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Racial/Ethnic Differences in Treatment Recommendations: Lifestyle Changes and Medication Prescriptions for High Cholesterol

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Abstract

Objective—High cholesterol is a common condition in the United States, affecting nearly one third of adults, and is a leading precursor to coronary heart disease. This study investigates race/ethnic differences in treatment recommendations for patients with high cholesterol, including prescription medication and lifestyle changes such as eating less fat, losing weight, or exercising more.

Design—Data were obtained from the 2005–2010 National Health and Nutrition Examination Survey (N=4,846), a representative sample of adults in the United States, and the 2005–2010 National Ambulatory Medical Care Survey (N=12,113), a representative sample of patient visits in the United States. Logistic regression analyses were used to assess whether health professionals recommended lifestyle changes or medication prescriptions differently by patient race/ethnicity and age. Models adjusted for demographic characteristics, socioeconomic status, health behaviours, health care access/utilization, and comorbidities.

Results—Non-Hispanic Black and Hispanic patients with high cholesterol were significantly and substantially more likely to receive recommendations for lifestyle changes compared to non-Hispanic White patients. These differences were exacerbated at younger ages and largely diminished for adults over the age of 65. These patterns were reflected in both datasets. However, non-Hispanic Black patients from the NHANES analysis were less likely than non-Hispanic White patients to receive medication prescriptions for high cholesterol, particularly at younger ages. There were no race/ethnic differences in odds of medication prescriptions for Hispanic patients compared to White patients.

Conclusions—Results suggest widespread and pervasive race/ethnic differences in recommending lifestyle changes for patients with high cholesterol. Although lifestyle changes may lower cholesterol they are often less effective than prescription medication. Because differences in lifestyle recommendations were not reflected in prescription practices, results may indicate a form of discrimination within physician-patient interactions that could be addressed by increased provider education about most effective treatment practices.

Keywords

racial/ethnic health disparities; treatments for high cholesterol; physician-patient interactions

Introduction

Racial/ethnic disparities in health continue to be pervasive and produce cumulative health disadvantages for people of color. National data from the United States demonstrate disparities in mortality, chronic diseases, and access to health care, among others (Williams and Sternthal 2010) and micro-level studies have elucidated unequal treatment within the health care system and between health care providers and patients (Saha, Arbalaez, and Cooper 2003; Smedley, Stith, and Nelson 2003). These and other studies suggest that disparities perpetuate throughout the disease process, from prevalence to management or effective treatment (Nelson, Norris, and Mangione 2002; McWilliams et al. 2009; Egan, Zhao, and Axon 2010). However, little is known about how a patient's race/ethnicity may matter in the intermediary processes between diagnosis of a condition and its progression or management, particularly for many chronic conditions that require time and resources to effectively control. For chronic conditions that increase mortality risk, it is essential to understand factors that affect differential management so that interventions can be (perhaps more effectively and equitably) implemented before life threatening events occur. This study addresses this gap by examining how treatment recommendations given to patients with high cholesterol differ by race/ethnicity and age. Lifestyle recommendations, such as exercising more, may be more effective and realistic to implement at younger ages, whereas prescriptions for medication may be the best avenue for cholesterol management at older ages. By examining race/ethnic differences across age groups, the analyses may suggest when and why disparities are most apparent. Treatment recommendations from healthcare providers are a crucial component of disease management; they often represent a quick decision-making process that may be penetrated by implicit and explicit racial/ethnic bias.

Coronary heart disease (CHD) is the leading cause of death in the United States, accounting for approximately one in four deaths each year (CDC 2012). Effective treatment or management of CHD contributors (such as high cholesterol, hypertension, and obesity) lowers the risk of developing the disease. High cholesterol [i.e. hyperlipidaemia or high levels of low-density lipoprotein (LDL)], is one of the leading contributors to CHD in the United States. As of 2011, one in three Americans had high cholesterol, making them twice as likely to develop heart disease than those with normal cholesterol. Additionally, evidence suggests that high cholesterol remains untreated for more than half of those diagnosed. Because of these substantial risks and consequences, understanding treatment and management of high cholesterol is of utmost concern to the public health community (CDC 2012).

Like most diseases, death rates from coronary heart disease (CHD) and prevalence rates of the leading CHD contributors reveal disparities along racial/ethnic lines. Among the largest race/ethnic groups in the U.S., non-Hispanic Blacks (NH Blacks) had higher overall and premature death rates from CHD than non-Hispanic Whites (NH Whites), whereas

Hispanics had lower death rates from CHD than NH Whites as of 2013 (CDC 2013). Between 1999–2006 NH Blacks and Mexican Americans had lower rates of diagnosed high cholesterol than NH Whites (NCHS 2010). Diagnosis rates may reflect lower overall prevalence or higher rates of undiagnosed high cholesterol, making it difficult to determine whether lower reported rates of high cholesterol indicate a relative health advantage for NH Blacks and Mexican Americans compared to NH Whites.

In addition to racial/ethnic disparities in prevalence of high cholesterol, extensive evidence over the past 25 years suggests that health care providers treat patients differently based on racial/ethnic status (Smedley et al. 2003; Ferguson et al. 2002; Cooper and Powe 2004). In 2003, the Institute of Medicine released a detailed report documenting the widespread nature of race/ethnic disparities in health, emphasizing both the role of system level determinants (i.e. health care access/utilization) and the role of micro-level interactions between physicians and patients (Smedley et al. 2003). Research evaluating micro-level interactions continues to suggest physician bias as the driving force behind treatment disparities (Burgess, Fu, and van Ryn 2004; Kposowa et al. 2002; Van Ryn et al. 2006). Furthermore, an estimated 77% of NH Black patients and 79% of Hispanic patients have a racially/ethnically discordant health care provider, compared to only 23% of NH White patients (Saha et al. 1999; Chen et al. 2005; Street et al. 2008). Health care providers may enact implicit biases despite potential “good intentions,” and factors beyond race, such as age, gender, socioeconomic status, and other social, behavioral, and demographic characteristics affect their perceptions of patients (Burgess et al. 2004; Van Ryn et al. 2000; Lutfey et al. 2010). Blair and colleagues (2013) found extensive implicit biases against NH Black and Hispanic patients among primary care providers and community members despite little explicit bias. These implicit biases may be further exacerbated by the immense time pressure placed on health care providers (Stepanikova et al. 2012; Dovidio et al. 2008; Burgess et al. 2004) and may be more likely when there is more room for discretion in types of treatment options available (Mikuls et al. 2005).

