Published in final edited form as:
Pharmacoepidemiol Drug Saf. 2010 August ; 19(8): 834–842. doi:10.1002/pds.1974.

Racial and ethnic disparities in cardiovascular medication use among older adults in the United States

Dima M. Qato[1,2,3,*], **Stacy Tessler Lindau**[1,2,4], **Rena M. Conti**[5,6], **L. Philip Schumm**[7], and **G. Caleb Alexander**[4,5,8,9]

[1]Department of Obstetrics and Gynecology, University of Chicago, Chicago, IL, USA

[2]Chicago Core on Biomarkers in Population-Based Aging Research, NORC and the University of Chicago Center on Demography and Economics of Aging, Chicago, IL, USA

[3]Department of Heath Policy and Administration, University of Illinois School of Public Health, Chicago, Illinois, USA

[4]MacLean Center for Clinical Medical Ethics, University of Chicago, Chicago, Illinois, USA

[5]Center for Health and Social Sciences, University of Chicago, Chicago, Illinois, USA

[6]Section of Pediatric Hematology/Oncology, University of Chicago, Chicago, Illinois, USA

[7]Department of Health Studies, University of Chicago, Chicago, Illinois, USA

[8]Section of General Internal Medicine, Department of Medicine, University of Chicago, Chicago, Illinois, USA

[9]Department of Pharmacy Practice, University of Illinois at Chicago School of Pharmacy, Chicago, Illinois, USA

SUMMARY

Background—Despite persistent racial/ethnic disparities in cardiovascular disease (CVD) among older adults, information on whether there are similar disparities in the use of prescription and over-the-counter medications to prevent such disease is limited. We examined racial and ethnic disparities in the use of statins and aspirin among older adults at low, moderate, and high risk for CVD.

Methods and Results—In-home interviews, including a medication inventory, were administered between June 2005 and March 2006 to 3005 community-residing individuals, ages 57–85 years, drawn from a cross-sectional, nationally-representative probability sample of the United States. Based on a modified version of the Adult Treatment Panel III (ATP III) risk stratification guidelines, 1066 respondents were at high cardiovascular risk, 977 were at moderate risk, and 812 were at low risk. Rates of use were highest among respondents at high cardiovascular risk. Racial differences were highest among respondents at high risk with blacks less likely than whites to use statins (38% *vs.* 50%, $p = 0.007$) and aspirin (29% *vs.* 44%, $p = 0.008$). After controlling for age, gender, comorbidity, and socioeconomic, and access to care factors, racial/ethnic disparities persisted. In particular, blacks at highest risk were less likely than

[*]Correspondence to: D. M. Qato, The University of Chicago, 5841 S. Maryland, MC 2050, Chicago, IL 60637. dqato@babies.bsd.uchicago.edu.

CONFLICT OF INTEREST

Dr Qato is a consultant for IMS Health. Dr Alexander is a consultant for IMS Health and has previously served as a consultant to Astra Zeneca (2003) and received grants from Merck (2006) and Pfizer (2007).

their white counterparts to use statins (odds ratio (OR) 0.65, confidence interval (CI) 0.46–0.90) or aspirin (OR 0.61, CI 0.37–0.98).

Conclusions—These results, based on an in-home survey of actual medication use, suggest widespread underuse of indicated preventive therapies among older adults at high cardiovascular risk in the United States. Racial/ethnic disparities in such use may contribute to documented disparities in cardiovascular outcomes.

Keywords

geriatrics; disparities; race/ethnicity; secondary prevention; statins

INTRODUCTION

Prescription and over-the-counter medications play an important role in older adult health in the United States,[1] including the prevention of morbidity and mortality from common chronic conditions such as cardiovascular disease (CVD).[2-4] CVD is the leading cause of death[5] and health disparities[6] among older adults. Despite concerns about persistent racial/ethnic disparities in health[7] and health care,[8] including disparities in cardiovascular health,[9,10] current information on disparities in the use prescription and over-the-counter medications for the prevention of CVD among older adults is limited. Racial and ethnic disparities in cardiovascular medication use among older adults may be an important contributor to disparities in cardiovascular outcomes.

Although there is growing evidence of the benefits of statins (3-hydroxy-3-methylglutaryl coenzyme A reductase isnhibitors) and aspirin for the primary and secondary prevention of CVD,[3,11] previous studies have documented racial/ethnic disparities in their use among various subpopulations in the United States.[12-16] However, these prior studies leave several questions unanswered. First, most are nearly a decade old and are not generalizable to the older adult population in the U.S.[12-15] This is important because medication use has increased substantially during the last decade and statins and aspirin are among the most commonly used medications among older adults,[1] and it is unclear whether previously described disparities in younger populations[12,13,15] persist in older adults. Second, considerable efforts have been undertaken during the last decade to address racial/ethnic disparities in health care, and it is unclear what impact, if any, these efforts have had on racial/ethnic gaps in cardiovascular medication use among older adults. Third, the studies examining disparities in statin use,[12-14] focus on prescription medications alone, and exclude analysis of over-the-counter medications, including aspirin. The Behavioral Risk Factor Surveillance Survey (BRFSS), a telephone-survey, does provide information on aspirin use. Several studies[15,17] used BRFSS to report that blacks and Hispanics 35 years and older in the U.S. were less likely to use aspirin than their white counterparts, but these studies do not examine disparities among respondents at high cardiovascular risk. Finally, most prior studies examining disparities in statin use are derived from clinical audits[13] or claims data,[14] and measure prescribing practices or prescription acquisition, respectively, rather than actual use.[18,19] These data may underestimate racial/ethnic disparities in statin use due to differences in adherence[20] and the exclusion of respondents who do not use statins due to lack of access to clinical or pharmacy services. A study based on the National Health Nutrition and Examination Survey (NHANES, for 1999–2004)[12] does measure actual medication use and reports that blacks and Hispanics are less likely to use statins than their white counterparts. This NHANES study, however, limits its analyses to patients of 18 years and older with high cholesterol and does not examine racial/ethnic disparities by CVD risk among the oldest age groups.

