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Medicaid Expansion and Disparity Reduction in Surgical Cancer Care at High Quality Hospitals

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Abstract

Background—The Affordable Care Act's (ACA) Medicaid expansion has been heavily debated due to skepticism of Medicaid's ability to provide high-quality care. Particularly, little is known whether Medicaid expansion improves access to surgical cancer care at high-quality hospitals. To address this question, we examined the effects of the 2001 New York Medicaid expansion, the largest in pre-ACA era, on this disparity measure.

Methods—We identified 67,685 nonelderly adults from the New York State Inpatient Database who underwent select cancer resections. High-quality hospitals were defined as high-volume hospitals or low-mortality. Disparity was defined as model-adjusted difference in percentage of patients operated at high-quality hospitals by insurance type (Medicaid/uninsured vs. privately insured) or by race (African-American vs. white). Levels of disparity were calculated quarterly for each comparison pair, then analyzed using interrupted time series to evaluate the impact of Medicaid expansion.

Results—Disparity in access to high-volume hospitals by insurance type was reduced by 0.61 percentage points per quarter following expansion ($p=0.003$). Medicaid/uninsured beneficiaries

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had similar access to low-mortality hospitals as the privately insured; no significant change was detected around expansion. Conversely, racial disparity increased by 0.86 percentage points per quarter ($p<0.001$) in access to high-volume hospitals and by 0.48 percentage points per quarter ($p=0.005$) in access to low-mortality hospitals following Medicaid expansion.

Conclusion—Pre-ACA Medicaid expansion reduced the disparity in access to surgical cancer care at high-volume hospitals by payer. However, it was associated with increased racial disparity in access to high-quality hospitals. Addressing racial barriers in access to high-quality hospitals should be prioritized.

INTRODUCTION

One of the fundamental pillars of the 2010 Affordable Care Act (ACA), which seeks to improve access to high-quality healthcare for the poorest Americans, is the expansion of Medicaid eligibility to 138% of the Federal Poverty Line. Currently 32 states (including District of Columbia) have expanded Medicaid under the ACA, and both expansion and non-expansion states are observing closely the effects of expansion especially in the midst of a debate on whether and how Congress might further reform the Medicaid program. Early reports on results of the ACA showed 43% reduction in uninsured rate (1). In addition, evaluations of pre-ACA Medicaid expansions showed improvements, including greater access to subspecialty surgical care, increased utilization of preventive care, improved health-related outcomes, and in some reports reduced mortality rate (2–5).

Despite these improvements, substantial controversy still surrounds ACA's Medicaid expansion in part around access to high quality care. Using surgical cancer care as a proxy for tertiary specialty care, it has been widely documented that receiving surgery at high-quality hospitals such as high volume or low mortality is closely associated with insurance status and race (6). Specifically, the uninsured and Medicaid beneficiaries traditionally receive their surgical cancer care at low-quality hospitals and experience worse surgical outcomes (6–8). Furthermore, evidence also support that vulnerable population (e.g. racial/ethnic minorities, uninsured, those with Medicaid) were less likely to benefit from ongoing national trends to regionalize complex cancer surgery to high volume hospitals (6, 9). The significance of this disparity is underscored by research showing that treatment of ovarian cancer at high-quality centers mitigates racial and ethnic disparities in surgical outcome and survival (10). To date, most evidence generated on expansion coverage has heavily focused on access to primary care (11). However, little is known whether expanding Medicaid can reduce disparities in receiving surgical cancer care at high-quality hospitals, a phenomenon with different flow of care treatment dynamics when compared to routine health care via primary care services. Indeed, we recently found no differential effect of pre-ACA Medicaid expansion on access to surgical cancer care among African-Americans and Hispanics Medicaid beneficiaries vs. white Medicaid beneficiaries (2). However, knowledge on whether expansions of Medicaid eligibility can reduce disparities in receiving cancer surgery at high-quality surgical care remains largely unknown.

In order to answer the question of how Medicaid expansion affects disparities in receiving surgical cancer care at high quality hospitals, we used data from the 2001 Medicaid

expansion in the state of New York. This expansion is useful to study, as it was one of the largest pre-ACA expansions of Medicaid coverage in the US, and targeted a similar population as did the ACA Medicaid expansion. Furthermore, early results of the impact of ACA's Medicaid expansion on surgical cancer care are still pending. Drawing from our recent work, we seek to measure the effects of Medicaid expansion on receiving surgical cancer care at high-quality hospitals by insurance status and by race. We defined two types of high-quality hospitals: high-volume hospitals and low-mortality hospitals. We hypothesize that this pre-ACA expansion reduced disparities in access to surgical cancer care at these high-quality hospitals. The findings of this health policy question may contribute to the ongoing debate on the future of the ACA Medicaid expansion.