However, studies aimed at evaluating health care provider bias typically use vignettes, clinic medical records, or short provider surveys. These methods are useful for uncovering specific reasons why racial/ethnic status of patients and providers may produce particular perceptions among some health care providers or in specific settings. However, a review of healthcare provider racism by Paradies and colleagues (2014) concludes that the quality of current studies suffers from small sample sizes, low response rates, non-representative samples, lack of robust statistical analyses to address potential confounders, and validity concerns based on health care professionals providing socially desirable responses. They note, ‘Despite a burgeoning interest in racism as a contributor to these [health] disparities, we still know relatively little about the *extent* of healthcare provider racism or how best to measure it’ (Paradies, Truong, and Priest 2014:384, authors’ emphasis).

This study complements these micro-level analyses and broadens their scope by examining nationally representative data on healthcare providers’ treatment recommendations for patients with high cholesterol. Treatment recommendations either take the form of a medication prescription for a statin or a suggested lifestyle change. Common lifestyle changes that can lower cholesterol including eating less fat, increasing exercise, and losing

weight. In 2013 a report from the American College of Cardiology and the American Heart Association task force issued a recommendation to physicians in the United States to increase the use of statins because of their effectiveness in lowering cholesterol. The report also recommended that physicians prescribe cholesterol-lowering medication to younger adults because of its demonstrated safety for long-term use (Stone et al. 2014). This study will examine both medication prescriptions and lifestyle changes for patients with high cholesterol.

In addition to using national data, this study also addresses Paradies and colleagues' (2014) concerns and contributes to the broader literature of race/ethnic health disparities in three ways. First, it examines disparities in treatment recommendations for high cholesterol, which is one of the leading precursors to CHD and affects more than a third of the U.S. adult population. Using a widespread chronic condition likely captures a more representative group of U.S. adults, compared to studies that have examined race/ethnic bias in rare conditions (Chen 2005, Mikuls et al. 2005). Additionally, because multiple treatment options exist for high cholesterol, including medication and lifestyle changes, examining race/ethnic differences within a single condition but across multiple types of treatment may further elucidate race/ethnic inequalities. Second, this study uses two national surveys - one of patients and one of physicians - to account for the chance of misreporting from either group and to examine differences between patient and physician reports. Third, it uses a sample of over 16,000 patients with high cholesterol and conducts robust statistical analyses across multiple treatment recommendations for high cholesterol, taking into account patients' demographic characteristics, socioeconomic status, other chronic health conditions, health behaviours, and healthcare access/utilization. In sum, this study is the first to examine race/ethnic treatment differences for high cholesterol and the first to compare physician and patient reports for specific types of treatment recommendations. Although small-scale studies are necessary to explore specific mechanisms of provider bias, they must be complemented by larger scale studies. It is thus essential to examine the *extent* of racial/ethnic differences and whether these differences reflect institutionalized physician biases or rare cases. Results can encourage either localized or more systematic policy interventions.

Methods

Data

Patient data were obtained from the National Health and Nutrition Examination Survey (NHANES). The NHANES is a representative cross-sectional sample of children and adults in the United States. The survey is conducted biennially by the Centers for Disease Control and Prevention (CDC) and the National Center for Health Statistics (NCHS). Each survey cycle includes a sample of between 5,000 and 10,000 respondents from 15 counties across the United States. It includes questions related to health and nutrition in addition to medical examination and laboratory tests and combines clinical health measures with self-reported assessments of physical and mental health as well as social and behavioural indicators.

Due to a limited number of adults eighteen years and older who have been diagnosed with high cholesterol within multiple racial/ethnic groups, the study combines three publicly available NHANES survey cycles from 2005–2010. The combined surveys result in a

sample of 4,846 NH White, NH Black, and Hispanic adults who have ever been diagnosed with high cholesterol.

To complement patient reports from NHANES, this study also examines physician's reports of treatment recommendations for high cholesterol from the National Ambulatory Medical Care Survey (NAMCS). NAMCS is an annual survey collected by the Centers for Disease Control and Prevention (CDC) and the National Center for Health Statistics (NCHS) using a national random sample of patient visits for physicians in non-federal clinics. Randomly selected physicians were asked to fill out intake sheets for randomly selected patient visits and record patient demographics, diagnoses, and treatment recommendations. This study uses five NAMCS survey cycles from 2006–2010 to align with the 2005–2010 NHANES sample, resulting in a total NAMCS sample of 12,113 adult patients over the age of 18 who had high cholesterol at the time of the visit.

An important distinction between the patient and physician surveys is that NHANES is patient-reported and representative of the U.S. population, whereas NAMCS is physician-reported and representative of patient visits. Furthermore, race/ethnicity are self-reported in NHANES, but in NAMCS, the physician reports the patient's race/ethnicity. The latter has important implications for race/ethnic ascription, because it reflects the physician's perception of the patient's race, and thus recommendation differences based on race/ethnicity in NAMCS may be a closer approximation of physician's race/ethnic bias than in NHANES. NAMCS also had less reliable social indicators because they were assessed (or omitted) by the physician, or were assigned by an aggregate measure from the Census tract where the patient lives. However, both surveys collected data about high cholesterol diagnoses and the same types of treatment recommendations during the same time period. Using NAMCS addresses some of the shortcomings of NHANES by documenting the date of the visit so that the period and patient characteristics are aligned. NAMCS also documents visit characteristics like the amount of time spent with the health care provider and whether the patient had been seen before. Because the surveys have different designs, if race/ethnic differences are apparent in both surveys it would provide strong evidence that the underlying causes are likely pervasive in the United States.

