ORIGINAL RESEARCH

Association of Hospital Racial Composition and Payer Mix With Mortality in Acute Coronary Syndrome

Pratyaksh K. Srivastava, MD; Gregg C. Fonarow, MD; Ehete Bahiru, MD; Boback Ziaeian, MD, PhD

***Background*—**Patient characteristics insufficiently explain disparities in cardiovascular outcomes among hospitalized patients, suggesting a role for community or hospital-level factors. Here, we evaluate the association of hospital racial composition and payer mix with all-cause inpatient mortality for patients hospitalized with acute coronary syndrome (ACS).

***Methods and Results*—**Using the National Inpatient Sample, we identified adult hospitalizations from 2014 with a primary diagnosis of ACS (n=550 005). We divided National Inpatient Sample hospitals into quartiles based on percent of minority (black, Hispanic, Asian or Pacific Islander, Native American race/ethnicity) and low-income payer (Medicaid or uninsured) discharges in 2014. We utilized logistic regression to determine whether hospital minority or low-income payer makeup associated with all-cause inpatient mortality among those admitted for ACS . In adjusted models, ACS patients admitted to hospitals with >12.4% to 25.4% (Quartile 2), >25.4% to 44.3% (Q3), and >44.3% (Q4) minority discharges experienced a 14% (OR 1.14, 95% CI 1.06–1.23), 13% (OR 1.13, 95% CI 1.04–1.23), and 15% (OR 1.15, 95% CI 1.04–1.26) increased odds of all-cause inpatient mortality compared with hospitals with ≤12.4% (Q1) minority discharges. ACS patients admitted to hospitals with >18.7% to 25.7% (Q2) and >34.0% (Q4) low-income payer discharges experienced a 9% (OR 1.09, 1.01–1.17) and 9% (OR 1.09, 1.00–1.19) increased odds of all-cause inpatient mortality when compared with hospitals with ≤18.7% (Q1) low-income payer discharges.

***Conclusions*—**Hospital minority and low-income payer makeup positively associate with odds of all-cause inpatient mortality among patients admitted for acute coronary syndrome. **(*J Am Heart Assoc*. 2019;8:e012831. DOI: 10.1161/JAHA.119.012831.)**

Key Words: acute coronary syndrome • health services research • quality of care • race and ethnicity

Patient race/ethnicity and socioeconomic status significantly associate with cardiovascular morbidity and mortality. Black patients have higher rates of fatal coronary artery disease, are diagnosed with heart failure at an earlier age, and experience worse cardiovascular outcomes.[1–6] Medicaid and uninsured patients are less likely to receive optimal medical therapy for heart failure and acute coronary syndrome (ACS), and have higher cardiovascular mortality compared with patients with private insurance.[7–11] When evaluating health outcomes, disparities in cardiovascular morbidity and mortality are inadequately explained by patient-level characteristics such as demographics, race, regional income, and comorbidities, even after traditional hospital characteristics are taken into account.[12–14] Hospital racial composition and payer mix represent 2 potentially important system factors not typically accounted for in traditional risk-adjusted cardiovascular models. Patients admitted to safety net hospitals are less likely to receive optimal goal-directed medical therapy, while patients admitted to hospitals with greater minority populations have been shown to experience increased cardiovascular mortality.[13,15–18] Prior work assessing the impact of hospital race and payer mix on cardiovascular outcomes is limited to a narrow geographic region or the Medicare or Medicaid population.[12] Research suggests that Medicare patients are a poor surrogate for the general population, and studies of smaller geographic regions have limited generalizability.[19] Given the seemingly important impact of hospital race and payer makeup on cardiovascular outcomes, and the lack of studies exploring this relationship in the general population, we sought to evaluate the association of hospital minority makeup and low-income payer (Medicaid or uninsured) mix with all-cause inpatient mortality among patients admitted for ACS.

From the Division of Cardiology, University of California Los Angeles, Los Angeles, CA (P.K.S., E.B., B.Z.); Ahmanson-UCLA Cardiomyopathy Center, University of California, Los Angeles Medical Center, Los Angeles, CA (G.C.F.); Division of Cardiology, VA Greater Los Angeles, Los Angeles, CA (B.Z.).

