Published in final edited form as:
J Natl Med Assoc. 2008 December ; 100(12): 1386–1393.

Predicting medication use in an elderly hypertensive sample: Revisiting the Established Populations for Epidemiologic Studies of the Elderly study

Mimi M. Kim, Ph.D. [Investigator][*], **Daniel L. Howard, Ph.D. [Professor and Director]**[*], **Jay S. Kaufman, Ph.D. [Associate Professor]**[†], and **DaJuanicia Holmes, M.S. [Center for Biostatistics and Data Management]**[*]

[*]The Institute for Health, Social, and Community Research, 900 South Wilmington Street, Room 207, Raleigh, NC 27601, Tel: 919.235.0142, ext. 2009, Fax: 919.967.6664, mkim@shawu.edu

[*]The Institute for Health, Social, and Community Research at Shaw University, 118 E. South Street, Raleigh, NC 27601; Phone: (919) 546-8256; Fax: (919) 836-9433; howardd@shawu.edu

[†]Department of Epidemiology, The University of North Carolina at Chapel Hill School of Public Health, CB #7435 Chapel Hill, NC 27599-7435; Phone: (919) 966-7435; Fax: (919) 966-2089; jay_kaufman@unc.edu

[*]Institute for Health, Social, and Community Research, Shaw University, 900 S. Wilmington Street, Suite 220, Raleigh, NC 27601; Phone: (919) 829-0356; Fax: (919) 821-2647; dholmes@shawu.edu

Abstract

Though some research has begun to examine specific factors related to race that should be targeted in the design of interventions to improve medication adherence, there remains an underreporting of factors that contribute to the use of hypertensive medications by race.

Methods—This study examined medication use reported by a sample of elderly, controlled and uncontrolled hypertensive patients from the North Carolina Established Populations for the Epidemiologic Studies of the Elderly (NC EPESE) study.

Results—In the adjusted final multivariable models of medication use over time, in both Caucasian and African-American women, those with higher BMI were more likely to report taking their medication over time; satisfaction with their medical care was predictive among Caucasian women and receiving treatment from a minority physician was predictive among African-American women.

Conclusion—Focusing on individual-level characteristics and the different issues that may underlie specific ethnic groups, particularly health care provider characteristics, may help to develop more precisely targeted interventions to improve a full range of healthcare services that are often needed by elderly hypertensive patients.

Keywords

Hypertension; medication use; health disparities

Correspondence to: Mimi M. Kim.

Introduction

Research has thoroughly identified racial and ethnic disparities in hypertension and cardiovascular health problems in the U.S. among African Americans and Caucasians.[1–3] Research has concluded that the prevalence of hypertension among African Americans is among the highest in the United States.[4–6] Research has also shown that African Americans experience the onset of hypertension at a younger age and with worse disease severity.[4,7] Ferdinand and Armani (2007) conclude that a series of genetic and environmental factors contribute to the high prevalence of hypertension in the African American population.

In addition, Bosworth and colleagues (2006) looked at factors that may explain racial differences in blood pressure control. The authors found that African Americans were more likely to be nonadherent to medication regimens, functionally illiterate, and have a hypertensive family member than their Caucasian counterparts.8 Bosworth and colleagues (2006) concluded that African Americans were more likely to have lower levels of blood pressure control compared to Caucasians, even after controlling for 20 possible explanatory factors. In a more recent study, Bosworth and colleagues (2008) again explored health disparities in blood pressure control. They concluded that age, medication nonadherence, and worrying about blood pressure status contributed to the racial disparity of blood pressure control status.9 Giles and colleagues (2007) similarly found that treated African Americans and Mexican Americans had the lowest rates of treated blood pressure control.10 But, this study, like many others, recommends that interventions for improving medication adherence should take race into account. Though the importance of race to intervention design has been identified across several studies, only a minority of studies have taken the next step to identify specific providers and/or patient characteristics to improve racial awareness in practice.