Measures

Patients were included in the analysis if they had ever been diagnosed with high cholesterol. In NHANES, adults were considered to have been diagnosed with high cholesterol if they answered in the affirmative to the question, "Have you ever been told by a doctor or health professional that your blood cholesterol level was high?" In NAMCS, physicians were asked to document all present or past diagnoses. If physicians indicated that the patient had ever been diagnosed with high cholesterol then she or he was included in the analysis.

Dependent variables—This study uses two binary dependent variables to assess treatment recommendations for adults with high cholesterol: medication prescriptions and lifestyle changes. For medication prescriptions, the NHANES survey asks participants, "To lower your blood cholesterol, have you ever been told by a doctor or other health professional to take prescribed medicine." It also asks about three types of lifestyle changes:

eating less fat, losing weight, or exercising more. The questions state, “To lower your blood cholesterol, have you ever been told by a doctor or other health professional... to eat fewer high fat or high cholesterol foods; to control weight or lose weight; to increase physical activity or exercise?” The three lifestyle indicators were highly correlated, indicating that patients were likely having a discussion with their providers about lifestyle changes more broadly. For this reason, a single binary indicator was used to assess whether (1) or not (0) a patient receives any recommendation for a lifestyle change.

The NAMCS survey asked physicians to assess the same recommendations. The prescription section of the survey asked about all prescriptions a patient currently had. NAMCS has multiple variables to describe each prescription, including the national drug code (NDC), generic drug name, and ingredient code. There was a high level of missingness across the prescription variables for a single prescription, so in order to catch all potential cholesterol medications, a list of NDCs, generic drug names, and ingredients codes associated with high cholesterol were cross referenced across each patient prescription, up to eight prescriptions. Overall, 88% of patients with high cholesterol had at least one medication prescription, and 18% of patients were identified as having a cholesterol-specific medication.

Lifestyle recommendations in NAMCS were assessed through the health education portion of the survey. Providers were asked to check boxes associated with all of the health education they provided patients during the visit. The three health education areas selected for analyses in this study were “Diet/nutrition,” “Exercise,” and “Weight reduction” to align with the NHANES lifestyle changes. If any or all of these were recommended to the patient, the variable was coded as 1, and patients who received none of the recommendations were coded as 0.

Primary independent variables—The two primary independent variables in the analysis were race/ethnicity and age. Three race/ethnic groups were included: NH White, NH Black, and Hispanic of any race. Additional race/ethnic groups could not be used because of small sample sizes in both datasets. Among the 4,846 participants in NHANES, there were 2,729 (56%) NH Whites, 985 (20%) NH Blacks, and 1,329 (27%) Hispanics. Among the 12,113 patients in NAMCS, there were 9,558 (79%) NH Whites, 1,118 (9%) NH Blacks, and 1,437 (12%) Hispanics. Models were stratified by three age groups: 18–49 year olds, 50–64 year olds, and 65 years or older.

Covariates—For each survey, covariates were included to account for demographic and socioeconomic factors, health behaviours, health care access and utilization, and comorbidities. Independent variables differed by survey, and more social indicators were available in the NHANES survey while more provider and clinic indicators were available in the NAMCS survey. Models from both surveys controlled for mean-centered age within each age category as well as an age-squared term to account for the possibility of a non-linear relationship between treatment recommendations and age. All models also controlled for gender (male/female).

NHANES included education (less than high school, high school graduate, and some college or more schooling), employment (currently employed for wages/unemployed), and health

behaviours (alcohol consumption and smoking status). Alcohol consumption was coded dichotomously as either high alcohol consumption (more than one drink per day for women and two drinks per day for men), or anything less, including non-drinkers. Smoking status was categorized as either never, former, or current smokers. Health care access/utilization was measured by insurance status (insured or not insured), having regular place for care (yes/no), and the number of visits in the past year (0 visits, 1–2 visits, 3 or more visits). Comorbidities included clinically measured body mass index (BMI; coded as normal, overweight, obese I, obese II or III). About 5% of respondents (230 people) were missing measured BMI from NHANES. However, NHANES also has a self-rated BMI, for which 213 of the 230 participants had data. Although not as accurate as measured BMI, using self-rated BMI for these 213 participants was superior to list-wise deletion or imputation. Additional comorbidities included ever diagnosed with hypertension, and ever diagnosed with diabetes. Finally, models controlled for survey cycle, which may serve as a proxy for period shifts in disease prevalence or policy changes regarding best practices for treatment over a five-year period.

NAMCS data contained fewer, albeit similar, covariates as NHANES with variations in wording and specification. The most dissimilar indicators were for socioeconomic status, in which NAMCS was limited to education and income characteristics of the patient's zip code. Education was broken into quartiles by the percent of residents with a bachelor's degree in the zip code. Income was also broken into quartiles by the median annual household income of residents in the zip code. The only health behaviour included in the NAMCS data was tobacco use, for which slightly less than one third of respondents were missing data. Those missing data were included as a separate smoking category along with never smokers and current smokers. Health care characteristics included whether the visit was with the patient's primary care physician (yes/no), whether the physician had seen the patient before (yes/no), whether the patient received Medicaid benefits (yes/no), frequency of clinic visits in the past year (0 visits, 1–2 visits, 3+ visits), and the number of minutes spent with the patient. Comorbidities for NAMCS included current diagnoses of hypertension or diabetes. NAMCS did have patient BMI but it was missing for almost half of the patients, so was not included in the analysis. About 5% of the NAMCS sample was missing race/ethnic data, and NCHS calculates imputed values for key variables such as race and gender. However, since race/ethnicity were the primary independent variables of interest, patients with imputed race/ethnicity and gender were not included in the analysis, resulting in a sample of 12,113 patients.