Correspondence to: Boback Ziaeian, MD, PhD, Division of Cardiology, UCLA David Geffen School of Medicine, 650 Charles E. Young Dr. South, A2-237 CHS, Box 951679, Los Angeles, CA 90095. E-mail: bziaeian@mednet.ucla.edu

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Clinical Perspective

What Is New?

- In a large, nationwide sample, hospital minority and low-income payer makeup were both found to positively associate with odds of all-cause inpatient mortality among patients admitted with acute coronary syndrome.
- Facilities taking care of larger proportions of minority and low-income payer patients were found to have lower rates of invasive cardiovascular procedures, and potentially a sicker baseline population.

What Are the Clinical Implications?

- Policy changes that provide resources and support to facilities taking care of large proportions of minority and low-income payer patients are needed and have the potential to improve outcomes for those admitted with acute coronary syndrome.

Methods

The National Inpatient Sample (NIS) data set provides hospital administrative data through the Agency for Healthcare Research and Quality's Healthcare Cost and Utilization Project. For 2014, the NIS included 44 states and the District of Columbia, and encompassed >96% of the US population. Patients with all insurances, including those with Medicare Advantage and the uninsured, are included. NIS methodology and sampling details are described elsewhere.[20] NIS data used for the analyses below are publicly available. Methods and materials used to conduct analyses below are available upon request.

The 2014 NIS consists of 29 751 955 discharges from 4400 hospitals. After exclusion of discharges of nonadults (<18 years of age), discharges with missing age information, discharges from hospitals with <2500 discharges, and discharges from hospitals with ≥10% missing race or payer information, 26 107 715 discharges from 2293 hospitals remained. Of these, 550 005 were admitted with a primary diagnosis of ACS. This cohort was used for the analyses below (Figure 1).

NIS hospitals were divided into quartiles based on percent of minority (black, Hispanic, Asian or Pacific Islander, Native American race/ethnicity) and low-income payer (Medicaid or uninsured) discharges in 2014. We used logistic regression to investigate the association between hospital minority and low-income payer quartile, and the odds of all-cause inpatient mortality among those admitted for a primary diagnosis of ACS. Model 1 was adjusted for age and sex. Model 2 was adjusted for the covariables in Model 1 plus traditional hospital characteristics available: teaching status, bed size, and region. Model 3 was adjusted for the covariables in Model 2 plus patient comorbidities and procedures received before the hospitalization visit from which data were obtained (Figure 2). Model 4 was adjusted for the covariables in Model 3 plus for individual-level race and individual-level payer status. A cubic spline analysis was subsequently conducted to continuously model the impact of hospital minority makeup and low payer status on probability of all-cause inpatient mortality for patients admitted with ACS. Three knots were used for the spline models. Cubic splines were adjusted for the covariables in Model 4. Last, we compared rates of various inpatient procedures across hospital minority and low-income payer quartiles using a nonparametric Pearson χ^2 test of proportions. All statistical analysis was performed using Stata 15.1 (StataCorp, College Station, TX). Survey-specific data commands were utilized where applicable. P.K.S. and B.Z. had full access to the data, and take responsibility for the integrity of the data analysis. An institutional review board waiver was obtained for the project.

Results

The final cohort included 550 005 primary ACS discharges (Figure 1) with a median age (95% CI) of 66.8 (66.7–67.0)

