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Dependent Coverage Provision Led To Uneven Insurance Gains And Unchanged Mortality Rates In Young Adult Trauma Patients

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Abstract

Insurance coverage has increased among young adults due to the 2010 dependent coverage provision of the Affordable Care Act. However, little is known about the provision's effects on clinical outcomes and insurance coverage of patients with trauma – the most frequent cause of death and physical disability among young adults. Using the 2007-2012 National Trauma Databank, we conducted a difference-in-differences analysis of coverage rates among 19-25 year-old trauma patients, compared to 26-34 year-old controls, and examined trauma-relevant outcomes by patient, injury, and hospital characteristics. We found a 3.4 percentage point decrease in uninsured status among younger trauma patients following the policy change, concentrated among nonminority patients, those with less severe injuries, and those with lower trauma-related mortality risk. We did not detect significant changes in intensive care use or overall mortality. The heterogeneous coverage impact of this provision on high- versus low-risk trauma patients has implications for future efforts to expand coverage.

Background

Prior to the Affordable Care Act (ACA), approximately three in ten young adults in the United States lacked health insurance, the highest proportion of any age group.[1] One of the

earliest provisions of the ACA aimed to expand coverage to young adults by allowing them to stay on their parents' insurance plans until age 26, commonly referred to as the dependent coverage provision (DCP).[2-5] Analyses of the provision's initial impact showed that as many as 3 million young adults gained insurance by 2012,[4] accompanied by improvements in access to care.[2,5,6] While, recent studies have also demonstrated increases in self-reported physical and mental health due to the policy,[2,6,7] little is known about the impact of DCP on other health outcomes for young adults.

Traumatic injuries disproportionately account for the largest share of morbidity and mortality in young adults.[8] For example, traumatic injuries — unintentional injury, suicide, and homicide — make up the top three causes of death among 15-34 year olds, together resulting in over 46,000 deaths annually (Appendix A1).[8,9] By comparison, the next leading cause of death (cancer) is responsible for 5,000. While prior studies focused on the link between coverage for young adults and their access to primary care,[2,5,6] emergency care,[2,6,10] and mental health,[2,7] this recent coverage expansion provides a unique opportunity to assess the impact of insurance access among young adults in the domain that contributes most to their risk of death and disability: trauma.

The Dependent Coverage Provision

The Dependent Coverage Provision (DCP) of the ACA took effect for plans renewing on or after September 23, 2010. Prior studies comparing 19-25 year olds to older adults not affected by this provision have found significant increases in private insurance coverage ranging from 3 to 10 percentage points.[2-6,10-12] This increase in insurance has been uneven across groups, as the DCP led to greater insurance coverage increases among men[5,13] and the unmarried.[5] Detection of population level differences in coverage gains by racial or ethnic group, employment status, and educational status have, however, shown mixed results.[5,6,13,14] Additional analyses focused on access to care have suggested that the policy has led to increased rates of primary care access,[2-6,10-12] and fewer delays in seeking care due to cost concerns,[5,6] with some suggestions that such gains have been greatest among the more highly educated.[6,11]

Despite the evidence on the effect of the DCP on insurance rates for young adults, little is known about the effects of the DCP on processes of care and health outcomes. Because young adults are relatively healthy, metrics that are typically studied for older adults - including primary care access, chronic disease management, and long-term survival – may provide minimal insight on the effectiveness of this particular insurance expansion. Here, we focus instead on acute traumatic injury as a highly prevalent, morbid, and costly clinical condition in this age group.

Although the DCP increased insurance coverage among young adults seeking emergency care,[2,6,10] since the policy differentially favored young adults whose parents had private health insurance (who are likely to have higher incomes and educational backgrounds), it may have worsened existing disparities in coverage across socioeconomic racial/ethnic groups.[6,7,13] A robust literature based on observational studies documents disparities in health outcomes after trauma between the insured and the uninsured.[15-29] Compared to insured trauma patients, and after controlling for known risk factors at the patient, injury,

and facility level, uninsured patients receive less care,[16,17,30] are less likely to undergo a surgical procedure,[17,30] have shorter length of hospital and intensive care unit (ICU) stay,[26,27] have lower rates of discharge to a rehabilitation facility,[18,22,24,27] and have higher in-hospital mortality.[17,19-21,23,26-30] Though some have suggested that these disparities are driven by provider sensitivity to insurance status and subsequent treatment decisions,[17,21,30] the findings to date are limited to suggestive associations since they were all derived from observational data. The 2012 DCP thus provides a unique opportunity to further understand the relationship between insurance coverage and trauma outcomes by exploiting a quasi-experimental research design.