Analytic strategy

Logistic regressions were performed for each binary outcome in each dataset. Since these recommendations were not mutually exclusive, final models controlled for the other type of recommendations to understand the odds of receiving either a medication prescription or lifestyle change recommendation net of other recommendations. Models were analysed using the total population as well as stratified by each of the three age categories, resulting in eight models for each survey (sixteen models total).

Survey weights were applied to each survey. NHANES survey weights allow results to be representative of the U.S. adult population, and account for primary sampling unit, strata, and individual weights. NAMCS survey weights allow results to be representative of patient visits by using an individual-level patient visit weight. Additionally, robust standard errors were used for the NAMCS models to account for the clustering of multiple patient visits for the same physician. For both surveys, pregnant women (NHANES n=26, NAMCS n=12) and those with missing data on dependent or independent variables that appear to be missing at random were not included in the analysis. All data were analysed using Stata 13 (StataCorp 2013).

Results

Descriptive statistics

Table 1 provides NHANES characteristics of adults 18 and older with high cholesterol by race/ethnic group. Compared to NH Whites, NH Black and Hispanic adults were younger and had lower socioeconomic status, with the exception of high employment among Hispanic adults. Hispanic adults had the most limited access and utilization of health care services. NH Blacks and NH Whites had similar average rates of having a regular place to go for health care, but NH Black adults reported lower rates of health insurance and more visits in the past year. NH Blacks reported the lowest alcohol use but the highest current smoking rates, and NH Whites and Hispanics had similar health behaviour profiles. Notably, most adults with high cholesterol had at least one comorbid condition. Comorbidity rates for obesity, hypertension, and diabetes were more exacerbated among NH Blacks and Hispanics than among NH Whites, with the exception of low hypertension rates among Hispanics. Nearly one third of NH Blacks with high cholesterol also had diabetes, and more than two thirds were hypertensive.

Table 2 provides NAMCS characteristics of patients with high cholesterol across a representative sample of patient visits. NH White patients had the lowest rates of treatment recommendations (27%) compared to 36% among Hispanic patients and 38% among NH Black patients. However, the rates of receiving prescriptions for high cholesterol were almost identical across race/ethnic groups.

Similar to the NHANES patterns, NH White patients in NAMCS were older and lived in zip code areas with more socioeconomically advantaged residents compared to NH Black and Hispanic patients. Rates of Medicaid were about three times greater among NH Black and Hispanic patients compared to NH White patients.

The vast majority of all patients were seeing their primary care physician during the visit, with the lowest rates of primary physician visits for NH Whites. Relatedly, almost all physicians reported having seen the patient previously. Physicians reported spending a similar amount of time with NH Black and NH White patients, but reported spending an average of two more minutes with Hispanic patients.

Comorbidity rates among hypertensive patients were extremely high for each race/ethnic group. Similar to NHANES, comorbidity rates were highest among NH Black patients. Overall, about two thirds of patients had hypertension and about one third had diabetes.

Multivariate models

Table 3 summarizes results of the multivariate logistic regression models of treatment recommendations from NHANES. All models were adjusted for complex sampling design, but unadjusted models contain no covariates. Panel A describes results for the total population. Overall, NH Blacks and Hispanics have significantly and substantially higher odds of receiving a recommendation to make a lifestyle change compared to NH Whites. The racial/ethnic differences were greater among young adults ages 18–49. In Panel B, after adjusting for demographic, social, behavioural, health care, and comorbidity characteristics, younger NH Black adults were almost twice as likely their NH White counterparts to receive a recommendation for lifestyle changes (Panel B, OR=1.91, $p<.05$), and Hispanic adults were more than twice as likely to receive recommendations for lifestyle changes (Panel B, OR=2.33, $p<.05$). The same race/ethnic disparities remained statistically significant albeit attenuated for adults ages 50–64 (Panel C), and differences were no longer statistically significant among adults older than 65 (Panel D).

The patterns for medication prescriptions did not match those of recommendations for lifestyle changes for adults with high cholesterol. Instead, NH Black adults had approximately 25% *lower odds* of receiving a medication prescription for high cholesterol compared to NH Whites (Panel A, OR=.75, $p<.05$). This disparity was primarily driven by differences in younger adulthood (ages 18–49), in which NH Black adults were approximately 42% less likely to receive a medication prescription compared to their NH White counterparts (Panel B, OR=.58, $p<.05$). These differences appear after adjusting for covariates, and were not present in the unadjusted models. However, NH White and Hispanic adults of all ages had similar odds of receiving a prescription for high cholesterol.

Table 4 summarizes results of the multivariate logistic regression models of treatment recommendations from NAMCS. Although NAMCS contained a different patient population and covariates in the analysis, the overall patterns in treatment recommendations were similar to those reported using NHANES. Physicians reported higher odds of recommending lifestyle changes to NH Black and Hispanic patients compared to NH White patients. Similar to NHANES, the differences were the most dramatic among younger patients ages 18–49. NH Black patients were more than two and a half times more likely to receive a recommendation for a lifestyle change compared to NH White patients ($p<.001$), and Hispanic patients were more than two times as likely to receive a lifestyle change recommendation ($p<.001$). These higher odds among patients of color compared to NH White patients were smaller yet persistent among patients ages 50–64, but were no longer statistically significant for patients over the age of 65.

Accounting for covariates in the adjusted models increased the odds of receiving a lifestyle change recommendation for patients of color compared to NH White patients across all age groups. Covariates had the largest effect for younger adults ages 18–49.