METHODS

Database and Study Participants

We used data from the New York State Inpatient Database in the 5 years before and after the 2001 Medicaid expansion (1997–2006). This database was built as a part of the Healthcare Cost and Utilization Project under the Agency for Healthcare Research and Quality (12). As previously mentioned, the 2001 Medicaid expansion in New York represents one of largest expansions in the U.S. prior to the ACA. It also closely resembles the 2010 ACA's Medicaid expansion in that it primarily targeted adults without dependent children. Additionally, early results of the impact of ACA's Medicaid expansion on surgical cancer care is largely unavailable. We identified 67,685 non-elderly adults 19–64 years old who underwent one of nine surgical procedures of esophagus, stomach, pancreas, liver, kidney, colon, rectum, bladder, and lung cancer resections using primary procedure code on the discharge record via *International Classification of Diseases, 9th Revision, Clinical Modification* procedure codes. Partial and total resections for each organ were grouped together. These procedures were selected because of their complexity and risk for morbidity and mortality. Analysis examining access to high-volume hospitals was restricted only to patients who underwent one of five complex cancer resections with demonstrated strong volume-outcome relationships (esophagus, liver, pancreas, and urinary bladder; N=10,737)(13).

Measures of High-Quality Hospitals (HQHs)

Rationale behind using High-Quality Hospitals—Our rationale draws from previous research and conceptual framework underscoring the complex nature of surgical disparities, including surgical cancer care, due to several factors including insurance status (or lack of), local market environment, referrals patterns and patient-level factors (14–17).

We used two different measures to represent surgical quality in defining high-quality hospitals. The first proxy we chose is procedure volume, which has an established and documented correlation with surgical outcomes for certain procedures for nearly two decades (13). As a result, high risk/complex surgical procedures, including pancreatic and esophageal cancer surgery, were centralized to high-volume hospitals. Yet, disparities based on socioeconomic factors were widely reported to exist in terms of access to high-volume hospitals. Specifically, ethnic/racial minorities, un- or underinsured, and those who are

multi-morbid were less likely to receive major cancer surgery at high-volume hospitals. (18, 19).

The second proxy is low post-operative inpatient mortality, an undoubted benchmark measure for quality of surgical care, and frequently used to guide referrals and shape payment policies. Both proxies have been adopted by the AHRQ as Inpatient Quality Indicators. (20–22). Furthermore, both proxies are also used by insurers as criteria for evidence-based referrals and for designation of quality care centers (23). Together, we believe that both proxies can also be used as potential disparity measures as well as quality measures.

Definition of High-Quality Hospitals—Using the hospital volume proxy, we defined high-volume hospitals according to previously published algorithm: as hospitals with the highest procedure-specific case volumes that treat 1/3 of all patients of that procedure within a given calendar year. Hence, hospital's high-volume status can differ among different procedures and years (24, 18, 9). We also recognize that others have used different volume threshold as a definition for high-volume hospitals (7). In addition, the fluctuating threshold for high-volume status is adopted to minimize the effect of increasing total procedure volume on subsequent time trend analysis. Again, analysis of Medicaid expansion and disparity in access to high-volume hospitals were only performed on complex cancer resections with demonstrated strong volume-outcome relationships (esophagus, liver, pancreas, and urinary bladder; N=10,737)

Low-mortality hospitals were identified as hospitals with lowest quartile of observed-to-expected (O/E) inpatient mortality rate ratios < 0.7 (13). By this definition, hospitals in the lowest quartile for O/E mortality ratios are categorized as low-mortality hospitals. We recognize the lack of widely used or standardized O/E inpatient mortality cut-offs points; we hence performed sensitivity analyses using two more generous cut-off points for the O/E ratio: 0.79 (the median inpatient O/E mortality ratio of benchmark hospitals in the 2017 Truven Health 100 Top Hospitals Study)(12), and 0.9 (as representative of nearly 40% of study hospitals). The O/E mortality ratio provides an overall measure of mortality for each hospital and enables comparison among hospitals after adjusting for procedure type, patient age, sex, race, insurance type, comorbidity, and time trend. A procedure-adjusted overall mortality measure was chosen over procedure-specific mortality because some procedures of interest are uncommon and may result in very small sample size and unstable estimates in the majority of hospitals. We excluded hospitals that performed fewer than 50 cases during the entire duration of the study period to obtain reliable estimates of mortality. Analysis of Medicaid expansion and disparity in access to low-mortality hospitals were performed across our entire cohort of 67,685 non-elderly adults (19–64 years old) who underwent one of nine surgical procedures of esophagus, stomach, pancreas, liver, kidney, colon, rectum, bladder, and lung cancer

