



Has the Expansion of Health Insurance Coverage via the Implementation of the Affordable Care Act Influenced Inequities in Coronary Revascularization in New York City?

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Abstract

Background/Purpose In 2014, New York City implemented the Affordable Care Act (ACA) leading to insurance coverage gains intended to reduce inequities in healthcare services use. The paper documents inequalities in coronary revascularization procedures (percutaneous coronary intervention and coronary artery bypass grafting) usage by race/ethnicity, gender, insurance type, and income before and after the implementation of the ACA.

Methods We used data from the Healthcare Cost and Utilization Project to identify NYC patients hospitalized with the diagnosis of coronary artery disease (CAD) and/or congestive heart failure (CHF) in 2011–2013 (pre-ACA) and 2014–2017 (post-ACA). Next, we calculated age-adjusted rates of CAD and/or CHF hospitalization and coronary revascularization. Logistic regression models were used to identify the variables associated with receiving a coronary revascularization in each period.

Results Age-adjusted rates of CAD and/or CHF hospitalization and coronary revascularization in patients 45–64 years of age and 65 years of age and older declined in the post-ACA period. Disparities by gender, race/ethnicity, insurance type, and income in the use of coronary revascularization persist in the post-ACA period.

Conclusions Although this health care reform law led to the narrowing of inequities in the use of coronary revascularization, disparities persist in NYC in the post-ACA period.

Keywords Coronary revascularization inequities · Affordable Care Act · Insurance

MSC code 00A06 Mathematics for nonmathematicians

Introduction

The Affordable Care Act, formally known as the Patient Protection and Affordable Care Act and colloquially known as Obamacare, is a landmark U.S. federal statute enacted by the 111th United States Congress and signed into law by President Barack Obama on March 23, 2010. Through insurance subsidies, Medicaid expansion, and the formation of the Health Insurance Marketplace, this law seeks to improve access to health care [1]. Studies have found that the ACA not only reduced racial and ethnic inequalities in insurance coverage, but also reduced financial barriers to health care services access in the USA [2, 3]. Despite the uneven implementation of the ACA, this successful expansion of insurance coverage, and the financial protection it offers, has been sufficient to view the ACA as an important and successful policy.

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Cardiovascular disease (CVD) is the leading cause of mortality in the USA, with coronary artery disease (CAD) and congestive heart failure (CHF) constituting over half of these deaths [4, 5]. Social determinants of health (SDOH) are key drivers of disparities in all-cause and CVD mortality between non-Hispanic Black (NHB) and non-Hispanic White (NHW) populations. Research has shown that efforts to reduce the racial mortality gap should focus on addressing SDOH as key upstream drivers of excess mortality risk in NHB individuals in the USA [6]. Increased access to health insurance coverage in the USA has improved cardiovascular health measures, including reductions in rates of cardiovascular deaths, hospitalizations among the uninsured for cardiovascular events, and volumes of uninsured cardiac surgery patients [7–9]. While medical management and lifestyle interventions to address these conditions has been a recent focus, coronary revascularization procedures—which include percutaneous coronary interventions (PCIs) and coronary artery bypass grafting (CABG)—continue to be important tools for improving patient outcomes [10, 11]. Yet, despite the widespread use and effectiveness of coronary revascularization when indicated, previous research has found large disparities in its use by gender, race and ethnicity, insurance status, and socioeconomic status [12–17]. Prior studies assessing the impact of the ACA (specifically through Medicaid expansion) on reducing racial and ethnic coronary revascularization disparities have come to different conclusions [18, 19].

In 2014, NYC fully implemented the ACA and expanded Medicaid. Since then, 400,000 residents have gained Medicaid coverage in New York and nearly 200,000 residents have enrolled in Marketplace coverage [20]. Between 2013 and 2019, the percentage of New Yorkers without insurance fell from 10.7 to 5.2%. There were gains in Medicaid and ACA private insurance coverage by Non-Hispanic Whites, Hispanics, and Non-Hispanic Blacks in New York, but insurance gains were particularly large among Whites [21]. There is also evidence that insurance expansion was strongest among those with at least a high school education versus those without [22]. Considering existing literature, conflicting evidence around the impacts of this health legislation on coronary revascularization disparities, and the insurance coverage gains seen in NYC, we examine how inequities in coronary revascularization usage by race/ethnicity, gender, insurance status, and income are influenced in NYC by the increases in coverage related to the ACA.

