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Potential impact of ACA-related insurance expansion on trauma care reimbursement

John W Scott, MD, MPH^{1,2}, Pooja Upadhyaya, MPP^{3,4}, Peter Najjar, MD, MBA^{1,5}, Thomas C Tsai, MD, MPH^{1,6}, Kirstin W Scott, MPhil, PhD⁷, Mark G Shrime, MD, PhD^{2,8}, David M Cutler, PhD^{9,10}, Ali Salim, MD^{1,11}, and Adil H Haider, MD, MPH^{1,11}

¹Center for Surgery and Public Health, Department of Surgery, Brigham & Women's Hospital, Boston, MA

²Program in Global Surgery and Social Change, Harvard Medical School, Boston, MA

³John F. Kennedy School of Government, Harvard University, Cambridge, MA

⁴David Geffen School of Medicine at the University of California, Los Angeles, Los Angeles, CA

⁵Harvard Business School, Boston, MA

⁶Department of Health Policy and Management, Harvard T.H. Chan School of Public Health, Boston, MA

⁷Harvard Medical School, Boston, MA

⁸Massachusetts Eye & Ear Infirmary, Department Of Otolaryngology & Office of Global Surgery, Boston, MA

⁹Department of Economics, Harvard University, Cambridge, MA

¹⁰National Bureau of Economics Research, Cambridge, MA

¹¹Division of Trauma, Department of Surgery, Brigham & Women's Hospital, Boston, MA

Abstract

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Introduction—Nearly one-quarter of trauma patients are uninsured and hospitals recoup less than 20% of inpatient costs for their care. This study examines changes to hospital reimbursement for inpatient trauma care if the full coverage expansion provisions of the Affordable Care Act (ACA) were in effect.

Methods—We abstracted nonelderly adults (ages 18–64y) admitted for trauma from the Nationwide Inpatient Sample (NIS) during 2010—the last year prior to most major ACA coverage expansion policies. We calculated national and facility-level reimbursements and trauma-related contribution margins using NIS-supplied cost-to-charge ratios and published reimbursement rates for each payer type. Using US census data, we developed a probabilistic microsimulation model to determine the proportion of pre-ACA uninsured trauma patients that would be expected to gain private insurance, Medicaid, or remain uninsured after full implementation of the ACA. We then estimated the impact of these coverage changes on national and facility-level trauma reimbursement for this population.

Results—145,849 patients (representing 737,852 patients nationwide) were included. National inpatient trauma costs for 18–64y patients totaled \$14.8 billion (95% CI:12.5,17.1). Pre-expansion reimbursements totaled \$13.7 billion (10.8,14.7), yielding a national margin of –7.9% (–10.6, –5.1). Post-expansion projected reimbursements totaled \$15.0 billion (12.7,17.3), increasing the margin by 9.3 absolute percentage-points to +1.4% (–0.3,+3.2). Of the 263 eligible facilities, 90 (34.2%) had a positive trauma-related contribution margin in 2010, which increased to 171 (65.0%) using post-expansion projections. Those facilities with the highest proportion of uninsured and racial/ethnic minorities experienced the greatest gains.

Conclusion—Health insurance coverage expansion for uninsured trauma patients has the potential to increase national reimbursement for inpatient trauma care by over one billion dollars and nearly double the proportion of hospitals with a positive margin for trauma care. These data suggest that insurance coverage expansion has the potential to improve trauma centers' financial viability and their ability to provide care for their communities.

- *Level II*: Sensible costs and alternatives; values obtained from limited sources; multi-way sensitivity analyses
- Policy Analysis / Economic Analysis

Keywords

Affordable Care Act; Health Insurance; Health Policy; Reimbursement; Trauma Centers

BACKGROUND

Trauma is the second most costly medical condition in the United States (US) in terms of health care spending—accounting for over \$92 billion in annual expenditures.¹ Given the nature of traumatic injury, trauma centers often care for some of the most economically disadvantaged and otherwise underserved populations—especially those without insurance.^{2,3} Nationally, almost one of every five trauma patients are uninsured.^{4–7} Especially for those trauma centers serving as a community safety net, the high proportion of uncompensated care provided to the un- and under-insured at many US trauma centers often leads to negative financial margins, where costs exceed reimbursement. Whereas

hospitals may be reimbursed more than 130% of the cost of inpatient trauma care by many private insurers, they recoup less than 20% of these costs when patients are uninsured.^{8,9} Uninsured patients are more likely to be transferred to a tertiary referral center than insured patients, regardless of clinical severity.^{7,10,11} This practice only increases the burden of margin-negative care on the trauma referral centers caring for the most vulnerable populations. Ultimately, these facilities are at risk of financial insolvency and closure.^{12,13}

