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The Impact of the Affordable Care Act (ACA) Medicaid Expansion on Access to Minimally Invasive Surgical Care

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Abstract

INTRODUCTION—This study aims to evaluate the effect of the ACA Medicaid expansion on the utilization of minimally invasive (MIS) approaches to common general surgical procedures.

METHODS—We queried five Healthcare Cost and Utilization Project State Inpatient Databases to evaluate rates of utilization and costs of MIS and open approaches pre and post Medicaid expansion.

RESULTS—117,241 patients met the inclusion criteria. Following the enactment of the ACA, use of both laparoscopic gastric bypass (IRR 1.08; 95% CI: [1.02, 1.15]) and Nissen fundoplication (IRR 1.17; 95% CI [1.09, 1.26]) increased in Medicaid patients treated in expansion states than in those treated in non-expansion states. Simultaneously, the costs reported for self-pay patients increased in expansion states more than in non-expansion states (+\$1,669; 95% CI [\$655, \$2,682]).

CONCLUSIONS—Medicaid expansion was associated with increased rates of utilization of MIS approaches to several surgical procedures and a shifting of costs toward patients who were self-insured.

Keywords

Affordable Care Act Medicaid expansion; minimally invasive surgery; healthcare disparities; public health policy

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INTRODUCTION

The Affordable Care Act (ACA) Medicaid expansion was implemented in 2014.¹ In states that opted to participate in the expansion, adults with an income level of up to 138% of the federal poverty threshold were made eligible to receive Medicaid benefits.¹ The ACA Medicaid expansion was intended to provide insurance coverage to many previously uncovered individuals and provide access to care for individuals that previously had no or limited access to care.

Studies evaluating the impact of the ACA Medicaid expansion have found that ACA Medicaid expansion was associated with improved access to primary care in those states that expanded Medicaid and reduced out-of-pocket medical and prescription drug spending for individuals participating in Medicaid expansion.^{2,3} Little is known regarding the effect Medicaid expansion has had in the tertiary care setting and specifically on the application of resource-intensive surgical procedures and specific approaches to the care of surgical patients in states that opted to expand Medicaid.

In the current study, we seek to evaluate trends in utilization and costs of care for minimally invasive and open approaches to surgical procedures in states that expanded Medicaid after the enactment of the ACA compared to rates and costs for those procedures in states that opted not to expand Medicaid. We expected that Medicaid expansion would result in increased utilization of well-developed minimally invasive approaches to care for common surgically treated conditions that are generally performed in non-emergent settings.

METHODS

Data Source

Patients were identified using the Healthcare Cost and Utilization Project (HCUP), State Inpatient Databases (SID) for the following states: Washington (WA), Iowa (IA), New York (NY), Maryland (MD), Florida (FL), and North Carolina (NC). HCUP is an administrative dataset composed of a family of healthcare databases developed through a Federal-State-Industry partnership sponsored by the Agency for Healthcare Research and Quality (AHRQ). Each SID captures all inpatient discharges at non-federal facilities for the respective state, regardless of primary payer. States electing to expand Medicaid were identified from previously published literature and information available from HCUP.¹ WA, IA, MD, and NY had opted to participate in Medicaid expansion while FL and NC had opted to NOT participate in the expansion. The SIDs for these states were used in this study as these SIDs contained a large heterogeneous geographic representation of the United States population, healthcare systems, and policies.

Study Population

The analysis cohort included adult patients between the ages of 18 and 64 years that were discharged from hospitals after undergoing a non-emergent surgical procedure for obesity, paraesophageal hernia (PE), gastroesophageal reflux disease (GERD), chronic diverticulitis or benign or malignant tumor in the pancreatic body/tail between 2010 and 2014. We chose these procedures as they are operations that are performed on a non-emergent basis and

require inpatient hospitalization. Because they require hospitalization, these procedures and associated outcomes are consistently captured by the HCUP-SID databases. Because they are performed on a non-emergent basis, they are expected to be susceptible to the effects of improved access that are potentially associated with the implementation of the ACA. International Classification of Diseases, Ninth Revision (ICD-9) diagnosis and procedure codes were used to identify patients undergoing the select minimally invasive surgery (MIS) and open procedures. ICD-9 codes have been used and validated in previous studies.^{4–14} The list of ICD-9 clinical diagnosis and procedure codes used in our analysis are provided in supplemental Table 1. Patients younger than 18 years of age, older than 64 years of age or on Medicare insurance were excluded as they were not eligible for the ACA's Medicaid expansion.¹⁵

