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Original Contribution

Emergency department patient payer status after implementation of the Affordable Care Act: A nationwide analysis using NHAMCS data[☆]

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ABSTRACT

Objective: To evaluate changes in insurance status among emergency department (ED) patients presenting in the two years immediately before and after full implementation of the Affordable Care Act (ACA).

Methods: We evaluated National Hospital Ambulatory Medical Care Survey (NHAMCS) Emergency Department public use data for 2012–2015, categorizing patients as having any insurance (private; Medicare; Medicaid; workers' compensation) or no insurance. We compared the pre- and post-ACA frequency of insurance coverage—overall and within the older (≥ 65), working-age (18–64) and pediatric (< 18) subpopulations—using unadjusted odds ratios with 95% confidence intervals. We also conducted a difference-in-differences analysis comparing the change in insurance coverage among working-age patients with that observed for older Medicare-eligible patients, while controlling for sex, race and underlying temporal trends.

Results: Overall, the proportion of ED patients with any insurance did not significantly change from 2012 to 2013 to 2014–2015 (74.2% vs 77.7%) but the proportion of working-age adult patients with at least one form of insurance increased significantly, from 66.0% to 71.8% (OR 1.31, CI: 1.13–1.52). The difference-in-differences analysis confirmed the change in insurance coverage among working-age adults was greater than that seen in the reference population of Medicare-eligible adults (AOR 1.70, CI: 1.29–2.23). The increase was almost entirely attributable to increased Medicaid coverage.

Conclusion: In the first two years following full implementation of the ACA, there was a significant increase in the proportion of working-age adult ED patients who had at least one form of health insurance. The increase appeared primarily associated with expansion of Medicaid.

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1. Introduction

With full implementation in 2014, the Patient Protection and Affordable Care Act [1] (ACA) greatly increased the number of Americans with health insurance. Since then, both divergent health policy perspectives and acknowledged shortcomings of the ACA have led to various and ongoing efforts to revise, replace or repeal the law [2,3]. The effectiveness of the ACA and the impact of potential changes to the law are typically assessed in terms of the total number U.S. residents covered by health insurance and the taxpayer-borne costs of the associated programs (e.g., Medicaid expansion). What can be lost in those analyses is any

practical effect the ACA may have had on individual patients actually seeking care and on the health care providers and facilities that serve them.

For emergency medicine, the anticipated effects associated with the ACA included an increase in overall emergency department (ED) visits, fewer uninsured ED patients, and increases in Medicaid coverage [4]. Reports from individual states [5,6], from a cohort of states participating in the Agency for Healthcare Research and Quality (AHRQ) “Fast Stats” program [7], and from 126 investor-owned hospital EDs [8] have largely confirmed those predictions, although the size and significance of the effects varies greatly depending on the studied state(s), whether the state(s) participated in the expansion of Medicaid, the time period studied, and whether the analysis explored all patients or only Medicaid patients. To our knowledge, there has been no nationwide analysis of changes in ED payer mix following implementation of the ACA that has incorporated data from all states.

The purpose of this study was to evaluate evolutions in payer status among patients seeking ED care in the years immediately before and after implementation of the ACA.

[☆] GSO & LHB conceived and designed the study, and obtained and managed the data. LHB provided statistical advice on study design and analyzed the data; GSO, RAW, CZ & LHB reviewed and interpreted the data. GSO & LHB drafted the manuscript. GSO, RAW, CZ & LHB contributed substantially to the manuscript revision, and take responsibility for the paper as a whole.

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2. Methods

2.1. Study design

We used an observational, difference-in-differences approach to examine longitudinal trends in insurance status among ED patients presenting in the two years immediately before and after full implementation of the ACA. Difference-in-differences analyses are well-described [9] and are common for evaluating the longitudinal effects of health policy initiatives while controlling for underlying temporal trends.

