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Update on quality of care in Hispanics and other racial-ethnic groups in the United States discharged with the diagnosis of Acute Myocardial Infarction in 2013

Tomás Romero [a,*,1], Kristina L. Greenwood [b,1], Dale Glaser [c,d,1]

[a] University of California — San Diego, La Jolla, CA, United States
[b] Sharp HealthCare, San Diego, CA, United States
[c] Glaser Consulting, San Diego, CA, United States
[d] University of San Diego, San Diego, CA, United States

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ABSTRACT

Background: Disparities in Acute Myocardial Infarction (AMI) care and outcomes have been frequently reported in racial-ethnic minorities in the U.S. Some studies have attributed disparities in Hispanics and other minorities to lower quality of services at hospitals where they seek care. Current information from hospitals with large Hispanic representations and updated quality resources is needed.

Methods: Retrospective observational study of 839 AMI patients discharged in 2013 from three Southern California Hospitals (A, B, C) with tertiary cardiac care level. Non-Hispanic Whites (NHW) and Hispanics (H) were the larger racial-ethnic groups (68.3%), and the comparison of these two groups constitutes the focus of the study. Mortality, 30 day readmissions, medication/performance measures (PRx); aspirin, statins/anti-lipids, beta-blockers, ACEI/ARB for LV systolic dysfunction, <90 min door-balloon time, and revascularization procedures were compared between hospitals, NHW and H, using Chi-squared tests (χ^2), Odds Ratios (OR) with 95% confidence intervals (CI), and Z tests for proportions — independent groups.

Results: No significant differences in hospital, 30 day mortality, PRx or procedures were observed between NHW, H and other racial-ethnic minority groups, or hospitals. Hospital C had 47.3% H and Hospitals A + B 14.6% ($p < 0.001$, effect size = 0.430). AMI performance measures exceeded 2013 national rates across all facilities. NHW had more private/commercial insurance (52.5% vs. 25.4%, OR 3.24, 95% CI 2.19–4.80, $p < 0.001$) than H.

Conclusions: Equitable access to quality hospital services in three Southern California hospitals offset previously reported disparities in AMI management in Hispanics. These results may not necessarily reflect the reality of AMI care for Hispanics in other U.S. regions.

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1. Introduction

Acute Myocardial Infarction (AMI) disparities in care and outcomes have been reported in the U.S. for >25 years and became more apparent in the management of women and minority racial-ethnic groups after the introduction of coronary reperfusion and revascularization treatment modalities [1–3]. Information regarding quality of care and outcomes in AMI has often been collected from large national data sources or from quality improvement studies in voluntary participating hospital facilities. Analyses have been hindered due to the use of information from regions with contrasting socio-economic characteristics, and hospitals with unequal level of services and minorities representation [4–7]. Nevertheless, it has been suggested that disparities in Hispanics and other minority groups may be related to the quality of services available in hospitals where they seek care [8–10]. We felt that a study of AMI patients treated recently in hospitals with comparable current standards of care with a large Hispanic population, today the largest racial-ethnic minority in the U.S., could provide updated insights. Three hospitals from a Southern California region San Diego County attained all these features.

2. Objectives

To determine if: a) disparities existed in hospital outcomes and quality of care in patients discharged with a diagnosis of AMI in 2013 between three regional hospitals providing a tertiary level of cardiac care; and b) quantify the extent to which demographic diversity of

* Corresponding author at: 831 Adella Avenue, Coronado, CA 92118, United States.
E-mail address: tomas.romero@sharp.com (T. Romero).
[1] This author takes responsibility for all aspects of the reliability and freedom from bias of the data presented and their discussed interpretation.

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patients and hospitals (Non-Hispanic White and Hispanic race-ethnicity, socio-economic status) was associated with those disparities.