There were no statistically significant race/ethnic differences in odds of prescribing cholesterol medication for any age group in the NAMCS analyses. Unlike the NHANES analyses, NH Black patients did not have lower odds of receiving a prescription medication compared to NH White patients.

Conclusion and Discussion

This study is the first to examine racial/ethnic differences in treatment recommendations for high cholesterol by analysing one national survey of patient reports and one of physician reports. Examining recommendations for treating high cholesterol provides important insight into routine medical encounters between physicians and patients because it is one of the most common chronic conditions in the United States and a precursor to CHD, the leading cause of death among U.S. adults. Furthermore, utilizing patient and physician reports helps address issues of respondent bias, including recall bias among NHANES participants or reporting errors by physicians. Analysing nationally representative data adds scope to most previous studies that use specific health care delivery systems such as local hospitals or clinics.

Although NHANES and NAMCS are different datasets with distinct patient populations and variables, results from both surveys demonstrate that NH Black and Hispanic patients had higher odds of receiving recommendations that involved lifestyle changes, including dietary changes, increased exercise, and weight loss, than did NH White patients. These differences were particularly dramatic among younger adults ages 18–49, were attenuated among adults 50–64, and were no longer statistically significant among adults over the age of 65. Despite these differences in lifestyle recommendations, the analyses revealed no consistent race/ethnic differences in likelihood of receiving a prescription for cholesterol-lowering medication, with the exception of lower likelihood among Black patients in the NHANES data. These differences persist in both surveys after accounting for many potential confounders, including demographic factors, socioeconomic indicators, health behaviours, health access/utilization, and comorbidities such as obesity, hypertension, and diabetes.

One of the concerning implications of these findings is that NH Black and Hispanic patients were no more likely or, for NH Blacks, potentially less likely to receive a prescription for medication, which is the most effective method for managing high cholesterol. Lifestyle changes such as eating less fat, losing weight, and increased exercise are also more difficult to implement and overall less effective in lowering cholesterol compared to statins (Stone et al. 2014). If NH Black and Hispanic patients are also more likely to receive prescription medication it could indicate more investment in these patients from health care providers. Instead, higher odds of lifestyle changes alone are more suggestive of discriminatory practices, and perhaps the manifestation of negative stereotypes about the bodies and behaviours of people of color. Finally, descriptive statistics demonstrate that physicians were spending about the same amount of time with NH Black and NH White patients. If physicians were providing more recommendations for lifestyle changes because they were more invested in NH Black patients, then it might be expected that they were spending more time with these patients, which is not the case.

This study also stratified analyses of treatment recommendations by age group to identify whether younger patients have different treatment experiences compared to older patients. Lifestyle changes had the highest chance of success if implemented at younger ages, when patients are often more physically able and autonomous and the effects of chronic conditions like high cholesterol may not have impacted physical functioning to the same degree that they do in older adulthood. This is an ideal time to implement behavioural interventions. However, there is no rationale for why patients of color should have twice the odds of receiving these lifestyle interventions compared to their NH White counterparts, particularly given that all patients in this study had high cholesterol and models adjusted for other common chronic conditions and social factors. The fact that treatment recommendations by physicians become more equitable among older adults likely reflects the lower effectiveness of lifestyle changes at this stage of the life course, not necessarily the elimination of discriminatory practices.

Results confirm previous studies that demonstrate physician bias by patient race/ethnicity (Blair et al. 2013, Cooper et al. 2004, Cooper-Patrick et al. 1999, Dovidio et al. 2008, Fincher et al. 2003, Malat 2006, Paradies et al. 2014). Although physician race/ethnicity was not publicly available for NHANES or NAMCS data, previous studies have found that Black and Hispanic patients are much more likely to have a racially discordant physician (i.e. patients have providers of a different race/ethnic status). Assuming these interactions are racially discordant (and possibly even if they are not), multiple sociological and social-psychological explanations may account for differential treatment. Disparate patterns in recommended lifestyle changes could indicate either harmful discrimination against Black and Hispanic patients or a greater investment in Black and Hispanic patients. Physicians may infer that Black and Hispanic patients generally have worse health behaviours or less knowledge about implementing behavioural changes, and would thus benefit from more health education than non-Hispanic White patients. Similarly, Black and Hispanic patients may request alternatives to medications (Smedley et al. 2003; Fincher et al. 2003; Lutfey and Freese 2005; Cooper-Patrick 1999). Alternatively, physicians could be providing Black and Hispanic patients more treatment options to increase likelihood of successful cholesterol management.

Regardless of the potentially positive or negative effects, it is concerning that physicians were differentially providing these recommendations based on race/ethnic status. Many physicians receive cultural competency training that is aimed to better prepare them for interacting with patients from diverse backgrounds. Cultural competency training often focuses on cultural differences between groups and how this shapes group expectations and reactions within medical settings. This model reflects an ethnic theory approach in which race is understood primarily as differences in culture and beliefs (Perloff et al. 2006; Malat 2006). It makes problematic assumptions about the homogeneity within racial groups, failing to consider how cultural traits and beliefs, as well as other characteristics like socioeconomic status and health behaviours, often vary considerably among members of the same race. Findings from this study suggest that physicians nationwide may be making these group-based decisions.

This study has several limitations. The biggest limitations of NHANES for the purpose of this study are its cross-sectional nature and limited information about the timing of events. NHANES asks participants whether they have been diagnosed with high cholesterol and about their treatment experiences, but does not ask when they were diagnosed or received particular recommendations. It is therefore difficult to assess how long ago and at what point in their life course the participants experienced the reported interactions with health care providers. It is possible, for example, that some elderly patients were reporting on recommendations that were given decades ago, and were subject to memory error or period effects. Furthermore, NHANES did not ask patients about the race/ethnicity of their provider so it is not possible to assess whether the provider-patient interactions were racially concordant.