The recent passage of the Patient Protection and Affordable Care Act (ACA) has resulted in significant changes to the number of Americans with insurance coverage. As more than 20% of non-elderly adult trauma patients were uninsured prior to the ACA,^{3–7,14} population-level changes in insurance coverage will have a significant impact on payer mix and thus financial margins for trauma care. In spite of these ongoing changes, there are no existing estimates of the ACA's potential impact on national-level changes in payer mix and subsequent reimbursement for trauma care. Understanding the potential impact of the ACA on trauma center financial performance is important for trauma surgeons, administrators, hospitals, and policy makers who must navigate the emerging policies and debates regarding continued health policy reform.

In this study, we explored two questions regarding the potential effects of the ACA on trauma care in the US. First, we sought to estimate the impact of ACA-related insurance expansion policies on insurance status of historically uninsured trauma patients. Second, we sought to quantify the impact of these coverage expansion policies on reimbursement and profit margins for trauma care at both the national and facility levels.

METHODS

Study Design and Patient Population

We performed a population-level analysis using the Nationwide Inpatient Sample (NIS) to create nationally-representative estimates of the impact of the ACA on trauma care. The NIS includes all annual discharges from 20% of participating acute care hospitals and is purposefully designed to provide national-level estimates.¹⁴ Our study cohort included all injured non-elderly adults (ages 18–64) from the 2010 NIS. Injury was defined by the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) diagnoses codes 800–959. Insurance status is provided by the NIS and was categorized into the following five groups: Private, Medicaid, Medicare, Uninsured (self-pay), or Other (Worker's Compensation, US Military-sponsored coverage, and other government programs). For facility-level analyses, we included all facilities with at least 100 trauma admissions in 2010. Facility-level traits of interest included location, teaching status, bed-size, payer-mix, and the racial and ethnic composition of patients seen by each hospital.

In order to estimate the future impact of policies that are still actively ongoing, we relied on data from the 2010 NIS—the last year prior to most of the ACA-related insurance coverage expansion policies—and compared the observed 2010 values (pre-ACA) against modeled estimates (post-ACA) that are derived from the best available published data from the literature and governmental survey data from the US Census Bureau.^{8,9,15–20} In order to build our model for post-ACA estimations we determined the following: (i) the probability

that an uninsured patient would be eligible for Medicaid or private insurance coverage, (ii) the likelihood that a newly eligible patient would actually enroll in the policy, and (iii) the ratio of inpatient costs to hospital reimbursement for trauma care for different payers.

Probability of Insurance Coverage Eligibility and Enrollment

The coverage-expansion policies of the ACA most relevant to this analysis are (1) expansion of state-level Medicaid eligibility, (2) governmental premium tax credits (PTCs) for individuals to buy private insurance plans through a Health Insurance Marketplace (often referred to as “exchanges”), and (3) the individual and employer mandates. An individual’s eligibility for Medicaid or PTCs is based on income relative to the federal poverty line (FPL) and the state in which they live. At the time of this analysis, only 32 states had elected to expand Medicaid eligibility, thus eligibility thresholds differ by state. In states that expanded Medicaid, US citizen below 138% FPL are eligible for Medicaid and those between 138%–400% FPL are eligible for PTCs. In non-expanding states, US citizens between 100%–400% FPL are newly eligible for PTCs, and a small number of individuals below 44% FPL are likely eligible for Medicaid but unenrolled.¹⁵