3. Methods

A retrospective observational study was conducted of 839 adult patients admitted and discharged in calendar year 2013 with a discharge diagnosis of AMI from three general non-profit, non-teaching hospitals in San Diego County (A Central — 666 beds, B Eastern — 540 beds and C Southern location — 343 beds) with on-site 24/7 cardiac catheterization (CATH), percutaneous coronary intervention (PCI), and coronary artery bypass graft (CABG) services. Diagnosis of AMI was established according to ICD-9 codes (410.00 to 410.91) for EKG features and the standard diagnostic changes of biomarkers (CKMB and Troponin I) [11]. The patients included in the study met criteria utilized by the Specifications Manual for National Hospital Inpatient Quality Measures Discharges 01-01-13 (1Q13) through 12-31-13 (4Q13) AMI, Version 4.2 [12] and the details for each quality performance measure are described in Table 4. Analyses were performed to compare the demographic and facility groups that were included vs. excluded based on the measure specifications. Information was retrieved from a common data warehouse that stores electronic medical records for all patients. In addition to demographic information, data included specific co-morbid health conditions and calculation of the Charlson Co-Morbidity Index.

In-hospital mortality, 30 day mortality and 30 day readmission rates were the primary outcomes. Quality performance indicators that included the use of therapies; aspirin (ASA) at admission and discharge, beta-blocker at discharge, Angiotensin Converting Enzyme Inhibitor (ACEI) or Angiotensin Receptor Blocker (ARB) for Left Ventricular Systolic Dysfunction (LVSD), statins/anti-lipids at discharge and <90 min door-to-balloon (for ST-segment elevation myocardial infarction (STEMI) only) were used as predictors in a multiple logistic regression model. Secondary outcomes were the utilization of PCI, CATH and/or CABG procedures during the index hospitalization.

Comparisons for primary and secondary outcomes were made between hospitals and racial-ethnic groups. Race-ethnicity and language preference were self-reported by the patient or companion at the time of admission. Although data were collected for all racial-ethnic groups (Table 2), their representation in our study roughly reflected demographic proportions in San Diego County based on census data, [13] where 79.7% are categorized as Non-Hispanic White (46.3%) or Hispanic (33.4%), with the remaining population represented by Asians (12.1%), Non-Hispanic Blacks/African Americans (5.6%), and Others that include smaller representations (Native Americans, Hawaiian/Pacific Islander, miscellaneous). Medical Insurance was considered as a proxy of socio-economic status [14] and classified in 5 categories: 1) No insurance/self-pay, 2) County Programs, 3) MediCal/Medicaid, 4) Medicare/Supplemental/HMO/Tricare, or 5) Commercial HMO, PPO, Workmans' Compensation/Other. Select outcomes and performance measures were analyzed in two dichotomous insurance groups: Group 1 ("Commercial-Private" Insurance composed by categories 4 and 5) vs. Group 2 ("No Insurance-County Services-MediCal/Medicaid" including categories 1, 2 and 3).

3.1. Statistical analysis

For between-group comparisons ANOVA was performed for the quantitative outcomes, and when significance was found for between-subject variables with three groups or more, post-hoc testing was conducted to test all pairwise differences. The chi-squared test (χ^2) was performed when examining the relationship between two categorical variables. For 2×2 contingency tables, Odds Ratios (OR) and 95% confidence intervals (CI) were calculated in addition to the test statistics. Differences in independent proportions and between group differences of more than two groups were analyzed using the Z test. Effect sizes were reported to complement significance testing. The level of significance was set at $\alpha = 0.05$ for all analyses [15]. Finally, a multiple logistic regression of primary outcomes (in-hospital and 30 day mortality, 30 day readmission) and secondary outcomes (PCI, CABG, CATH) was performed adjusted for the following covariates: age, gender, race-ethnicity, Commercial-Private insurance, current smoking, STEMI, Charlson Co-morbidity Index score, co-morbidities (hypertension, diabetes, dyslipidemia, chronic renal disease, cerebrovascular disease), history of PCI, and history of CABG) to test for differences between hospitals and Non-Hispanic Whites (NHW) and Hispanics (H).