In this study, we use the largest national database of trauma centers to explore three phenomena: the effect of the DCP on insurance coverage among young adult trauma patients, the differential coverage effect of this policy on subgroups of trauma patients, and the impact of DCP on trauma outcomes.

Study Data and Methods

Data

We used the 2007-2012 National Trauma Databank (NTDB) research data set. The NTDB was created by the American College of Surgeons and is the largest centralized source of trauma registry data in the nation, representing the vast majority of trauma centers in the United States.[31,32] To date, the NTDB consists of data on over six million patient encounters from over 900 voluntarily enrolled trauma centers.

In this study, we included all encounters for patients aged 19-34 years old between 2007-2009 and 2011-2012. Our final sample included 841,600 patient encounters (Appendix A2).[9] Consistent with prior studies, our treatment group was defined as patients aged 19-25 years old with our control group being those aged 26-34 years old. The two groups are similar in their medical conditions, job-market trends, baseline coverage trends, and clinical trauma-related characteristics (Exhibit 1).[5,14,31,33]

Given the objective of the policy to increase insurance coverage among young adults, one of our primary outcomes was insurance status in this population. We categorized insurance status as private (including Blue Cross/Blue Shield, Private/Commercial Insurance, and workers' compensation), public (including Medicare, Medicaid, and other government), other (including no fault automobile and other), and uninsured (coded as “self pay” in the NTDB). To address the category of “unknown” insurance status in the NTDB, our primary analysis used multiple imputation to predict insurance status based on patient, injury, and facility factors; these results did not differ from an alternative approach in which we simply excluded patients with unknown insurance status from our sample (Appendix A2).[9]

We also examined three clinical outcomes of interest: 1) in-hospital mortality (which excluded patients who had already died by the time they had arrived at the hospital, but included deaths occurring in the emergency department or during the hospital admission); 2) ICU length of stay (LOS); and 3) rate of discharge to post-acute care facility (including rehabilitation facility, skilled nursing facility, and intermediate care facility).

Our analyses adjusted for patient demographics, including age, gender, and race, and injury characteristics, including injury severity score (ISS, a measure of anatomic severity),[34] revised trauma score (RTS, a measure of physiologic injury severity),[35] blunt versus penetrating injury type, mechanism of injury, and the presence of a severe head injury or severe extremity injury. Finally, we adjusted for the following facility characteristics: status as a level-1 or non-level-1 trauma center, teaching status, non-profit status, and safety-net status (safety-net hospitals defined as the top decile of facilities ranked by proportion of patients with no insurance or Medicaid).[15,36] Each of these covariates were selected for their established association with our outcomes of interest.[32,37]

Analysis

We used a difference-in-differences (DID) approach comparing changes in outcomes in the treatment group before and after the DCP to the changes in our control group. This approach removes bias from secular trends, based on the assumption that these trends would have been similar for the two age groups in the absence of the DCP. The approach also accounts for time-invariant differences between the treatment and control group by adjusting for baseline differences in outcomes. To evaluate the effect of the DCP on young adults, we defined the pre-policy period as 2007-2009 and the post-policy period as 2011-2012. We excluded year 2010 as a washout period, since the policy gradually took effect from September of 2010 through the following September (as all plans renewed), and the NTDB does not provide monthly or quarterly variables.

We performed three primary analyses. First we examined how the uninsured rate changed among 19-25 year old trauma patients before and after the DCP, as compared to 26-34 year olds. Second, we used a similar design to examine which subgroups of trauma patients in this age group experienced the largest changes in rates of uninsured after the DCP. Finally, we used this quasi-experimental framework to examine whether the provision had any measureable impact on clinical outcomes that may be plausibly associated with changes in insurance status among trauma patients.[17,19-29,38] For all analyses, we adjusted for facility-level fixed effects and clustered standard errors at the facility level to allow for within-facility correlation. For the subgroup analysis regarding changes in uninsurance, we tested for between subgroup differences in the policy's impact by adding an interaction term between post-period, young adult, the patient subgroup feature of interest.

This study has undergone human subjects approval at the Harvard Medical School. All analyses were completed using Stata version 13.0 (StataCorp). A two-sided p value of 0.05 was used to establish statistical significance.

