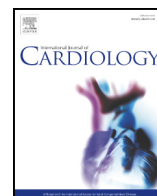




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# Update on quality of care in Hispanics and other racial-ethnic groups in the United States discharged with the diagnosis of Acute Myocardial Infarction in 2013

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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 ( $\chi^2$ ), 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

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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 ( $\chi^2$ ) was performed when examining the relationship between two categorical variables. For  $2 \times 2$  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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