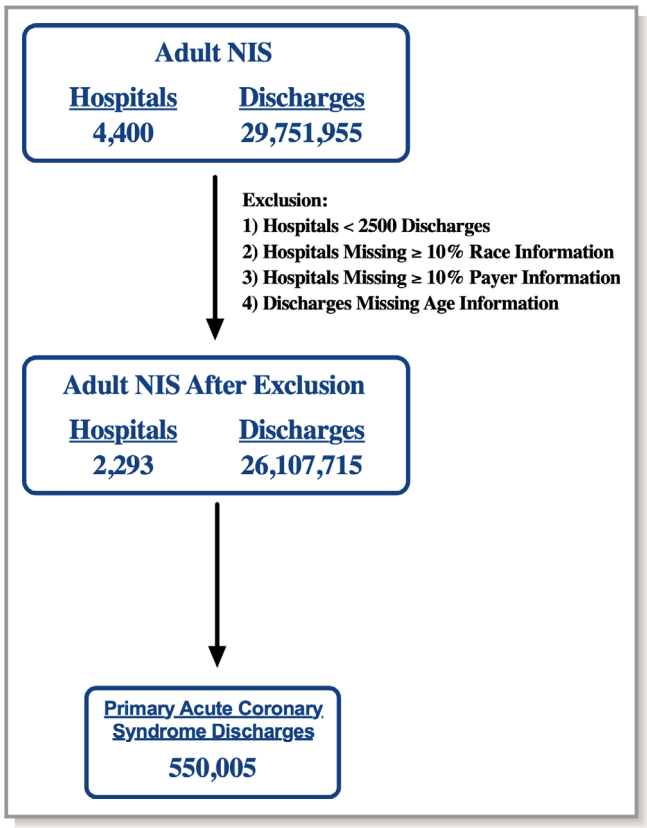

Figure 1. Determination of the final cohort. NIS indicates National Inpatient Sample.

Comorbidity/Procedure	Codes Used to Define Comorbidity/Procedure
Hypertension	CCS 98, 99
Hyperlipidemia	CCS 53
Diabetes Mellitus Without Complications	CCS 49
Smoking	ICD-9 305.1
Obesity	ICD-9 278.00-278.03, 649.10-649.14, V85.30-V85.39, V85.41-V85.45, V85.54, 793.91
Alcohol Use	ICD-9 291.0-291.3, 291.5-291.9, 303.00-303.93, 305.00-305.03
Drug Use	ICD-9 292.0, 292.82-292.91, 304.00-304.93, 305.20-305.93, 648.30-648.34
Coronary Artery Disease	CCS 101
Valvulopathy	CCS 96
Percutaneous Transluminal Coronary Angioplasty	ICD-9 V45.82
Coronary Artery Bypass Grafting	ICD-9 V45.81
Chronic Obstructive Pulmonary Disease	CCS 127
Pulmonary Heart Disease	CCS 103
Chronic Kidney Disease	CCS 158
Chronic Liver Disease	ICD-9 070.22, 070.23, 070.32, 070.33, 070.44, 070.54, 456.0-456.21, 571.0, 571.2, 571.3, 571.40-571.49, 571.5-571.9, 572.3, 572.8, 573.5, V42.7
Protein-Calorie Malnutrition	CCS 52
Lymphoma	200.00-202.38, 202.50-203.01, 202.02-203.82, 238.6, 273.3
Solid Malignancy	ICD-9 140.0-172.9, 174.0-175.9, 179-195.8, 209.00-209.36, 258.01-258.03
Metastatic Malignancy	ICD-9 196.0-199.1, 209.70-209.75, 209.79, 789.51
Psychiatric Disorders	ICD-9 295.00-298.9, 299.10-299.11
Peptic Ulcer Disease	ICD-9 531.41, 531.51, 531.61, 531.70, 531.71, 531.91, 532.41, 532.51, 532.61, 532.70, 532.71, 532.91, 533.41, 533.51, 533.61, 533.70, 533.71, 533.91, 534.41, 534.51, 534.61, 534.70, 534.71, 534.91
Human Immunodeficiency Virus/ Acquired Immunodeficiency Syndrome	ICD-9 042-044.9
Dementia	CCS 653
Rheumatoid Arthritis	ICD-9 710.0-710.9, 714.0-714.9, 720.0-720.9, 701.0, 725

Figure 2. Patient history/comorbidities adjusted for in logistic regression models. CCS indicates clinical classification software; *ICD*, *International Classification of Diseases*.

years. Thirty-eight percent were female, 10.6% were black, and 14.5% were low-income payer (Medicaid or Uninsured). In the cohort, 77.2% had hypertension, 42.3% had diabetes mellitus, and 17.4% were obese. Five percent of the cohort died during hospitalization. Full baseline characteristics of the population are presented in Table 1.