Materials and Methods

Data and Descriptive Statistics

To identify hospitalizations for patients with diagnoses of CAD and/or CHF and coronary revascularizations performed on the

population 45 years of age and older in NYC, we rely on hospital administrative data from the State Inpatient Database (SID) of New York, one of the databases of the Healthcare Cost and Utilization Project (HCUP) created by the Agency for Healthcare Research and Quality. It includes all inpatient hospitalizations in New York State (excluding only the Veterans Administration hospitals) and captures diagnoses, procedures, length of stay, and status at discharge, along with demographic and health insurance information. Hospitalizations among New York City residents are identified in this dataset using Federal Information Processing Standard codes representing the boroughs of NYC: the Bronx, Brooklyn, Manhattan, Queens, and Staten Island. To assure an adequate number of hospital discharges and procedures for statistically meaningful comparisons, and to compare outcomes before and after the implementation of the ACA, we calculate two multi-year averages, for 2011–2013 and 2014–2017. Baseline characteristics of patients hospitalized for CAD and/or CHF in both time periods were summarized and annual averages were calculated. To determine age-adjusted population rates, we rely on U.S. Census data for 2010 and weights derived from the 2000 U.S. Census.

To identify the diagnoses of patients from January 1, 2011, to September 30, 2014, the International Classification of Diseases (ICD), Ninth Revision, Clinical Modification (ICD-9-CM) codes were used. As the ICD-9 system transitioned to ICD, Tenth Revision, Clinical Modification (ICD-10-CM) code set on October 1, 2014, all patients from this point to December 31, 2017, were identified using this new system. We focused on CAD and CHF to identify the appropriate patient pool for this study for two reasons. First, these are patients for whom coronary revascularization is an appropriate procedure. Coronary angiography is recommended in patients with heart failure, including those with reduced left ventricular function, with or without angina, to establish the diagnosis of coronary artery disease especially in patients who are considered potentially suitable candidates for coronary revascularization. Second, we confirmed in the analysis of our data that including the diagnosis of congestive heart failure as part of ischemic heart disease captures more than ninety-five percent of the coronary revascularization procedures in the dataset.

To identify CABG and PCI use, ICD, 9th Revision, Procedure Coding System (ICD-9-PCS) and ICD, 10th Revision, Procedure Coding System (ICD-10-PCS) were used, with the transition in code set also occurring on October 1, 2014. The specific diagnoses and procedure codes used can be found in Supplementary Table 1.

Regression Analysis

We conducted multiple logistic regression analyses to assess the factors associated with coronary revascularization for hospitalized patients admitted with CAD and/or CHF over

two time periods: 2011–2013 and 2014–2017. Both models estimate the probability that patients, ages 45 years and older with these discharge diagnoses, would receive a coronary revascularization procedure (PCI or CABG). The independent individual variables are age, gender, race/ethnicity, primary payer (insurance status), and number of diagnoses on record (as a measure of illness severity). The neighborhood-level variables (by zip code) to assess access to coronary revascularization include median household income quartile and physician density. Following our previous analyses of the use of coronary revascularization, we draw on Andersen's Behavioral Model which states that age, gender, race/ethnicity, and income are "predisposing" characteristics; and that insurance status, physician density, and zip code of residence are "enabling" characteristics [23].

We include the age squared variable in our models, in addition to the continuous age variable, because the regression model assumes a linear relationship between the dependent and independent variables, but the probability of coronary revascularization increases between the ages of 45 and 75 and decreases thereafter due to increasing frailty. The inclusion of age squared in the model corrects for this assumption and more accurately models the relationship between age and the use of coronary revascularization. Because observations in individuals from the same neighborhood may be correlated, we tested for bias due to unobserved neighborhood-level heterogeneity by estimating the models with a dummy variable for each zip code as a replacement for neighborhood-level variables. The parameter estimates for the individual characteristics were not appreciably different from those generated by the original model.

Results

Demographic data for hospitalizations with CAD and/or CHF are presented in Table 1.

In total, there were 586,402 hospitalizations identified in 2011–2013 and 712,562 hospitalizations identified in 2014–2017 in patients 45 years of age and older. In both periods, patients 65 years of age and older and males made up most of the hospitalizations each year. In the years 2011–2013, Medicaid and uninsured patients constituted approximately 16.2% and 1.7% of hospitalizations annually (respectively). In the post-ACA period, Medicaid patients comprised 17.3% of average annual hospitalizations and uninsured patients comprised 1.1% of average annual hospitalizations.