4. Results

4.1. Baseline characteristics

Of the 839 patients included in the study, 47.2% were NHW, 21.1% H and 31.7% corresponded to smaller racial-ethnic group representations (Asians, non-Hispanic Blacks/African-Americans, Others) (Tables 1, 2). Hospital C had a significantly larger proportion of H patients (47.3% vs. 14.6% for Hospitals A + B, $p < 0.001$, effect size = 0.430) (Fig. 1) and less use of English as preferred language (61.1% vs. 85.6%, $p < 0.001$, effect size = 0.261) (Table 3). NHW had more Commercial-Private insurance than H (52.5% vs. 25.4%, OR 3.24, 95% CI 2.19–4.80, $p < 0.001$) (Table 1). A lower prevalence of diabetes was noted in NHW than in H (26.8% vs 40.7%, OR 0.533, 95% CI 0.367–0.774, $p = 0.001$). H had higher rates of renal failure and dialysis, and higher Charlson Co-morbidity Index scores than NHW (3.25 vs. 2.72, $p < 0.01$, effect size = 0.016).

4.2. Primary outcomes

There were no significant differences based on rates of in-hospital mortality or 30 day mortality according to NHW vs. H race-ethnicity after multivariable logistic regression data adjustment (for details see Statistical analysis section) (Table 1). No significant differences between NHW and H and the other racial-ethnic groups were noted in unadjusted data analysis (Supplemental Table 1). Hospital B, had significantly larger 30 day readmission rates (14.7% vs. 8.9%, $p < 0.05$, effect size = 0.092) (Table 2). No significant differences were noted in the average length of stay between hospitals or according to race-ethnicity (Table 1 and Supplemental Table 1).

4.3. Secondary outcomes

No significant differences in PCI, CATH or CABG procedures were found between NHW and H (Table 1) after multivariable logistic regression adjustment for age, insurance type, co-morbidities and previous coronary revascularization procedures. Hospital B had significantly larger rates of CATH and PCI and greater proportions of patients with STEMI than the other facilities (Table 2).

4.4. Quality performance measures

There were no significant differences in the use of ASA on admission or at discharge, beta blockers, statin/anti-lipids, ACEI/ARB for LV systolic dysfunction at discharge, or door to balloon time < 90 min for STEMI between NHW, H and the three hospitals (for details on the performance comparisons with the 2013 National Rates for each one of these specified measures please see Supplemental Table 2, that also includes a comparison of demographic data between included and excluded patients from the specified performance measures).

4.5. Medical insurance, demographics and outcomes

NHW had a significantly larger proportion of Commercial-Private insurance than H (52.5% vs. 25.4%, OR 3.24, 95% CI 2.19–4.80, $p < 0.001$) (Table 1). Hospital C (with the largest proportion of H patients) had less patients with Commercial-Private insurance than Hospital A (37.1% vs. 48.4%, $p < 0.05$, effect size = 0.09) (Table 3). The group with Commercial-Private insurance had a lower 30 day readmission rate than the group with No Insurance-County Services-MediCal/Medicaid (8.3% vs 13.8%, OR 0.57, 95% CI 0.36–0.90, $p = 0.015$). There were no significant associations based on type of insurance with respect to mortality or proportion of CATH, PCI or CABG procedures (Table 3).

5. Discussion

Our study included a diverse population represented by most major racial-ethnic groups in the U.S., although reflecting the regional predominance of Non-Hispanic Whites and Hispanics, the focus of the analysis of racial-ethnic disparities in this study. No significant differences were observed in the major cardiovascular risk factors between these racial-ethnic groups other than the larger prevalence of diabetes in Hispanics, with similar prevalence of current smoking, hypertension and obesity. However, Hispanics presented more co-morbidities (renal failure, dialysis), and a higher Charlson co-morbidity index than Non-Hispanic Whites although without differences in hospital and 30 day mortality, 30 day readmissions and length of stay between them.

The national origin or ancestry of Hispanics in the U.S. may have very different regional representation. In San Diego, where the study was

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Table 1
Relationship of Non-Hispanic White and Hispanic race-ethnicity with demographics, patient characteristics, co-morbid conditions, clinical outcomes and performance measures for patients with Acute Myocardial Infarction discharge diagnosis in 2013.