Limitations

To our knowledge, this is the first quasi-experimental study to examine the impact of the DCP on trauma patients. Still, there remain a number of limitations to the analysis. First, while the NTDB is the largest national trauma database, it is a convenience sample as opposed to being drawn from a nationally representative sample. It does contain, however, data from approximately 95% of all Level 1 trauma centers, as defined by the American College of Surgeons (ACS). Though it purposefully over-represents the most severely

injured patients, the NTDB has been used throughout the clinical literature to understand the state of trauma care in the country especially pertaining to meaningful clinical endpoints such as in-hospital mortality, ICU days, and discharge to a post-acute care facility.[31,32,37] This potential oversampling of more severely injured patients – if anything - should increase the likelihood of finding an effect of the DCP on our clinical outcomes of interest.

Second, the NTDB is a visit-level database; thus, it does not follow individual patients over time and is potentially subject to double counting. Also, because this study relies upon a visit-level analysis with a sample limited to those individuals with a trauma event, our estimates are not analogous to previous population-based estimates of coverage changes due to the DCP.

Thirdly, the NTDB does not contain data on other potential drivers of variation in the DCP's effects, namely patient demographics such as educational status, income, employment, marital status, and state of residence.

Finally, we rely on a difference-in-differences analysis to evaluate for changing trends in the composition of the trauma patient population over time in an attempt to reduce bias from secular trends, but it is possible that our results were impacted by time-varying confounding factors. One such possibility is that voluntary enrollment by facilities into the NTDB has increased substantially over the last 10 years, with each additional year including more trauma centers and thus more patient encounters. If the age mix of the newly added trauma centers differed significantly from those already in the sample it could bias our results. A sensitivity analysis using only facilities present from 2008-2010, however, showed no change in any of our key findings.

Study Results

Coverage Changes After the DCP

After the policy was implemented, 19-25 year old trauma patients experienced a 3.4 percentage point decrease, or a 9.5% relative drop, in the risk of being uninsured ($p<0.001$) as compared to the 26-34 year old control group (Exhibit 2). This significant decrease in uninsured status among trauma patients was coupled with significant decreases in public insurance (-2.2%, $p<0.001$) and significant increases in private insurance (+5.3%, $p<0.001$) (Exhibit 3).

Subgroup Changes in Coverage After the DCP

Notably, the coverage expansion provided by the DCP was not evenly distributed across all uninsured populations. Young adults who experienced the greatest reductions in uninsurance were men, non-Hispanic Whites, those with less severe injuries, and those presenting to non-teaching hospitals (Exhibit 4). Those experiencing significantly smaller decreases in uninsured status were racial/ethnic minorities, assault victims, gunshot wound and motor vehicle collision victims, those with severe or critical injury severity, and those presenting to safety-net facilities.

Changes in Clinical Outcomes After the DCP

In Exhibit 5, we summarize the changes in in-hospital mortality, length of ICU stay, and rates of discharge to post-acute care facility for 19-25 years olds after the policy, relative to controls. The technical appendix provides a detailed explanation of all models.[9] Overall, there were no significant differences in in-hospital mortality, length of ICU stay, or rate of discharge to post-acute care facility after the DCP took effect.

Sensitivity Analyses

Sensitivity analyses that included only patients with known insurance status and thus no imputed data showed similar results for insurance coverage changes (Appendix A3).[9] In order to focus on the patients at highest risk for clinical outcomes of interest, we performed sensitivity analyses including only patients with moderate, severe, or critical injuries (ISS >8). This also did not meaningfully alter our results. A third set of sensitivity analyses comparing patients 23-25 years of age to patients 27-29 years of age found similar results for both changes in insurance category and clinical outcomes (Appendix A4).[9]

Discussion

Our results suggest that the ACA's DCP led to a decrease in the uninsured rate among young adults experiencing trauma, the greatest cause of death and physical disability for this population. These data also highlight the heterogeneous effect of the DCP across populations. We found that coverage gains were smallest among minorities, patients of safety-net hospitals, gunshot or motor vehicle crash victims, and those with high-severity injuries, whereas gains were greatest among white males with less severe injuries.

Our results are broadly consistent with previous analyses of the DCP that have used population survey data.[2,3,5-7,12–14,33] However, this study provides new evidence regarding the heterogeneous impact of the ACA's DCP across subpopulations in trauma as well as its potential impact on racial and ethnic disparities. Young adults presenting to the emergency departments of safety-net hospitals with the most severe injuries, especially after a gunshot wound or a motor vehicle crash, were significantly less likely to receive coverage through the DCP than other young adults. Furthermore, non-white trauma patients experienced significantly lower reductions in uninsured status than did non-Hispanic whites. This suggests that the effect of the DCP on the young adult trauma patients differs from its effects among the general population of young adults. Previous studies examining the effect of the DCP on the general population of young adults have shown no significant differences in the relative degree of coverage expansion between races.[5,6,13,14] However, our findings among trauma patients add to the sub-analysis finding by Shane et al. that, among those patients below 133% of the federal poverty line, non-Hispanic whites were more likely to receive coverage than Hispanics.[14]