Between the two time periods we examined, the age-adjusted rates of inpatient hospital discharges with CAD

and/or CHF and coronary revascularization decreased (Table 2).

Among patients aged 45–64, the age-adjusted rate of hospitalization with CAD and/or CHF decreased by about 12.9%. In patients 65 years of age and older, this rate decreased by about 15.6%. With regard to coronary revascularization, for the population cohort aged 45–64 years, the age-adjusted rate of coronary revascularization among patients hospitalized with CAD and/or CHF decreased by about 20.2%. Among patients 65 years of age and older, the age-adjusted rate of coronary revascularization decreased by about 29.1%.

In both time periods, age, insurance status, race, gender, number of diagnoses, and income quartile zip code residence were all associated with statistically significant odds ratios for receiving a coronary revascularization (Tables 3).

The odds of women receiving a coronary revascularization were about 41% lower than among men during the 2011–2013 period (OR: 0.59, 95% CI: 0.58–0.61) and 32% lower than among men during the 2014–2017 period (OR: 0.68, 95% CI: 0.63–0.74). The odds of coronary revascularization were about 64% lower among non-Hispanic (NH) Black patients (OR: 0.36, 95% CI: 0.34–0.37) and 37% lower among Hispanic patients than NH White patients in 2011–2013 (OR: 0.63, 95% CI: 0.61–0.65). In comparison to NH White patients from 2014 to 2017, NH Black patients and Hispanic patients had 47% lower odds (OR: 0.53, 95% CI: 0.47–0.60) and 38% lower odds (OR: 0.62, 95% CI: 0.55–0.71) of receiving a coronary revascularization, respectively. NH Asian and Pacific Islander patients and patients coded as "Other Race" had higher odds of coronary revascularization in both the 2011–2013 and 2014–2017 periods, when compared to NH White patients (Table 3).

In 2011–2013, the odds of coronary revascularization for those without health insurance were about 62% lower when compared to their privately insured counterparts (OR: 0.38, 95% CI: 0.36–0.41). Medicaid recipients had 40% lower odds (OR: 0.60, 95% CI: 0.58–0.62) and Medicare beneficiaries had 37% lower odds of receiving a coronary revascularization (OR: 0.63, 95% CI: 0.61–0.65), when compared to the private insurance reference group. Coronary revascularization odds were lower for those with Other Government Insurance (OR: 0.23, 95% CI: 0.19–0.28). In 2014–2017, the odds of coronary revascularization for patients without health insurance were about 40% lower than their privately insured counterparts (OR: 0.60, 95% CI: 0.44–0.80). In comparison to privately insured patients, the odds of coronary revascularization in this time period were 47% lower among Medicaid recipients, 36% lower among Medicare beneficiaries, and about 78% lower for those with Other Government Insurance (Table 3). In both periods, patients in the first-, second-, or third-income quartiles had lower odds of coronary revascularization. When compared to

Table 1 Hospitalizations with CAD and/or CHF diagnoses before ACA implementation (2011–2013) and after ACA implementation (2014–2017) in NYC

| Characteristic | Number of hospitalizations, annual average (%) | |
|----------------------------------|--|----------------------|
| | Before ACA, 2011–2013 | After ACA, 2014–2017 |
| Age group (years) | | |
| 45–64 | 56,904 (29.1) | 51,417 (28.9) |
| ≥ 65 | 138,563 (70.9) | 126,746 (71.1) |
| Gender | | |
| Male | 100,860 (51.6) | 94,050 (52.8) |
| Female | 94,606 (48.4) | 84,108 (47.2) |
| Race/ethnicity | | |
| NH White | 74,937 (38.3) | 64,887 (36.4) |
| NH Black | 49,006 (25.1) | 45,621 (25.6) |
| NH Asian and Pacific Islander | 8560 (4.4) | 10,049 (5.6) |
| Hispanic | 32,991 (16.9) | 29,120 (16.3) |
| Other | 29,643 (15.2) | 28,485 (16.0) |
| Missing | 331 (0.2) | 0 (0.0) |
| Insurance type | | |
| Private | 21,603 (11.1) | 19,042 (10.7) |
| Medicare | 138,004 (70.6) | 125,052 (70.2) |
| Medicaid | 31,630 (16.2) | 30,894 (17.3) |
| Other insurance | 666 (0.3) | 978 (0.5) |
| Uninsured | 3327 (1.7) | 2047 (1.1) |
| Missing | 237 (0.1) | 151 (0.1) |
| Neighborhood income | | |
| Fourth quartile (highest income) | 26,670 (13.6) | 43,422 (24.4) |
| Third quartile | 44,292 (22.5) | 45,305 (25.4) |
| Second quartile | 48,803 (24.8) | 44,443 (24.9) |
| First quartile (lowest income) | 68,044 (34.6) | 44,994 (25.3) |
| Missing | 8897 (4.5) | 0 (0.0) |
| Borough Of NYC | | |
| Bronx | 33,920 (17.4) | 32,771 (18.4) |
| Brooklyn | 64,950 (33.2) | 54,371 (30.5) |
| Manhattan | 32,717 (16.7) | 30,091 (16.9) |
| Queens | 50,367 (25.8) | 47,514 (26.7) |
| Staten Island | 13,513 (6.9) | 13,417 (7.5) |