The NAMCS survey also has several limitations. Primarily, NAMCS relies on physicians to report patient race/ethnicity. Since patients with missing values for race and ethnicity were not included in the analysis, the remaining patients could reflect a specific patient population. For example, physicians may not have categorized patients who were racially or ethnically ambiguous to them, or perhaps classified patients in a different way than patients would have classified themselves. Nonetheless, having a physician-reported race/ethnic categorization may be a more accurate indicator of how the physician would treat the patient than the patient's own self-assessment. NAMCS also lacks individual-level socioeconomic data and instead relies on aggregate indicators of the patients' zip codes that may not reflect patients' circumstances. Another limitation of the NAMCS data is the difficulty of exhaustively categorizing prescription medication across multiple prescription drug codes. Because both datasets have some limitations, assessing differences in treatment recommendations across both surveys provides a robust approach to understanding national patterns.

This study demonstrates an overarching pattern of physician race/ethnic bias in lifestyle recommendations for high cholesterol. Future research should evaluate specifically why health care providers may provide different types of recommendations to patients based on race/ethnicity and how these recommendations affect patient interpretations of having cholesterol. Additionally, NAMCS collects restricted data on physician race/ethnicity, and future studies could request access of the restricted data to assess how physician race/ethnicity affects treatment recommendations. Finally, future research should attempt to examine the impact of physician recommendations on long-term effects of chronic disease management. Cross-sectional studies do not track patients to see the extent to which they adhere to provider recommendations and how these recommendations may impact overall management of conditions or reduced risk of developing CHD.

In the context of policy and practice, this study suggests that large-scale institutions, such as consortia of providers, hospital/primary care networks, or government agencies should play a role in addressing unequal treatment by race/ethnic status. Interventions may include rethinking traditional cultural competency training that currently focuses on differences in favour of trainings that encourage evaluating resources that patients can harness to achieve successful management of chronic conditions.

References

- Blair IV, Steiner JF, Fairclough DL, Hanratty R, Price DW, Hirsh HK, Wright LA, Bronsert M, Karimkhani E, Magid DJ. 2013; Clinicians' Implicit Ethnic/Racial Bias and Perceptions of Care among Black and Latino Patients. *The Annals of Family Medicine*. 11(1):43–52. [PubMed: 23319505]
- Burgess DJ, Fu SS, van Ryn M. 2004; Why Do Providers Contribute to Disparities and What Can Be Done About It? *Journal of General Internal Medicine*. 19(11):1154–59. [PubMed: 15566446]
- Centers for Disease Control and Prevention. Cholesterol Facts. 2012. Found online at: <http://www.cdc.gov/cholesterol/facts.htm>
- Centers for Disease Control and Prevention. CDC Health Disparities and Inequalities Report — United States, 2013. 2013. <http://www.cdc.gov/mmwr/pdf/other/su6203.pdf>
- Chen MS. 2005; Cancer Health Disparities among Asian Americans. *Cancer*. 104(S12):2895–902. [PubMed: 16270313]
- Cooper, LA, Powe, NR. Commonwealth Fund. Disparities in Patient Experiences, Health Care Processes, and Outcomes: The Role of Patient-Provider Racial, Ethnic, and Language Concordance. Commonwealth Fund; New York, NY: 2004.
- Cooper-Patrick L, Gallo JJ, Gonzales JJ, Vu HT, Powe NR, Nelson C, Ford DE. 1999; Race, Gender, and Partnership in the Patient-Physician Relationship. *Journal of the American Medical Association*. 282(6):583–89. [PubMed: 10450723]
- Dovidio JF, Penner LA, Albrecht TL, Norton WE, Gaertner SL, Shelton JN. 2008; Disparities and Distrust: The Implications of Psychological Processes for Understanding Racial Disparities in Health and Health Care. *Social Science & Medicine*. 67(3):478–86. [PubMed: 18508171]
- Egan BM, Zhao Y, Axon RN. 2010; US trends in prevalence, awareness, treatment, and control of hypertension, 1988–2008. *Journal of the American Medical Association*. 303(20):2043–2050. [PubMed: 20501926]
- Ferguson WJ, Candib LM. 2002 Culture, Language, and the Doctor-Patient Relationship. FMCH Publications and Presentations. :61.
- Fincher C, Williams JE, MacLean V, Allison JJ, Kiefe CI, Canto J. 2003; Racial Disparities in Coronary Heart Disease: A Sociological View of the Medical Literature on Physician Bias. *Ethnicity & Disease*. 14(3):360–71.
- Gaertner, SL, Dovidio, JF. Reducing Intergroup Bias: The Common Ingroup Identity Model. Psychology Press; 2014.
- Kposowa AJ, Tsunokai GT. 2002; Searching for Relief: Racial Differences in Treatment of Patients with Back Pain. *Race and Society*. 5(2):193–223.
- Lutfey K, Freese J. 2005; Toward Some Fundamentals of Fundamental Causality: Socioeconomic Status and Health in the Routine Clinic Visit for Diabetes1. *American Journal of Sociology*. 110(5):1326–72.
- Lutfey KE, Eva KW, Gerstenberger E, Link CL, McKinlay JB. 2010; Physician Cognitive Processing as a Source of Diagnostic and Treatment Disparities in Coronary Heart Disease Results of a Factorial Priming Experiment. *Journal of Health and Social Behavior*. 51(1):16–29. [PubMed: 20420292]
- Malat J. 2006; Expanding Research on the Racial Disparity in Medical Treatment with Ideas from Sociology. *Health*. 10(3):303–21. [PubMed: 16775017]
- McWilliams JM, Meara E, Zaslavsky AM, Ayanian JZ. 2009; Differences in control of cardiovascular disease and diabetes by race, ethnicity, and education: US trends from 1999 to 2006 and effects of Medicare coverage. *Annals of Internal Medicine*. 150(8):505–515. [PubMed: 19380852]
- Mikuls TR, Saag KG, George V, Mudano AS, Banerjee S. 2005; Racial Disparities in the Receipt of Osteoporosis Related Healthcare among Community-Dwelling Older Women with Arthritis and Previous Fracture. *The Journal of Rheumatology*. 32(5):870–75. [PubMed: 15868624]
- Nelson K, Norris K, Mangione CM. 2002; Disparities in the diagnosis and pharmacologic treatment of high serum cholesterol by race and ethnicity: data from the Third National Health and Nutrition Examination Survey. *Archives of Internal Medicine*. 162(8):929–935. [PubMed: 11966345]