Outcomes of Interest

The primary outcomes of interest were the utilization rates for MIS and open approaches to the selected procedures pre- and post-ACA Medicaid expansion. A difference-in-difference (DID) analysis was used to estimate the effects of the ACA expansion on admissions and procedures by comparing rates of MIS and open surgeries for patients receiving Medicaid benefits and those identified as self-pay to those with private insurance in the same states. Utilization rates and rates of admission in the expansion states and non-expansion states were calculated for two periods: before (2010–2013) and after (2014) ACA expansion and the difference between the change utilization and admission rates in the expansion states and the change in utilization rates and admission rates in non-expansion states for patients by payer was then calculated and is reported as the DID. We also determined the incidence rate ratio (IRR) for the utilization and admission rates for each procedure/diagnosis. The IRR is the ratio of differences in rates of utilization or average costs for a given procedure in the expansion states to the differences in rates for that procedure in the non-expansion states. It is meant to be interpreted as the relative percentage point change in our outcomes of interest (utilization rates, admissions rates, and costs) associated with the ACA Medicaid expansion in states that expanded Medicaid relative to those that opted out.

Our second outcome of interest was the costs of care associated with a given procedure before and after the ACA Medicaid expansion by insurance type. We aimed to examine whether there would be shifting of costs as more patients opted to use Medicaid insurance. Cost data were obtained by multiplying the HCUP total charges variable for a given episode of care by the hospital-specific cost to charge ratio (CCR). These costs only include those for the index admission. HCUP SID contains data on total charges for each hospital discharge in the database. The charge information represents the amount that hospitals bill for services for any given admission. The CCR is developed using standardized information on all-payer inpatient cost and charges. Primary data on the cost to charge ratio is reported per federal regulations by every hospital annually to the Centers for Medicare and Medicaid Services (CMS). The CCR is calculated by CMS and reported to AHRQ. This ratio enables the conversion from charges recorded in HCUP for a given admission cost. These costs reflect the actual expenses incurred in the production of hospital services, including wages, supplies, and utility costs.

Statistical Analysis

Our analysis was a retrospective observational study of patients undergoing care from 2010 to 2014. We used a quasi-experimental study design known as difference-in-difference to compare rates of utilization of surgical procedures and admissions for related ICD-9 diagnoses in Medicaid expansion (WA, IA, MD, and MA) to those for non-expansion (FL and NC) states between 2010 and 2014. This statistical approach has been previously described in detail and used by our group and others to evaluate practice pattern variations that occur following policy changes (15–18).

Multivariable Poisson regression was used to examine a risk-adjusted IRR of the association of Medicaid insurance expansion with our outcomes of interest. For this model we created indicator variables for (1) time (before expansion (2010–2013) versus after expansion (2014)), (2) expansion status (expansion states (IA, NY, WA, and MD) versus non-expansion (NC and FL) states), and (3) insurance status (Medicaid or self-pay versus private insurance). A triple interaction term was created using the indicators variables which represent the differences in DID estimator, and its coefficient reflected the association between ACA Medicaid expansion in states that expanded Medicaid insurance compared to those states that opted not to expand and the outcomes of interest. Our final model was adjusted for patient demographics and comorbidities and weighted using state population data from the 2010–2014 census to account for population growth and migration during the study period. To confirm that there was no significant change between rates of utilization and costs among Medicaid patients in expansion states relative to non-expansion states before the ACA Medicaid expansion, we conducted a sensitivity analysis within the years before expansion to verify parallel trends in our outcomes of interest before reform.