That those trauma patients least likely to gain coverage were the most severely injured, minorities, and those already relying on safety-net systems suggests that these high-risk populations may remain relatively outside of the reach of this new policy. This may be due in part to lower rates of parental employment and/or private insurance coverage, which are

prerequisites for the DCP to have an impact, or to other factors related to less social support for this group of uninsured young adults. While this policy was not intended to be the only solution to lowering uninsurance among young adults, these data shed new light on the differential effects it has had consistent with longstanding socioeconomic disparities. This is particularly salient in light of the racial demographics of states that have elected not to expand Medicaid through the ACA.[39,40] Minority uninsured young adults may be among the most vulnerable in society given that two key provisions of the ACA's DCP and Medicaid expansion may have limited impact on improving their access to insurance.

The quasi-experimental framework of our analysis adds insight to previous observational studies that have found an association between uninsurance and poor outcomes following trauma. We found no statistically significant changes in clinical outcomes linked to this policy among young adults. In the context of the literature highlighting an association between uninsured status and trauma outcomes,[17,21,30] we had expected to find improvements in clinical outcomes associated with the coverage expansion. Moreover, a 2012 study showing that Medicaid expansion has lead to a reduction in all-cause mortality further supported this expectation, even though trauma was not the primary driver to the mortality rates in the study population.[41] Nevertheless, our findings offer a contrasting view.

There are, however, many possible explanations for the lack of improvement in trauma-relevant clinical outcomes among young adults following the DCP. Most importantly, our findings must be interpreted in light of the 95% confidence interval around our difference-in-differences mortality estimate (Exhibit 5), which rules out a reduction in mortality of greater than -94 deaths per 100,000, from a baseline of 2,876 per 100,000 (a 3.3% relative reduction in mortality). Given that the coverage change in our sample was only 3.4 percentage points, our findings cannot rule out substantial individual-level mortality changes that would still be consistent with prior research.[17,21]

Another possibility is that prior observational studies showing a link between worse trauma outcomes and uninsured status are confounded by unmeasured covariates, rather than demonstrating a causal relationship. This is the first study to use a quasi-experimental approach to investigate this well-established association drawn from multiple prior observational studies. We do not find evidence to support a causal interpretation of this pattern. Possible unmeasured drivers include patient comorbidities, socioeconomic status, variability in pre-hospital care, and a segregated trauma system whereby predominately minority-serving hospitals have worse outcomes after trauma.[21,38]

Moreover, our findings raise the possibility that the magnitude of the health gains in the general population associated with insurance coverage[41,42,43] may not extend to the care of traumatic injuries. This may be driven in part by policies such as the Emergency Medical Treatment and Labor Act (EMTALA) as well as the immediate nature of trauma care in which a significant proportion of life-saving treatment is provided before a patient's insurance status is known.

Another possible explanation for the lack of clinical findings is that those who gain coverage from the DCP were less severely injured patients who were not as likely to experience any

of our clinical outcomes of interest. As such, the magnitude of improved outcomes may have been too small for our study to detect. However, this idea further emphasizes the fact that the uninsured trauma patients who were already at the highest risk of poor clinical outcomes were the least likely to benefit from coverage expansion.

The changing clinical makeup of the remaining uninsured pool of young adult trauma patients also has significant implications for economic projections in medical centers about the cost of caring for the uninsured. The DCP did in fact lead to significant decreases in the rate of uninsured trauma patients and the total number of non-paying trauma patients has decreased significantly. However, the cost per hospitalization of an uninsured young adult trauma patient is likely to be greater after the DCP due the increased injury severity — emphasizing the fact that a given percentage point reduction in uninsured patients does not equate to an identical percentage point reduction in uncompensated care.