For example, Kressin and colleagues (2007) looked at race, health beliefs, process of care, and medication adherence in a sample of hypertensive patients. Their research did not find a significant association between race and medication adherence. But, they did find that the providers of African American patients were significantly more active in educating their patients about medication adherence. The authors concluded that racial disparities may be reduced if patients and their providers take hypertension seriously by more actively advising and counseling hypertensive patients about medication use and disease states.11 Rose and colleagues (2000) conducted a qualitative study that explored the contexts of adherence for African American males with high blood pressure. Their qualitative findings suggested that adherence fluctuated depending on social, economic, and personal circumstances, in addition to the empathetic assistance from providers.12 Viswanathan and Lambert (2005) identified several factors that positively affected African-Americans medication adherence as well as factors that negatively impacted consistent use.13 Specifically, reminders of medication effectiveness, lifesaving attributed and a reminder of regimens were found to positively impact medication use. In contrast, factors such as fear of side effects, fear of dependency, and the hassle of taking regularly prescribed medications were among the factors that contributed to African-Americans resistance to consistent medication use.13

Though some research has begun to examine specific factors related to race that should be targeted in the design of interventions to improve medication adherence, there remains an underreporting of factors that contribute to the use of hypertensive medications by race, particularly service level factors. This paper intends to further analyze the association between current medication use and several other covariates, including service level factors, with particular attention to race among the EPESE participants with controlled and uncontrolled hypertension.

Methods

Study Design

This observational, longitudinal study is based on a subsample of hypertensive participants from the North Carolina Established Populations for the Epidemiologic Studies of the Elderly (NC EPESE). The purpose of EPESE was to longitudinally evaluate risk factors for diseases, disabilities, hospitalizations, institutionalization, and mortality among the elderly in four U.S. regions (East Boston, MA; two rural counties in Iowa; New Haven, CT; and portions of five counties in the north-central region of NC). These data were collected from residents from five urban and rural counties in the Piedmont Region of North Carolina. Data collection efforts employed a four-stage, stratified, probability sample with an oversample of African-Americans. Data were collected through in-person household interviews conducted every three years. The EPESE study design included continued follow-up on morbidity and mortality in addition to nursing home and hospital admissions. Approximately 62 percent of the participants across all four waves were lost to death, refusal, or follow-up[14]. Further explanation of the rationale and survey design is published elsewhere.15

For the NC EPESE dataset, data were collected over four waves: Wave 1 (baseline, 1987); Wave 2 (1990); Wave 3 (1994); and Wave 4 (1998). African Americans were oversampled for more meaningful racial comparisons. Wave 1 included 4136 participants (2263 African American and 1873 Caucasians), aged 65–75 years. For the present study, participants were followed over the subsequent waves after being classified as having controlled or uncontrolled hypertension.

Study Sample

The study sample included all hypertensive participants who self-reported being told by a physician that they had high blood pressure and yielded high blood pressure measurements in at least one wave. The study sample included 1,248 African Americans participants and 1,665 Caucasian participants from Wave 1.

Measures

Outcome variable—The outcome was derived from the following item: "*Are you currently taking any medication for [high blood pressure]?*" For the purposes of this analysis, the outcome variable looks at changes in hypertensive medication use over the course of four time periods.

Demographics/Background—Demographic and behavioral information such as income, education level, and living arrangements were collected from the participants at each wave. Gender, age, years of education, marital status (married: yes/no), employment status (currently working: yes/no), annual household income (<$15,000), and living in a rural area (yes/no) were collected from the participants at each wave.

Health characteristics—Various elements of the participants' health profile that were collected included smoking behavior according to the following question:

- "Do you smoke cigarettes regularly now?"

The participant's height and weight were taken at each visit, and the standard formula kg/m^2 was used to calculate body mass index. This analysis employs the mean body mass index. *Controlled* blood pressure status was defined according to the following two criteria: 1) being told by a physician that he/she was hypertensive; yet, 2) having a *normal* or prehypertensive blood pressure measurements (< 140 mm = systolic and <90 mm = diastolic) at the time of

data collection. Uncontrolled blood pressure status was defined as having blood pressure measurements (≥ 140 mm = systolic or ≥ 90 mm = diastolic) at the time of data collection.

Health services—Previous health services history was assessed using participants' responses to the following questions:

- "*Have you been in a nursing home in the past 12 months*;"
- "*Have you put off going to the doctor when necessary*;"
- "*Are you satisfied with the medical care received*;" and
- "*Did you receive medical care in a public facility*."

Health services variables were dichotomized (yes/no) for these analyses.

Health care provider characteristics—This domain included: physician race (minority: African-American/Non-Hispanic, American Indian/Alaskan Native, Asian/Pacific Islander, Hispanic and other; versus Caucasian/Non-Hispanic), physician gender, age, years since medical school graduation, and general/family specialty. Years since medical school graduation was calculated by subtracting the physician's graduation year from the year of the wave. This information was linked to EPESE from the North Carolina Health Professions Data System (HPDS) which collects and disseminates timely data on licensed health care professionals[16].

