



## Original Contribution

# The effect of race on postsurgical ambulatory medical follow-up among United States Veterans<sup>☆</sup>



Robert B. Schonberger, MD, MHS (Assistant Professor)<sup>a,\*</sup>, Feng Dai, PhD (Research Scientist)<sup>a,b</sup>,  
Cynthia Brandt, MD, MPH (Professor, Staff Physician)<sup>a,c,d</sup>, Matthew M. Burg, PhD (Professor, Staff Physician)<sup>a,e</sup>

<sup>a</sup> Department of Anesthesiology, Yale School of Medicine, 333 Cedar St, TMP-3, New Haven, CT 06520

<sup>b</sup> Yale Center for Analytical Sciences, Yale School of Public Health, New Haven, CT 06520

<sup>c</sup> Department of Emergency Medicine, Yale School of Medicine, New Haven, CT 06516

<sup>d</sup> VA Connecticut Healthcare System, 950 Campbell Ave, West Haven, CT 06516

<sup>e</sup> Department of Internal Medicine, Yale School of Medicine, New Haven, CT 06520

## ARTICLE INFO

## Article history:

Received 18 April 2016

Received in revised form 14 October 2016

Accepted 3 November 2016

## ABSTRACT

**Study objective:** To investigate the association between self-identified black or African American race and the presence of ambulatory internal medicine follow-up in the year after surgery. Our hypothesis was that among US Veterans who presented for surgery, black or African American race would be associated with a decreased likelihood to receive ambulatory internal medicine follow-up in the year after surgery.

**Design:** Retrospective observational.

**Setting:** All US Veterans Affairs hospitals.

**Patients:** A total of 236,200 Veterans undergoing surgery between 2006 and 2011 who were discharged within 10 days of surgery and survived the full 1-year exposure period.

**Interventions:** None.

**Measurements:** Attendance at an internal medicine follow-up appointment within 1 year after surgery.

**Main results:** After controlling for year of surgery, age, age  $\geq 65$  years, sex, Hispanic ethnicity, and number of inpatient days, black or African American patients were 11% more likely to lack internal medicine follow-up after surgery (adjusted odds ratio, 1.11; 95% confidence interval, 1.06–1.16). When accounting for geographic region, this difference remained significant at the Bonferroni-corrected  $P < .007$  level only in the Midwest United States where black or African American patients were 28% more likely to lack medical follow-up in the year after surgery (odds ratio, 1.28; 95% confidence interval, 1.16–1.42;  $P < .0001$ ).

**Conclusions:** The disparity in ambulatory medical follow-up following surgery among black or African American vs nonblack or non-African American Veterans in the Midwest region deserves further study and may lead to important quality improvement initiatives aimed specifically at this population.

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## 1. Introduction

Public health advocates within the anesthesiology community have suggested that the perioperative period provides an important

opportunity for health risk factor screening and triage [1], and data supporting this suggestion are increasingly widespread [2–7]. In prior work, we have investigated clinical prediction models among patients presenting for surgery to identify those likely to have poorly controlled hypertension and who thus might benefit from efficient, targeted referral interventions for ambulatory medical follow-up [8–10].

Because blacks or African Americans have a higher prevalence of cardiovascular risk factors, including hypertension, as compared with the nonblack or non-African American population, they may stand to benefit the most from perioperative care coordination initiatives designed to improve longitudinal cardiovascular risk factor reduction. Moreover, evidence demonstrates that black or African American patients exhibit higher visit rates to emergency departments as compared with white persons and lower rates of outpatient office visits where longitudinal risk factor reduction would typically be the focus of care [11]. The effect

<sup>☆</sup> Disclosures: The authors have no relevant conflicts of interest to disclose. This work was supported in part by the National Heart, Lung, and Blood Institute of the National Institutes of Health (NIH) under award number K23HL116641. This work was also supported by the Veterans Health Administration and by CTSA Grant UL1 RR024139 from the National Center for Advancing Translational Sciences at the NIH. The content is solely the responsibility of the authors and does not necessarily represent the policy or views of the NIH, the Veterans Health Administration, or the United States Government.

\* Corresponding author at: Department of Anesthesiology, Yale School of Medicine, New Haven, CT 06520. Tel.: +1 203 785 2802; fax: +1 203 785 6664.

E-mail addresses: robert.schonberger@yale.edu (R.B. Schonberger), feng.dai@yale.edu (F. Dai), cynthia.brandt@yale.edu (C. Brandt), matthew.burg@yale.edu (M.M. Burg).

of race on location of care remains significant even after controlling for expected source of payment and poverty. For these reasons, the opportunity to harness the perioperative encounter as an additional screening and referral opportunity—particularly for black or African American patients—deserves further study.

Racial disparities in the delivery and use of health care have been described in several contexts within the United States [12–14], including specifically during the perioperative period. For example, it has been shown that black or African American patients are significantly less likely to receive regional as opposed to general anesthesia [15]. However, it is not known whether significant disparities in care ascribable to race continue into the postsurgical follow-up period. Because the subset of black or African American patients who come for nonemergency surgery has an already established interaction with a physician specialist, they may not remain as underserved in respect to ambulatory care visits as their larger demographic cohort would suggest [16]. Indeed, there is evidence to suggest that among patients for whom access to insurance is equivalent, racial disparities previously seen in some surgical populations may disappear [17].