Column percentages may not equal 100% due to rounding. There were 586,402 total hospitalizations before ACA implementation (2011–2013) and 712,562 hospitalizations after ACA implementation (2014–2017)

Table 2 Age-adjusted rates (per 100,000) of coronary revascularization and hospitalization with CAD and/or CHF, NYC; 2011–2013 and 2014–2017

| | 2011–2013 | 2014–2017 |
|----------------------------|-----------|-----------|
| Coronary revascularization | | |
| 45–64 years | 366.2 | 292.1 |
| ≥ 65 years | 962.8 | 683.0 |
| CAD and/or CHF | | |
| 45–64 | 2631.7 | 2292.6 |
| ≥ 65 years | 13,203.4 | 11,109.7 |

Age adjustment based on the 2000 U.S. Census population

the highest income quartile residents, the odds of coronary revascularization among the lowest income quartile residents were 33% lower (OR: 0.67, 95% CI: 0.64–0.69) before ACA implementation, and 19% lower after ACA implementation (OR: 0.81, 95% CI: 0.73–0.91).

Discussion

Between the 2011–2013 and 2014–2017 periods, we found a decrease in both the prevalence of hospitalization with CAD and/or CHF and, appropriately, the use of coronary revascularization in NYC. The reduction in coronary revascularization usage may be associated with declines in CAD

Table 3 Multiple logistic regression predicting coronary revascularization among patients 45 years of age and older with CAD and/or CHF, NYC, 2011–2013 and 2014–2017

| New York City 2011–2013 | | | New York City 2014–2017 | | |
|---|------------------|---------|---|------------------|---------|
| Factor | OR (95% CI) | P-value | Factor | OR (95% CI) | P-value |
| Gender | | | Gender | | |
| Male | 1 [Reference] | NA | Male | 1 [Reference] | NA |
| Female | 0.59 (0.58–0.61) | <0.01 | Female | 0.68 (0.63–0.74) | <0.01 |
| Race and ethnicity | | | Race and ethnicity | | |
| NH White | 1 [Reference] | NA | NH White | 1 [Reference] | NA |
| NH Black | 0.36 (0.34–0.37) | <0.01 | NH Black | 0.53 (0.47–0.60) | <0.01 |
| NH Asian and Pacific Islander | 1.24 (1.18–1.30) | <0.01 | NH Asian and Pacific Islander | 1.18 (1.02–1.37) | 0.028 |
| Hispanic | 0.63 (0.61–0.65) | <0.01 | Hispanic | 0.62 (0.55–0.71) | <0.01 |
| Other race | 1.09 (1.06–1.12) | <0.01 | Other race | 1.75 (1.60–1.92) | <0.01 |
| Neighborhood median income, quartile | | | Neighborhood median income, quartile | | |
| Highest (fourth) | 1 [Reference] | NA | Highest (fourth) | 1 [Reference] | NA |
| Third | 0.88 (0.85–0.91) | <0.01 | Third | 0.87 (0.79–0.96) | <0.01 |
| Second | 0.82 (0.80–0.85) | <0.01 | Second | 0.80 (0.72–0.89) | <0.01 |
| Lowest (first) | 0.67 (0.64–0.69) | <0.01 | Lowest (first) | 0.81 (0.73–0.91) | <0.01 |
| Insurance | | | Insurance | | |
| Private | 1 [Reference] | NA | Private | 1 [Reference] | NA |
| Medicare | 0.63 (0.61–0.65) | <0.01 | Medicare | 0.64 (0.57–0.71) | <0.01 |
| Medicaid | 0.60 (0.58–0.62) | <0.01 | Medicaid | 0.53 (0.48–0.60) | <0.01 |
| Other government insurance | 0.23 (0.19–0.28) | <0.01 | Other government insurance | 0.22 (0.10–0.49) | <0.01 |
| Uninsured | 0.38 (0.36–0.41) | <0.01 | Uninsured | 0.60 (0.44–0.80) | <0.01 |
| Age | 1.36 (1.35–1.38) | <0.01 | Age | 1.15 (1.11–1.19) | <0.01 |
| Age squared | 1.00 (1.00–1.00) | <0.01 | Age squared | 1.00 (1.00–1.00) | <0.01 |
| Number of diagnoses on record | 0.94 (0.93–0.94) | <0.01 | Number of diagnoses on record | 0.95 (0.94–0.96) | <0.01 |
| Physicians per 1000 people | 0.01 (0.00–0.25) | 0.04 | Physicians per 1000 people | 1.00 (1.00–1.00) | <0.01 |