Characteristic	Race-ethnicity		*p* value	Effect size[a]	Odds Ratio[b]	Odds Ratio confidence interval (95%)
	Non-Hispanic White $n = 396$	Hispanic $n = 177$				
Age in years (mean ± S.D.)	68.97 ± 14.24	64.23 ± 14.70	<0.05	0.023		
Range (minimum to maximum)	30 to 103	20 to 96				
Female	149 (37.6%)	61 (34.5%)	0.468			
English as preferred language	392 (99.0%)	80 (45.2%)	<0.001		118.8	(42.4–332.3)
Insurance			<0.001	0.285		
▪ No insurance, self-pay	11 (2.8%)	16 (9.0%)				
▪ County programs	23 (5.8%)	17 (9.6%)				
▪ MediCal, Medicaid	154 (38.9%)	99 (55.9%)				
▪ Medicare, Supplemental	93 (23.5%)	10 (5.6%)				
▪ Commercial	115 (29.0%)	35 (19.8%)				
Patients with Commercial-Private insurance	208 (52.5%)	45 (25.4%)	<0.001		3.24	(2.19–4.80)
Smoking status			=0.001	0.161		
▪ Current	85 (22.8%)	34 (20.2%)				
▪ Former	112 (30.0%)	28 (16.7%)				
▪ Non-smoker	176 (47.2%)	106 (63.1%)				
Current smoker (compared to non-smoker)	85 (22.8%)	34 (20.2%)	0.084		1.50	(0.946–2.39)
ST-segment elevation myocardial infarction	161 (40.7%)	80 (45.2%)	0.309		0.831	(0.581–1.18)
Co-morbid conditions						
Hypertension	104 (26.3%)	48 (27.1%)	0.830		0.957	(0.642–1.42)
Hyperlipidemia	70 (17.7%)	33 (18.6%)	0.781		0.937	(0.593–1.48)
Congestive heart failure	148 (37.4%)	80 (45.2%)	0.077		0.724	(0.505–1.03)
Peripheral vascular disease	49 (12.4%)	29 (16.4%)	0.196		0.721	(0.438–1.18)
Diabetes without complication	106 (26.8%)	72 (40.7%)	=0.001		0.533	(0.367–0.774)
Diabetes with complication	25 (6.3%)	27 (15.3%)	=0.001		0.374	(0.210–0.666)
Renal failure	80 (20.2%)	54 (30.5%)	<0.01		0.577	(0.385–0.863)
On dialysis	5 (1.3%)	10 (5.6%)	<0.01		0.214	(0.072–0.634)
Stroke	20 (5.1%)	14 (7.9%)	0.181		0.619	(0.305–1.25)
Charlson Index of Co-Morbidity (mean ± S.D.)	2.72 ± 1.83	3.25 ± 2.02	<0.01	0.016		
Length of stay (mean ± S.D.)	5.20 ± 8.09	5.67 ± 6.20	0.497			
Clinical outcomes[c]						
Mortality in hospital	16 (4.0%)	8 (4.5%)	0.527		0.686	(0.213–2.206)
Mortality at 30 days	21 (5.3%)	8 (4.5%)	0.914		0.943	(0.326–2.727)
Readmission at 30 days	52 (13.1%)	16 (9.0%)	0.305		1.44	(0.717–2.889)
Performance measures						
Percutaneous coronary intervention	246 (62.1%)	108 (61.0%)	0.802		1.04	(0.728–1.50)
Coronary bypass graft	34 (8.6%)	23 (13.0%)	0.103		0.629	(0.359–1.10)
Cardiac catheterization	318 (80.3%)	146 (82.5%)	0.538		0.866	(0.546–1.37)

[a] Effect size based on Eta squared for analysis of variance.
[b] Odds Ratio used Non-Hispanic White patients as the reference group.
[c] The relationship of race-ethnicity to clinical outcome measure analyses were based on a fully adjusted logistical regression model that accounted for age, gender, acute myocardial infarction classification, comorbidities, history of coronary revascularization, and facility.

conducted, 95% correspond to Mexican nationality or ancestry, in contrast to New York, where Mexicans represent <3% and Puerto Ricans and Dominicans close to 90%. According to the SOL study [16], similar prevalence of coronary artery disease, diabetes, hypertension and diabetes is noted in most of the U.S. Hispanics (approximately 2 to 5%, 20%, 30% and 40% respectively) although access to quality health care facilities may differ significantly across the U.S. states and regions.