To update and overcome some of the analytic limitations of prior analyses, we used the National, Social life, Health and Aging Project (NSHAP), a recently completed, nationally representative home-based survey of older adults, to examine racial and ethnic differences in cardiovascular medication use among older adults in the United States at low, moderate, and high risk for CVD. We were also interested in understanding the demographic, socioeconomic, and access to care factors associated with these disparities.

METHODS

Participants

The NSHAP study protocol and sample design have been previously described.[21,22] We selected a nationally representative probability sample of community-dwelling persons 57–84 years of age (at the time of screening in 2004) from households across the United States. Blacks, Hispanics, men, and the oldest persons (75–84 years of age at the time of screening) were oversampled. Of 4400 individuals identified, 4017 were in the target population and 3005 of these were successfully interviewed, yielding an unweighted response rate of 74.8% and a weighted response rate of 75.5%. The weighted response rates among non-minority households and minority households (African American or Latino) were 75.1 and 79.5, respectively. The final sample weights were adjusted to account for differences in non-response by age and race/ethnicity using sample-based weighting.[23]

Professional interviewers conducted in-home interviews in English and Spanish between July 2005 and March 2006. Our analysis excludes 70 respondents who described themselves as something other than white, black, or Hispanic, 12 respondents who did not provide answers to the questions on race and ethnicity, and 29 respondents for whom medication data were not collected, yielding an analytic sample of 2894. The protocol was approved by the University of Chicago and NORC institutional review boards, and all respondents provided written informed consent. In-home interviews included an interviewer-administered questionnaire, a medication log, and biological measures.

Data

Interviews were conducted using Computer-Assisted Personal Interviewing (CAPI). An inventory of current medications was obtained by direct observation of medication bottles.[24] Respondents were asked to provide the interviewer with all medications used ‘on a regular schedule, like every day or every week’ and instructed to include ‘prescription and non-prescription medications, over-the-counter medicines, vitamins, and herbal and alternative medicines.’ We defined cardiovascular medication use as the regular use (at least daily or weekly) of at least one statin or aspirin medication. We defined statin medications as those single or multi-component products containing atorvastatin, fluvastatin, simvastatin, lovastatin, pravastatin, and rosuvastatin, and aspirin medications as those single-component aspirin products as well as aspirin-dipyridamole combination products.

The Adult Treatment Panel III (ATP III) risk categories were used to classify subjects into one of three CVD risk categories,[3,25] heretofore referred to as cardiovascular risk. Our categories, however, are not identical to the ATP III risk groups. We defined respondents at high cardiovascular risk as those who reported ever being diagnosed with coronary heart disease (myocardial infarction), or a coronary heart disease (CHD) risk equivalent (stroke, peripheral vascular disease, heart failure, and/or diabetes). Patients with CHD or a CHD risk equivalent are considered to be at highest risk (10-year risk >20%) for developing a cardiovascular event. We defined moderate cardiovascular risk respondents as those not at high risk, who reported smoking currently and/or had a systolic blood pressure greater than 140 mmHg or diastolic blood pressure greater than 90 mmHg. Blood pressure measurements

were taken from the left arm 2–3 times with the respondent seated and then averaged. All other subjects were considered at low cardiovascular risk.

We examined the association between cardiovascular medication use and several demographic and health measures including age, gender, race/ethnicity, and comorbidity. Race and ethnicity were measured with the questions: 'Do you consider yourself primarily white or Caucasian, black or African American, American Indian, Asian, or something else?' and 'Do you consider yourself Hispanic or Latino?' Based on these items, we categorized respondents as: (1) white, non-Hispanic, (2) black, non-Hispanic and (3) Hispanic, non-black. Comorbidities were measured by asking respondents whether a medical doctor had ever told them they had each of several common medical conditions, including high blood pressure, stroke, myocardial infarction, heart failure, diabetes, thyroid problems, Alzheimer's disease or dementia, cancer, and any type of arthritis. We used the responses to these questions to compute a previously validated version of the Charlson Comorbidity Index.[26]

We included measures of socioeconomic status including household income and education (Table 1). We coded household income as a per cent of federal poverty level (FPL) based on reported household income and marital status.[27] Access to health care was captured by insurance status and usual source of care. For insurance status we asked: 'Are you currently covered by any of the following health insurance programs: (Medicare, Medicaid, private insurance, Veterans Administration, or other)?' Source of care was measured with the questions: 'Is there a place that you usually go when you are sick or need advice about your health?' and, if yes, 'What kind of place do you go to most often: Is it a clinic, doctor's office, emergency room, or some other place?'

Statistical analysis

We used weighted percentages or means to summarize the distribution of each variable, both for the sample as whole and separately by race/ethnicity. Differences in these distributions between racial/ethnic groups were evaluated using the Pearson χ^2 statistic, corrected for the survey design with the second-order correction of Rao and Scott,[28] or, in the case of the comorbidity index, a Wald test based on the regression of the index on indicator variables for racial/ethnic groups.