After adjustment, ACS patients admitted to hospitals with >12.4% to 25.4% (Quartile 2), >25.4% to 44.3% (Q3), and >44.3% (Q4) minority discharges experienced a 14% (OR 1.14, 95% CI 1.06–1.23), 13% (OR 1.13, 95% CI 1.04–1.23), and 15% (OR 1.15, 95% CI 1.04–1.26) increased odds of all-cause inpatient mortality compared with hospitals with ≤12.4% (Q1) minority discharges (Table 2, Model 4). ACS patients admitted to hospitals with >18.7% to 25.7% (Q2) and >34.0% (Q4) low-income payer discharges experienced a 9% (OR 1.09, 95% CI 1.01–1.17) and 9% (OR 1.09, 95% CI 1.00–1.19) increased odds of all-cause inpatient mortality when compared with hospitals with ≤18.7% (Q1) low-income payer discharges (Table 3, Model 4). In sensitivity analysis, there were no interactions observed between sex and hospital minority or low-income payer quartile.

Adjusted cubic splines (Model 4) continuously modeling the impact of hospital minority and low-payer makeup on probability of inpatient death from acute coronary syndrome are shown in Figure 3. In the adjusted minority analysis, hospital minority make up positively associates with odds of all-cause inpatient mortality from ACS across all 4 quartiles (Figure 3A). In the adjusted low-payer analysis, hospital low-payer makeup positively associates with odds of all-cause inpatient mortality across the first 3 quartiles. Though the slope of the line changes over quartile 4, the probability of death in quartile 4 still remains higher than seen in the majority of quartile 1 (Figure 3B).

Among patients admitted for ACS, rates of coronary angiography and percutaneous coronary intervention

Table 1. Baseline Characteristics of the Cohort

Variable	Total Adult National Inpatient Sample n=26 107 715	Primary Acute Coronary Syndrome Diagnosis n=550 005
Age		
Age, mean (95% CI), y	57.1 (56.9–57.4)	66.8 (66.7–67.0)
Sex		
Women, N (%)	15 301 770 (58.6)	208 945 (38.0)
Race		
White, N (%)	17 448 531 (66.8)	408 015 (74.2)
Black, N (%)	3 948 580 (15.1)	58 325 (10.6)
Hispanic, N (%)	2 866 795 (11.0)	42 955 (7.8)
Asian or Pacific Islander, N (%)	670 220 (2.6)	13 405 (2.4)
Native American, N (%)	141 280 (0.5)	2820 (0.5)
Other, N (%)	796 730 (3.1)	17 720 (3.2)
Payer status		
Medicare, N (%)	12 033 796 (46.1)	312 255 (56.8)
Medicaid, N (%)	4 767 559 (18.3)	47 525 (8.6)
Private insurance, N (%)	7 247 250 (27.8)	143 580 (26.1)
Uninsured, N (%)	1 282 840 (4.9)	32 210 (5.9)
Other, N (%)	743 825 (2.8)	13 680 (2.5)
Low payer (Medicaid+uninsured), N (%)	6 050 399 (23.2)	79 735 (14.5)
Inpatient mortality		
Died during hospitalization, N (%)	580 170 (2.2)	27 275 (5.0)
Comorbidities		
Hypertension, N (%)	13 789 521 (52.8)	424 550 (77.2)
Lipid disorder, N (%)	7 928 876 (30.4)	358 090 (65.1)
Diabetes mellitus, N (%)	7 169 490 (27.5)	232 770 (42.3)
Obesity, N (%)	3 734 500 (14.3)	95 465 (17.4)
Tobacco abuse disorder, N (%)	3 977 760 (15.2)	140 595 (25.6)
Coronary artery disease, N (%)	5 510 070 (21.1)	457 685 (83.2)
Chronic kidney disease, N (%)	3 144 225 (12.0)	101 775 (18.5)

significantly differed across hospital minority and low-income payer quartile (Tables 4 and 5). In general, rates of coronary angiography and percutaneous coronary intervention were lower in Q4 compared with Q1–Q3 minority and low-payer hospitals. ACS patients admitted to hospitals with greater percentages of minority and low-income payer discharges were also found to have increased rates of cardiac arrest, hemodialysis, and mechanical ventilation (Tables 4 and 5).