Conclusion

The 2010 DCP of the ACA led to a significant 3.4 percentage point decrease in the rate of uninsured trauma patients aged 19-25. However, our results show an uneven effect of this coverage expansion among the observed sample of trauma patients, with smaller coverage gains among minorities, patients in safety net hospitals, and those with more severe injuries. Furthermore, we found no significant change in clinical trauma outcomes as a result of this coverage expansion. Understanding the drivers and consequences of heterogeneous impacts of coverage expansion will help inform future polices that aim to reduce the number of uninsured Americans.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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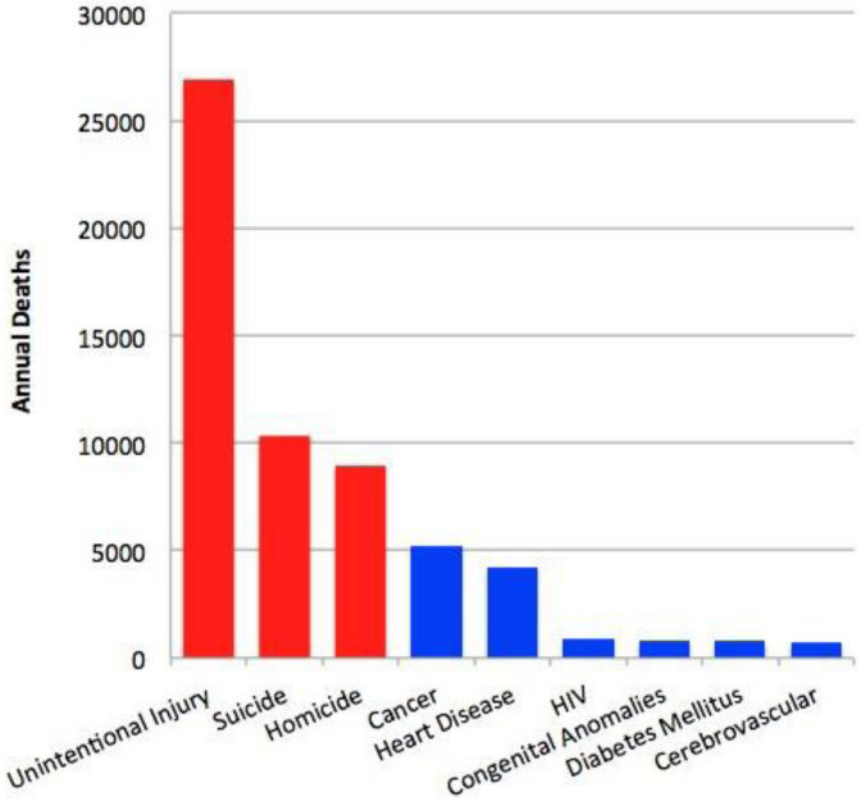
Appendix A1: Leading Causes of Death for Young Adults, 2010



SOURCE: National Vital Statistics System, National Center for Health Statistics, Centers for Disease Control and Prevention, 2010. **NOTE:** Young Adults ages 15-34; Trauma-related causes are in red, nontrauma-related in blue; HIV, Human immunodeficiency virus

Unintentional Injury	26914
Suicide	10335
Homicide	8936
Cancer	5223
Heart Disease	4250
HIV	903
Congenital Anomalies	809
Diabetes Mellitus	771
Cerebrovascular	707

Appendix A3: Changes in Insurance Status for Young Adult Trauma Patients Ages 19-25 vs 26-34, before and after the ACA-DCP. Sensitivity Analysis in which unknown insurance status excluded from analysis

	Ages 19-25		Ages 26-34		Difference in change between age groups[1]	p value for between-group difference
	Before ACA-DCP	After ACA-DCP	Before ACA-DCP	After ACA-DCP		
Insurance Status[2]						
Private	31.1%	35.0%	32.5%	30.2%	6.2%	<0.001***
Public	17.9%	18.6%	18.2%	21.3%	-2.5%	<0.001***
Other	15.3%	16.0%	13.7%	14.5%	-0.1%	0.918
Uninsured	35.7%	30.5%	35.6%	34.1%	-3.7%	<0.001***

SOURCE: National Trauma Data Bank, 2007-09 & 2011-12. **NOTE:** ACA, Affordable Care Act; DCP, dependent coverage provision; CI, confidence interval; ICU, intensive care unit. 1. Adjusted for age, year, and facility effects; 2. All patients with known insurance status (n= 709,206);

* p < 0.05,

** p < 0.01,

*** p < 0.001

Appendix A4: Changes in Insurance Status and Clinical Outcomes for Young Adult Trauma Patients Ages 23-25 vs 27-29, before and after the ACA-DCP