2.2. Data and study population

We analyzed data from the National Hospital Ambulatory Medical Care Survey (NHAMCS) Emergency Department public use files for 2012 through 2015 (the most recent available data). Administered by the Centers for Disease Control and Prevention (CDC) and National Center for Health Statistics (NCHS), the NHAMCS program collects data on the utilization and provision of ambulatory care services in hospital EDs, outpatient departments and ambulatory surgery locations. The NHAMCS ED public use data are based on a national sample of emergency department visits. The NHAMCS data collection processes are described in detail elsewhere [10] and have been generally consistent since 2012. Briefly, the NHAMCS ED public use data are based on a national probability sample of ED visits at eligible general and short-stay hospitals located in the 50 states and the District of Columbia. The sampling uses a four-stage probability design, progressing from area primary sampling units (PSUs), to hospitals within PSUs, to clinics within outpatient departments, and lastly to patient visits. At each included hospital, ED patient visits are sampled during a randomly selected four-week period [10].

2.3. Primary outcome measure

NHAMCS records all expected sources of payment for each enrolled subject. We categorized patients as having insurance if the expected sources of payment included private insurance, Medicare, Medicaid or worker's compensation; patients without at least one of these expected sources of payment were categorized as uninsured.

We characterized insurance status among patients in three age groups: children (age < 18 years); working-age adults (age 18–64 years); and older/Medicare eligible adults (age ≥ 65 years). We also further divided working-age adults into two subgroups (ages 18–25 years and 26–64 years) to differentiate any effects associated with the ACA provisions allowing young adults to remain on their parents' insurance plans.

2.4. Statistical analysis

NHAMCS is a sample survey, requiring the application of weights to the sample data in order to produce national estimates and to accurately assess the sampling error of statistics based on the data. We addressed this by using survey data procedures incorporating the NHAMCS "PATWT" (weight), "CPSUM" (sampling unit) and "CSTRATM" (strata) variables as described in the NHAMCS public use file documentation [10]. We used these survey procedures to calculate the weighted (but otherwise unadjusted) proportions (with 95% confidence intervals (CI)) of ED patients with insurance coverage for each age group in each study year, and to perform logistic regression to calculate the unadjusted odds ratio (with 95% CI) for insurance coverage before and after ACA implementation.

For our multivariable difference-in-differences analysis we used the Medicare eligible age group as the reference standard, anticipating that insurance status among patients in that age group would be relatively unaffected by the ACA. The difference-in-differences analysis again incorporated survey procedures to conduct logistic regression modelling

for insurance status (yes/no) as the dependent variable, with the interaction of age group and period (i.e., pre- vs. post-ACA) as the difference-in-differences estimator. We also included sex and race (white, non-Hispanic vs. all others) in these regression models, with time modeled as linear trend. As recommended, we used an alpha value of 0.01 to establish statistical significance [10]. All analyses were conducted in Stata/MP (College Station, TX).

2.5. Post-hoc analysis

Where significant differences in pre- vs. post-ACA insurance status were found, we further explored changes in coverage among specific types of insurance—private insurance, Medicare, Medicaid and Worker's Compensation—and specifically evaluated changes in Medicaid coverage in regions with higher and lower numbers of states that expanded Medicaid eligibility.

3. Results

Between 2012 and 2015 NHAMCS sampled 99,135 ED visits representing 539,586,294 ED visits nationwide. Table 1 shows the number of patients sampled and their demographic characteristics for each year and for the entire study period, as well as their weighted representation. The estimated number of ED visits increased 6.6% after ACA implementation, from approximately 131 million visits to 139 million visits per year. Representation by age, sex and race was reasonably constant throughout the study period; no single demographic group disproportionately contributed to the increase in total ED visits.