Analyses

Analyses for this study sought to investigate the relationship between current medication use and several domains of covariates for elderly African Americans and for Caucasians who either had controlled or uncontrolled hypertension. The decision to look separately at the two racial groups was based on an initial multivariable model that estimated the effects for all of the variables included in the demographics domain. In addition to other variables, race was a significant predictor of current medication use (OR=1.35; p=0.002) over time. Therefore, the analyses examine the significant predictors of medication use according to race.

This analysis employed generalized estimating equations (GEE) to simultaneously test for trends across time for each of the demographic, health characteristics, health services, and healthcare provider characteristic domains according to each racial group using a logistic link function in the GEE analysis. The GEE models allow for assessment of impacts of the primary predictor variables and multiple covariates on the outcome variable.[17] The GEE analysis first looked at the bivariate association of each independent variable with the outcome variable. These results are presented in the first column of table 3 and table 4. Then, the analysis included the variables in each domain in an individual model and these results are presented in the second column. Finally, the final multivariable model included any variables that resulted in significant odds ratios across each of the domain models. These results are presented in the third column of table 3 and table 4. Variable reduction was accomplished by including covariates with a p-value less than 0.10 in the domain models in the final multivariable model. Odds ratios produced by this technique estimate the odds of a predicted outcome (e.g., current medication use) associated with exposure to independent variables (e.g., gender, age). All analyses were generated using Version 9.1.3 of SAS®.

Results

Descriptive Analyses

Table 1 describes the number of individuals who fall into each category of hypertension status by wave. According to Table 1, at wave 1, most participants fall into the uncontrolled

hypertension category (n=2,135; 73.3%). Each wave follows a similar pattern of frequency with the most participants falling into the uncontrolled hypertension category. Also, over half of the sample reported currently taking medications at Wave 1 (n=1,619; 55.6%). As a result of these frequencies, an additional sub-analysis was completed to examine the potential for bias between hypertension status and medication use. Based on the findings of this sub-analysis, there was no evidence of a bias.

Table 2 presents the overall sample characteristics by race and wave for all of the independent variables. Only the wave 1 sample will be discussed here. The sample was almost equally one-third male for African-Americans and Caucasians. The mean age for African-Americans was 73 years old (SD=6.6) and 74 years old for Caucasians (SD=6.4). Overall, a higher percentage of the African-American sample live in a rural area compared to Caucasians. Finally, a comparable percentage of Caucasian and African-American participants had a “controlled” level of hypertension.

According to the Health Services domain, a slightly higher percentage of Caucasians resided in a nursing home in the past 12 months compared to the African-American sample. A much higher number of African-American participants report receiving care in a public facility when compared to Caucasian participants. When looking at health care provider characteristics, there was a much higher number of minority physicians treating the African-American sample than for the Caucasian sample. The mean age of the healthcare providers for the African-American and Caucasian sample were similar comparable.

GEE Models with Logistic Link

Bivariate Analysis – Caucasian Sample—In Table 3 and Table 4, the first column displays bivariate associations with current medication use for Caucasians and African-Americans, respectively, for the four domains of interest. Tests of the statistical significance of each bivariate association were conducted with logistic regression. A number of variables in each domain were found to be associated individually with current medication use in each racial group.

In Table 3, there were several significant odds ratios found in the bivariate associations with current medication use for the Caucasian sample. First, in the demographics domain, women were more likely to be taking their medication compared to men (OR=1.35; 95% CI=1.05, 1.72). For every one year increase in years of education, the odds of a participant taking their medication increases by four percent (OR=1.04; 95% CI=1.01, 1.07). In the health characteristic domain, body mass index was significantly associated with medication use. For a one unit increase in body mass index, the odds a participant is taking their medication increases by three percent (OR=1.03; 95% CI=1.00, 1.06) over time. In the health services domain, those who reported being concurrently satisfied with the medical care received (OR=1.44; 95% CI=1.03, 2.00) were also more likely to report taking their medication than those who were not satisfied over time. Further, participants who did not receive care in a public facility were more likely to take their medication (OR=1.45; 95% CI=1.04, 2.04) over time. Annual household income (<$15,000) (OR=0.80; 95% CI=0.63, 1.03), residing in a nursing home in the past 12 months (OR=0.73; 95% CI=0.52, 1.04) and put off going to the doctor when necessary (OR=0.74, 95% CI=0.55, 1.00) were nearly significant predictors of medication use over time.