Outcome (Dependent) variables

Our outcome variable was disparity in access to high-quality hospitals defined as the model-adjusted difference in percentage of patients who received their surgical care at a high-

quality hospitals by insurance type (Medicaid/uninsured vs. privately insured) or by race (African-American vs. non-Hispanic white). Patients from other racial groups and Hispanic patients were excluded because of sample size. Informed by previous literature on expansion coverage in Massachusetts, Medicaid and uninsured patients were combined as one analytic group in order to capture changes due to obtaining Medicaid coverage by an otherwise uninsured patient within this group (25, 26). Access to the two types of high-quality hospitals were analyzed separately.

We choose to measure the effects of this expansion on racial disparity due to two reasons. First, African-American patients face persistent and widespread disparities in access to quality healthcare, are significantly more likely to be uninsured compared to non-Hispanic white patients and therefore could potentially benefit the most from Medicaid expansion. Second, we recently demonstrated the New York 2001 expansion of Medicaid did not significantly increase the proportion of coverage for minority patients among all Medicaid recipients of complex surgical care (2).

Statistical Analysis

The statistical analysis was conducted in two steps. First, access to high-quality hospitals was modeled using a logistic regression controlling for patients' age, sex, procedure type, and emergency admission, with an interaction term between time quarter and the comparator variable of interest (insurance type or race). For comparison by insurance type, we also adjusted for race, but for comparison by race, adjustment for insurance type was not performed because we conceptualize that race affects access to care through insurance. Levels of disparity were calculated quarterly both for the difference between privately insured and uninsured/Medicaid and for the difference between non-Hispanic white patients and African-American patients from model fitted values.

We then used interrupted time series (ITS) analysis to evaluate the impact of Medicaid expansion on these measures of disparity in access to high-quality hospitals. ITS is a robust quasi-experimental method widely used to determine the impact of a specific intervention such as the impact of a newly implemented policy (27), and it has also been used in published works measuring the effects of Medicaid expansion on care utilization of different services (3, 28).

The impact is estimated by measuring changes in the slope and the intercept of the outcome measure – in this case disparity in access – around time of the intervention while taking pre-intervention trends into account. Linear models with seasonality adjustments were used in our primary analyses; when necessary, autoregressive and moving average components were added to control for additional autocorrelation of the time series. Sensitivity analyses included removing the term describing instantaneous intercept change from all models and estimating; estimates of post-expansion trends from both types of models were compared. All tests were two-sided and used a significance level of 0.05. All analyses were performed using SAS 9.4.

RESULTS

Patient Characteristics

Of the 67,685 patients selected for our study, 15.0% were Medicaid beneficiaries or uninsured (Table 1). Twelve percent (12.1%) were African-American and 67.3% were non-Hispanic white. The most represented age group was in the 50–64 year old age group at 67.4%, followed by 29.1% in the 35–49 year old age group. The most represented procedure type in our cohort was colon resection (23.9%), followed by kidney and lung resections at 11.9% and 10.7%, respectively. Less than 10% of procedures were emergent, and the 78.4% of the cohort had a Charlson comorbidity index of 0.

Effect of Medicaid Expansion on Disparity in Access to High-Quality Hospitals by Insurance Type

Over the entire study period, 14.7% of total low-mortality hospital patients were Medicaid beneficiaries or uninsured vs. 77.9% who were privately insured. For high-volume hospitals, 9.5% of total patients were Medicaid beneficiary or uninsured vs. 83.7% who were privately insured.