Logistic regression was used to model racial/ethnic differences in the prevalence of statin and aspirin use within each of the cardiovascular risk subgroups.[29] Separate models were initially fit for each covariate, followed by the full model including all covariates. The fit of the full model was assessed using a designbased F-adjusted mean residual test.[33] These models are summarized in terms of odds ratios (OR) and corresponding 95% confidence intervals (CI), obtained by inverting the corresponding Wald test. In addition, approximate relative risks were obtained from these models using the method described by Zhang and Yu.[29] *p*-values for testing the individual indicator variables for race/ethnicity and for joint tests of the indicator variables for each covariate are based on the corresponding Wald statistics.

All estimates are weighted using the sample weights distributed with the NSHAP dataset which adjust for differential probabilities of selection and differential non-response.[30] Design-based variance estimates for the regression models were obtained using the linearization method.[31] All *p*-values are two-sided, and no adjustments were made for multiple testing. All analyses were performed with Stata version 11.0.[31]

RESULTS

Participants

Table 1 depicts the weighted distribution of demographic, health, and cardiovascular risk characteristics in our sample, which correspond closely to those of the population and other national samples.[21,25] Of the 2894 adults 57–85 years of age included in this analysis, 2092 identified themselves as non-Hispanic white, 500 as non-Hispanic black, and 302 as non-black Hispanic. Whites were slightly older, had higher income and educational levels, were more likely to be insured, to have private insurance, and to receive care from a doctor's office or HMO health facility. Overall, 35% (n = 1066) were considered at high cardiovascular risk; 35% (n = 977) were classified as moderate risk; and 30% (n = 812) were classified as low risk.

Differences in the prevalence of cardiovascular medication use

Table 2 reports the estimated prevalence of statin and aspirin use by cardiovascular risk. Older adults at high risk were more likely to use preventive therapies than those at moderate or low risk; nearly half (48%) regularly used a statin and 41% regularly used aspirin. Racial disparities were present in each risk category. For example, among those at highest cardiovascular risk, blacks were less likely than whites to use statins (38% *vs.* 50%, p = 0.007) or aspirin (29% *vs.* 44%, p = 0.008). Among black respondents at high risk not using statins, less than 1% were using other cholesterol lowering medications. There was no observed difference in statin use between whites and Hispanics within any of the three risk strata.

Hispanics were less likely than whites to use aspirin, and this difference was once again greatest among respondents at highest cardiovascular risk (30% *vs.* 44%, p = 0.069). After excluding 190 respondents reporting a history of ulcers (a relative contraindication for aspirin use) from the sample, the estimated prevalence of aspirin use was also lower for blacks and Hispanics, 31% and 30%, respectively, compared to whites (43%) among respondents at high cardiovascular risk (data not shown). Among respondents at high risk not using aspirin, 8% were using other types of platelet aggregation inhibitors (for example clopidogrel) and use did not differ across racial and ethnic groups. Finally, only 24% of respondents in the high risk category were using aspirin and statins concurrently (data not shown).

Factors associated with statin use

Table 3 displays the results of the bivariate and multivariate analyses examining statin use among respondents at high cardiovascular risk. Racial disparities in statin use persist after accounting for differences in demographic, socioeconomic, access to care factors and comorbidity. For example, among older adults at high cardiovascular risk, blacks had significantly lower odds (OR 0.65, 95% CI 0.46, 0.90) and relative risk (RR) (RR 0.78, 95% CI 0.63, 0.95) than whites of using statins. Although in bivariate analyses, there was a modest difference in the rates of statin use between Hispanics and non-Hispanic whites (46% *vs.* 50%), this difference was not statistically significant in the multivariate model (p = 0.604).

Factors associated with aspirin use

Table 4 depicts similar analyses for aspirin use. The racial difference in aspirin use persists after controlling for differences in demographic, comorbidity, socioeconomic and access to care factors; the odds of aspirin use among blacks was lower than that of their white counterparts (OR 0.61 (CI 0.37 0.98) and RR 0.73 (CI 0.51, 0.99)). Although there was also

an ethnic disparity in the full model (OR 0.64, (CI 0.33, 1.26) and RR 0.76 (CI 0.46, 1.13)), this difference was not statistically significant ($p = 0.192$).

DISCUSSION

To our knowledge, this is the first nationally-representative population-based study to describe racial and ethnic disparities in the use of statins and aspirin among community-residing older adults at risk for CVD. In contrast to data derived from clinical audits[13,32] or pharmacy claims,[14] which tend to overestimate prescription medication use and exclude the use of over-the-counter medications, these data were based on an in-home survey of individuals' actual medication use. We found that among the third (35%) of older adults at high cardiovascular risk, fewer than half were using aspirin (41%) or statins (48%). These rates indicate substantial underuse of both statins and aspirin among older adults, despite growing evidence demonstrating benefits for the primary and secondary prevention of CVD.[3,33] As has been previously reported for younger populations,[12,15] we also found that older blacks were significantly less likely than whites to use these cardiovascular medications. These racial disparities among older adults at high cardiovascular risk were not due to differences in socioeconomic or access to care factors. These findings suggest disparities in medication use for prevention of CVD remain an important public health problem that may not result solely from income or access barriers, factors often associated with disparities in non-adherence[34] and the quality of medical care,[35] respectively. Improvement in both the prescribing[13] and actual use of these preventive therapies among older adults at highest cardiovascular risk may provide an important remedy in reducing persistent racial disparities in cardiovascular outcomes.