All analyses were performed using STATA 14 software (College Station, TX). Baseline characteristics are presented as means and standard deviations, medians, and interquartile ranges (IQR), or counts and percentages. Unadjusted comparisons of two or more proportions between pre- and post-expansion were performed using a chi-squared test, and continuous variables were compared using t-tests or Wilcoxon rank sum tests as appropriate. This database is de-identified therefore no consent was required or obtained. This study was evaluated and approved by the Institutional Review Board at Loyola University Chicago.

RESULTS

Demographic Data

A total of 132,851 patients met inclusion criteria receiving care for the selected procedures in the states under study before and after the enactment of the ACA. 82,209 (62%) were cared for in states that expanded Medicaid and 50,642 (38%) were cared for in states that elected to forgo expansion. Patients receiving care in expansion states tended to be slightly younger (44 vs. 45; $p<0.01$), were more likely to be male (73% vs. 65%; $p<0.01$) and from an ethnic minority (33% vs. 32%; $p<0.01$) than those receiving care in non-expansion states. There were no differences in Charlson comorbidity index ($p=0.34$) between patients undergoing care in expansion states relative to those undergoing care in non-expansion states. In the years following expansion, the percentage point increase of patients covered by

Medicaid was higher in the expansion states than it was in the non-expansion states (4.3% vs. 1.4%). (Table 1; supplemental Table 2)

Admission Rates Before and After ACA Medicaid Expansion

We examined changes in rates of admission in patients with Medicaid insurance for specific diagnoses before and after the implementation of the ACA in states that elected to expand Medicaid relative to those that did not. Table 2 shows the results of that comparison. Following the implementation of the ACA, the rate of admission for a diagnosis of obesity increased by 11% (IRR 1.11; $p < .01$) and by 4% in paraesophageal hernia (IRR 1.04; $p < .01$) among Medicaid patients treated in expansion states than it did in Medicaid patients treated in non-expansion states. By comparison, the rates of admission for Medicaid patients with a diagnosis of pancreatic benign and malignant pancreatic tumors decreased by 6% (IRR 0.94; $p < .01$) in expansion states than in non-expansion states. There was no significant difference in the rate of change in rates of admission for diverticulitis (IRR 1.02; $p = 0.66$) among Medicaid patients in expansion states compared to non-expansion states. (Table 2)

Utilization of Surgery by Approach Before and After ACA

We compared the use of MIS approaches to non-emergent general surgical operations in states that expanded Medicaid under the ACA to the use of such approaches in states that did not expand Medicaid under the hypothesis that improved access to care would lead to an increase in the utilization of advanced MIS. Among Medicaid patients, following implementation of the ACA, rates of utilization for laparoscopic approaches to gastric bypass increased by 8% (IRR 1.08; 95% CI [1.02, 1.15]) and by 17% in Nissen fundoplication (IRR 1.17; 95% CI [1.09, 1.26]) in expansion states than they did in non-expansion states. The rate of utilization of open sigmoidectomy increased by 27% (IRR 1.27; 95% CI [1.01, 1.60]) among Medicaid patients in expansion states compared to non-expansion states. By contrast, the rates of utilization of open gastric bypass decreased by 38% (IRR 0.62; 95% CI [0.49, 0.79]) and by 13% in laparoscopic sleeve gastrectomy (IRR 0.87; 95% CI [0.83, 0.91]) among Medicaid patients receiving care in expansion states than they did among those receiving care in non-expansion states. There was no difference in the rate of change in rates of utilization of open gastric bypass, laparoscopic distal pancreatectomy, open distal pancreatectomy, and laparoscopic sigmoid colectomy between Medicaid patients in expansion states and those in non-expansion states. (Table 3)

In our sensitivity analysis, we found no significant trend in utilization rates for laparoscopic gastric bypass, sleeve gastrectomy, Nissen fundoplication, distal pancreatectomy, and sigmoidectomy between Medicaid ($p > 0.05$) patients in expansion states and those undergoing care in the non-expansion states for years prior to the implementation of the ACA (2010 to 2014).