Therefore, in the present study, we investigated the association between self-identified black or African American race and the likelihood of postsurgical outpatient ambulatory internal medicine follow-up within the Veterans Health Administration. Our hypothesis was that (1) among US Veterans who presented for surgery, there would be an association between black or African American race and a decreased likelihood to engage in ambulatory internal medicine follow-up in the year after surgery. We further hypothesized that (2) such an effect would persist independent of geographic region and after controlling for comorbid disease burden and demographic factors including age, sex, and Hispanic ethnicity. Third, we sought to investigate whether a similar association between race and outpatient medical follow-up would be present among the subset of patients who, prior to their surgery, demonstrated blood pressures in the hypertensive range ( $\geq 140/90$  mm Hg).

## 2. Materials and methods

After appropriate institutional review board approval, we created an electronic health record (EHR)–based historical cohort of patients aged  $\geq 21$  years who received surgical care at any Veterans Health Administration (VHA) health care facility between September 2006 and August 2011 as has been previously described [18]. The resulting cohort is being used in several studies examining the relationship between perioperative assessments and postoperative outcomes [10,18].

For the present study, the outcome of interest was whether the patient had at least 1 nonsurgical medical visit (described below) within the VHA in the 365 days following surgery. To minimize confounding due to perioperative morbidity and mortality, only patients who were discharged within 10 days of surgery and who survived for a full 365-day period after surgery were included in the analysis of ambulatory clinic follow-up. After unadjusted analysis, Cox proportional hazard ratios were calculated to determine whether black or African American race was independently associated with likelihood of ambulatory care follow-up in the VHA system after surgery when controlling for a variety of patient and facility-level factors. In a parallel analysis, we explored the same association using only the subset of patients who presented preoperatively with blood pressures  $\geq 140/90$  mm Hg, calculated as the mean of 2 preoperative readings. Specific blood pressure targets to define hypertension remain controversial [19,20]. In the present study, we chose to define blood pressure status by actual recorded blood pressure rather than a diagnostic code for the disease of hypertension because poorly controlled blood pressure—rather than a patient's being classified as a hypertensive—is the primary mediator of morbidity in this population, and those patients with elevated blood pressures may have the highest likelihood of benefitting from improved postoperative internal medicine follow-up care.

## 3. Data sources

Data sources and variable specifications have been summarized previously [18]. Briefly, patients were identified by their unique Patient Integration Control Number assigned by the VHA Master Veteran Index. Demographic information; surgical specialty; American Society of Anesthesiologists Physical Status score (ASA Physical Status score) [21]; and *International Classification of Diseases, Ninth Revision, Clinical Modification*, inpatient diagnostic codes dating from January 2000 to the index surgery date were extracted from the VHA Corporate Data Warehouse for inclusion in this analysis. Black or African American race and Hispanic ethnicity were coded separately based on self-identification to allow for both classifications independently. The mechanism for obtaining self-identified race typically occurs during intake into the VHA system, but a Veteran's chosen racial affiliation may be modified at any point in the care pathway at the request of the Veteran. Patients with missing self-reported race were excluded. Age was included as a semicontinuous variable and also dichotomized as  $\geq 65$  years to account for discontinuities in health care use that occur with the assumption of Medicare eligibility [22–24]. Other data included in the analysis were the year of surgery (to account for increasing EHR penetrance during the study period) and the number of inpatient days postoperatively. Preoperative blood pressures were taken as the mean of 2 measurements from within 30 days prior to surgery and were considered hypertensive if either the systolic blood pressure was  $\geq 140$  mm Hg or the diastolic blood pressure was  $\geq 90$  mm Hg.

Ambulatory visit data for the 365-day postoperative period were collected by querying the VHA National Patient Care Database Medical SAS Outpatient Datasets [25] as has been described in prior reports [26]. Clinic types were identified by the Stop Codes associated with each visit. As has been described previously, a Stop Code for any of the following clinics was considered positive for the exposure of interest: primary care, cardiology, pulmonology, endocrinology, diabetes, hypertension, women's, infectious disease, and geriatric primary care [18]. This outpatient clinic list was based on the NEXUS clinic group as defined by the VHA External Peer Review Program, with the addition of infectious disease clinics. NEXUS clinic visits are used to determine which Veterans are receiving primary care across the VHA system. Infectious disease clinics were included because they are the primary care source for many Veterans with HIV.

## 4. Statistical analysis

After performing descriptive analytics of the included variables, an unadjusted analysis was done to measure the prevalence of at least 1 nonsurgical ambulatory clinic follow-up in the year following surgery between black or African American and nonblack or non-African American patients. We then performed a series of Cox regression models to determine whether the likelihood of ambulatory clinic follow-up during the first surgical year differed for black or African American vs nonblack or non-African American Veterans after controlling for different measures of preoperative comorbidity (ASA Physical Status Score, Charlson Comorbidity Index [CCI], and Veterans Aging

**Table 1**  
Veterans Integrated Service Networks by geographic region

VISN	Region
1, 2, 3, 4	Northeast
5, 6	Mid-Atlantic
7, 8, 9, 16, 17	Southeast
10, 11, 12, 15, 23	Midwest
18	Southwest
19	Mountain West
20, 21, 22	West

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