Discussion

In this cross-sectional study of 550 005 primary ACS discharges, both hospital minority and hospital low-income payer makeup positively associated with odds of all-cause inpatient mortality among patients admitted for ACS.

While prior research demonstrates that minority and low-income payer patients experience worse cardiovascular outcomes, there have been limited studies evaluating the impact of hospital-level minority makeup and payer mix on inpatient mortality in a large nationwide sample.[7–11,18] Here, we demonstrate that ACS patients admitted to hospitals with higher proportions of minority and low-income payer discharges have increased all-cause inpatient mortality, even after adjustment for age, sex, hospital characteristics, patient comorbidities, individual patient race, and individual patient payer status.

Table 2. Hospital Minority Makeup and Odds of Inpatient Mortality Among Patients Admitted for Acute Coronary Syndrome

	Odds of Inpatient Mortality (95% CI)			
Hospital Minority Quartile	1 (0–12.4%)	2 (>12.4–25.4%)	3 (>25.4–44.3%)	4 (>44.3%)
N died/N alive (% mortality)	7635/162 505 (4.7%)	7025/132 090 (5.3%)	6665/123 245 (5.4%)	5950/104 675 (5.7%)
Model 1	1	1.17 (1.09–1.26)‡	1.24 (1.15–1.34)‡	1.31 (1.22–1.41)‡
Model 2	1	1.14 (1.06–1.23)‡	1.17 (1.08–1.26)‡	1.24 (1.15–1.35)‡
Model 3	1	1.14 (1.06–1.23)‡	1.13 (1.05–1.23)†	1.16 (1.07–1.26)‡
Model 4	1	1.14 (1.06–1.23)‡	1.13 (1.04–1.23)†	1.15 (1.04–1.26)†

Model 1: adjusted for age and sex. Model 2: adjusted for variables in Model 1 plus for hospital teaching status, hospital bed size, hospital region. Model 3: adjusted for variables in Model 2 plus for history of percutaneous transluminal coronary angioplasty, coronary artery bypass grafting, coronary artery disease, valvulopathy, hypertension, chronic obstructive pulmonary disease, diabetes mellitus without complications, protein-calorie malnutrition, dementia, lymphoma, solid malignancy, metastatic malignancy, psychiatric disorders, chronic liver disease, pulmonary heart disease, peptic ulcer disease, human immunodeficiency virus, rheumatoid arthritis, obesity, alcohol use, drug use, hyperlipidemia, smoking, chronic kidney disease. Model 4: adjusted for variables in Model 3 plus individual-level race and individual-level payer status.
†$P<0.01$.
‡$P<0.001$.

One explanation may be that hospitals with large proportions of minority and low-income payer patients lack the resources necessary to provide the invasive procedures often required for acute cardiovascular care. To test this hypothesis, we compared rates of invasive cardiac procedures performed during the patient's hospitalization from which data were obtained across different hospital minority and low-income payer quartiles. We found lower rates of coronary angiography and percutaneous coronary intervention in Q4 minority and low-payer hospitals compared with hospitals in earlier quartiles. It should be noted, however, that is difficult to ascertain why certain hospitals may be performing more or fewer procedures. While 1 hypothesis may be that hospitals taking care of larger proportions of lower-paying patients may be under-resourced, and therefore have lower procedure rates, it is also possible that hospitals may be inappropriately performing more or fewer procedures based on a variety of other factors such as physician decision making or regional practice patterns.

After additionally adjusting for angiography and percutaneous coronary intervention rates, ACS patients admitted to Q2, Q3, and Q4 minority hospitals still had increased odds of all-cause inpatient mortality with ORs of 1.13 (95% CI 1.05–1.22), 1.13 (95% CI 1.04–1.23), and 1.11 (95% CI 1.00–1.22), respectively, when compared with patients in Q1 minority hospitals. ACS patients attending Q2 low-payer hospitals also still had increased rates of all-cause inpatient mortality after additional adjustment for procedures (OR 1.08, 95% CI 1.01–1.17).