Multivariable Domain Models – Caucasian Sample—In the demographics domain, being male (OR=0.67, 95% CI=0.49, 0.92), was the only significant predictor of medication use over time. In the health characteristics domain, body mass index (OR=1.03; 95% CI=1.00, 1.06) was the only covariate significantly associated with medication use over time. According to the health services domain, participants who reported being satisfied with the medical care

they received (OR=1.36; 95% CI=0.96, 1.92) and participants who received care in a public facility (OR=0.72; 95% CI=0.50, 1.03) were nearly significant predictors of medication use over time. No variables in the health care provider characteristics domain were significantly associated with the outcome.

Multivariable Final Models – Caucasian Sample—Variables selected in each domain at $p<0.10$ were included in a final model predicting medication use for Caucasians. The following covariates were significantly associated with the participants using their medication in the final multivariable model: male (OR=0.69; 95% CI=0.52, 0.91), body mass index (OR=1.03; 95% CI=1.00, 1.06), and satisfied with medical care received (OR=1.44; 95% CI=1.01, 2.06). Receiving care in a public facility (OR=0.72; 95% CI=0.50, 1.05) was an additional predictor in the final model that was nearly significant. There were no significant predictors from the health care provider characteristics domain included in the final model.

Bivariate Analysis – African-American Sample—Table 4 presents the bivariate associations with medication use over time for the African-American sample. There were several significant bivariate associations in the four domains. First, in the demographics domain, women were more likely to report using their medications (OR=1.72; 95% CI=1.37, 2.13) over time. For every one year increase in education, the odds a participant is taking their medication increases by four percent (OR=1.04; 95% CI=1.02, 1.07) over time. Married participants were also more likely to report using their medication (OR=1.26; 95% CI=1.01, 1.59) and participants whose income was $15,000 or more were more likely to be taking their medication (OR=1.45; 95% CI=1.02, 2.04). Participants who resided in a rural area were also more likely to report medication use over time (OR=1.39; 95% CI=1.13, 1.71). In the health characteristic domain, a one unit increase in body mass index was significantly associated with a five percent increase in the odds a participant is taking their medication (OR=1.05; 95% CI=1.03, 1.07). Further, participants with controlled blood pressure were more likely to be taking their medication compared to those with uncontrolled blood pressure (OR=1.23; 95% CI=1.03, 1.45) over time. In the health services domain, participants who did not put off going to the doctor when necessary were more likely to report taking their medication than those who did not (OR=1.35; 95% CI=1.02, 1.79). Also, participants who did not receive care in a public facility were more likely to report using their medication (OR=1.39; 95%CI=1.15, 1.69). Residing in a nursing home in the past 12 months (OR=1.72; 95%CI=0.99, 2.98) was a nearly significant predictor of medication use over time. In the health care provider characteristics domain, minority racial status for the physician (OR=1.25; 95%CI=1.00, 1.55) was a nearly significant predictor of medication use over time.

Multivariable Domain Models – African-American Sample—In the demographics domain, male gender (OR=0.47, 95% CI=0.36, 0.63), years of education (OR=1.05, 95% CI=1.02, 1.09), being married (OR=1.65, 95% CI=1.23, 2.22) and residing in a rural area (OR=1.43, 95% CI=1.13, 1.81) were significantly associated with medication use over time. In the health characteristics domain, body mass index (OR=1.05; 95% CI=1.03, 1.07) and controlled blood pressure (OR=1.31, 95% CI=1.08, 1.59) were significantly associated with medication use over time. According to the health services domain, participants who received care in a public facility (OR=0.73, 95% CI=0.60, 0.89) was significantly associated with medication use over time. Further, putting off going to the doctor when necessary (OR=0.75, 95% CI=0.55, 1.01) was a nearly significant predictor of medication use over time. According to the health care provider characteristics, minority racial status for the physician (OR=1.25, 95% CI=0.99, 1.57) was a nearly significant predictor of using medication over time.

Multivariable Final Models – African-American Sample—Variables selected in each domain at $p<0.10$ were included in a final model predicting current medication use in the

African-American sample. The final model resulted in the following variables as significantly associated with medication use over time: male (OR=0.52; 95% CI=0.37, 0.74), body mass index (OR=1.05; 95% CI=1.02, 1.08), and minority physician (OR=1.36; 95% CI=1.03, 1.80). Being married (OR=1.36; 95% CI=0.96, 1.91), living in a rural area (OR=1.31; 95% CI=0.96, 1.79), and controlled blood pressure (OR=1.26; 95% CI=0.97, 1.65) were additional covariates that were nearly significant in the final model.