NH non-Hispanic

and/or CHF hospitalizations as well as changes in clinical practice around use of the procedure. These findings may reflect a greater focus on medical therapy for CAD, as well as changes in management strategies for stable CAD [24, 25]. This is consistent with other studies, which have documented declines in the use of both PCI and CABG [26, 27].

While declining, coronary revascularization can improve health outcomes and survival in heart failure and coronary artery disease patients and since national trends indicate that approximately 450,000 PCI and 200,000 CABG procedures occur annually in the USA, studying disparities in these interventions is important.

Inequalities in access to coronary revascularization by gender, income, insurance status, and race (between NH Black and NH White patients) narrowed in NYC, following the full implementation of the ACA. We cannot attribute our findings directly to the implementation of the ACA; however, several pathways could have contributed to improved access and usage of coronary revascularization. Improved health coverage may have led to earlier care for heart disease, a higher likelihood of less complicated presentation,

and thus a greater opportunity to undergo coronary revascularization [9]. Later, sicker presentation and presence of co-morbidities can make patients riskier surgical candidates for CABG. Additionally, the ACA by reducing out-of-pocket costs and financial burden, especially for low-income populations, may have also encouraged the use of procedures [28]. Nevertheless, large race/ethnicity, gender, income, and insurance status inequities in coronary revascularization use persist in NYC in the post-ACA period. Of course, it is important to note that while disparities may represent differential under treatment of some disadvantaged groups, it is also possible that there might be some component of overtreatment of some advantaged groups, even after the overall decrease in the use of these procedures.

First addressing the narrowing of gender disparities in coronary revascularization after the ACA document align with similar trends in other health services [29]. However, the gender disparities in the use of coronary revascularization among patients hospitalized with CAD and/or CHF continue to be large, even in the post-ACA period. Some of the existing literature points to the fact that women traditionally

present with CAD when they are older and sicker, and in turn may be poorer candidates for surgical coronary revascularization [30]. As we have argued previously, we do not believe that clinical differences in the need or appropriateness of coronary revascularization are likely to explain the differences we document here, particularly since we have controlled for age [14]. Gender bias in the treatment of heart disease has been pervasive in the medical system. Women traditionally experience referral delay for CABG [31], and “referral bias.” Additionally, once hospitalized for CAD, women routinely receive fewer diagnostic and therapeutic procedures in comparison to men (including coronary revascularization) [32]. In the past two decades, campaigns to address the disproportionate impact of heart disease on women have been established, including the Go Red for Women® initiative by the American Heart Association and The Heart Truth by the National Heart, Lung, and Blood Institute. Unfortunately, despite national programs such as these, we find that inequalities in coronary revascularization usage by gender persist.

Black and Hispanic adults were more likely than White adults to be uninsured or forego care due to costs of care, prior to the ACA [33]. The reduction of disparities between NHB patients and NHW patients is consistent with findings showing that the ACA narrowed racial/ethnic disparities in care access, although it is particularly striking since insurance gains in New York were not as great among NH Blacks as NH Whites [34, 35]. Our finding that there was no reduction in coronary revascularization inequalities between NHW and Hispanic patients after ACA implementation is consistent with the New York insurance expansion findings [36]. This result could be the lack of health coverage mechanisms for the NYC undocumented population, which included approximately 507,000 people and that 53% of this group is of Hispanic/Latino origin [37].