As displayed in Figure 1, disparity in access to high-volume hospitals for surgical cancer care between Medicaid/uninsured and the privately insured increased by 0.45 percentage points per quarter in the pre-expansion period ($p = 0.0003$); in contrast, disparity in access decreased by 0.52 percentage points per quarter following the expansion in 2001 (pre-post contrast = 0.97 percentage points per quarter, 95% CI: 0.64 – 1.31, $p < 0.0001$). This corresponds to a total 20.4 percentage points in the 21-month post-expansion period observed. Details of the fitted model are presented in Table 2.

Regarding access to low-mortality hospital, there was no trend in disparity between uninsured/Medicaid patients and privately insured patients prior to the Medicaid expansion, nor did this change following the expansion.

Effect of Medicaid Expansion on Disparity in Access to High-Quality Hospital by Race

Over the entire study period, 9.6% of total low-mortality hospital patients were African-American vs. 72.2% who were non-Hispanic white. For high-volume hospitals, 8.2% of total patients were African-American vs. 73.1% who were non-Hispanic white.

Disparity in access to high-volume hospitals for surgical cancer care between African-American patients and non-Hispanic white patients was decreasing by 0.43 percentage points per quarter in the pre-expansion period ($p = 0.005$); in contrast, disparities increased by 0.44 percentage points per quarter following Medicaid expansion (pre-post contrast = 0.87 percentage points per quarter, 95% CI: 0.53 – 1.21, $p < 0.0001$). Over the 21-month post-expansion observation, the increase accumulates to 18.3 percentage points. (Figure 2). Racial disparity in access to low-mortality hospital shows a similar pattern, decreased briefly at the time of the expansion by 5.6 percentage points (95% CI: 2.0 – 8.2, $p = 0.005$), but increasing following expansion by 0.48 percentage points per quarter (95% CI: 0.16 – 0.80, $p = 0.005$). The 21-month total of this increase equals 10.1 percentage points.

Sensitivity Analysis

When an O/E mortality ratio of < 0.79 and < 0.9 was used to define low-mortality hospitals, respectively, results for analysis on payer-based disparity were similar to the main analysis, but the increase in racial disparity in access to low-mortality hospitals was no longer significant. The point estimate of this increase decreased as the cut-off value increased but remained positive in all three analyses.

Additional sensitivity analyses were performed to check the robustness of the estimates of the post-expansion trends. In all four models, exclusion of the term describing instantaneous intercept change did not change the direction nor the significance of the change in the trend in disparities following Medicaid expansion.

DISCUSSION

The present study demonstrated that a large Medicaid expansion in the pre-ACA era that occurred in New York in 2001 reduced the disparity in access to high-quality hospitals for surgical cancer care between uninsured/Medicaid patients vs. privately insured patients. This finding suggests that the expansion in Medicaid eligibility helped improve low-income Americans' access to high-quality hospitals for surgical cancer care by providing previously uninsured patients with Medicaid coverage. However, the study also shows that this Medicaid expansion also led to a widening in racial disparities in access to high-quality hospitals for surgical cancer care. Low-income non-Hispanic white patients may have been better able to obtain or to take advantage of the benefits of Medicaid coverage when obtaining complex surgical cancer care.

To our knowledge, this study is the first to examine the effects of Medicaid coverage expansion on disparity in access to high-quality hospitals for cancer surgery care. It has been widely reported that Medicaid coverage expansion has improved access to a variety of health care services, including primary care, subspecialty surgical care, and surgical cancer care (25, 29–31). However, increased coverage and care utilization has not been shown to be strongly associated with better health outcomes. While substantial reduction in adjusted all-cause mortality was shown in states that had undergone Medicaid expansion (by 19.6 deaths per 100,000 adults, for a relative reduction of 6.1%; $P=0.001$)(5), there has also been literature suggesting expanded Medicaid coverage generated no significant improvements in physical health outcomes despite the increase in utilization of health care services (29). The lack of strong association between increased utilization of health care services through Medicaid expansion with health outcomes raises questions regarding the access to high-quality care. Our findings help inform these questions by showing that for surgical cancer care, the expansion of Medicaid coverage is associated with lessening of the gap in access to high-quality hospitals between privately insured and Medicaid/uninsured.

Contrary to the observed reduction of disparity by payer, we found that Medicaid expansion was associated with a widened access racial gap to high-quality hospitals. These findings are consistent with previous work showing that while the 2001 NY Medicaid expansion provided higher access and utilization to surgical cancer care to Medicaid beneficiaries overall, it did not differentially increase utilization among Medicaid racial minorities

compared with non-Hispanic white counterparts (2). Furthermore, an increase in racial disparities following New York's Medicaid expansion was also found in access to high-volume hospitals for urinary cystectomy (32).