Impact of ACA on Aggregate Costs of Care

To evaluate the impact of expanding Medicaid on the costs of inpatient care for non-emergent surgical diseases, we examined the change in overall costs of care (post-ACA to pre-ACA) for admissions associated with the diagnoses under study by insurance type. This analysis was risk adjusted for age, Charlson comorbidity index, and facility type. Following

the implementation of the ACA, the in-hospital costs of care for self-pay patients undergoing care in expansion states rose by +\$1,669 (95% CI [+\$655, +\$2,682]) relative to the costs of care for self-pay patients undergoing care in non-expansion states. By contrast, the costs of care for Medicaid (−\$385; 95% CI [−\$1,055, −\$286] and privately (+\$104; 95% CI [−\$158, +\$367]) insured patients did not change relative to costs for those patients in non-expansion states. (Table 4)

To better understand the effect of the ACA Medicaid expansion on costs for specific procedures, we performed a risk-adjusted cost analysis comparing the changes in costs of care with the implementation of the ACA for each type of procedure for patients undergoing selected surgical procedures in expansion states to those undergoing the same operations in non-expansion states. We found that for Medicaid patients, there was a generally consistent decrease in the costs of care associated with MIS approaches to the procedures in expansion states relative to costs of MIS approaches in non-expansion states. For Medicaid patients undergoing laparoscopic gastric bypass in expansion states, costs fell by −\$905 per case (95% CI [−\$1,330, −\$479]) relative to those for Medicaid patients undergoing laparoscopic gastric bypass in non-expansion states. For laparoscopic sleeve gastrectomy costs of care for Medicaid patients in expansion states fell by −\$762 per case (95% CI [−\$1,091, −\$433]) relative to those undergoing laparoscopic sleeve gastrectomy in non-expansion states and for laparoscopic Nissen fundoplication costs fell by −\$1,378 per case (95% CI [−\$2,015, −\$742]) relative to laparoscopic Nissen done among Medicaid patients in non-expansion states. By contrast, hospital costs for privately insured patients undergoing laparoscopic gastric bypass and laparoscopic sleeve gastrectomy rose in expansion states relative to the costs for privately insured patients undergoing those procedures in non-expansion states. Similarly, costs for self-pay patients undergoing laparoscopic and open gastric bypass rose in states that expanded Medicaid relative to non-expansion states. There was no change in the costs of care with ACA implementation for the other surgical procedures under review. (Table 5)

DISCUSSION

In this study, we aimed to evaluate the impact of the ACA Medicaid Expansion on the utilization of minimally invasive and open approaches to common surgical procedures. We had two main findings. First, in states that expanded Medicaid coverage under the ACA, the rates of utilization of MIS approaches for gastric bypass and Nissen fundoplication, and open sigmoidectomy rose among Medicaid patients relative to the rates of utilization among Medicaid patients in non-expansion states. Second, we found there was an associated increase in the in-hospital cost of care for uninsured/self-pay patients in states that expanded Medicaid for these procedures.

Our principal finding suggests that the ACA Medicaid expansion led to increased utilization of MIS approaches to gastric bypass and Nissen fundoplication in states that expanded Medicaid compared to non-expansion states. These are new findings and are consistent with literature previously identifying an association between insurance expansion and access to surgical care. Previous studies examining the impact of the ACA would suggest that Medicaid expansion has been associated with improvements in access to medical and

surgical care.^{15,16} In one study from our group, we found that the ACA Medicaid expansion was associated with an increase in lung and colorectal cancer surgeries in states that expanded Medicaid compared to non-expansion states.¹⁵ Another study by Loehrer et al. found the ACA Medicaid expansion was associated with a 2.6 percentage point increase in the probability of optimal surgical management for the uncomplicated presentation of appendicitis, cholecystitis, diverticulitis, non-ruptured aortic aneurysm, and peripheral arterial disease.¹⁶ This finding is also consistent with the evidence in the literature, suggesting that utilization varies with access in general. Prior studies examining gastric bypass surgery have shown that privately insured patients are several times more likely than uninsured or underinsured patients to have gastric bypass.¹⁷