Part of the residual disparity may be explained by the baseline severity of patient comorbidities. Minority and

Table 3. Hospital Low-Income Payer Makeup and Odds of Inpatient Mortality Among Patients Admitted for Acute Coronary Syndrome

	Odds of Inpatient Mortality (95% CI)			
Hospital Low-Income Payer Quartile	1 (0–18.7%)	2 (>18.7–25.7%)	3 (>25.7–34.0%)	4 (>34.0%)
N died/N alive (% mortality)	7440/151 230 (4.9%)	7580/144 485 (5.2%)	7230/136 550 (5.3%)	5025/90 250 (5.6%)
Model 1	1	1.13 (1.05–1.21)‡	1.17 (1.08–1.26)‡	1.28 (1.18–1.39)‡
Model 2	1	1.11 (1.04–1.19)†	1.13 (1.04–1.22)†	1.22 (1.12–1.32)‡
Model 3	1	1.10 (1.02–1.18)*	1.08 (1.00–1.17)	1.13 (1.04–1.23)†
Model 4	1	1.09 (1.01–1.17)*	1.07 (0.99–1.16)	1.09 (1.00–1.19)*

Model 1: adjusted for age and sex. Model 2: adjusted for variables in Model 1 plus for hospital teaching status, hospital bed size, hospital region. Model 3: adjusted for variables in Model 2 plus for history of percutaneous transluminal coronary angioplasty, coronary artery bypass grafting, coronary artery disease, valvulopathy, hypertension, chronic obstructive pulmonary disease, diabetes mellitus without complications, protein-calorie malnutrition, dementia, lymphoma, solid malignancy, metastatic malignancy, psychiatric disorders, chronic liver disease, pulmonary heart disease, peptic ulcer disease, human immunodeficiency virus, rheumatoid arthritis, obesity, alcohol use, drug use, hyperlipidemia, smoking, chronic kidney disease. Model 4: adjusted for variables in Model 3 plus individual-level race and individual-level payer status.
*$P<0.05$.
†$P<0.01$.
‡$P<0.001$.