Many published studies have attributed differences in the management of AMI observed in the larger U.S. racial-ethnic minorities (Hispanics and non-Hispanic Blacks/African Americans) to cultural/language characteristics and type of medical insurance [2,4,6,17–19,21]. In contrast, we found that despite significant differences in those factors between non-Hispanic Whites and Hispanics (the two larger racial-ethnic groups in our study), language preference and type of medical insurance did not significantly impact primary outcomes or quality of care/performance measures. It is noteworthy that our results compared favorably with performance metrics from the Specifications Manual for National Hospital Inpatient Quality Measures for AMI. However, patients with private-commercial insurance had less 30 day readmissions than those without insurance or with Medicaid/MediCal or County Services insurance coverage, a finding that may suggest differences in post discharge care or other similarly undetermined factors. The higher 30 day readmission rate in patients without commercial insurance may also reflect the well documented yet undetermined way in which disadvantaged socioeconomic status is associated with poorer health outcomes. In addition, Hospital B had a significantly larger 30 day readmission rate that may have been driven by a larger proportion of STEMI and PCI procedures than in the other facilities. The influence of language barriers on outcomes and quality of care has been evaluated mostly in the outpatient setting [17–20] and to the best of our knowledge, not in the management of AMI patients. In a 2010 study that analyzed results for 154,381 patients with AMI, stroke or pneumonia from the Nationwide Inpatient Sample (NIS) data base, the authors concluded that privately insured patients had significantly lower in-hospital mortality compared with uninsured or Medicaid recipients, and this relationship was independent of the hospital's proportion of patients with those types of coverage. However, in contrast to our study, they did not conduct a comparative analysis of the level of services offered by the different hospital facilities [21].

A relevant finding in our study was that the hospital with a predominant Hispanic patient representation (47.3%) had similar primary outcomes, quality of care and performance markers compared with the other two hospital facilities with predominant NHW but comparable quality of cardiac services. Although Hispanics had a larger proportion of patients with no insurance, County Services or MediCal/Medicaid, there were no disparities in outcomes, procedures, or performance measures for the hospital with the largest proportion of Hispanics. In contrast, several studies have described an inverse relationship

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Table 2
Relationship of facilities with demographics, patient characteristics, clinical outcomes and performance measures for patients with Acute Myocardial Infarction discharge diagnosis in 2013.

Characteristic	Total $N = 839$	Facility			p value	Effect size[a]
		Hospital A $n = 304$	Hospital B $n = 368$	Hospital C $n = 167$		
Age in Years (mean ± S.D)	66.42 ± 14.55	67.11 ± 14.61	66.05 ± 14.76	65.99 ± 14.03	0.591	
Range (min to max)	20 to 103	29 to 101	20 to 96	35 to 103		
Female	299 (35.6%)	111 (36.5%)	134 (36.4%)	54 (32.2%)	0.609	
Race-ethnicity					< 0.001	0.430
▪ Non-Hispanic White	396 (47.4%)	137 (45.1%)	215 (58.4%)	44 (26.3%)		
▪ Hispanic	177 (21.1%)	58 (19.1%)	40 (10.9%)	79 (47.3%)		
▪ Non-Hispanic Black	36 (4.3%)	13 (4.3%)	15 (4.1%)	8 (4.8%)		
▪ Asian	69 (8.2%)	38 (12.5%)	10 (2.7%)	21 (12.6%)		
▪ Other	137 (16.3%)	39 (12.8%)	86 (23.4%)	12 (7.2%)		
▪ Unknown	24 (2.8%)	19 (6.3%)	2 (0.5%)	3 (1.8%)		
Race-ethnicity (two largest groups)					<0.001	0.400
▪ Non-Hispanic White	396 (69.1%)	137 (70.3%)	215 (84.3%)	44 (35.8%)		
▪ Hispanic	177 (30.9%)	58 (29.7%)	40 (15.7%)	79 (64.2%)		
English as preferred language	677 (80.7%)	248 (81.6%)	327 (88.9%)	102 (61.1%)	<0.001	0.261
Patients with Commercial-Private insurance	360 (42.9%)	147 (48.4%)	151 (41.0%)	62 (37.1%)	<0.05	0.088
Smoking status					<0.05	0.118
▪ Current	195 (24.5%)	62 (21.8%)	99 (28.4%)	34 (20.7%)		
▪ Former	198 (24.8%)	65 (22.9%)	96 (27.5%)	37 (22.6%)		
▪ Non-smoker	404 (50.7%)	157 (55.3%)	154 (44.1%)	93 (56.7%)		
ST-segment elevation myocardial infarction	346 (41.2%)	97 (31.9%)	174 (47.3%)	75 (44.9%)	<0.001	0.144
Charlson Index of Co-Morbidity (mean ± S.D.)	2.86 ± 1.93	2.82 ± 1.97	2.85 ± 1.89	2.96 ± 1.96	0.753	
Length of Stay (LOS) (mean ± S.D.)	5.08 ± 6.69	4.75 ± 6.05	5.24 ± 7.64	5.34 ± 5.44	0.550	
Clinical outcomes[b]						
Mortality in hospital	39 (4.6%)	15 (4.9%)	18 (4.9%)	6 (3.6%)	0.769	
Mortality at 30 days	46 (5.5%)	15 (4.9%)	23 (6.3%)	8 (4.8%)	0.688	
Readmission at 30 days	96 (11.4%)	25 (8.2%)	54 (14.7%)	17 (10.2%)	<0.05	0.092
Performance measures[c]						
Percutaneous coronary intervention	511 (60.9%)	169 (55.6%)	241 (65.5%)	101 (60.5%)	<0.05	0.090
Coronary bypass graft	96 (11.4%)	34 (11.2%)	42 (11.4%)	20 (12.0%)	0.967	
Cardiac catheterization	683 (81.4%)	237 (78.0%)	317 (86.1%)	129 (77.2%)	<0.01	0.108

