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# Racial and ethnic postoperative outcomes after surgery: the Hispanic paradox

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ABSTRACT

*Background:* The Hispanic population in the United States have previously been shown to have, in some cases, better health outcomes than non-Hispanic whites (NHWs) despite having lower socioeconomic status and higher frequency of comorbidities. This epidemiologic finding is coined as the Hispanic Paradox (HP). Few studies have evaluated if the HP exists in surgical patients. Our study aimed to examine postoperative complications between Hispanic and NHW patients undergoing low- to high-risk procedures.

*Materials and methods:* We conducted a retrospective cohort study analyzing adult patients who underwent high-, intermediate-, and low-risk procedures. The Healthcare Cost and Utilization Project California State Inpatient Database between 2006 and 2011 was used to identify the patient cohort. Candidate variables for the adjusted model were determined a priori and included patient demographics with the ethnic group as the exposure of interest.

*Results:* The median age for Hispanics was 52 (SD 19.3) y, and 38.8% were male ($n = 87,837$). A higher proportion of Hispanics had Medicaid insurance (23.9% *versus* 3.8%) or were self-pay (14.2% *versus* 4.5%) compared with NHWs. In adjusted analysis, Hispanics had a higher odds risk for postoperative complications across all risk categories combined (OR 1.06, 95% CI 1.04-1.09). They also had an increased in-hospital (OR 1.38, 95% CI 1.14-1.30) and 30-d mortality in high-risk procedures (OR 1.34, 95% CI 1.19-1.51).

*Conclusions:* Hispanics undergoing low- to high-risk surgery have worse outcomes compared with NHWs. These results do not support the hypothesis of an HP in surgical outcomes.



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## Introduction

Hispanics and Latinos are a mixed heritage group who trace their origin or descent to Mexico, Dominican Republic, Puerto Rico, Cuba, and Central and South America. They are the second-largest ethnic group in the United States and account for 18% of the US population. The Latino population has increased nine-fold since the 1960s. According to the Pew Research Center, Latinos are the second-fastest growing ethnic group with a 2.0% growth rate between 2015 and 2016.[1]

Studies suggest an association between mortality and multiple socioeconomic characteristics including education, occupation, employment, health insurance, and poverty.[2] Other factors associated with socioeconomic status include intrauterine environment, prolonged exposure to stressful life events, and reaction to macro societal factors including income inequality.[2] In this regard, Latinos and Hispanics have worse access to health care insurance, lower average income, education, and higher frequency of comorbidities, which should suggest more deleterious outcomes than their non-Hispanic counterparts.[3] However, multiple studies have demonstrated better health outcomes in Hispanics when compared with non-Hispanic whites (NHWs).[4] These repeated epidemiologic findings in Hispanic health, which was first noted by Kyriakos Markides in 1986, have earned the term Hispanic Paradox (HP).

Many studies have well-documented disparities between African Americans and white patients, but the difference in surgical outcomes between Hispanics and NHWs undergoing surgery is not well defined in the literature.[4,5] In addition, few studies have evaluated the HP in surgical patients. We aim to examine in-hospital mortality, 30-d mortality, and postoperative complications between Hispanics and NHWs undergoing low- to high-risk procedures. We hypothesize that Hispanics have worse outcomes than their NHW counterparts.

## Materials and methods

### *Data source and patient selection*

The Healthcare Cost and Utilization Project California (HCUP) State Inpatient Database (SID) between 2006 and 2011 was used to identify the patient cohort. The HCUP is an administrative data set composed of a family of health care databases developed through a Federal-State-Industry partnership sponsored by the Agency for Healthcare Research and Quality. Each SID captures all inpatient stays at nonfederal facilities for the respective state, regardless of primary payer. Encounters in the SID are obtained from participating state-level data organizations and are based on data abstracted from inpatient discharge records.

California was included in the study because they have a high percentage of verified patient identifiers and perform a high volume of the various low- to high-risk surgeries chosen. Furthermore, the State of California has a large Hispanic and Latino population. Hospital-level data such as, hospital size, residency training programs, full-time nurse staffing, bed size, and total admissions is obtained from the American Hospital Association Annual Survey Database—a survey that is released annually and is comprised of data from more than 6000 hospitals and 400 health systems. This study is deemed exempt from institutional review board approval by the Loyola University Chicago because de-identified, publicly available data are used.

Inclusion criteria were all Hispanics and NHWs that underwent any of the qualifying procedures. We excluded black, Asian or Pacific Islander, Native American, and those classified as others to prevent confounding by outcome differences in these various races/ethnicities. We created variables for Hispanics and NHWs, using the race and ethnicity HCUP variable.

### *Categories of risk*

Categories of high-, intermediate-, and low-risk surgeries were stratified using the American College of Cardiology/American Heart Association guidelines for cardiac risk of noncardiac surgery.[5,6] The International Classification of Disease, 9th Revision, Clinical Modification codes (ICD-9) were used to identify patients who qualified as high-risk for esophagectomy, pancreatectomy, abdominal aortic aneurysm repair (AAA), and pneumonectomy. Intermediate-risk procedures included ICD-9 codes for total knee replacement, total hip replacement, carotid endarterectomy (CEA), colorectal, prostatectomy, and cystectomy. Low-risk included ICD-9 codes for a laparoscopic appendectomy, laparoscopic cholecystectomy, and mastectomy (Supplemental Table 1).

### *Statistical analysis*

The primary outcomes were in-hospital mortality and 30-d mortality. The secondary outcome was a comparison of individual and composite postoperative complications for the following: pulmonary embolism, myocardial infarction, sepsis, urinary tract infection (UTI), pneumonia, deep venous thromboembolism, aspiration, cardiac complications, pulmonary insufficiency, acute renal failure, or intraoperative surgical complications. These complications were identified using ICD-9 codes (Supplemental Table 2).

Descriptive statistics were performed with *t*-tests for continuous variables and chi-square tests for categorical variables. Variables for the adjusted model were determined a priori and included patient demographics with the ethnic group as the exposure of interest. Multivariable analyses were conducted using multilevel mixed effects logistic regression for binary dependent variables. Procedure types were controlled for within each risk strata. The following variables were forced into the mixed effect multivariable model: age, gender, income, insurance, and Charlson comorbidity index. Postoperative complications were also stratified by time with 2006 as a reference to evaluate trends over time. Statistical analysis was performed in STATA MP, version 14 (Stata Corp, College Station, TX).