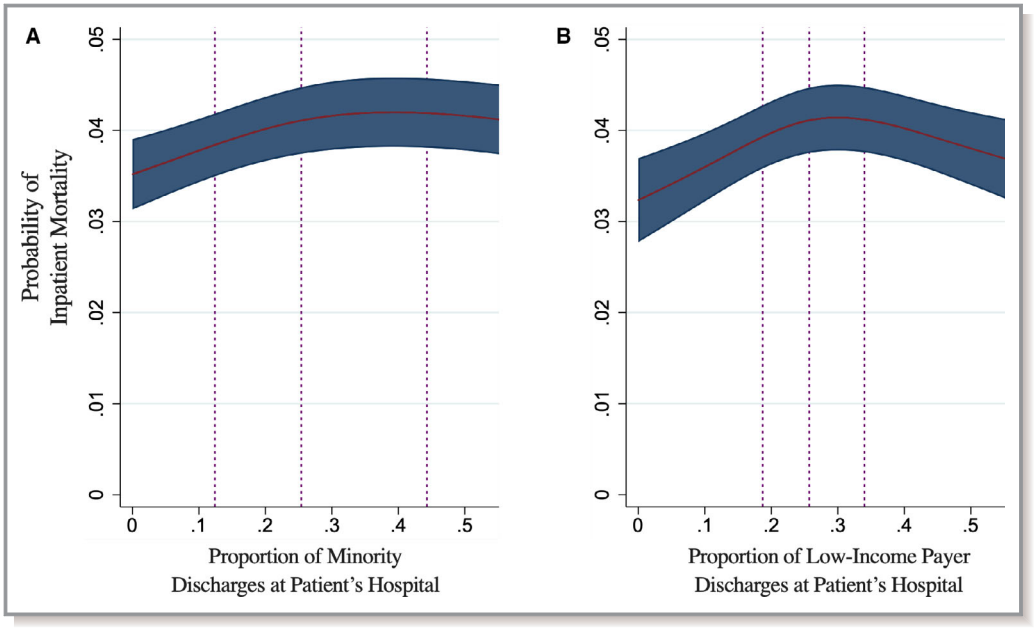

Figure 3. Hospital minority (**A**) and low-income payer (**B**) makeup and probability of inpatient mortality for patients admitted with primary diagnosis of Acute Coronary Syndrome. Cubic Spline Models adjusted for age, sex, patient race, patient payer status, patient comorbidities, and hospital characteristics (Model 4). Hospital minority and low-income payer quartiles are designated by dashed purple lines.

low-income payer patients often have more advanced and more poorly controlled comorbidities because of a variety of different factors.[7,21–24] While models may control for the presence or absence of a condition, they are unable to fully account for severity, which may result in unmeasured confounding. In both our minority and low-payer analyses, patients admitted to hospitals with higher proportions of minority and low-income payer patients were more likely to require hemodialysis and mechanical ventilation, and were more likely to have cardiac arrest, potentially suggesting a sicker baseline population. Furthermore, minority and low-income payer status likely serves as a proxy for overall socioeconomic status, which

Table 4. Procedures Stratified by Hospital Minority Quartile for Patients Admitted With Acute Coronary Syndrome

	Hospital Minority Quartile				
	1 (0–12.4%)	2 (>12.4–25.4%)	3 (>25.4–44.3%)	4 (>44.3%)	
Variable	n=170 200	n=139 160	n=129 980	n=110 665	*P* Value*
Pulmonary artery catheter placement, N (%)	1535 (0.9)	1755 (1.3)	1520 (1.2)	880 (0.8)	0.06
Angiogram, N (%)	121 230 (71.2)	102 180 (73.4)	96 500 (74.2)	74 375 (67.2)	<0.001
Percutaneous coronary intervention, N (%)	82 505 (48.5)	70 440 (50.6)	65 220 (50.2)	48 140 (43.5)	<0.001
PPM or ICD placement/revision, N (%)	3415 (2.0)	3340 (2.4)	3125 (2.4)	2500 (2.3)	0.03
ECMO, N (%)	11 055 (6.5)	11 830 (8.5)	11 365 (8.7)	8265 (7.5)	<0.001
Cardioversion, N (%)	4925 (2.9)	5050 (3.6)	4810 (3.7)	4175 (3.8)	<0.001
Cardiac arrest, N (%)	8295 (4.9)	7895 (5.7)	7130 (5.5)	6415 (5.8)	<0.001
Hemodialysis, N (%)	3895 (2.3)	4380 (3.1)	4965 (3.8)	6490 (5.9)	<0.001
Mechanical ventilation, N (%)	12 590 (7.4)	12 470 (9.0)	12 305 (9.5)	12 040 (10.9)	<0.001
Noninvasive ventilation, N (%)	3900 (2.3)	3405 (2.4)	3400 (2.6)	3530 (3.2)	0.001
Blood product transfusion, N (%)	9115 (5.4)	8930 (6.4)	9550 (7.3)	9340 (8.4)	<0.001
Thoracentesis, N (%)	1605 (0.9)	1750 (1.3)	1605 (1.2)	1425 (1.3)	0.003

ECMO indicates extracorporeal membrane oxygenation; ICD, implantable cardioverter defibrillator; PPM, permanent pacemaker.
*Categorical variables compared across quartiles using nonparametric Pearson χ^2 Test of Proportions.