In order to determine the probability of gaining coverage for each of the uninsured patients in our dataset, we relied on US census data to model estimated incomes. The NIS assigns patients to a quartile classification of community income level (1 = lowest, 4 = highest) based on the median income level of the patient’s ZIP code. By combining NIS-supplied income thresholds for these quartiles with data from the 2010 US census on national distribution of household incomes, we calculated a mean household income value for each community income quartile. We then used techniques described by *Salem and Mount*,²¹ and more recently by *Shrime et al.*,²² to generate a gamma probability distribution of all incomes in that quartile (see appendix). By doing this, we were able to assign each patient an estimated income drawn from their quartile-specific income distribution, converted it to a percentage of the FPL, and determined whether or not they would be eligible for Medicaid, private coverage, or neither. Performing this calculation on every uninsured patient in the dataset enumerated the proportion of previously uninsured patients that would be eligible to gain Medicaid, the proportion that would be eligible for private insurance, and the proportion that would not be eligible for either. We assumed that 12% of the uninsured population were undocumented immigrants and thus are never eligible for coverage gains.¹⁵ We used a microsimulation model to repeat this process 10,000 times and obtained an overall population-weighted estimate of insurance coverage eligibility for the uninsured non-elderly adult trauma patients. See the appendix for additional model assumptions.

We also addressed the possibility that a patient who might be newly eligible for Medicaid or PTCs or is subject to the mandate may still not elect to enroll in coverage. Analysis of a recent summary of projected enrollment rates under the ACA reveals that the midpoint of a variety of estimates is approximately 75%.²³ We thus applied this 75% enrollment estimate to the aforementioned eligibility calculations to generate our best estimate for change in payer mix after full ACA implementation.

Determination of Cost, Revenue, and Contribution Margin

We converted the inpatient hospital charges provided in NIS into estimated costs using Healthcare Cost and Utilization Project (HCUP) provided cost-to-charge ratios; these estimates from year 2010 were normalized to 2015 USD using annual hospital consumer-price-indices.²⁴ To calculate estimated reimbursements, we relied on previously published analyses of trauma-center reimbursement to calculate a ratio of reimbursement to hospital costs based on insurance status (Private, Medicaid, Medicare, Uninsured, and Other) (Figure 1).⁸ For example, our primary estimates suggest that average reimbursement for Medicaid patients covers 60.2% of inpatient costs. As such, a patient insured by Medicaid who accrued \$10,000 in inpatient costs would account for \$6,020 of hospital revenue. For the pre-expansion calculations, patient-level costs were multiplied by the revenue-to-cost estimates associated with their insurer. For post-ACA calculations, an uninsured patient's costs were calculated by the following equation:

$$\text{Post- ACA Revenue} = \text{cost} \times [p_{(\text{PRIVATE})} * r_{(\text{PRIVATE})} + p_{(\text{MEDICAID})} * r_{(\text{MEDICAID})} + p_{(\text{UNINSURED})} * r_{(\text{UNINSURED})}]$$

In this equation, $p_{(\text{PRIVATE})}$, $p_{(\text{MEDICAID})}$, and $p_{(\text{UNINSURED})}$ represent the probability that a patient without insurance would be covered by each possible payer type after the ACA, as calculated above. The $r_{(\text{PRIVATE})}$, $r_{(\text{MEDICAID})}$, and $r_{(\text{UNINSURED})}$ terms represent the insurer-specific revenue-to-cost estimates shown in Figure 1. For example, if a patient had a 33% probability of gaining private coverage, a 33% probability of gaining Medicaid, and a 33% probability of remaining uninsured, then their estimated reimbursement would be the cost of their care times 1/3 the private reimbursement ratio plus the cost of their care times 1/3 the Medicaid reimbursement ratio plus the cost of their care times 1/3 the uninsured reimbursement ratio.

Population-level costs and reimbursements were calculated as the sum of all patient costs and reimbursements, and NIS-supplied discharge weights were applied to ensure national-representativeness. National- and facility-level trauma-related contribution margins were calculated according to the equation: $\text{margin} = (\text{revenue} - \text{cost}) / \text{revenue}$.

Sensitivity Analyses

In order to determine the impact that our estimated enrollment rate had on our outcomes, we performed a series of sensitivity analyses. First, instead of using the 75% estimate as noted in our primary analysis, we used an upper bound enrollment estimate of 95% as proposed by the Congressional Budget Office¹⁸ and then a revised lower-bound estimate of 62% enrollment proposed by Sommers et al.¹⁹ Additionally, our primary model relies on the derivation of payer-specific reimbursement-to-cost ratios for US trauma patients, as described by *Shafi et al.*⁸ To ensure that our findings were robust and not driven solely by the source of reimbursement-to-cost ratios, we used two other recently published approaches.^{9,20} See the appendix for full specification of the primary model and all four sensitivity analyses.