Fig. 1 shows the evolution of insurance coverage over the course of the study. Overall, the proportion of patients with any insurance increased from 74.2% in the pre-ACA period to 77.7% in the post-ACA period, although this change was not statistically significant (OR 1.21, CI: 1.03–1.43, $p = 0.019$). However, as anticipated, insurance coverage in the older/Medicare-eligible age group was relatively constant throughout the study period, as was the frequency of insurance coverage among children under age 18. Among working-aged adults, the proportion of patients with any insurance increased significantly from 66.0% in the pre-ACA period to 71.8% in the post-ACA period (OR 1.31, CI: 1.13–1.52, $p < 0.001$). The increase in insurance coverage among working age adults was similar for the 26–64-year-old (OR 1.30, CI: 1.11–1.52) and 18–25-year-old (OR 1.35, CI: 1.15–1.59) subgroups.

Fig. 2 shows that the increase in insurance coverage among working-age adults was almost entirely attributable to increased Medicaid coverage. Private insurance (~35%)—as well as Medicare (~9%) and worker's compensation coverage (~1.5%) (data not shown)—was essentially stable throughout the study period among ED patients between 18 and 64 years of age.

Table 2 shows the results of the difference-in-differences analysis confirming the post-ACA increase in insurance coverage among working-age adults compared with coverage for older/Medicare-eligible adults, while controlling for sex, race and underlying temporal trends. Again, the effect was similar among the 18–25-year-old and 26–64-year-old age groups, and there was no significant association between ACA implementation and insurance coverage among children <18 years of age.

4. Discussion

Perspectives about the ACA sometimes overlook the practical effects the law has had on both individuals seeking care and the providers who serve those patients. Our aim was to help inform those perspectives by evaluating changes in payer status among a nationally representative cohort of ED patients seeking care immediately before and after the implementation of the ACA.

After ACA implementation, we found significant increases in the proportion of adults aged 18–64 years with at least one form of

Table 1
Number and demographic characteristics of the patients sampled for the NHAMCS ED public use files, 2012–2015.

	2012	2013	2014	2015	Total
Unweighted					
N – Sampled	29,453	24,777	23,844	21,061	99,135
Age 65+	4700 (16.0)	3838 (15.5)	3760 (15.8)	3333 (15.8)	15,631 (15.8)
Age 18–64	18,575 (63.1)	15,565 (62.8)	14,468 (60.7)	13,060 (62.0)	61,668 (62.2)
Age 26–64	14,489 (49.2)	12,301 (49.7)	11,473 (48.1)	10,246 (48.47)	48,509 (48.9)
Age 18–25	4086 (13.9)	3264 (13.2)	2995 (12.6)	2814 (13.4)	13,159 (13.3)
Age 0–17	6178 (21.0)	5374 (21.7)	5616 (23.6)	4668 (22.2)	21,836 (22.0)
Male	13,227 (44.9)	11,075 (44.7)	10,779 (45.2)	9451 (44.9)	44,532 (44.9)
White ^a	16,942 (57.5)	14,303 (57.7)	13,795 (57.9)	12,530 (59.5)	57,570 (58.1)
Any insurance	21,918 (74.4)	18,277 (73.8)	18,808 (78.9)	16,785 (79.7)	75,788 (76.5)
Weighted					
N – ED visits	130,869,572	130,353,081	141,420,460	136,943,181	539,586,294
Age 65+	20,808,262 (15.9)	20,726,140 (15.9)	21,778,751 (15.4)	21,363,136 (15.6)	84,715,048 (15.7)
Age 18–64	82,447,830 (63.0)	81,601,029 (62.6)	87,115,003 (61.6)	83,672,284 (61.1)	335,083,089 (62.1)
Age 26–64	63,833,060 (48.8)	63,725,141 (48.9)	67,987,873 (48.1)	65,829,528 (48.1)	261,375,601 (48.4)
Age 18–25	18,561,770 (14.2)	17,875,888 (13.7)	19,127,130 (13.5)	17,842,756 (13.0)	73,707,488 (13.7)
Age 0–17	27,613,480 (21.1)	28,025,912 (21.5)	32,526,706 (23.0)	31,907,761 (23.3)	119,788,157 (22.2)
Male	58,106,090 (44.4)	57,355,356 (44.0)	64,063,468 (45.3)	61,076,659 (44.6)	240,655,487 (44.6)
White ^a	75,119,134 (57.4)	79,515,379 (61.0)	80,185,401 (56.7)	80,522,590 (58.8)	315,118,396 (58.4)
Any insurance	96,058,266 (73.4)	97,634,458 (74.9)	110,590,800 (78.2)	105,720,136 (77.2)	410,058,583 (76.0)