We also evaluated differences in aspirin and statin use among older adults by ethnicity, which suggests, in contrast to our finding of racial disparity, a lack of ethnic disparity in statin use. Hispanics were less likely to use aspirin compared to their white counterparts, however, although the magnitude of the difference was similar to that for blacks, it was not statistically significant (with only 302 Hispanics in our sample, our power to detect such a difference is relatively low). The lack of an ethnic difference in statin use may indicate that older adult blacks encounter barriers in the use of preventive prescribed therapies not experienced by their Hispanic counterparts. These barriers may be associated with limited access to pharmacies due to residential segregation[36-38] and black patients' distrust of their physicians.[39] Previous studies have found these factors to be associated with a reduced utilization of preventive services among blacks, whereas language barriers are considered the primary contributors to ethnic disparities.[40]

Remarkably, older adults at high cardiovascular risk were less likely to use aspirin—a medication that can be obtained without a prescription at a fraction of the cost—than they were to use statins. This was true for all racial/ethnic groups, but was particularly pronounced in Hispanics. Low utilization of aspirin among older adults is often attributed to safety risks,[41,42] including clinical contraindications.[43] However, this difference in usage persisted in our study even after excluding respondents who reported a history of ulcers, a common relative contraindication to aspirin use. In contrast to previous studies documenting cost-related medication underuse,[44-46] the disproportionately lower rates of aspirin use (compared to statins) also suggest that racial/ethnic disparities in medication use are not solely due to problems associated with medication costs or income. Patient preference may be important; statins may have been preferred or prioritized by patients because of their prescription-only status.

Our findings suggest that policies and interventions to reduce disparities in use of preventive therapies for CVD among older adults may need to extend beyond ensuring equal access to

medical care.[7,47,48] The observed racial disparities may be due to a variety of unobserved factors that may include differences in neighborhood characteristics[49,50] such as the geographic accessibility of pharmacy services.[51,52] Limited access to primary care services as a usual source of care among black minorities may contribute to discontinuity in care and the underuse of medications.[53,54] Thus, efforts to improve the accessibility of primary care services, including pharmacy services, for older adults in minority communities should be considered a public health priority.

Our analysis has two limitations. Our CVD risk stratification was derived using a modified version of the ATP-III risk classification[3,25] based on available self-report data and lacks some variables used by others in assigning CVD risk (e.g., LDL cholesterol and Framingham risk scoring). The prevalence of high CVD risk in this population, however, was similar to that reported for the same age group from an NHANES study.[25] Second, although other prescription drug classes may be used for the prevention of CVD, we focus on statins and aspirin because they are first line recommendations with proven benefit in both the primary and secondary prevention of CVD and are currently almost exclusively used for this purpose.

CONCLUSIONS

Persistent widespread underuse of preventive medicines for CVD is evident among community-dwelling older adults in the United States. In addition, there are racial and ethnic disparities in the use of statins and aspirin among older adults that may contribute to the higher CVD mortality among blacks and Hispanics. Efforts to increase the use of statins and aspirin among black and Hispanic individuals at high risk for CVD should consider factors such as access to pharmacies, attitudes about prescription versus non-prescription medications, and the quality of medical care.

Acknowledgments

The National Health, Social Life and Aging Project (NSHAP) is supported by the National Institutes of Health, including the National Institute on Aging, the Office of Research on Women's Health, the Office of AIDS Research, and the Office of Behavioral and Social Sciences Research (5R01AG021487). NSHAP is also supported by the National Opinion Research Center, whose staff was responsible for the data collection. The National Institutes of Health, National Institute on Aging University of Chicago—NORC Center on Demography and Economics of Aging Core on Biomarkers in Population-Based Health and Aging Research (5 P30 AG 012857) supported Dr. Lindau's and Dr. Qato's effort on this manuscript. Dr. Lindau's effort was also supported by a career development award from the National Institute on Aging K23AG032870. This study was also supported in part by an unrestricted pilot grant (PI: Dr. Stacy Lindau) from the University of Chicago Program in Pharmaceutical Policy funded by the Merck Foundation. The University of Chicago Program in Pharmaceutical Policy (PI: David Meltzer) supported Dima Qato's effort on this manuscript. Dr. Alexander has career development awards from the Agency for Healthcare Research and Quality (K08 HS15699-01A1) and the Robert Wood Johnson Physician Faculty Scholars Program. The funding sources had no role in the design and conduct of the study, analysis or interpretation of the data, and preparation or final approval of the manuscript prior to publication.

REFERENCES

1. Qato DM, Alexander GC, Conti RM, Johnson M, Schumm P, Lindau ST. Use of prescription and over-the-counter medications and dietary supplements among older adults in the United States. JAMA. 2008; 300(24):2867–2878. [PubMed: 19109115]
2. Executive Summary of The Third Report of The National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, And Treatment of High Blood Cholesterol In Adults (Adult Treatment Panel III). JAMA. 2001; 285(19):2486–2497. [PubMed: 11368702]
3. Grundy SM, Cleeman JI, Merz CN, et al. Implications of recent clinical trials for the National Cholesterol Education Program Adult Treatment Panel III guidelines. Circulation. 2004; 110(2): 227–239. [PubMed: 15249516]