	Ages 19-25		Ages 26-34		Difference in change between age groups[1]	Risk adjusted difference in change between age groups (95% CI)[2]	p value for between-group difference
	Before ACA-DCP	After ACA-DCP	Before ACA-DCP	After ACA-DCP			
Insurance Status[3]							
Private	29.7%	32.9%	31.3%	29.2%	5.0%	n/a	<0.001***
Public	17.5%	18.6%	18.2%	21.0%	-1.8%	n/a	<0.001***
Other	14.8%	15.5%	14.0%	14.9%	0.0%	n/a	0.86
Uninsured	37.9%	33.0%	36.5%	34.8%	-3.3%	n/a	<0.001***
Clinical outcomes among entire population[3]							
Mortality (per 100K)	2880	2538	2715	2386	-14	-38 (-238, 162)	0.71
ICU stay (days)	5.26	5.04	5.27	5.12	-0.06	-0.04 (-0.27, 0.18)	0.69
Discharge to rehabilitation facility (%)	10.12%	10.16%	10.23%	10.26%	0.0%	0.0% (-0.5, 0.5)	0.90

SOURCE: National Trauma Data Bank, 2007-2009 & 2011-2012. **NOTE:** ACA, Affordable Care Act; DCP, dependent coverage provision; CI, confidence interval; ICU, intensive care unit. 1. Risk adjusted models for clinical outcomes adjusted for age, year, facility, gender, race, injury severity, injury mechanism, traumatic brain injury, level-1 trauma center

status, teaching status, for-profit status, and safety-net hospital status; 3. n= Patients age 23-25 and 27-29 with known insurance status: 326,033

* $p < 0.05$,

** $p < 0.01$,

*** $p < 0.001$

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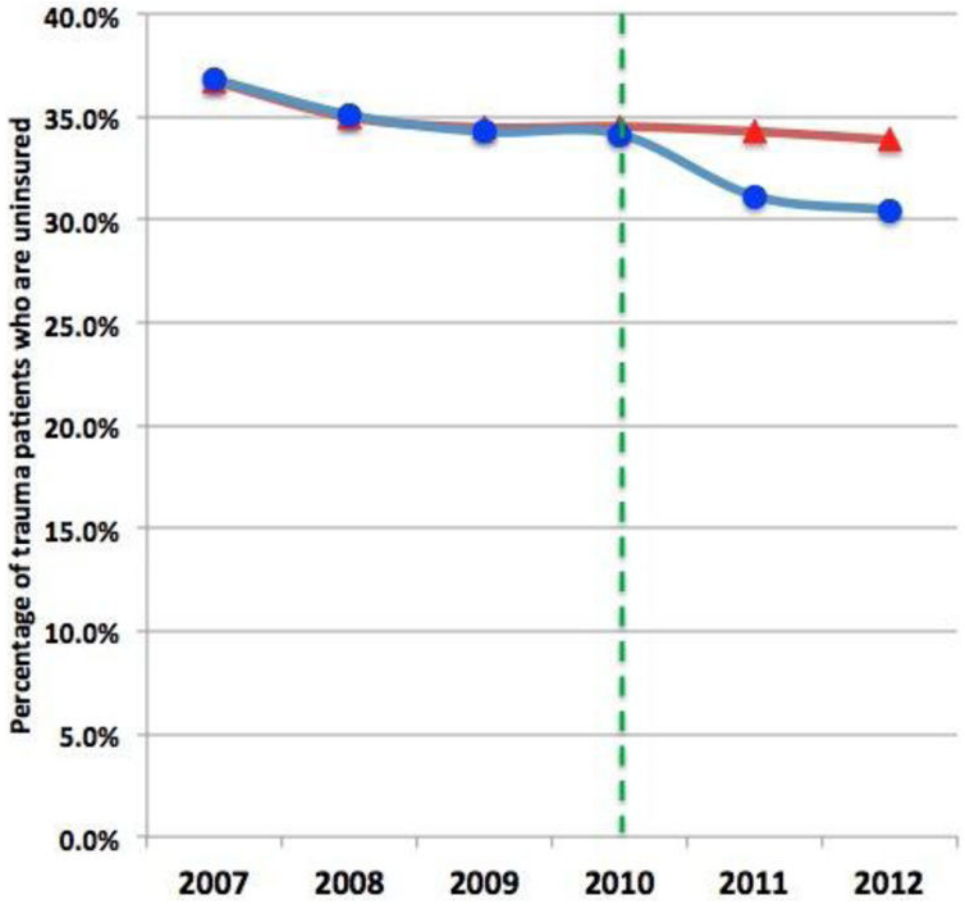

Exhibit 2. Proportion of Among Young Adult Trauma Patients Without Insurance, Ages 19–25 and 26–34, By Year, 2007–12

SOURCE: National Trauma Data Bank, 2007-2012 (n = 1,014,848). Data for patients with unknown insurance status were estimated using 20 rounds of multiple imputation (n=152,169). **NOTE:** The Affordable Care Act's Dependent Coverage Provision (ACA-DCP) took effect in 2010 (green dashed line)

