

Impact of Medicaid Expansion on Cardiac Surgery Volume and Outcomes



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Background. Thirty-one states approved Medicaid expansion after implementation of the Affordable Care Act. The objective of this study was to evaluate the effect of Medicaid expansion on cardiac surgery volume and outcomes comparing one state that expanded to one that did not.

Methods. Data from the Virginia (nonexpansion state) Cardiac Services Quality Initiative and the Michigan (expanded Medicaid, April 2014) Society of Thoracic and Cardiovascular Surgeons Quality Collaborative were analyzed to identify uninsured and Medicaid patients undergoing coronary bypass graft or valve operations, or both. Demographics, operative details, predicted risk scores, and morbidity and mortality rates, stratified by state and compared across era (preexpansion: 18 months before vs postexpansion: 18 months after), were analyzed.

Results. In Virginia, there were no differences in volume between eras, whereas in Michigan, there was a significant increase in Medicaid volume (54.4% [558 of

1,026] vs 84.1% [954 of 1,135], $p < 0.001$) and a corresponding decrease in uninsured volume. In Virginia Medicaid patients, there were no differences in predicted risk of morbidity or mortality or postoperative major morbidities. In Michigan Medicaid patients, a significant decrease in predicted risk of morbidity or mortality (11.9% [8.1% to 20.0%] vs 11.1% [7.7% to 17.9%], $p = 0.02$) and morbidities (18.3% [102 of 558] vs 13.2% [126 of 954], $p = 0.008$) was identified. Postexpansion was associated with a decreased risk-adjusted rate of major morbidity (odds ratio, 0.69; 95% confidence interval, 0.51 to 0.91; $p = 0.01$) in Michigan Medicaid patients.

Conclusions. Medicaid expansion was associated with fewer uninsured cardiac surgery patients and improved predicted risk scores and morbidity rates. In addition to improving health care financing, Medicaid expansion may positively affect patient care and outcomes.

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The Patient Protection and Affordable Care Act (ACA) was signed into law on March 23, 2010, in an effort to provide affordable, quality health care to all Americans [1]. A major pillar of the comprehensive reform package was the expansion of Medicaid, which would provide insurance coverage to all Americans aged younger than 65 years earning less than 138% of the federal poverty level (FPL) [2]. Although the constitutionality of the ACA was upheld by the United States Supreme Court in *National Federation of Independent Business (NFIB) vs Sebelius*, provisions requiring states to expand Medicaid

were deemed “unconstitutionally coercive” [3, 4]. State governments therefore became responsible for deciding whether to expand Medicaid: 31 states (plus the District of Columbia) decided to do so, recognizing the financial implications and contentious political environment [5, 6].

The effect of primary payer status on access to medical care, affordability, and quality has long been debated. Some studies concluded that payer status is not associated with outcomes, instead identifying risk factors and comorbidities as important predictors [7, 8], whereas others have identified a significant relationship between the two [9, 10]. In a series of publications using the Nationwide Inpatient Sample database, Medicaid payer status was associated with increased rates of risk-adjusted mortality and worse outcomes. Patients undergoing coronary artery bypass grafting (CABG) and cardiac valve operations had longer lengths of stay and

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Abbreviations and Acronyms

ACA	= Affordable Care Act
AVR	= aortic valve replacement
BMI	= body mass index
CABG	= coronary artery bypass grafting
CI	= confidence interval
FPL	= Federal poverty level
MSTCVS-QC	= Michigan Society of Thoracic and Cardiovascular Surgeons Quality Collaborative
MV	= mitral valve
MVR	= mitral valve replacement
OR	= odds ratio
PROM	= predicted risk of mortality
PROMM	= predicted risk of morbidity or mortality
STS	= The Society of Thoracic Surgeons
VCSQI	= Virginia Cardiac Services Quality Initiative

higher costs if they had Medicaid compared with those with Medicare, private insurance, or no insurance [11, 12].

Considering that these analyses were completed before the ACA, the purpose of this study was to determine the effect of Medicaid expansion on improving access to health care and outcomes, using validated cardiac surgery databases from two states that made independent and different decisions regarding Medicaid expansion. We hypothesized that expansion of Medicaid in Michigan would decrease uninsured cardiac surgery volume and improve outcomes compared with Virginia, a state that declined expansion. Improving the understanding of the effects of Medicaid expansion on the delivery of health care and patient outcomes may help state governments make informed policy decisions.

Patients and Methods

Study Design

This study was exempt from Institutional Review Board approval at both institutions. We analyzed prospectively collected data from the Virginia Cardiac Services Quality Initiative (VCSQI) and the Michigan Society of Thoracic and Cardiovascular Surgeons Quality Collaborative (MSTCVS-QC), both of which contain The Society of Thoracic Surgeons (STS) Adult Cardiac Surgery data. VCSQI consists of 18 cardiac surgery member sites in Virginia, and MSTCVS-QC captures all 33 nonfederal hospitals performing adult cardiac surgery in Michigan. STS data are abstracted at each participating institution by trained coordinators and consist of demographic, payer status, risk factor, perioperative, morbidity, death, discharge, and readmission data on patients aged older than 18. The STS database is recognized as one of the leading national registry initiatives focused on improving surgical outcomes and health care quality [13].

After implementation of the ACA, Michigan expanded Medicaid in April 2014 to provide coverage for all adults making less than 138% of FPL [14]. Conversely, the Virginia government decided not to expand Medicaid and continued to provide traditional Medicaid coverage for pregnant women and children up to 143% of FPL and disabled adults up to 80% of FPL [15]. Analyses were completed on patients undergoing cardiac operations during the 18 months before the start of Medicaid expansion in Michigan (October 2012 to April 2014, pre-expansion era) and during the 18 months thereafter (April 2014 to September 2015, postexpansion era).

Patient Selection

This study included Medicaid and uninsured patients aged 18 years or older who underwent CABG or valve operations in Virginia (VCSQI) and Michigan (MSTCVS-QC) between October 2012 and September 2015. We excluded patients without risk scores, including predicted risk of morbidity or mortality (PROMM) and predicted risk of mortality, which facilitates the normalization of observed-to-expected outcomes across institutions.

Variables

The primary end point for this study was rate of major morbidity (reoperation, stroke, kidney failure, deep sternal wound infection, or ventilator support >24 hours) within 30 days postoperatively. Death was not chosen as the primary outcome because event rates are historically low after CABG and valve operations. The primary exposure variable was era.

Statistical Analysis

Univariate analysis was performed simultaneously on data from VCSQI and MSTCVS-QC comparing patient demographics, case specifics, predicted risk scores, and outcomes between eras. Analyses were completed on three cohorts: Medicaid patients only (excluding dual-eligible Medicare/Medicaid patients), uninsured patients only, and combined Medicaid and uninsured patients. The Student *t* test and Mann-Whitney *U* test were used for normally and nonnormally distributed continuous variables, respectively. The χ^2 test or Fisher exact test were used for categorical variables. Unadjusted and adjusted postexpansion odds ratios for morbidity and death were calculated using multivariable logistic regression. Odds of major morbidity were adjusted for PROMM, and odds of death within 30 days were adjusted for predicted risk of mortality. The α level for significance was 0.05. Statistical analyses were performed with Stata 14 software (StataCorp LP, College Station, TX) and SAS 9.4 software (SAS Institute, Inc, Cary, NC).

Results

Characteristics of Cardiac Surgery Patients

A total of 1,183 uninsured or Medicaid patients underwent CABG or cardiac valve operations, or both, between

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