Table 5. Procedures Stratified by Hospital Low-Income Payer Quartile for Patients Admitted With Acute Coronary Syndrome

Variable	Hospital Low-Payer Quartile				*P* Value*
	1 (0–18.7%)	2 (>18.7–25.7%)	3 (>25.9–34.0%)	4 (>34.0%)	
	n=158 765	n=152 120	n=143 790	n=95 330	
Pulmonary artery catheter placement, N (%)	1480 (0.9)	1620 (1.1)	1735 (1.2)	855 (0.9)	0.40
Angiogram, N (%)	111 455 (70.2)	111 195 (73.1)	105 650 (73.5)	65 985 (69.2)	<0.001
Percutaneous coronary intervention, N (%)	75 780 (47.7)	75 790 (49.8)	71 655 (49.8)	43 080 (45.2)	<0.001
PPM or ICD placement/revision, N (%)	3535 (2.2)	3480 (2.3)	3170 (2.2)	2195 (2.3)	0.92
ECMO, N (%)	11 645 (7.3)	12 290 (8.1)	11 690 (8.1)	6890 (7.2)	0.15
Cardioversion, N (%)	5115 (3.2)	5275 (3.5)	4940 (3.4)	3630 (3.8)	0.07
Cardiac arrest, N (%)	8040 (5.1)	8560 (5.6)	7730 (5.4)	5405 (5.7)	0.01
Hemodialysis, N (%)	5080 (3.2)	4780 (3.1)	5155 (3.6)	4715 (4.9)	<0.001
Mechanical ventilation, N (%)	13 195 (8.3)	12 790 (8.4)	13 025 (9.1)	10 395 (10.9)	<0.001
Noninvasive ventilation, N (%)	4125 (2.6)	3545 (2.3)	3630 (2.5)	2935 (3.1)	0.03
Blood product transfusion, N (%)	10 725 (6.8)	9370 (6.2)	9530 (6.6)	7310 (7.7)	0.02
Thoracentesis, N (%)	1735 (1.1)	1700 (1.1)	1715 (1.2)	1235 (1.3)	0.33

ECMO indicates extracorporeal membrane oxygenation; ICD, implantable cardioverter defibrillator; PPM, permanent pacemaker.
*Categorical variables compared across quartiles using nonparametric Pearson χ^2 Test of Proportions.

can contribute to unmeasured confounding through difficult-to-measure environmental factors.[25–28]

The remaining association may be explained by a number of intangible, and often unmeasured, hospital-level factors. Hospitals with greater numbers of minority and low-income payer patients may be under-resourced, and therefore may lack the personnel, communication, and integration necessary for efficient patient transitions from the Emergency Room to higher levels of care.[29] Hospital culture, engagement in quality, and the use of protocol-driven therapies may also be contributing.[12] Last, low-income payer hospitals are less likely to provide guideline-directed medical therapy, and low-income payer patients are less likely to receive the standard of care for a wide range of cardiovascular conditions, which may be contributing further to the observed disparity.[8,10,18,30–32]

Reimbursement systems that focus solely on quality outcomes, and not the reasons behind those outcomes, may unfairly punish hospitals taking care of large proportions of minority and low-payer patients. As prior research and the data above demonstrate, poor outcomes in these facilities may be the result of both hospital quality (less access to invasive procedures, understaffing, less use of protocol-driven therapies) and baseline patient health (more severe baseline comorbidities in segregated environments). Providing financial support, as opposed to punitive action, to help hire trained staff, purchase needed equipment, and establish protocol-driven procedures has the potential to even the playing field, and improve outcomes for ACS patients admitted to facilities with large proportions of minority and low-payer patients.[33]

This study is limited by the design of the NIS, which does not allow for identification of specific patients, and therefore allows for 1 patient to potentially contribute multiple discharges over the course of a year. The NIS relies on administrative collection of diagnoses, which may limit the accuracy of diagnostic definitions. The NIS does not provide data on long-term outcomes for discharges and therefore does not allow for longitudinal analysis of mortality disparities. Furthermore, the NIS does not allow for delineation of data by state, which limits analysis on the influence of state-level policies. Lastly, while attempts were made to control for patient severity and comorbidities, the potential for residual and unmeasured confounding remains.

In conclusion, hospital minority and low-income payer makeup were found to positively associate with odds of all-cause inpatient mortality among those admitted with ACS despite adjusting for age, sex, hospital characteristics, patient comorbidities, and individual patient race and insurance status. Policy changes that provide resources and support to facilities taking care of large proportions of minority and low-income payer patients are needed, and have the potential to improve outcomes for those admitted with ACS.

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