Discussion

This study examined current medication use in an elderly sample of hypertensive patients. An initial multivariable model of the variables included in the demographics domain yielded a significant association between race and current medication use. This finding suggests the importance of examining factors that contribute to medication use within the specific context of race. Therefore, two, separate multivariable models were tested for Caucasians and African-Americans.

For the entire sample (n=2,913), 50.7 percent of the Caucasian participants reported currently taking medication at Wave 1 compared to a higher 59.2 percent of the African-American participants. Furthermore, the majority of the total sample was female, single, and unemployed. Less than one-half of the Caucasian sample reported living in a rural area but in contrast to over half of the African-American sample who reported living in a rural area. In the adjusted final multivariable models of medication use over time, in both Caucasian and African-American women, those with higher BMI were more likely to report taking their medication over time; satisfaction with their medical care was predictive among Caucasian women and receiving treatment from a minority physician was predictive among African-American women. Though direct comparisons should not be drawn between the two multivariable models, contrasting the two racial groups yields noteworthy differences.

Specifically, in the bivariate analysis, gender, years of education, body mass index and having received care in a public facility were significant predictors of medication use over time in both the Caucasian and African-American sample. Satisfaction with medical care received was predictive of medication use over time for Caucasians but not African-Americans. Being married, annual household income, living in a rural area, controlled blood pressure status, and minority race of the physician were predictive or nearly predictive of medication use over time in the African-American sample, but not in the Caucasian sample. These differences suggest that specific demographic, health characteristics, and health provider characteristics may be important predictors of current medication use over time for African-Americans and should be further investigated.

Research has shown that the characteristics of providers can play a significant role in patient behaviors for African-Americans,[11,17] particularly treatment adherence. For example, when a physician is a minority, the African-American participant is more likely to report medication use over time (OR=1.36; 95% CI=1.03, 1.80) controlling for other covariates. But, as Rose and colleagues (2000) suggest, it is important to consider the social, economic, and personal circumstances surrounding an African-American hypertensive patient, in addition to the health care provider characteristics.

Study limitations

This study includes several limitations. First, the data relied on self-report to gather sensitive health information on the participants' personal health history; therefore, the validity and reliability of the self-report data should be considered in this study. Specifically, underreporting, unassociated with any covariates, may bias the findings present here which therefore, indicate that the applicability of the findings to the larger populations should be

interpreted cautiously. Further, this sample consists of individuals recruited from health treatment settings. Therefore, these data do not speak to current medication use for those hypertensive patients who are not engaged in consistent health treatment.

Conclusion

Decades of research have shown that hypertensive patients have a wide range of healthcare needs and depend greatly on the use of effective medication regimens. But consistent medication use poses a consistent challenge for providers and the overall health care system. Similarly, disparities in health consistently pose challenges for providers, policymakers, and researchers alike. Yet little research has systematically explored different aspects of disparities as they relate to different kinds of health problems. This analysis identified specific correlates to current medication use among Caucasians and African-Americans, separately.

The findings suggest that medication use is a concern for Caucasian males who have a lower body mass index and were not satisfied with the medical care they have received. Furthermore, medication use may also be more of a concern for African-American males who have a lower body mass index and Caucasian physicians. In sum, focusing on individual-level characteristics and the different issues that may underlie specific ethnic groups may help to develop more precisely targeted interventions to improve a full range of healthcare services that are often needed by elderly hypertensive patients.

Acknowledgments

This research was funded by the Department of Health and Human Services Agency for Healthcare Research and Quality grant #R24 HS013353. Investigators were also funded, in part, by the NIH National Center on Minority Health and Health Disparities grant #P60 MD000239.

