that expanded traditionally and the state that expanded using a waiver in terms of changes in ED utilization.<sup>3</sup> It is also consistent with those of another larger study examining Midwestern states documenting few differences in coverage and health care (but not examining ED use specifically) between individuals in states undergoing traditional versus waiver Medicaid expansions.<sup>42</sup>

Nevertheless, our finding that increase in ED in waiver states were primarily in the form of any use as opposed to intensive use warrants further study, as high ED utilizers represent a particularly vulnerable group and an important target of health policy in the ED. It could be that this result is driven by changes in the types of programs implemented in waiver states which drive people to seek better management of chronic conditions or other diseases that typically result in high ED use: if this is true, this would suggest there are potentially lessons to be learned from the policies implemented by states undergoing waiver expansions. Conversely, if this result is driven by high cost-sharing or other financial penalties that decrease multiple ED visits even if they are necessary, this could result in worse outcomes for individuals in states undergoing waiver expansions later on. Studies investigating differences in types of ED use (emergent vs. non-emergent) in states undergoing traditional or waiver states post-Medicaid expansions are warranted to address this question.

In summary, 3 years post-expansion, we find evidence of increased use of ED services in states expanding coverage, particularly in the form of intensive use as defined by two or more visits per year. We did not find strong evidence of differences between traditional and waiver expansion states in the effects of expansion on any ED use or intensive ED use. Our results do suggest, however, that compared to non-expansion states, states undergoing waiver expansions may be more effective at reducing intensive ED use. Future studies should investigate the implications of these reductions in intensive ED use for patients and continue to investigate the extent to which health care use and outcomes differ between states expanding Medicaid through traditional and waiver models.

## AUTHOR CONTRIBUTIONS

ES conceived the study, conducted the data analysis, and drafted the manuscript. MKB supervised and advised data analysis and contributed substantially to its revision. ES takes responsibility for the article as a whole.

## CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

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## SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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