^a White, non-Hispanic.

insurance documented in the NHAMCS expected payer field. The effect was consistent across the bivariate and the difference-in-differences analyses and persisted when analyzing 18–25-year-olds and 26–64-year-olds separately. The proportion of uninsured working-age ED patients decreased from 34% (2012–2013) to 28% (2014–2015). This effect was similar to that reported for 11 non-Medicaid expansion states in an analysis using data from the AHRQ “Fast Stats” program: 35% (2012–2013) vs. 31% (2014) [7]. Among Medicaid expansion states included in that analysis, the proportion of uninsured adult ED patients decreased from 23% to 11% [7]. In Maryland and Illinois—both Medicaid expansion states included in the AHRQ “Fast Stats” analysis—the proportion of uninsured adult ED patients decreased from 16% to 10% (2012–2013 vs. 2014–2015) [5] and from 23% to 13% (2011–2013 vs. 2014–2015) [6], respectively. Garthwaite et al. [8] reported a 47% relative decrease in the proportion of uninsured adult ED patients seen in investor-owned hospital EDs between 2012 and 2014, but they did not report the raw proportion of uninsured adult ED patients.

Although much discussion around the ACA focuses on the “individual mandate” and the marketplace insurance plans, the greatest increase in post-ACA insurance coverage for ED patients has been attributable to Medicaid: Medicaid coverage among working-aged adults increased from 25.6% to 31.8%, while private insurance coverage remained

unchanged at 35.1%. Fig. 3 reinforces this *post-hoc* finding, illustrating the changes in Medicaid coverage among adult ED patients by geographic region. The increase is most apparent in the northeastern and western regions, where 100% and 77% of states, respectively, had expanded Medicaid at the time of this analysis. Medicaid coverage increased less dramatically in the midwestern region, where 58% of states expanded Medicaid. In the southern region, where just 41% of states expanded Medicaid, coverage was nearly static throughout the study period. These findings, too, are consistent with previous analyses from individual states and selected cohorts that have reported associations between Medicaid expansion and decreased numbers of uninsured patients [5–8].

The NHAMCS data do suggest an increase in the overall number of ED visits in the years following implementation of the ACA, but the endurance of this effect is unknown. Following an 8.5% increase in 2014, the number of estimated ED visits decreased 3.2% in 2015. Although ED physicians reportedly perceive an increase in patient volume following implementation of the ACA [11], the results of the previous empirical studies have been inconsistent [5–7]. A longer longitudinal analysis will be required to determine whether there is any lasting effect.

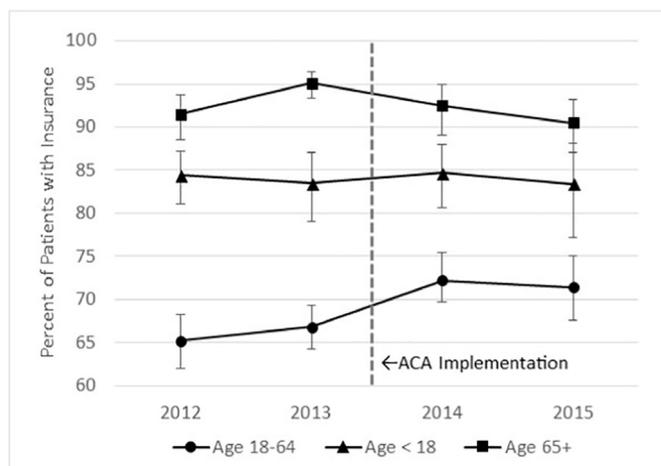


Fig. 1. Insurance coverage among ED patients before and after implementation of the Affordable Care Act (ACA), by age group. Error bars represent the 95% confidence interval.