[a] Effect size based on Phi for chi-square analysis or Eta squared for analysis of variance.
[b] Additional analyses that examined the relationship of facility to clinical outcome measures were based on a fully adjusted logistical regression model that accounted for age, gender, acute myocardial infarction classification, comorbidities, and history of coronary revascularization. Results indicated statistically higher readmission rates for Hospital B compared to Hospital A (Odds ratio = 1.823 (95% confidence interval: 1.051–3.163), $p = 0.033$.
[c] Results indicate that Hospital B had significantly greater use of percutaneous coronary intervention procedures than Hospital A. Hospital B also had significantly greater use of cardiac catheterization procedures than Hospitals A or C.

between the quality of care and performance of hospitals with higher volumes of minorities, Medicaid recipients or patients with no insurance, suggesting a poorer level of qualified providers and/or technical resources in those facilities [8–10,21–23]. A study that analyzed readmission rates in Hispanic Medicare beneficiaries with heart failure and AMI found that Hispanics were more likely to be readmitted than white patients, partly due to their propensity to be admitted in "Hispanic serving" hospitals, underscoring the need to target quality

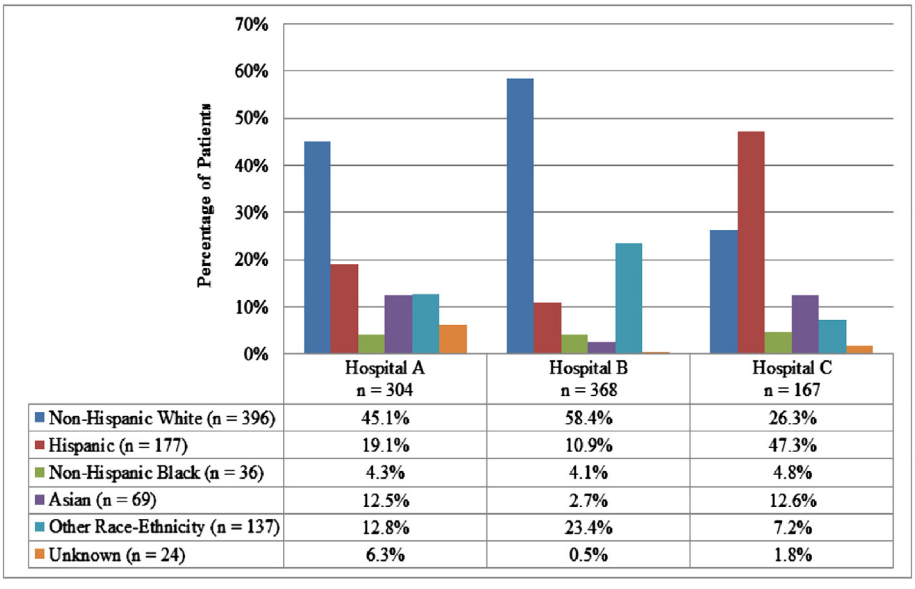

Fig. 1. Comparison of race-ethnicity groups by facility for patients with Acute Myocardial Infarction discharge diagnosis in 2013.