4. Hebert PR, Pfeffer MA, Hennekens CH. Use of statins and aspirin to reduce risks of cardiovascular disease. J Cardiovasc Pharmacol Ther. 2002; 7(2):77–80. [PubMed: 12075395]
5. Lloyd-Jones D, Adams R, Carnethon M, et al. Heart disease and stroke statistics—2009 update: a report from the American Heart Association Statistics Committee and Stroke Statistics Subcommittee. Circulation. 2009; 119(3):e21–e181. [PubMed: 19075105]
6. Mensah GA, Brown DW. An overview of cardiovascular disease burden in the United States. Health Aff (Millwood). 2007; 26(1):38–48. [PubMed: 17211012]
7. Unequal Treatment: Confronting Racial & Ethnic Disparities in Health Care. Institute of Medicine; 2003.
8. Agency for Heathcare Research and Quality. National Healthcare Disparities Report. Department of Health and Human Services; AfHRaQW, DC: 2006. National Healthcare Disparities Report. Washington, DC
9. Mensah GA, Mokdad AH, Ford ES, Greenlund KJ, Croft JB. State of disparities in cardiovascular health in the United States. Circulation. 2005; 111(10):1233–1241. [PubMed: 15769763]
10. Davis AM, Vinci LM, Okwuosa TM, Chase AR, Huang ES. Cardiovascular health disparities: a systematic review of health care interventions. Med Care Res Rev. 2007; 64(5 Suppl):29S–100S. [PubMed: 17881625]
11. Weisman SM, Graham DY. Evaluation of the benefits and risks of lowdose aspirin in the secondary prevention of cardiovascular and cerebrovascular events. Arch Intern Med. 2002; 162(19):2197–2202. [PubMed: 12390062]
12. Mann D, Reynolds K, Smith D, Muntner P. Trends in statin use and low-density lipoprotein cholesterol levels among U.S. adults: impact of the 2001 national cholesterol education program guidelines. Ann Pharmacother. 2008; 42:1208–1215. [PubMed: 18648016]
13. Ma J, Sehgal NL, Ayanian JZ, Stafford RS. National trends in statin use by coronary heart disease risk category. PLoS Med. 2005; 2(5):e123. [PubMed: 15916463]
14. Setoguchi S, Glynn RJ, Avorn J, Levin R, Winkelmayer WC. Ten-year trends of cardiovascular drug use after myocardial infarction among community-dwelling persons>or=65 years of age. Am J Cardiol. 2007; 100(7):1061–1067. [PubMed: 17884362]
15. Brown DW, Shepard D, Giles WH, Greenlund KJ, Croft JB. Racial differences in the use of aspirin: an important tool for preventing heart disease and stroke. Ethn Dis. 2005; 15(4):620–626. [PubMed: 16259485]
16. Ford ES, Li C, Pearson WS, Zhao G, Mokdad AH. Trends in hypercholesterolemia, treatment and control among United States adults. Int J Cardiol. 2010; 140(2):226–235. Epub 2008 Dec 10. [PubMed: 19081646]
17. Ajani UA, Ford ES, Greenland KJ, Giles WH, Mokdad AH. Aspirin use among U.S. adults: Behavioral Risk Factor Surveillance System. Am J Prev Med. 2006; 30(1):74–77. [PubMed: 16414427]
18. Smith NL, Psaty BM, Heckbert SR, Tracy RP, Cornell ES. The reliability of medication inventory methods compared to serum levels of cardiovascular drugs in the elderly. J Clin Epidemiol. 1999; 52(2):143–146. [PubMed: 10201655]
19. Qato DM, Schumm LP, Johnson M, Mihai A, Lindau ST. Medication data collection and coding in a home-based survey of older adults. J Gerontol B Psychol Sci Soc Sci. 2009; 64(Suppl 1):i86–93. [PubMed: 19491196]
20. Benner JS, Glynn RJ, Mogun H, Neumann PJ, Weinstein MC, Avorn J. Long-term persistence in use of statin therapy in elderly patients. JAMA. 2002; 288(4):455–461. [PubMed: 12132975]
21. Lindau ST, Schumm LP, Laumann EO, Levinson W, O'Muircheartaigh CA, Waite LJ. A study of sexuality and health among older adults in the United States. N Engl J Med. 2007; 357(8):762–774. [PubMed: 17715410]
22. O'Muircheartaigh C, Eckman S, Smith S. Statistical design and estimation for the national social life, health, and aging project. J Gerontol B Psychol Sci Soc Sci. 2009; 64(Suppl 1):i12–i19. [PubMed: 19567827]
23. Kalton G, Kasprzyk D. The treatment of missing survey data. Surv Methodol. 1986; 12:1–16.