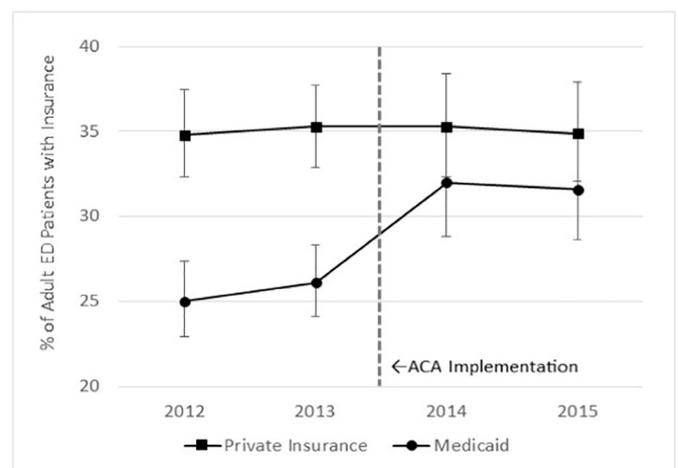


Fig. 2. Private insurance and Medicaid coverage among working-age (18–64 years old) ED patients before and after implementation of the Affordable Care Act (ACA). Error bars represent the 95% confidence interval.

Table 2

Multivariable difference-in-differences analyses of insurance coverage among working-age adult and pediatric ED patients (vs. older/Medicare eligible adults) before and after implementation of the Affordable Care Act (ACA)

	OR	Linearized Std. Err.	t	p > t	95% CI
Adults					
Age 18–64 (vs. Age 65+)	0.15	0.02	−19.44	<0.001	0.12–0.18
Post-ACA	0.76	0.17	−1.26	0.209	0.49–1.17
Age 18–64 & Post-ACA	1.72	0.24	3.84	<0.001	1.30–2.26
Male	0.71	0.02	−11.03	<0.001	0.67–0.75
White	1.52	0.09	7.45	<0.001	1.36–1.69
Time	1.01	0.08	0.17	0.866	0.87–1.18
Age 25–64 (vs. Age 65+)	0.16	0.02	−19.12	<0.001	0.13–0.19
Post-ACA	0.75	0.18	−1.22	0.221	0.47–1.19
Age 25–64 & Post-ACA	1.70	0.24	3.79	<0.001	1.29–2.23
Male	0.72	0.02	−9.96	<0.001	0.67–0.76
White	1.52	0.09	7.27	<0.001	1.36–1.70
Time	1.02	0.09	0.19	0.853	0.86–1.20
Age 18–26 (vs. Age 65+)	0.12	0.01	−18.96	<0.001	0.10–0.15
Post-ACA	0.74	0.17	−1.29	0.197	0.47–1.17
Age 18–26 & Post-ACA	1.78	0.28	3.76	<0.001	1.32–2.41
Male	0.70	0.04	−6.50	<0.001	0.63–0.78
White	1.62	0.12	6.56	<0.001	1.40–1.88
Time	1.02	0.10	0.23	0.818	0.85–1.23
Children					
Age 0–18 (vs. Age 65+)	0.41	0.05	−6.91	<0.001	0.32–0.53
Post-ACA	0.84	0.25	−0.59	0.558	0.47–1.50
Age 0–17 & Post-ACA	1.30	0.23	1.50	0.135	0.92–1.83
Male	0.95	0.05	−0.92	0.356	0.86–1.06
White	1.34	0.10	4.03	<0.001	1.16–1.54
Time	0.96	0.13	−0.31	0.754	0.74–1.25

OR = odds ratio; Std. Err. = standard error; CI = confidence interval. Bolded entries are the difference-in-differences estimators.