There are several types of patients that are now on Medicaid insurance because of the ACA expansion. There are those patients who were previously uninsured, and because of the expansion were able to gain access to surgical care. Another group of patients is those that were previously insured by their employer became eligible for Medicaid through the expansion and siphoned off patients who otherwise would have opted for private insurance. The last group of patients is those new patients who were introduced into the healthcare system because of never having access to healthcare insurance in the past. The ability to examine which group our patients belong to in this analysis is beyond the capabilities of the HCUP SID database. Our study is consistent with these previous reports but is also novel in that few prior studies have examined the impact of the ACA Medicaid expansion on access to and utilization of MIS approaches.

We did identify a decrease in the rate of utilization of laparoscopic sleeve gastrectomy in expansion states compared to non-expansion states. While this may seem to run counter to the observation that the ACA has done something to improve access and drive increased utilization of MIS approaches, this finding likely reflects practice patterns that were established and considered the standard of care at the time of expansion. Until very recently, the gastric bypass was regarded as the gold standard bariatric procedure providing durable long-term weight control and improvement in obesity-related co-morbidities such as diabetes, hypertension, sleep apnea, and hyperlipidemia.^{18–21} At the time the ACA was implemented, outcomes for gastric bypass were felt to be superior to the sleeve, and gastric bypass was used preferentially. In the years since expansion, utilization of gastric sleeve has dramatically increased and has surpassed the gastric bypass as the first choice in weight reduction surgery. The flux in utilization (increases in MIS roux-en y gastric bypass and decreases in gastric sleeve) immediately following expansion likely reflects a trend toward what was then regarded as optimal care (toward laparoscopic gastric bypass) for these patients. Also, potentially contributing to this effect may be the fact that Medicaid beneficiaries tend to have higher rates of severe morbid obesity (BMI >40). This would be expected to lead to a higher proportion of patients undergoing laparoscopic gastric bypass, which is still considered superior to sleeve in patients with severe morbid obesity.²²

With regard to costs of care, our findings suggest a tendency among providers to offset increased costs of caring for Medicaid patients that likely followed expansion by shifting costs to uninsured/self-pay patients. When considering our study population as a whole, there was no significant difference in in-hospital costs associated with caring for the

Medicaid population in expansion states compared to non-expansion states. The costs of caring for self-pay/no charge patients was higher in expansion states following the implementation of ACA compared to non-expansion states. When examining costs for specific procedures, we noted similar trends. Costs for self-pay patients undergoing laparoscopic gastric bypass in expansion states rose with ACA implementation relative to those for patients undergoing laparoscopic gastric bypass in non-expansion states while costs for Medicaid patients undergoing the same procedures in states that expanded Medicaid fell relative to non-expansions states. These findings likely reflect efforts on the part of providers to share the costs of caring for new Medicaid patients over the entire population in the years after the expansion. Prior studies of the ACA Medicaid expansion that have examined patients in the outpatient setting have demonstrated a decrease in out of pocket expenses to patients as well as a decline in total Medicaid spending with no significant increase in expenditure from state funds.^{23–25} Other studies have identified similar trends toward alternative billing policies by hospitals for uninsured patients who do not have pre-negotiated rates.^{26–29}

There are several possible explanations for why the in-hospital costs of care for uninsured/self-pay patients in states that expanded Medicaid. It could be possible that there was a tendency among providers or healthcare systems to offset increased costs for Medicaid patients by shifting costs to uninsured/self-pay patients. Another possible explanation is that the patient population who remains self-pay/uninsured are more high-risk patients and therefore accrue higher in-hospital costs compared to a more heterogeneous group of people before the ACA Medicaid expansion.