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Table 3
Relationship of insurance category with clinical outcomes and performance measures for patients with Acute Myocardial Infarction discharge diagnosis in 2013.

Characteristic	Insurance category		*p* value	Odds Ratio[a]	Odds Ratio confidence interval (95%)
	Commercial-Private $n = 360$	No Insurance-County Services-Medicaid $n = 479$			
Clinical outcomes					
Mortality in hospital	19 (5.3%)	20 (4.2%)	0.454	1.28	(0.672–2.433)
Mortality at 30 days	20 (5.6%)	26 (5.4%)	0.936	1.03	(0.563–1.867)
Readmission at 30 days	30 (8.3%)	66 (13.8%)	0.015	0.569	(0.361–0.897)
Performance measures					
Percutaneous coronary intervention	231 (64.2%)	280 (58.5%)	0.094	1.27	(0.960–1.687)
Coronary bypass graft	33 (9.2%)	63 (13.2%)	0.074	0.666	(0.427–1.040)
Cardiac catheterization	302 (83.9%)	381 (79.5%)	0.110	1.34	(0.936–1.916)

[a] Odds Ratio used Commercial-Private insurance category as the reference group.

improvement efforts at those hospitals [9]. The large national quality improvement study "Get with the Guidelines—Coronary Artery Disease Program" (GWTH-CAD) showed that hospitals with a large proportion of Black/African American and Hispanic patients improved initial disparities in "defect-free-care" compared to NHW after 4 ½ years of enrollment in a voluntary incentive program that awarded performance for managing patients with Unstable Angina Pectoris and AMI [7]. It has been noted [24–26] that guidelines for the management of AMI patients are now more widely implemented in U.S. hospitals, particularly in academic or top-ranked centers, but it is uncertain if lower quality facilities, those that serve a large proportion of racial-ethnic minority groups, or those that did not enroll in the GWTG program have shown similar improvements. A study analyzing data from 123 hospitals included in the University Health System Consortium database found that only 20% of patients were in minority groups in the top quality performance hospital versus 70% in the lower performance facilities [8].

Our study has several limitations. First, it is uncertain if our results are generalizable to minority groups other than Hispanics, or to Hispanics living in different regions in the U.S. Although we did not find differences in outcomes among non-Hispanic minority groups, their proportions in our study were too small to attempt further meaningful comparisons. We chose the location of the study to investigate the influence of race-ethnicity and medical insurance in hospitals with similar levels of care, resources and data collection process, taking advantage of a region with a large Hispanic representation and considering that most of the documented disparities in minorities have been based on data collected from hospitals with unequal service resources. Second, we did not measure the proficiency of English language or the cultural competency of the hospital staff providers that may have minimized the impact of language differences, particularly in the facility with the larger Hispanic patient proportion. However, the influence of language barrier and cultural competency has been investigated mostly in the outpatient care setting and not sufficiently as a factor in the management of AMI patients [9,19]. Third, smoking cessation counseling and referral to cardiac rehabilitation services were not included as procedural variables due to constraints with the documentation system. Finally, we did not directly evaluate education or income categories, although medical insurance characteristics were used as proxy of socio-economic status.

6. Conclusions

Our study indirectly supports the contention that disparities in quality of care and outcomes repeatedly described in past studies of AMI in Hispanics, other racial-ethnic minorities and socio-economically disadvantaged patients in the U.S. may be driven by a lower overall quality level of services instead of the proportion of those groups in the hospital facilities where they seek care.

Supplementary data to this article can be found online at http://dx.doi.org/10.1016/j.ijcard.2017.07.004.

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