- Paradies Y, Truong M, Priest N. 2014; A Systematic Review of the Extent and Measurement of Healthcare Provider Racism. *Journal of General Internal Medicine*. 29(2):364–87. [PubMed: 24002624]
- Perloff RM, Bonder B, Ray GB, Ray EB, Siminoff LA. 2006; Doctor-Patient Communication, Cultural Competence, and Minority Health Theoretical and Empirical Perspectives. *American Behavioral Scientist*. 49(6):835–52.
- Saha S, Komaromy M, Koepsell TD, Bindman AB. 1999; Patient-Physician Racial Concordance and the Perceived Quality and Use of Health Care. *Archives of Internal Medicine*. 159(9):997–004. [PubMed: 10326942]
- Saha S, Arbelaez JJ, Cooper LA. 2003; Patient-Physician Relationships and Racial Disparities in the Quality of Health Care. *American journal of public health*. 93(10):1713–19. [PubMed: 14534227]
- Smedley, BD, Stith, AY, Nelson, AR. Institute of Medicine, Committee on Understanding and Eliminating Racial and Ethnic Disparities in Health Care. *Unequal Treatment: Confronting Racial and Ethnic Disparities in Health Care*. Washington, DC: National Academies Press; 2003.
- StataCorp. *Stata Statistical Software: Release 13*. College Station, TX: StataCorp LP; 2013.
- Stepanikova I. 2012; Racial-Ethnic Biases, Time Pressure, and Medical Decisions. *Journal of Health and Social Behavior*. 53(3):329–43. DOI: 10.1177/0022146512445807 [PubMed: 22811465]
- Stone NJ, Robinson JG, Lichtenstein AH, Bairey Merz CN, Blum CB, Eckel RH, Goldberg AC, et al. 2014; 2013 ACC/AHA guideline on the treatment of blood cholesterol to reduce atherosclerotic cardiovascular risk in adults. *Circulation*. 129(25 suppl 2):S1–S45. [PubMed: 24222016]
- Street RL, O'Malley KJ, Cooper LA, Haidet P. 2008; Understanding Concordance in Patient-Physician Relationships: Personal and Ethnic Dimensions of Shared Identity. *The Annals of Family Medicine*. 6(3):198–205. [PubMed: 18474881]
- Van Ryn M, Burke J. 2000; The Effect of Patient Race and Socio-Economic Status on Physicians' Perceptions of Patients. *Social Science & Medicine*. 50(6):813–28. [PubMed: 10695979]
- Van Ryn M, Burgess D, Malat J, Griffin J. 2006; Physicians' Perceptions of Patients' Social and Behavioral Characteristics and Race Disparities in Treatment Recommendations for Men with Coronary Artery Disease. *American Journal of Public Health*. 96(2):351–57. [PubMed: 16380577]
- Williams DR, Sternthal M. 2010; Understanding Racial-Ethnic Disparities in Health Sociological Contributions. *Journal of Health and Social Behavior*. 51(1 suppl):S15–S27. [PubMed: 20943580]

Key Messages

1. Health care provider biases during patient visits have been documented but not demonstrated on a large scale. This study examines race/ethnic differences in treatment recommendations for patients with high cholesterol using two national data sources.
2. Non-Hispanic Black and Hispanic patients with high cholesterol were more likely to receive recommendations to make lifestyle changes to manage their cholesterol compared to non-Hispanic White patients with high cholesterol, after adjusting for many individual-level covariates.
3. Non-Hispanic Black and Hispanic patients were either slightly less likely or as likely as non-Hispanic White patients to be prescribed medication for high cholesterol.
4. Treatment recommendations for high cholesterol may vary by race/ethnicity. This may have important implications for how well patients can manage the condition and how it contributes to race/ethnic disparities in mortality.

Table 1

Characteristics of adults ages 18–84 with high cholesterol by race/ethnicity in NHANES 2005–2010 (N=4,846)*

	Non-Hispanic white (N=2,729)	Non-Hispanic black (N=985)	Hispanic (N=1,329)
Lifestyle changes	86%	92%	91%
Cholesterol medication	63%	62%	60%
Demographic characteristics			
Age 18–49	30%	40%	46%
50–64	37%	37%	36%
65+	32%	24%	18%
Female	51%	57%	50%
Married	70%	47%	68%
Socioeconomic characteristics			
Education (<HS)	14%	25%	46%
HS grad	27%	25%	18%
More than HS	60%	50%	37%
Employed full time	55%	49%	60%
Healthcare access/use			
Health Insurance	93%	85%	73%
Regular place for care	95%	97%	89%
Doctor visits:			
0 visits	6%	6%	11%
1–2 visits	42%	38%	45%
3+ visits	52%	56%	43%
Health behaviors			
High alcohol cons.	37%	31%	38%
Never smoked	48%	55%	58%
Former smoker	35%	25%	26%
Current smoker	17%	21%	16%
Comorbidities			
BMI: Normal weight	22%	14%	14%
Overweight	37%	28%	40%
Obese I	24%	28%	28%
Obese II & III	17%	29%	17%
Ever Hypertensive	51%	68%	44%
Ever Diabetic	17%	32%	26%