Several additional findings warrant discussion. We noted that patients undergoing care for benign and malignant pancreatic tumors had no significant change in the rates of utilization of either open or laparoscopic approaches. We also noted significant changes in the pattern of care for diverticulitis with increased utilization of open sigmoid colectomy in expansion states after implementation of the ACA. With regard to the observation on the utilization of pancreatectomy, we made similar findings in a study previously published by our group evaluating rates of pancreatic resection in specific in HCUP. We found that the ACA Medicaid expansion was not associated with an increase in pancreatectomy rates in expansion states compared to non-expansions states.¹⁵ It may be that patients with pancreatic cancer are relatively immune to changes in access to insurance. With regard to the observation on the surgical management of diverticulitis, we feel this reflects an ACA-related increase in incentive to do procedures. Throughout the study, national trends in the management of diverticular disease were away from surgical intervention. The fact that the rates of utilization of open sigmoid colectomy increased in expansion states compared to non-expansion states likely reflects, at least in part, an effect of the ACA to encourage utilization of surgical procedures. It may be also possible that patients who gained access to insurance through the ACA were more willing to undergo operations because their care is covered. Due to limitations inherent in the dataset, it is impossible to judge the underlying necessity of the operations performed, and further study would be needed to understand the exact causes of these findings.

There are several limitations to this study. It is a retrospective review of an administrative dataset. The administrative dataset does not contain detailed clinical information on many physiologic measures which may contribute to patient selection for different interventions, determine outcomes, and affect costs of care. There may be miscoding of the ICD-9 codes. The study was limited to 2014 as that data was the latest available from HCUP. More recent rates of utilization were not examined. Our study was limited to a few states and cannot be extrapolated to the entire US population.

CONCLUSION

Following the implementation of the ACA, the rates of utilization of MIS approaches to gastric bypass and Nissen Fundoplication and open sigmoidectomy repair among Medicaid patients undergoing care in states that expanded Medicaid increased relative to those for patients undergoing care in states that did not expand Medicaid. There was an associated increase in the in-hospital cost of care for uninsured/self-pay patients in states that expanded Medicaid. The increase in MIS procedures is likely driven by states expanding access to care. The changes in costs of care may reflect efforts on the parts of health systems to share costs associated with new Medicaid patients across the entire population cared for by the health system.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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HIGHLIGHTS

- ACA Medicaid expansion increased utilization of MIS procedures
- Cost of caring for Medicaid patients after the expansion was neutral

Table 1.

Patient Characteristics in Medicaid Expansion States and Non-expansions States

	Expansion		Non-Expansion		P
Patients, No. (%)	82,209	61.9%	50,642	38.1%	
Age, mean (SD)	44	11	45	11	<.01
Male, n (%)	60,005	73.0%	32,836	64.8%	<.01
CCI, median (IQR)	0	0–1	0	0–1	0.34
Insurance type, n (%)					
Private	64,215	78.1%	42,917	84.7%	<.01
Medicaid	16,302	19.8%	4,032	8.0%	
Self-Pay	1,641	2.0%	3,416	6.7%	
No- Charge	51	0.1%	277	0.5%	
Race/ethnicity, n (%)					
White	55,130	67.1%	34,440	68.0%	<.01
Black	11,009	13.4%	8,857	17.5%	
Hispanic	8,956	10.9%	6,294	12.4%	
Other	7,114	8.7%	1,051	2.1%	
Procedures, n (%)					
Laparoscopic Gastric Bypass	29,116	35.4%	19,579	38.7%	<.01
Open Gastric Bypass	3,845	4.7%	1,797	3.5%	
Laparoscopic Sleeve Gastrectomy	26,573	32.3%	13,347	26.4%	
Laparoscopic Nissen	18,230	22.2%	11,502	22.7%	
Laparoscopic DP	179	0.2%	73	0.1%	
Open DP	1,196	1.5%	807	1.6%	
Laparoscopic Sigmoidectomy	8,766	10.7%	7,023	13.9%	
Open Sigmoidectomy	5,604	6.8%	4,165	8.2%	

Expansion states (WA, IA, NY, and MD). Non-expansion states (FL and NC). Pre-Medicaid expansion (2010–2013), post-Medicaid expansion (2014). Abbreviations: Charlson comorbidity index (CCI) and distal pancreatectomy (DP).