	2007	2008	2009	2010	2011	2012
Ages 19-25	36.9%	35.1%	34.3%	34.2%	31.2%	30.5%
Ages 26-34	36.7%	35.0%	34.5%	34.5%	34.3%	33.9%

Exhibit 1
Patient and Injury Characteristics, 2007-2009

	Ages 19-25	Ages 26-34
Total Encounters	246,282	217,886
Mean Age	21.8	29.7
Male (%)	76%	76%
White (%)	55%	55%
Insurance Type		
Private	31%	32%
Public	18%	19%
Other	15%	14%
Uninsured	35%	35%
Intent		
Unintentional	74%	72%
Self-Harm	2%	2%
Assault	23%	26%
Mechanism		
Fall	10%	14%
Gun shot wound	12%	9%
Motor vehicle collision	41%	36%
Motorcycle	6%	7%
Other	7%	9%
Ped/Cycle	5%	5%
Stab	9%	9%
Struck	10%	10%
Critical Inury (ISS ≥ 25)	35%	32%
Traumatic Brain Injury	19%	18%
Severe Extremity Injury	13%	12%
Level 1 Trauma Center	63%	64%
Safety Net Hospital	11%	11%
Non-Profit Hospital	94%	94%
University Teaching Hospital	56%	56%

SOURCE: National Trauma Data Bank, 2007-2009 (n = 464,168) **NOTE:** MVC, motor vehicle collision; ISS, Injury severity score

Exhibit 3

Changes in Insurance Status for Young Adult Trauma Patients Ages 19-25 vs 26-34, before and after the ACA-DCP

	Ages 19-25		Ages 26-34		Difference in change between age groups[1]	p value for between-group difference
	Before ACA-DCP	After ACA-DCP	Before ACA-DCP	After ACA-DCP		
Insurance Status						
Private	31.3%	34.7%	32.4%	30.3%	5.3%	<0.001***
Public	18.2%	18.7%	18.4%	21.1%	-2.2%	<0.001***
Other	15.2%	15.8%	14.0%	14.5%	0.2%	0.18
Uninsured	35.3%	30.8%	35.3%	34.1%	-3.4%	<0.001***

SOURCE: National Trauma Data Bank, 2007-2009 & 2011-2012 (n = 841,600). Data for patients with unknown insurance status were estimated using 20 rounds of multiple imputation (n=152,169).
NOTE: ACA, Affordable Care Act; DCP, dependent coverage provision; CI, confidence interval; ICU, intensive care unit. 1. Adjusted for age, year, and facility effects;

* p < 0.05,

** p < 0.01,

*** p < 0.001

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Exhibit 4

Changes in Uninsured Status for Young Adult Trauma Patients Ages 19-25 and 26-34, By Subgroup of Patient and Injury Characteristics

Group[1]	Adults ages 19-25 who are uninsured, before ACA (%)	Percentage-point change, before versus after ACA		Difference in change between age groups	p value for between-subgroupdifference[2]
		Ages 19-25	Ages 26-34		
Full Sample	35.3%	-4.5%	-1.2%	-3.3%	<0.001***
age[3]					
Age 19-21	33.4%	-5.0%	(-1.2%)	-3.8%	Ref
Age 22-25	36.9%	-4.1%	(-1.2%)	-2.9%	0.01*
sex					
Males	37.7%	-4.4%	-0.8%	-4.4%	Ref
Females	27.8%	-4.2%	-2.2%	-2.0%	0.001**
race					
White	29.9%	-5.3%	-0.5%	-4.8%	Ref
Nonwhite	42.5%	-3.7%	-1.8%	-1.8%	<0.001***
intent					
Unintentional	30.8%	-4.5%	-0.9%	-3.5%	Ref
Self-Harm	41.1%	-5.3%	-2.1%	-3.2%	0.36
Assault	47.0%	-3.8%	-1.7%	-2.1%	0.01*
mechanism					
Fall	31.5%	-4.5%	-0.4%	-4.1%	Ref
Motorcycle	27.6%	-2.9%	0.9%	-3.8%	0.97
Other	34.5%	-3.9%	-0.6%	-3.4%	0.68
Ped/Cycle	32.4%	-5.3%	-2.2%	-3.1%	0.41
Stab	47.1%	-4.0%	-1.0%	-3.0%	0.26
Struck	39.5%	-4.3%	-1.4%	-2.9%	0.30