However, it is important to recognize that patients who are part of racial/ethnic minority populations face other unique, systemic obstacles to care access that White patients do not, which may explain persisting coronary revascularization disparities in the 2014–2017 period. For example, Black patients are less likely to be admitted into healthcare centers that can perform coronary revascularizations and/or have strong acute myocardial infarction outcomes [38]. Broadly, at the institutional level, studies have documented implicit bias towards patients from minority groups—which could impact health care access [39]. Although insurance coverage among NHB and Hispanic patients in New York City increased after the implementation of the ACA, they continue to be uninsured at higher rates than NH Whites [40]. However, this is unlikely to explain our findings, as coronary revascularization inequalities by race/ethnicity remain even after controlling for insurance coverage.

Multiple components of the ACA may have promoted healthcare accessibility in patients of lower socioeconomic status. Studies have demonstrated that the ACA had the greatest effects on improving health services access and use in the lowest-income populations. [41]. This may explain the amelioration of coronary revascularization inequalities between the highest income quartile group and the lowest income quartile group in the post-ACA period, compared to the more stable findings between the second- and third-income quartile groups in both periods.

Disparities in coronary revascularization by insurance status have persisted into the post-ACA period. Notably, Medicaid patients had even lower odds of receiving a coronary revascularization when compared to the privately insured patients after ACA implementation. A recent meta-analysis found that Medicaid recipients had a significantly lower likelihood of obtaining specialty care appointments when compared to the privately insured—which could directly impact healthcare utilization and help explain our findings [42]. Although insurance status may not directly impact care once in a healthcare center, it carries major influence throughout one’s lifespan. Patients who were uninsured prior to ACA passage may have had less access to health professionals, a regular site for care, and preventive care [43]. We speculate that these factors could have led to poorer chronic disease control over time and, thus, even newly covered Medicaid patients may have had more complicated hospital presentations, leading to reduced odds of coronary revascularization. We attempted to account for this by including the number of secondary diagnoses in our models, but this measure alone may be inadequate to capture the relevant clinical differences among patients.

Limitations

As the HCUP SID contains only administrative data, we were not able to account for the impact of clinical variables such as disease severity on coronary revascularization use. Secondly, we were not able to capture outpatient procedures or how outpatient medical management may have impacted the use of coronary revascularization. Third, this database included income data at the zip-code level, but not the individual level, which may have influenced the association between income and coronary revascularization usage. Finally, it is important to note that our models are not able to capture how a combination of patient characteristics may impact coronary revascularization usage. Future studies should explore how these factors intersect to impact coronary revascularization usage. Even so, our study has important implications for addressing equitable invasive heart disease treatment in NYC.

Conclusions

While some of our findings may be construed as reassuring, even in a city with extensive medical resources and with vastly improved comprehensive health insurance coverage, coronary revascularization usage disparities persisted in the post-ACA era. It is important to recognize that the ACA has accomplished many of its aims, reducing uninsured rates to some of the lowest in U.S. history and improving health care access. However, as demonstrated by our findings, increased insurance coverage cannot singlehandedly eliminate inequities in care, in this case in coronary revascularization. Our findings highlight the importance of continued research in identifying the causes of these inequalities. Future studies, for example, may benefit from the inclusion of special indicators for inequity, such as the Concentration Index, which quantifies the degree of socioeconomic-related inequality in a health variable [44], such as the use of revascularization. But while additional information about the underlying cause of inequalities is important, we believe that there is sufficient evidence to suggest the urgency of new initiatives at the provider and policy levels to improve coronary revascularization access.

Supplementary Information The online version contains supplementary material available at <https://doi.org/10.1007/s40615-023-01650-1>.

Author Contribution All authors contributed to the study conception and design. Material preparation, data collection, and analysis were performed by Daniel Weisz, Vineeth Amba, and Michael Gusmano. The first draft of the manuscript was written by Vineeth Amba and authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

Data Availability New York State Inpatient Database, a database of the Healthcare Cost and Utilization Project (HCUP) created by the Agency for Healthcare Research and Quality (AHRQ), is available for purchase. For more information about HCUP data, see <http://hcup-us.ahrq.gov/>.

Declarations

Ethics Approval All authors report no ethical issues; data is de-identified administrative and publicly available.

Consent to Participate Not applicable, as noted under ethics as data is publicly available.

Consent for Publication All authors consent to publication.

Conflict of Interest The authors declare no competing interests.

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