Despite these positive trends, lack of insurance continues to be an issue for a substantial number of ED patients. In our analysis, nearly a quarter of ED patients presenting in the first two years after ACA implementation were uninsured. In Maryland, 67,828 patients who were uninsured at the time of a pre-ACA ED visit also had a subsequent post-ACA ED visit, and 28% of them remained uninsured at that subsequent visit [5]. The reasons for this phenomenon are as diverse as they are complex. For example, some “near-poor” people do not qualify for Medicaid but earn too little to qualify for ACA premium subsidies; some people earn too much to qualify for ACA subsidies but still find insurance premiums unaffordable [12]. Further, some peoples' social circumstances inhibit their ability acquire either Medicaid or subsidized insurance. Whatever the reasons, it is important that efforts to improve

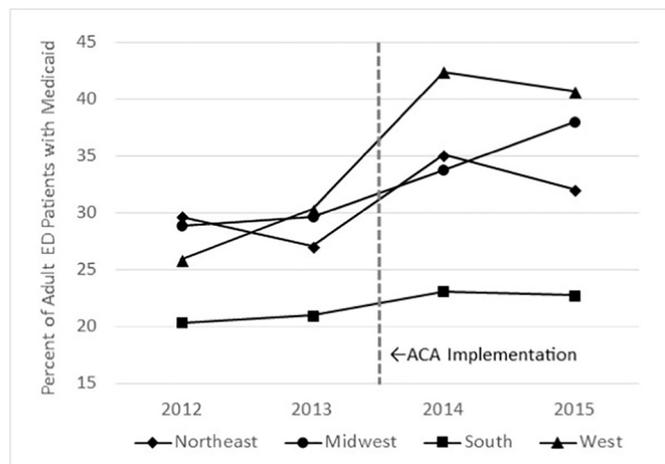


Fig. 3. Region-specific changes in Medicaid coverage among working-age (18–64-years-old) ED patients before and after implementation of the Affordable Care Act (ACA).

health care policy address the chronically uninsured who have not been helped by the ACA in its current form.

5. Limitations

We analyzed “expected source of payment” data as recorded in NHAMCS. These data are typically collected during patient registration and may differ from the ultimate actual payer [10]. This should, however, be a non-differential information bias that is consistent across all years in the study. We also do not know and cannot comment on any changes in the frequency of claims approval and/or the amount paid for ED visit claims. The practical payer status of an otherwise insured patient presenting to an out-of-network ED might not differ much from that of an uninsured patient—an issue that has been somewhat exacerbated by narrow-network marketplace insurance plans [13,14]. The difference-in-differences estimators used in our analysis should be viewed with some caution, as the interaction effects in non-linear models might not equal the marginal effect of the interaction term [15]. The bivariate analysis and graphical displays of the data, however, are both consistent with and supportive of the results of the difference-in-differences analysis. Our analysis of the differential effects of Medicaid expansion on insurance status is limited to regional variations, as individual states are not identified in the NHAMCS data. Lastly, our analysis is limited to the first two years following implementation of the ACA; a longer longitudinal analysis is warranted as more data become available, particularly in light of recent legislative and executive actions addressing some aspects of the ACA [2,3].

6. Conclusion

In the first two years following full implementation of the ACA, there was a significant increase in the proportion of working-age (18–64 years) adult ED patients who had at least one form of health insurance. The increase appeared primarily associated with expansion of Medicaid; private insurance and worker’s compensation coverage were essentially unchanged. The effect was consistent across the 18–25-year-old and 26–64-year-old age groups. There was no significant change in the proportions of insured children (<18 y.o.) and older/Medicare-eligible adults (>65 y.o.). There was an initial increase in total ED volume, but whether that is an enduring effect is unclear.

Presentation

N/A.

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None.

Conflicts of interest

Drs. Ziebell, Weston and Brown are employed by U.S. Acute Care Solutions (USACS), a private physician-owned provider of acute care hospital management and emergency department physician staffing, which might be viewed as a conflict. USACS had no role in the design, execution or reporting of this study.

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