Several potential reasons may be contributing to the observed widened post-expansion racial gap in our current paper. One possible explanation for this observed increase in racial disparity is based on the regionalization of surgical cancer care, which intensified during the period of our study (1997–2006). The aforementioned study on bladder resection by Casey et al. attributed the widened racial gap to regionalization of complex surgical care disproportionately benefiting white patients compared to African-Americans (24). This worsened disparity may also be the result of continued difference in referral patterns between physicians who treat predominantly African-American patients and those who see mostly white patients. These physicians whom African-American patients see are less likely to be board certified and have reported greater difficulties in providing access for their patients to high-quality subspecialties and nonemergency admission to hospitals (33). Furthermore, when the proper recommendations are given, African-American patients have been shown to have lower rates of acceptance of surgical treatment compared to whites (34). This well-documented phenomenon has been attributed partly to racial and cultural discordance between patients and physicians (35), and also issues of health literacy and misconceptions (36). Considering geographical variances, while minorities are more likely to live closer to high-quality hospitals than whites, minorities are also more likely to live in areas with greater number of competing hospitals, significantly varied in quality, and are less likely to have a high-quality hospital as their closest located hospital. In addition to facing greater decision complexity in hospital selection due to abundance of choices, minorities are also shown to have less available informal sources of information for hospital selection compared to whites due to lower procedural utilization rates within minority communities. These proven dynamics have led racial/ethnic minorities to bypass near-by high-volume hospitals to receive surgical care at low-volume hospitals (17). The contributory factors to racial disparity may also have been exacerbated by the predominantly larger white vs. African-American populations among Medicaid beneficiaries (67.9% vs. 11.7% respectively) leading to widened disparity by race following NY's expansion coverage. Together, the current study reinforces the complexity around drivers of disparities in surgical care. Our findings also highlight the need for further research on uncovering and mitigating barriers that contribute to racial disparities in receiving surgical cancer care high-quality hospital and testing future targeted interventions to reduce these barriers.

Our study has a number of limitations. First, the use of data from 2001 is subject to the unmeasured confounding of changes in trends over the course of time. Second, the absence of non-expanded state, that can serve as control state, to compare these disparity trends in is also a limitation of our work. Third, as with any retrospective observational study, we could not rule out the possibility of unknown confounders. Besides regionalization, other contemporaneous events may also affect the trends we studied. Fourth, our data source precluded the possibility of capturing state border crossing between NY and its neighboring states. Fifth, extrapolation of our study results to other states should be applied with care, given that substantial differences exist among state Medicaid programs. Six, the current study cannot differentiate between uninsured who opted to participated in New York's 2001

expansion vs. those did not, and remained uninsured. Finally and while mortality rate is inherently important and is an often used and emphasized quality metric, there is a lack of consensus on exact methodology, benchmark, and significance of mortality measurements (37). We are aware that there are limitations in arriving at a conclusion from our mortality-centered observations, but we believe these findings are important, reportable, and warrant further research. On the other hand, our study also presents with several strengths that include examining one of the largest of Medicaid in the pre-ACA era, having a demographically and geographically diverse cohort population, and having a heterogeneous selection of major cancer resections. In addition, use of robust methodological design helps reduce the effects of unmeasured confounding of time changes since 2001.

Findings from our study have policy and research relevance for current and future debates regarding Medicaid expansions. While the current work stems from 2001, these results from one of the largest pre-ACA Medicaid expansions in US may inform ongoing debate on expansion coverage and surgical cancer care. Because of the comparable features in New York's to ACA's Medicaid expansion, current findings are relevant to preempt health policy makers in Medicaid expanded states of possible unintended consequences of expansion coverage on vulnerable populations. First, the finding of worsening trends of racial disparities in access to receive surgical cancer care at high-quality hospitals following Medicaid expansion suggests that expanding Medicaid programs may need to be concerned with selective contracting and/or referral patterns that disadvantage patients from minority groups. Additional interventions may be necessary to insure that Medicaid expansion's improvements in access to high-quality care can preferentially or at least equally benefit disadvantaged racial minorities. More concerning is that these findings may also reinforce previous concerns over increased patient burden and minority "crowd out" of high-quality hospitals as a result of centralization of surgical cancer care. Second and upon further validation, use of risk-adjusted "access to complex surgical care at high-quality hospitals" as a "disparity metric" can be used by states to measure and track any unintended consequences of expanding Medicaid eligibility.