* Results account for complex sampling design

Table 2

Characteristics of patients ages 18–84 with high cholesterol by race/ethnicity in NAMCS 2005–2010 (N=12,113)*

	Non-Hispanic white (N=9,558)	Non-Hispanic black (N=1,118)	Hispanic (N=1,437)
Lifestyle changes	27%	38%	36%
Cholesterol medication	19%	19%	20%
Demographic characteristics			
Age 18–49	14%	21%	24%
50–64	33%	37%	32%
65+	52%	42%	44%
Female	52%	60%	53%
Socioeconomic characteristics			
Education Quartiles			
<12.84% w/Bachelor's Degree + in ZIP	22%	33%	34%
12.84–19.66%	25%	26%	25%
19.67–31.68 %	26%	26%	21%
>31.69%	28%	15%	20%
Income Quartiles Below \$32,793	18%	36%	30%
\$32,794–\$40,626	25%	27%	23%
\$40,627–\$52,387	27%	21%	28%
\$52,388 or more	29%	16%	19%
Healthcare/visit characteristics			
Has Medicaid	5%	13%	16%
Primary Physician	63%	69%	69%
Seen patient before	93%	92%	90%
Time with Doctor (minutes)	20.68	20.11	22.32
Health behaviors			
Never/Former smoker	65%	62%	57%
Current smoker	13%	13%	8%
Missing smoking data	23%	25%	39%
Comorbidities			
Currently Hypertensive	67%	80%	66%
Currently Diabetic	30%	42%	37%
Region			
Northeast	22%	13%	14%
Midwest	29%	26%	9%
South	35%	54%	50%
West	14%	7%	26%

* Results account for complex sampling design

Table 3

Patient-reported odds of physician recommending treatment for non-Hispanic black and Hispanic patients compared to non-Hispanic white patients by age groups for adults in the United States with high cholesterol*

<u>Lifestyle recommendation</u>			<u>Medication recommendation</u>		
Unadj. OR	95% CI	Adj. OR**	Unadj. OR	95% CI	Adj. OR**
Panel A: Total Population (N=4,846)					
NH White (referent)					
NH Black	1.84***	(1.42, 2.38)	1.63***	(1.27, 2.08)	0.94
Hispanic	1.62**	(1.20, 2.19)	1.81**	(1.24, 2.65)	0.86
Panel B: Ages 18–49 (N=1,227)					
NH Black					
NH Black	2.01**	(1.21, 3.32)	1.91*	(1.13, 3.24)	0.94
Hispanic	1.92**	(1.21, 3.04)	2.33*	(1.21, 4.51)	1.02
Panel C: Ages 50–64 (N=1,656)					
NH Black					
NH Black	2.10**	(1.24, 3.56)	1.73*	(1.01, 2.96)	1.28
Hispanic	1.61*	(1.00, 2.58)	1.99*	(1.07, 3.72)	1.22
Panel D: Ages 65 and older (N=1,963)					
NH Black					
NH Black	1.44+	(0.97, 2.15)	1.20	(0.79, 1.81)	1.25
Hispanic	1.18	(0.77, 1.81)	1.01	(0.64, 1.60)	1.30

+ p<.1,
* p<.05,
** p<.01,
*** p<.001

* Source: NHANES 2005–2010

** Adjusted odds account for differences in demographic characteristics, socioeconomic status, healthcare access, health behaviours, comorbidities, and survey year. All results account for complex sampling design.

Table 4

Physician-reported odds of recommending treatment for non-Hispanic black and Hispanic patients compared to non-Hispanic white patients by age for adults in the United States with high cholesterol^{*}

		<u>Lifestyle recommendation</u>			<u>Medication prescription</u>		
	Unadj. OR	95% CI	Adj. OR ^{**}	95% CI	Unadj. OR	95% CI	Adj. OR ^{**} 95% CI
Panel A: Total Population (N=12,113)							
NH white (referent)							
NH Black	1.68 ^{**}	(1.23,2.29)	1.76 ^{***}	(1.30,2.39)	1.05	(0.77,1.43)	1.08 (0.80,1.47)
Hispanic	1.54 ^{**}	(1.18,2.03)	1.65 ^{***}	(1.28,2.12)	1.07	(0.83,1.38)	1.17 (0.90,1.53)
Panel B: Ages 18–49 (N=2,005)							
NH Black							
	2.03 ^{**}	(1.30,3.17)	2.50 ^{***}	(1.54,4.05)	0.94	(0.52,1.71)	0.83 (0.44,1.55)
Hispanic							
	1.98 ^{***}	(1.38,2.83)	2.18 ^{***}	(1.48,3.20)	1.26	(0.79,2.02)	1.45 (0.86,2.43)
Panel C: Ages 50–64 (N=4,131)							
NH Black							
	1.60 [*]	(1.10,2.34)	1.67 ^{**}	(1.15,2.43)	0.96	(0.58,1.57)	0.96 (0.60,1.54)
Hispanic							
	1.46 [*]	(1.04,2.05)	1.65 ^{**}	(1.18,2.30)	0.93	(0.62,1.40)	1.03 (0.69,1.53)
Panel D: Ages 65 and older (N=5,977)							
NH Black							
	1.46 ⁺	(0.96,2.21)	1.64	(1.06,2.52)	1.26	(0.82,1.92)	1.39 (0.93,2.09)
Hispanic							
	1.29	(0.86,1.92)	1.43	(0.96,2.13)	1.22	(0.87,1.72)	1.28 (0.87,1.87)

⁺ p<.1,

^{*} p<.05,

^{**} p<.01,

^{***} p<.001

^{*} Source: NAMCS 2005–2010

^{**} Adjusted odds account for differences in demographic characteristics, socioeconomic status, healthcare access, health behaviours, comorbidities, and survey year. All results account for complex sampling design.