Table 2.

Impact Of The Affordable Care Act On Rates Of Admission By Diagnosis For Medicaid Patients Pre And Post Expansion

	Expansion States		Non-Expansion States		DID	IRR	P
	Pre [*]	Post [*]	Pre [*]	Post [*]			
Obesity	0.10	0.13	0.07	0.08	0.02	1.11	<.01
Paraesophageal hernia	0.10	0.11	0.05	0.06	0.01	1.04	<.01
Pancreatic cancer	0.05	0.05	0.05	0.05	0.01	0.94	<.01
Diverticulitis	0.10	0.10	0.04	0.04	0.00	1.02	0.66

* Pre-Medicaid expansion (2010–2013), post-Medicaid expansion (2014). The rate is admissions per 100 patients with a given diagnosis of interest at discharge. Abbreviations: incidence rate ratio (IRR) and difference-in-difference (DID).

Table 3.

Impact Of The Affordable Care Act On Rates Of Elective Surgery By Procedure For Medicaid Patients Pre And Post Expansion

	IRR	95% CI	
Laparoscopic Gastric Bypass	1.08	1.02	1.15
Open Gastric Bypass	0.62	0.49	0.79
Laparoscopic Sleeve Gastrectomy	0.87	0.83	0.91
Laparoscopic Nissen	1.17	1.09	1.26
Laparoscopic DP	0.51	0.17	1.52
Open DP	0.82	0.55	1.21
Laparoscopic Sigmoidectomy	0.98	0.85	1.13
Open Sigmoidectomy	1.27	1.01	1.60

Risk-adjusted for age, gender, Charlson comorbidity index, and race. Abbreviations: incidence rate ratio (IRR) and distal pancreatectomy (DP)

Table 4.

Impact of The Affordable Care Act on In-Hospital Index Admission Aggregated Cost By Insurance Type

	Marginal Cost Difference[*]	95% CI	
Insurance type			
Medicaid	−\$385	−\$1,055	+\$286
Private	+\$104	−\$158	+\$367
Self-Pay/No Charge	+\$1,669	+\$655	+\$2,682

^{*} Cost is risk adjusted for comorbidities, age, race, and gender.

Table 5.

Impact of The Affordable Care Act On In-Hospital Index Admission Cost By Procedure For Medicaid Patients Pre and Post Expansion By Insurance Type

	Medicaid			Private			Self-pay		
	Cost	95% CI		Cost	95% CI		Cost	95% CI	
Procedure type									
Laparoscopic Gastric Bypass	-\$905	-\$1,330	-\$479	\$453	\$119	\$787	\$3,426	\$2,207	\$4,644
Open Gastric Bypass	\$3,182	\$464	\$5,901	\$1,827	-\$51	\$3,706	\$11,565	\$3,684	\$19,445
Laparoscopic Sleeve Gastrectomy	-\$762	-\$1,091	-\$433	\$341	\$81	\$602	-\$276	-\$1,147	\$594
Laparoscopic Nissen	-\$1,378	-\$2,015	-\$742	\$71	-\$370	\$513	-\$704	-\$2,506	\$1,097
Laparoscopic DP	\$1,554	-\$13,329	\$16,438	-\$4,000	-\$12,001	\$4,002	na	na	na
Open DP	-\$5,020	-\$11,091	\$1,051	-\$100	-\$4,145	\$3,946	-\$8,409	-\$27,306	\$10,489
Laparoscopic Sigmoidectomy	\$527	-\$881	\$1,935	\$198	-\$529	\$926	-\$1,377	-\$5,073	\$2,320
Open Sigmoidectomy	-\$1,707	-\$4,093	\$679	\$1,228	-\$384	\$2,840	\$1,998	-\$6,137	\$10,134

Cost is risk adjusted for comorbidities, age, race, and gender. Pre-expansion (2010–2013) and post-expansion (2014). Distal pancreatectomy (DP). Cost is equal to the marginal cost difference.