Group[1]	Adults ages 19-25 who are uninsured, before ACA (%)	Percentage-point change, before versus after ACA		Difference in change between age groups	p value for between-subgroupdifference[2]
		Ages 19-25	Ages 26-34		
Motor vehicle collision	30.3%	-4.9%	-2.1%	-2.8%	0.06
Gun shot wound	48.9%	-4.0%	-1.8%	-2.1%	0.04*
injury severity					
Minor (ISS 1-9)	35.1%	-5.6%	-1.8%	-3.8%	Ref
Moderate (ISS 10-15)	33.4%	-4.3%	-0.3%	-4.0%	0.98
Severe (ISS 16-24)	31.7%	-3.8%	-1.0%	-2.8%	0.10
Critical (ISS >= 25)	38.5%	-3.7%	-1.0%	-2.7%	0.04*
traumatic brain injury (TBI)					
With TBI	33.1%	-5.0%	-1.7%	-3.3%	Ref
No TBI	35.9%	-4.5%	-1.1%	-3.4%	1.00
severe extremity injury					
Severe Extremity Injury	31.1%	-4.7%	-2.4%	-2.3%	Ref
No Severe Extremity Injury	36.0%	-4.5%	-1.1%	-3.4%	0.13
trauma center level					
Level 1 Trauma Center	35.8%	-4.7%	-1.5%	-3.1%	Ref
Level 2 or greater	34.5%	-4.2%	-0.7%	-3.5%	0.59
hospital profit status					
Non-profit Hospital	35.2%	-4.8%	-1.6%	-3.2%	Ref
For-profit Hospital	37.9%	-2.6%	1.2%	-3.7%	0.34
hospital safety net status					
Safety Net Hospital	54.6%	-3.7%	-1.9%	-1.8%	Ref
Non-Safety Net Hospital	33.0%	-4.8%	-1.3%	-3.5%	0.04*
hospital teaching status					

Group[1]	Adults ages 19-25 who are uninsured, before ACA (%)	Percentage-point change, before versus after ACA		Difference in change between age groups	p value for between-subgroupdifference[2]
		Ages 19-25	Ages 26-34		
University	36.7%	-4.8%	-2.0%	-2.8%	Ref
Community Affiliated	32.4%	-4.0%	-0.4%	-3.6%	0.38
Non-teaching	37.5%	-4.7%	-0.2%	-4.5%	0.06

SOURCE: National Trauma Data Bank, 2007-2009 & 2011-2012 (n = 841,600). Data for patients with unknown insurance status were estimated using 20 rounds of multiple imputation (n=152,169).
NOTE: ACA, Affordable Care Act; DCP, dependent coverage provision; ISS, injury severity score; TBI, traumatic brain injury. 1. p-values for difference in change after the policy for 19-25 year olds, as compared to 26-34 year olds, are all $p < 0.05$; 2. adjusted for age, year, gender, and facility; 3. Each age subgroup was compared against the entire control group to determine adjusted changes in insurance status;

* $p < 0.05$,

** $p < 0.01$,

*** $p < 0.001$

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Exhibit 5

Changes in Clinical Outcomes for Young Adult Trauma Patients Ages 19-25 vs 26-34, before and after the ACA-DCP

	Ages 19-25		Ages 26-34		Unadjusted difference in change between age groups	Risk adjusted difference in change between age groups (95% CI)[1]	p value for between-group difference
	Before ACA-DCP	After ACA-DCP	Before ACA-DCP	After ACA-DCP			
Clinical outcomes among young adult trauma patients							
Mortality (per 100K)[2]	2876	2626	2660	2426	-15	44 (-94, 183)	0.53
ICU stay (days)[3]	5.11	5.01	5.34	5.24	-0.01	0.01 (-0.15, 0.12)	0.85
Discharge to rehabilitation facility (%)[4]	10.1%	10.3%	10.6%	10.8%	0.0%	0.0% (-0.3, 0.3)	0.89

SOURCE: National Trauma Data Bank, 2007-2009 & 2011-2012. **NOTE:** ACA, Affordable Care Act; DCP, dependent coverage provision; CI, confidence interval; ICU, intensive care unit. 1. Risk adjusted models for clinical outcomes adjusted for age, year, facility, gender, race, injury severity, injury mechanism, traumatic brain injury, level-1 trauma center status, teaching status, for-profit status, and safety-net hospital status; 2. n= Entire sample, excluding dead on arrival: 832,876; 3. n= Patients with any ICU stay: 204,981; 4. n= Patients surviving to discharge: 618,063.

* $p < 0.05$,

** $p < 0.01$,

*** $p < 0.001$

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