RESULTS

Our final analytic dataset included 145,849 injured non-elderly adults (aged 18–64), weighted to represent 737,852 patients nationally in 2010 (Supplemental Figure 1). Before the ACA, 43.6% of eligible trauma patients had private insurance, 18.9% were uninsured, 15.2% had Medicaid, 13.0% had other insurance, and 9.4% had Medicare (Figure 3).

Our post-ACA model predicted that 57.9% of previously uninsured 18–64 year old trauma patients would be eligible to gain private coverage, 19.7% would be eligible for Medicaid, and 22.4% would not be eligible for either. Assuming 75% enrollment, this corresponds with 43.4% of the previously uninsured gaining private coverage, 14.6% gaining Medicaid, and 41.8% remaining uninsured (Figure 2). Taken together, the post-ACA national payer-mix estimated from our simulation model suggests that 52.0% patients would have private insurance, 17.9% Medicaid, and only 7.8% would remain uninsured (Figure 3). The results of our model closely mirror other coverage eligibility estimates based on the US Bureau of Labor and Statistics Current Population Survey (see Supplemental Figure 2).

In 2010, national inpatient costs for trauma care totaled \$14.8 billion (95% Posterior Credibility Interval (PCI): 12.5B, 17.1B), while estimated national reimbursements totaled \$13.7 billion (95%PCI: 11.6B, 15.9B), resulting in a negative national trauma-related contribution margin of –7.86% (95%PCI: –10.63%, –5.10%) (Table 1). Post-ACA estimates based on the same level of costs suggest reimbursement would increase to \$15.0 billion (95%PCI: 12.7B, 17.3B). This translates to a \$1.29 billion (95%PCI: 1.02B, 1.57B) increase in national trauma-related reimbursement for equivalent costs. These gains correspond to a +9.28 (95%PCI: +6.01%, +12.54%) percentage-point increase in trauma-related contribution margin, resulting in a post-ACA national margin of +1.42% (95%PCI: –0.32%, +3.15%).

Of the 263 facilities with at least 100 trauma admissions in 2010, the mean pre-ACA trauma-related contribution margin in 2010 was –6.4% (95%PCI: –8.0%, –4.7%). Post-ACA, the mean is predicted to increase to +2.6% (95%PCI: +1.6%, +3.6%). Comparing the pre- and post-ACA distribution of facility-level margins for trauma care, the greatest gains are predicted to be seen among the facilities with the lowest margins pre-ACA (Figure 4). In 2010, only 34% (n=90) of all 263 facilities had a positive margin, post-ACA this number is estimated to nearly double to 65% (n=171). Details of the variation in pre- and post-ACA margins by facility sub-type are shown in Table 2. Notably, the most negative margins pre-ACA and the greatest post-policy gains expected to be seen among facilities that care for the greatest proportion of uninsured patients and those that care for greatest proportion of non-white patients.

Results of our four sensitivity analyses, which used alternative coverage uptake estimates and alternative cost:reimbursement ratios, showed qualitatively similar results. Estimated gains in national reimbursement ranged from a low-end estimate of a +\$1.06 billion (95%PCI: 0.83B, 1.28B) to a high-end estimate of +\$1.63 billion (95%PCI: 1.29B, 1.99B). Corresponding changes in national margin ranged from a low estimate of +4.7 (95%PCI: +2.5%, +6.9%) percentage points to a high estimate of +12.05 (95%PCI: +8.2%, +15.9%)

percentage points. Complete results of our sensitivity analyses are available in Supplemental Tables 1 and 2.

DISCUSSION

Our analysis to assess the impact of the ongoing coverage expansion policies on insurance coverage rates and trauma care reimbursement in the US suggests that, approximately 40% of previously uninsured non-elderly adult trauma patients are expected to gain private insurance and another 14% will likely enroll in Medicaid. Due to these changes in payer-mix, we estimate that trauma centers could receive over one billion dollars in increased revenue, corresponding to a more than 9% absolute increase in profit margin nationally. At the facility level, we estimate that the proportion of hospitals delivering margin-positive trauma care – a critical determinant of financial sustainability – will nearly double from less than 35% to over 65%.