24. Qato DM, Schumm LP, Johnson M, Mihai A, Lindau ST. Medication data collection and coding in a home-based survey of older adults. J Gerontol B Psychol Sci Soc Sci. 2009; 64(Suppl 1):i86–i93. [PubMed: 19491196]
25. Ford ES, Giles WH, Mokdad AH. The distribution of 10-year risk for coronary heart disease among US adults: findings from the National Health and Nutrition Examination Survey III. J Am Coll Cardiol. 2004; 43(10):1791–1796. [PubMed: 15145101]
26. Katz JN, Chang LC, Sangha O, Fossel AH, Bates DW. Can comorbidity be measured by questionnaire rather than medical record review? Med Care. 1996; 34(1):73–84. [PubMed: 8551813]
27. Website UCB. Poverty thresholds. 2006 http://www.census.gov/hhes/www/poverty/threshld/thresh06.html.
28. Rao J, Scott AJ. On chi-squared tests for multiway contingency tables with cell proportions estimated from survey data. Annals of Statistics. 1984; 12:46–60.
29. Zhang J, Yu KF. What's the relative risk? A method of correcting the odds ratio in cohort studies of common outcomes. JAMA. 1998; 280(19):1690–1691. [PubMed: 9832001]
30. The National, Social Life, Health and Aging (NSHAP) Dataset. http://www.icpsr.umich.edu/NACDA/news.html#nshap/
31. Stata Statistical Software (computer program). Version 10.1. StataCorp LP; College Station, TX: 2008.
32. Stafford RS, Monti V, Ma J. Underutilization of aspirin persists in US ambulatory care for the secondary and primary prevention of cardiovascular disease. PLoS Med. 2005; 2(12):e353. [PubMed: 16277554]
33. Ansell BJ, Watson KE, Fogelman AM. An evidence-based assessment of the NCEP Adult Treatment Panel II guidelines. National Cholesterol Education Program. JAMA. 1999; 282(21): 2051–2057. [PubMed: 10591388]
34. Gellad WF, Haas JS, Safran DG. Race/ethnicity and nonadherence to prescription medications among seniors: results of a national study. J Gen Intern Med. 2007; 22(11):1572–1578. [PubMed: 17882499]
35. Ma J, Stafford RS. Quality of US outpatient care: temporal changes and racial/ethnic disparities. Arch Intern Med. 2005; 165(12):1354–1361. [PubMed: 15983283]
36. LaVeist TA. Racial segregation and longevity among African Americans: an individual-level analysis. Health Serv Res. 2003; 38(6 Pt 2):1719–1733. [PubMed: 14727794]
37. Robert SA, Ruel E. Racial segregation and health disparities between Black and White older adults. J Gerontol B Psychol Sci Soc Sci. 2006; 61(4):S203–211. [PubMed: 16855041]
38. Gaskin DJ, Price A, Brandon DT, Laveist TA. Segregation and Disparities in Health Services Use. Med Care Res Rev. 2009; 66(5):578–579. [PubMed: 19460811]
39. Musa D, Schulz R, Harris R, Silverman M, Thomas SB. Trust in the health care system and the use of preventive health services by older black and white adults. Am J Public Health. 2009; 99(7): 1293–1299. [PubMed: 18923129]
40. Fiscella K, Franks P, Doescher MP, Saver BG. Disparities in health care by race, ethnicity, and language among the insured: findings from a national sample. Med Care. 2002; 40(1):52–59. [PubMed: 11748426]
41. Alkhenizan A. Aspirin for primary prevention. Doctors and patients should understand potential benefits and risks of aspirin treatment. BMJ. 2000; 321(7274):1472–1473. [PubMed: 11187951]
42. Buring JE, Hennekens CH. Prevention of cardiovascular disease: risks and benefits of aspirin. J Gen Intern Med. 1990; 5(5 Suppl):S54–57. [PubMed: 2231066]
43. Stafford RSR, David C. The underutilization of cardiac medications of proven benefit. Journal of the American College of Cardiology. 2003; 41(1):56–61. [PubMed: 12570945]
44. Briesacher BA, Gurwitz JH, Soumerai SB. Patients at-risk for cost-related medication nonadherence: a review of the literature. J Gen Intern Med. 2007; 22(6):864–871. [PubMed: 17410403]
45. Piette JD, Heisler M, Wagner TH. Cost-related medication underuse among chronically ill adults: the treatments people forgo, how often, and who is at risk. Am J Public Health. 2004; 94(10): 1782–1787. [PubMed: 15451750]

46. Alexander GC, Casalino LP, Meltzer DO. Patient-physician communication about out-of-pocket costs. JAMA. 2003; 290(7):953–958. [PubMed: 12928475]
47. Eisenberg JM, Power EJ. Transforming insurance coverage into quality health care: voltage drops from potential to delivered quality. JAMA. 2000; 284(16):2100–2107. [PubMed: 11042759]
48. Schneider EC, Zaslavsky AM, Epstein AM. Racial disparities in the quality of care for enrollees in medicare managed care. JAMA. 2002; 287(10):1288–1294. [PubMed: 11886320]
49. Cagney KA, Browning CR, Wen M. Racial disparities in self-rated health at older ages: what difference does the neighborhood make? J Gerontol B Psychol Sci Soc Sci. 2005; 60(4):S181–190. [PubMed: 15980292]
50. Thorpe RJ Jr, Brandon DT, LaVeist TA. Social context as an explanation for race disparities in hypertension: findings from the Exploring Health Disparities in Integrated Communities (EHDIC) Study. Soc Sci Med. 2008; 67(10):1604–1611. [PubMed: 18701200]
51. Pollack CE, Armstrong K. The geographic accessibility of retail clinics for underserved populations. Arch Intern Med. 2009; 169(10):945–949. discussion 950-943. [PubMed: 19468086]
52. Morrison RS, Wallenstein S, Natale DK, Senzel RS, Huang LL. “We don’t carry that”–failure of pharmacies in predominantly nonwhite neighborhoods to stock opioid analgesics. N Engl J Med. 2000; 342(14):1023–1026. [PubMed: 10749965]
53. Doescher MP, Saver BG, Fiscella K, Franks P. Racial/ethnic inequities in continuity and site of care: location, location, location. Health Serv Res. 2001; 36(6 Pt 2):78–89. [PubMed: 16148962]
54. Gaskin DJ, Arbelaez JJ, Brown JR, Petras H, Wagner FA, Cooper LA. Examining racial and ethnic disparities in site of usual source of care. J Natl Med Assoc. Jan; 2007 99(1):22–30. [PubMed: 17304965]

KEY POINTS

1. The persistent widespread underuse of preventive medicines for CVD is evident among community-dwelling older adults in the United States.
2. Racial and ethnic disparities in the use of statins and aspirin among older adults may contribute to the higher CVD morbidity and mortality among blacks and Hispanics.
3. Efforts to increase the use of statins and aspirin among black and Hispanic individuals at high risk for CVD should consider factors such as access to pharmacies, attitudes about prescription versus non-prescription medications, and the quality of medical care.