In conclusion, we find that a pre-ACA Medicaid expansion reduced the disparity in access to high-quality hospitals for surgical cancer care between uninsured/Medicaid patients vs. privately insured patients, but increased the disparity in access to high-quality hospitals between African-American and non-Hispanic white patients. Our study suggests the need for additional research to investigate whether Medicaid expansion may aggravate racial disparities in surgical cancer care and potential interventions to reduce racial disparities in access to high-quality hospitals.

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Figure 1.

Adjusted Level of Disparity by Insurance Type (Difference between Privately Insured and Uninsured/Medicaid) in Access to High Quality Hospitals (HQH) among Recipients of Cancer Surgery in New York State, 1997–2006. Source: State Inpatient Database. Linear trends represent fitted values. HVH, high-volume hospitals; LMH, low-mortality hospitals

Figure 2.

Adjusted Level of Racial Disparity (Difference Between African-American and non-Hispanic White Patients) in Access to High Quality Hospitals (HQH) among Recipients of Cancer Surgery in New York State, 1997–2006. Source: State Inpatient Database. Linear trends represent fitted values. HVH, high-volume hospitals; LMH, low-mortality hospitals

Distribution of Patient Characteristics among Recipients of Cancer Surgery in New York State, 1997–2007, State Inpatient Database (N=67,685)

Table 1

Characteristic	Overall (N = 67,685), %	Low-mortality hospitals (N = 14,793), %	Other hospitals (N = 51,655), %	High-volume hospitals (N = 22,721), %	Other hospitals (N = 44,964), %
Age					
19 to 34 y	3.2	4.0	3.0	4.1	2.8
35 to 49 y	22.2	22.8	22.2	23.2	21.7
50 to 64 y	74.6	73.3	74.9	72.8	75.5
Race					
Non-Hispanic White	67.9	72.2	66.5	73.1	65.3
African-American	11.7	9.6	12.3	8.2	13.5
Hispanic	5.8	5.1	6.0	4.9	6.2
Asian	3.1	3.5	3.0	3.1	3.1
Insurance					
Medicare	7.0	6.1	7.2	5.5	7.7
Medicaid	11.5	10.4	11.8	7.5	13.5
Private Insurance	76.5	77.9	76.3	83.7	72.9
Uninsured	3.4	4.3	3.0	2.1	4.0
Procedure					
Lung	16.5	18.1	16.4	18.5	15.5
Esophageal	1.8	2.7	1.6	2.3	1.6
Gastric	4.9	5.5	4.8	5.7	4.6
Colon	36.8	31.2	37.8	37.0	36.7
Rectal	12.5	13.4	12.2	10.9	13.3
Liver	1.9	2.8	1.7	2.7	1.5
Pancreas	4.4	5.6	4.1	5.2	4.0
Kidney	18.3	16.6	19.0	14.6	20.2
Bladder	2.8	4.1	2.5	3.0	2.7
Emergency admission	10.9	7.8	11.6	6.5	13.1
Charlson Comorbidity Index					

Characteristic	Overall (N = 67,685), %	Low-mortality hospitals (N = 14,793), %	Other hospitals (N = 51,655), %	High-volume hospitals (N = 22,721), %	Other hospitals (N = 44,964), %
0	73.4	74.8	73.0	75.9	72.2
1	21.5	20.4	21.8	19.5	22.4
2 or higher	5.1	4.9	5.2	4.6	5.4

Estimates of Interrupted Time Series Model Describing Changes in Disparity in Access to High-Quality Hospitals after Medicaid Expansion in New York State, 1997–2006

Table 2

Variable	Intercept		Pre-expansion trend		Change in intercept		Change in trend	
	Estimate, %	p Value	Estimate, %	p Value	Estimate, %	p Value	Estimate, %	p Value
By insurance								
HVH	5.4	<.0001	0.45	0.0003	3.9	0.34	−0.97	<.0001
LMH	−1.3	0.30	−0.13	0.27	2.7	0.13	0.17	0.28
By race								
HVH	18.9	<.0001	−0.43	0.0053	−4.1	0.18	0.87	<.0001
LMH	6.4	<.0001	−0.12	0.33	−5.6	0.0046	0.48	0.0053

Abbreviations: HVH: high-volume hospital; LMH: low-mortality hospital.