Our findings suggest that a large proportion of nonelderly adults without insurance pre-ACA may gain private coverage. These findings are highly consistent with the best available eligibility estimates derived from analysis of the Current Population Survey.¹⁵ Enrollment in Medicaid and private insurance plans with the assistance of premium tax credits will be vital to the success of the ACA's coverage expansion efforts. The national proportion of uninsured non-elderly trauma patients is likely to decrease from a pre-ACA level of almost 20% to less than 10% (or even as low as 5%), depending on enrollment rates. Higher uptake of both Medicaid and private insurance plans will be beneficial to trauma centers currently caring for a large proportion of uninsured patients.

From an individual hospital or healthcare system's vantage point, caring for an uninsured trauma patient with \$10,000 in hypothetical costs could result in an average loss of -\$8,114; caring for a patient with private insurance with identical costs could result in an average profit of +\$3,225 (Figure 3). It is therefore unsurprising that the largest gains in facility-level margins were found among those facilities that care for the highest proportion of pre-ACA-uninsured patients (Table 2 and Figure 4). Conversely, those facilities who cared for the lowest proportion of pre-ACA uninsured patients will experience the smallest changes in payer mix and reimbursement due to insurance coverage expansion. Reductions in the amount of negative-margin care provided by vulnerable facilities is vital to their financial health as trauma center closures are almost 40% more likely if the center has a negative profit margin.¹² Medicaid eligibility and reimbursement have been shown to be among the most significant determinants of financial solvency or closure for trauma centers and safety-net hospitals.^{12,25} Additionally, prior studies have shown a strong link between higher proportions of uninsured patients and higher mortality rates.^{4,26} As insurance coverage expansion has the potential to enhance the financial viability of critically important trauma centers, the subsequent impact on clinical outcomes should be rigorously assessed.

It is important to note, however, that these estimates focus only on the effects of the ACA's coverage expansion policies. Significant concerns have been raised among trauma providers and others delivering safety-net care that planned ACA-related reductions to Medicaid's disproportionate share hospital (DSH) program could markedly compromise the financial

viability of trauma centers and safety-net providers.^{9,27–29} Predicting the effects of these planned DSH payment reductions is challenging because specific regulations regarding the amount each facility received from DSH payments are regulated by states and thus greatly variable. DSH is also a small fraction of total Medicaid spending (only 4% in 2012).²⁵ Additionally, a recent analysis found that DSH funding level was not a significant predictor of financial performance among safety-net hospitals prior to the ACA.²⁵ Our current analysis cannot predict the magnitude of DSH funding involved in trauma care, however, it does provide estimates regarding the degree to which key ACA coverage expansion efforts alone will change payer mix and reimbursement. Future analyses of the impacts of cuts to DSH funding on trauma centers now have a reasonable national benchmark for comparison.

There are a number of limitations inherent to the data and the study design that must be considered when interpreting our results. First, there are no nationally available data detailing payer-specific reimbursement rates for trauma care and such reimbursement rates vary not only between, but within payer-groups. To ensure that our findings were not driven by the reimbursement to costs ratios used in our primary model, we conducted a variety of analyses using different reimbursement ratios derived from recent peer-reviewed literature and found very similar results, with all three analyses producing reimbursement gains of over one billion dollars (Supplemental Table 1). Secondly, it is important to note that our analyses only consider charges, costs, and reimbursements for hospitals, not for physicians. The impact of changes in trauma patient payer mix on individual providers will vary according to a number of factors that are outside of the scope of the current analysis. Thirdly, our analysis does not take into account the 2010 Dependent Coverage Provision, which allows young adults to obtain coverage from a parent's private health insurance plan through the age of 26. This provision led to a significant reduction in the uninsured rate among young adult trauma patients,³⁰ but it was not accounted for in our model. Not accounting for this provision in our model could underestimate the proportion of 19–26 year olds who would gain private insurance coverage. Next, we assumed that 75% of patients eligible for coverage would actually enroll in insurance plans. We chose this estimate as a midpoint between the variety of estimates that we encountered in the literature.¹⁸ However, trauma patients include a subpopulation often perceived as risk takers, and so we also tested lower alternative enrollment rates to determine the impact of this parameter on our finding. Ultimately, these sensitivity analyses demonstrated very similar results (Supplemental Table 2). Finally, policy changes occur in real-time and data lag associated with population-based claims data such as those that we relied on with NIS make real-time analyses infeasible. As such, we have used the best available data sources to establish reasonable estimates of potential effects of ongoing policy changes. However, real-world implementation ACA-related policies may result in unanticipated variations from the best data presently available. Wide state-to-state variation in healthcare marketplace enrollment, changes in the number and quality of available commercial insurance products, changes in labor force participation have all been highlighted as potential challenges that make it difficult to predict the ultimate impact of the ACA in insurance coverage expansion. We will not know the full impact of the law's insurance coverage expansion policies for a few more years, and deviations from the assumptions we relied on in our model could result in different coverage estimated than those predicted by our analyses. Specifically, lower than projected enrollment in either