Table 1

Characteristics of the sample by race/ethnicity*

	Total sample (*N* = 2894)	White non-Hispanic (*N* = 2092)	Black non-Hispanic (*N* = 500)	Hispanic non-Black (*N* = 302)
Age group†				
57–64	41	40	43	50
65–74	35	34	39	35
75–85	24	25	17	15
Female	52	51	55	50
Highest education obtained†				
Less than high school	18	13	36	53
High school graduate	27	29	24	13
Some college	30	32	24	20
Bachelors or more	24	26	16	14
Household income†‡				
< = 100% federal poverty level	6	4	13	20
101–200% federal poverty level	12	11	17	16
>200% federal poverty level	69	73	47	45
Missing (<25k/yr)	5	4	10	9
Missing (unknown)	8	7	12	10
Health insurance†,§				
No insurance	4	3	8	12
Medicare	50	52	40	38
Private insurance	26	27	19	23
Medicaid/VA/other	6	5	9	10
Missing	14	13	24	17
Usual source and type of care†¶				
None	7	7	7	13
Clinic/Health center	12	11	16	20
Doctors office/HMO	70	72	57	54
Hospital ER/OP or Other	4	3	10	6
Missing	7	7	11	7
Co-morbidity Index†‖	1.7	1.7	1.9	1.5
Medication use				
Any statin use	32	33	27	32
Any aspirin use†	28	29	23	18
Both statin and aspirin usey†	14	15	9	11
CVE Risk Category†				
High	35	33	48	36
Moderate	35	36	31	28

	Total sample (*N* = 2894)	White non-Hispanic (*N* = 2092)	Black non-Hispanic (*N* = 500)	Hispanic non-Black (*N* = 302)
Low	30	31	20	36

[*] Percentage in each category, weighted to account for differential probabilities of selection and differential non-response.

[†] Difference between racial/ethnic groups statistically significant at the 0.05 level.

[‡] Those labeled as 'Missing (<25k/yr)' did not report a specific amount, but indicated that it was 'less than $25 000 per year'; those labeled as 'Missing (unknown)' did not provide sufficient information to make this determination.

[§] Those labeled 'Private insurance' are not covered by Medicare; those labeled 'Medicaid/VA/other' are not covered by Medicare or private insurance.

[¶] HMO refers to Health Maintenance Organization; 'Hospital ER/OP' refers to hospital emergency room or hospital outpatient.

[‖] Subgroup means (observed range 0–10 over entire sample).

Table 2

Racial and ethnic differences in aspirin and statin use by cardiovascular risk

Risk group‡	Estimated prevalence (%)*				Relative risk† (95% CI)	
	Overall	White, non-Hispanic	Black, non-Hispanic	Hispanic, non-black	Black, non-Hispanic *vs.* White, non-Hispanic	Hispanic, non-black *vs.* White, Non-Hispanic
High risk (*N* = 1066)						
Statin use	48	50	38	46	0.77 (0.63, 0.94)	0.94 (0.70, 1.18)
Aspirin use	41	44	29	30	0.67 (0.48, 0.90)	0.69 (0.43, 1.03)
Moderate risk (*N* = 977)						
Statin use	22	23	14	21	0.60 (0.36, 0.96)	0.92 (0.54, 1.47)
Aspirin use	19	19	16	8	0.84 (0.51, 1.31)	0.40 (0.17, 0.90)
Low risk (*N* = 812)						
Statin use	27	27	24	28	0.88 (0.55, 1.33)	1.04 (0.60, 1.64)
Aspirin use	24	26	17	15	0.64 (0.38, 1.03)	0.58 (0.27, 1.13)

*Estimates are weighted to account for differential probabilities of selection and differential non-response.

†Estimated relative risks and confidence intervals obtained using method described in Zhang and Yu (1998).

‡Excludes 39 respondents from analytic sample who could not be assigned to a risk group due to missing data.

Pharmacoepidemiol Drug Saf. Author manuscript; available in PMC 2013 March 02.

Table 3

Factors associated with racial and ethnic disparities in statin use among older adults at high cardiovascular risk (*N* = 1066)