Medicaid or private insurance plans could lead to a higher proportion of nonelderly adults remaining uninsured and subsequently a smaller increase in reimbursement. However, the most recent data from the Centers for Disease Control reveal that the overall uninsured rate in the US has fallen from 16% in 2010 to 8.9% as of June 2016³¹—a number that is already approaching our projected uninsured rate of approximately 8%. Also, an early analysis of a level 1 trauma center in Arizona showed that in the first 6 months after local implementation of the ACA, found that the uninsured rate fell from 23.3% pre-ACA to 8.2% post-ACA.³² This analysis also reported an approximately 13% increase in trauma-related reimbursement, which is qualitatively similar to our estimated 9.3% increase in margin. These are among the earliest results specifically focused on trauma patients and data that is both more nationally-representative and that includes a longer-term post-ACA study period are needed.

Historically, hospitals have often supported trauma centers by virtue of their beneficial impact of patient outcomes^{33–36} and the additional benefits that they bring despite the large amounts of margin-negative care. However, a 2015 position statement from the American College of Surgeons (ACS) noted that recent health economic changes have made trauma centers more financially beneficial and, in some markets, this has led to a proliferation of trauma centers beyond the needs of the populace.³⁷ Establishment of trauma centers for reasons other than population-level needs can result in dilution of trauma care across too many centers and the loss of the volume-outcome benefit³⁵—as has recently been demonstrated.³⁸ Meanwhile, other patient populations may be left without access to a critically-needed trauma center. The possibility that reimbursement for trauma care may measurably improve as more patients gain health insurance has the potential to exacerbate this worrying trend. These issues highlight the need for guidelines such as those proposed by the ACS Committee on Trauma, which state that trauma center designation should be “based upon the needs of the population being served, rather than the needs of individual health care organizations or hospital groups.”³¹

Overall, efforts to reduce the number of Americans without health insurance is expected to result in significantly improved reimbursement for trauma care, which could total more than one billion dollars per year nationally. Notably, these changes will not be experienced equally across all hospitals. The hospitals that stand to gain the most from insurance coverage expansion are those that are already caring for the highest proportion of uninsured and minority patients. These anticipated changes in payer-mix could have a marked, positive effects on both the lives of trauma patients as well as the financial viability of many of the hospitals these patients rely on for life saving care.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Figure 1. Average Estimated Payer-Specific Reimbursement for \$10,000 of In-hospital Costs Among US Trauma Patients

The average estimated payer-specific reimbursement (grey bars) is presented relative to a hypothetical inpatient cost of \$10,000 (black dashed line). The resultant payer-specific average reimbursement-to-cost-ratios used in our calculations are as follows: Private insurance 1.322, Medicaid 0.602, Uninsured 0.189, Medicare 0.730, and Other Insurance 1.622. See appendix for sensitivity analyses with alternative reimbursement-to-cost-ratios.

Figure 2. Insurance coverage gains for uninsured trauma patients after ACA implementation

Estimated gains in insurance coverage among the already uninsured non-elderly trauma patients after ACA-related insurance coverage expansion **Note:** The model above assumes 75% enrollment among patients eligible for Medicaid, premium tax credits, or required to obtain coverage under the ACA. Also, an estimated 12% of all uninsured individuals are undocumented immigrants and thus are not eligible for coverage gains outlined above.

Figure 3. Pre- and Post-ACA National Payer Mix for Non-elderly Adult Trauma Patients
Pre-ACA payer-mix is represented by the black bars. Results of insurance expansion model based on simulated incomes are shown in gray.

Figure 4. Pre- and Post-ACA Distribution of Hospital-level Contribution Margins for Trauma Care (n=263 facilities)

Distribution of hospital-level contribution margins for trauma care before the ACA (blue line) and after the ACA (red line). Vertical dashed line represents margin of zero. Before the ACA 34% of facilities had positive margins for trauma care, after the ACA an estimated 71% of facilities would have positive margins for trauma care.

TABLE 1
National Costs, Reimbursement, and Profit Margin for Non-Elderly Adult Trauma Care

	Nationally-weighted Total, USD	95% Confidence Interval	Contribution Margin, %	95% PCI
Total Costs	\$14,805,677,817.78	\$12,477,937,185.54	\$17,133,418,450.01	--
Pre-ACA Revenue	\$13,726,622,266.12	\$11,602,366,257.79	\$15,850,878,274.45	-10.63%
Post-ACA Revenue	\$15,018,470,665.53	\$12,704,289,901.44	\$17,332,651,429.62	-0.32%
Pre-/Post- Change	\$1,291,848,399.44	\$1,015,792,385.21	\$1,567,904,413.67	6.01%
			9.28%	12.54%

Authors' interpretation of data from the Nationwide Inpatient Sample, 2010; **PCI**: Posterior Credibility Interval

TABLE 2
Changes in facility-level trauma-related contribution margin for inpatient costs due to ACA-related coverage expansion

Facility Traits	Facilities n (%)	Pre-ACA		Post-ACA		Pre-/Post-ACA Change		p-value for between group difference		
		Contribution Margin, % (95% PCI)	Contribution Margin, % (95% PCI)	Contribution Margin, % (95% PCI)	Change in Margin, % (95% PCI)					
Total Population										
All included facilities ^a	263	-6.4%	-8.0%	-4.7%	2.6%	3.6%	9.0%	8.1%	9.9%	n/a
Location and Teaching Status										
Urban, Teaching (3)	118 (45%)	-7.4%	-9.9%	-4.8%	1.8%	3.4%	9.3%	7.8%	10.8%	ref
Urban, Non-Teaching (2)	114 (43%)	-4.8%	-7.2%	-2.4%	3.6%	5.0%	8.4%	7.1%	9.7%	0.797
Rural (1)	26 (10%)	-8.9%	-13.8%	-4.0%	2.0%	5.0%	10.9%	8.3%	13.4%	0.862
Hospital Bed Size										
Large (3)	181 (69%)	-6.1%	-8.0%	-4.2%	2.7%	3.9%	8.9%	7.9%	9.9%	ref
Medium (2)	60 (23%)	-8.2%	-12.0%	-4.4%	1.9%	4.0%	10.1%	7.8%	12.3%	0.13
Small (1)	17 (6%)	-2.9%	-9.3%	3.4%	4.4%	9.1%	7.3%	4.4%	10.3%	0.336
Proportion of patients with non-white race/ethnicity										
Less than 25% (1)	117 (45%)	-0.8%	-2.7%	1.2%	5.7%	7.1%	6.5%	5.6%	7.4%	ref
25% to 50% (2)	71 (27%)	-9.3%	-12.6%	-6.0%	2.2%	3.9%	11.5%	9.4%	13.5%	<0.001
Greater than 50 (3)%	73 (28%)	-12.1%	-15.1%	-9.1%	-1.7%	0.3%	10.6%	8.7%	12.5%	<0.001
Proportion of uninsured patients (by quartile)										
Lowest quartile (<12% uninsured)	66 (25%)	4.2%	1.8%	6.5%	6.1%	3.9%	1.9%	1.6%	2.3%	ref
2nd quartile (12–26% uninsured)	66 (25%)	-1.5%	-4.2%	1.1%	4.2%	1.9%	5.8%	5.3%	6.3%	<0.001
3rd quartile (26–45% uninsured)	66 (25%)	-8.2%	-10.2%	-6.1%	1.7%	0.2%	9.8%	9.1%	10.6%	<0.001
Highest quartile (>45% uninsured)	65 (25%)	-20.3%	-22.9%	-17.8%	-1.7%	-3.1%	18.9%	17.2%	20.6%	<0.001

Authors' interpretation of data from the Nationwide Inpatient Sample, 2010; ACA, Affordable Care Act; PCI, posterior credibility interval;

^a, Includes all NIS-sampled facilities treating greater than 100 non-elderly adult trauma patients (n=263)