	Unadjusted OR* (95% CI)	Adjusted OR* (95% CI)	*p*-value†
Race and ethnicity			0.044
White, Non-Hispanic	Reference	Reference	
Black, Non-Hispanic	0.63(0.46, 0.88)	0.65 (0.46, 0.90)	0.012
Hispanic, Non-black	0.88(0.54, 1.42)	0.87(0.52, 1.47)	0.604
Demographic characteristics			
Age group			0.078
57–64	Reference	Reference	
65–74	1.72(1.15, 2.57)	1.54(0.88, 2.67)	
75–85	1.32 (0.87, 2.00)	1.12(0.65, 1.93)	
Gender			0.007
Men	Reference	Reference	
Women	0.75 (0.60, 0.93)	0.70 (0.55, 0.90)	
Comorbidity Index	1.03(0.95, 1.11)	1.03(0.94, 1.11)	0.540
Socioeconomic characteristics			
Education			0.956
Less than high school	Reference	Reference	
High school graduate	0.95(0.65, 1.40)	0.94 (0.64, 1.38)	
Some college	0.95(0.69, 1.33)	0.96(0.67, 1.38)	
Bachelors or more	1.05(0.65, 1.69)	1.06 (0.62, 1.80)	
Household income‡			0.877
< = 100% federal poverty level	Reference	Reference	
101–200% federal poverty level	1.26(0.74, 2.15)	1.12 (0.65, 1.95)	
>200% federal poverty level	1.37(0.81, 2.31)	1.18 (0.65, 2.16)	
Missing (<25k/yr)	1.70(0.80, 3.60)	1.43 (0.68, 3.01)	
Missing (unknown)	1.28 (0.56, 2.91)	1.16 (0.50, 2.66)	
Access to care characteristics			
Health Insurance§			0.156
No insurance	Reference	Reference	
Medicare	2.11(1.00, 4.45)	1.47(0.60, 3.64)	
Private insurance	1.28(0.55, 2.97)	1.06 (0.46, 2.44)	
Medicaid/VA/other	2.89(0.94, 8.89)	3.04 (1.00, 9.20)	
Missing	1.63(0.67, 3.95)	1.33(0.53, 3.37)	
Usual source of care¶			0.118
None	Reference	Reference	
Clinic/Health center	2.40(1.20, 4.81)	2.31(1.04, 5.16)	
Doctors office/HMO	2.60(1.39, 4.87)	2.46(1.25, 4.83)	
Hospital ER/OP or Other	1.88 (0.83, 4.29)	1.69(0.67, 4.31)	

	Unadjusted OR* (95% CI)	Adjusted OR* (95% CI)	*p*-value†
Missing	2.12(0.88,5.10)	2.07(0.80, 5.36)	

*Estimates are weighted to account for differential probabilities of selection and differential non-response.

†*p*-values obtained from Wald tests based on the full model, using design-based variance estimates.

‡Those labeled as 'Missing (<25k/yr)' did not report a specific amount, but indicated that it was 'less than $25,000 per year'; those labeled as 'Missing (unknown)' did not provide sufficient information to make this determination.

§Those labeled 'Private insurance' are not covered by Medicare; those labeled 'Medicaid/VA/other' are not covered by Medicare or private insurance.

¶HMO refers to Health Maintenance Organization; 'Hospital ER/OP' refers to hospital emergency room or hospital outpatient.

Table 4

Factors associated with racial and ethnic disparities in aspirin use among older adults at high cardiovascular risk ($N = 1066$)

	Unadjusted OR* (95% CI)	Adjusted OR* (95% CI)	*p*-value†
Race and Ethnicity			0.094
White, Non-Hispanic	Reference	Reference	
Black, Non-Hispanic	0.54(0.34, 0.84)	0.61 (0.37, 0.98)	0.043
Hispanic, Non-black	0.56(0.30, 1.05)	0.64 (0.33, 1.26)	0.192
Demographic characteristics			
Age group			0.022
57–64	Reference	Reference	
65–74	1.46(0.96, 2.21)	2.01(1.23, 3.27)	
75–85	1.40(0.86, 2.30)	1.86(1.08, 3.21)	
Gender			0.065
Men	Reference	Reference	
Women	0.71(0.51, 0.97)	0.71(0.49, 1.02)	
Comorbidity Index (continuous)	1.05(0.97, 1.14)	1.08(0.99, 1.17)	0.069
Socioeconomic characteristics			
Education			0.407
Less than high school	Reference	Reference	
High school graduate	1.03(0.67, 1.58)	0.82(0.56, 1.20)	
Some college	0.99(0.70, 1.42)	0.75(0.50, 1.15)	
Bachelors or more	0.98(0.58, 1.65)	0.65(0.38, 1.11)	
Household income‡			0.062
< = 100% federal poverty level	Reference	Reference	
101–200% federal poverty level	1.94(1.15, 3.25)	1.80(1.06,3.04)	
>200% federal poverty level	2.40(1.55, 3.73)	2.12 (1.30, 3.43)	
Missing (<25k/yr)	2.46(1.25, 4.86)	2.09(0.98, 4.43)	
Missing (unknown)	1.61(0.83, 3.12)	1.62 (0.83, 3.13)	
Access to care characteristics			
Health Insurance§			0.077
No insurance	Reference	Reference	
Medicare	2.05(0.94, 4.44)	1.60 (0.57, 4.48)	
Private insurance	2.40(0.81, 7.09)	3.26(0.96, 11.00)	
Medicaid/VA/other	1.67(0.56, 4.97)	2.39(0.72, 7.94)	
Missing	1.66(0.65,4.20)	1.18 (0.41,3.40)	
Usual source of care¶			0.028
None	Reference	Reference	
Clinic/Health center	1.54 (0.76.3.14)	1.59(0.73, 3.47)	
Doctors office/HMO	1.50(0.71, 3.19)	1.22(0.63, 2.36)	
Hospital ER/OP or Other	0.89(0.39, 2.02)	0.93(0.43, 2.01)	

	Unadjusted OR* (95% CI)	Adjusted OR* (95% CI)	*p*-value†
Missing	1.93(0.85,4.40)	2.29(1.10, 4.77)	

*Estimates are weighted to account for differential probabilities of selection and differential non-response.

†*p*-values obtained from Wald tests based on the full model, using design-based variance estimates.

‡Those labeled as 'Missing (<25k/yr)' did not report a specific amount, but indicated that it was 'less than $25,000 per year'; those labeled as 'Missing (unknown)' did not provide sufficient information to make this determination.

§Those labeled 'Private insurance' are not covered by Medicare; those labeled 'Medicaid/VA/other' are not covered by Medicare or private insurance.

¶HMO refers to Health Maintenance Organization; 'Hospital ER/OP' refers to hospital emergency room or hospital outpatient.