References

1. Ferdinand KC. Hypertension in minority populations. J Clin Hypertens (Greenwich) 2006;8:365–368. [PubMed: 16687946]
2. Lackland DT. Racial disparities in hypertension. J Clin Hypertens (Greenwich) 2005;7:500–502. [PubMed: 16227768]
3. van den Born BJ, Koopmans RP, Groeneveld JO, et al. Ethnic disparities in the incidence, presentation and complications of malignant hypertension. J Hypertens 2006;24:2299–2304. [PubMed: 17053554]
4. Ferdinand KC, Armani AM. The management of hypertension in African Americans. Crit Pathw Cardiol 2007;6:67–71. [PubMed: 17667868]
5. Safford MM, Halanych JH, Lewis CE, et al. Understanding racial disparities in hypertension control: intensity of hypertension medication treatment in the REGARDS study. Ethn Dis 2007 Summer; 17:421–426. [PubMed: 17985492]
6. Burt VL, Whelton P, Roccella EJ, et al. Prevalence of hypertension in the US adult population. Results from the Third National Health and Nutrition Examination Survey, 1988–1991. Hypertension 1995;25:305–313. [PubMed: 7875754]
7. Stewart D, Johnson W, Saunders E. Hypertension in black Americans as a special population: why so special? Curr Cardiol Rep 2006;8:405–410. [PubMed: 17059791]
8. Bosworth HB, Dudley T, Olsen MK, et al. Racial differences in blood pressure control: potential explanatory factors. Am J Med 2006;119:e9–e15. [PubMed: 16431192]
9. Bosworth HB, Powers B, Grubber JM, et al. Racial Differences in Blood Pressure Control: Potential Explanatory Factors. J Gen Intern Med 2008;23:692–698. [PubMed: 18288540]
10. Giles T, Aranda JM Jr, Suh DC, et al. Ethnic/racial variations in blood pressure awareness, treatment, and control. J Clin Hypertens (Greenwich) 2007;9:345–354. [PubMed: 17485970]
11. Kressin NR, Wang F, Long J, et al. Hypertensive patients' race, health beliefs, process of care, and medication adherence. J Gen Intern Med 2007;22:768–774. [PubMed: 17364243]

12. Rose LE, Kim MT, Dennison CR, et al. The contexts of adherence for African Americans with high blood pressure. J Adv Nurs 2000;32:587–594. [PubMed: 11012800]

13. Viswanathan H, Lambert BL. An inquiry into medication meanings, illness, medication use, and the transformative potential of chronic illness among African Americans with hypertension. Res Social Adm Pharm 2005;1:21–39. [PubMed: 17138464]

14. Stimpson J, Ray L. Attrition of older Mexican American survey respondents. Journal of Immigrant and Minority Health. 2008

15. Cornoni-Huntley J, Ostfeld AM, Taylor JO, et al. Established populations for epidemiologic studies of the elderly: study design and methodology. Aging (Milano) 1993;5:27–37. [PubMed: 8481423]

16. de la Varre, C.; Hadley, HL.; Haaland, W., et al. North Carolina Health Professions 2005 data book. Chapel Hill: University of North Carolina at Chapel Hill;

17. Konrad TR, Howard DL, Edwards LJ, et al. Physician-patient racial concordance, continuity of care, and patterns of care for hypertension. Am J Public Health 2005;95:2186–2190. [PubMed: 16257949]

Table 1

Frequencies for hypertension categories by wave

	Wave 1	Wave 2	Wave 3	Wave 4
	N=2,913	N=2,855	N=2,432	N=1,470
	n (%)	n (%)	n (%)	n (%)
Hypertension Status				
Controlled	778(26.7)	1,035(36.3)	826(34.0)	610(41.5)
Uncontrolled	2,135(73.3)	1,513(53.0)	1,234(50.7)	781(53.1)
Currently using prescribed hypertensive medications	1,619(55.6)	1,446(50.6)	1,097(45.1)	529(36.0)
Not currently taking meds	363(12.5)	393(13.8)	312(12.8)	66(4.5)

Table 2

Profile for EPESE hypertensive patients by race and wave

	Wave 1 N=2,913		Wave 2 N =2,855		Wave 3 N =2,432		Wave 4 N =1,470	
	Caucasian	African American	Caucasian	African American	Caucasian	African American	Caucasian	African American
N	**1,248**	**1,665**	**1,227**	**1,628**	**1,044**	**1,388**	**657**	**813**
Demographics								
Male, n (%)	411(32.9)	532(32.0)	386(31.5)	505(31.0)	326(31.2)	405(29.2)	203(30.9)	220(27.1)
Mean Age (± SD)	73.5 (± 6.4)	73.4 (± 6.6)	76.3 (± 6.3)	76.2 (± 6.5)	78.8 (± 5.8)	79.1 (± 6.2)	81.7 (± 4.9)	82.1 (± 5.4)
Mean Years Of Education (± SD)	9.9 (± 3.6)	7.3 (± 4.0)	10.0 (± 3.6)	7.3 (± 4.0)	10.1 (± 3.6)	7.4 (± 4.0)	10.3 (± 3.7)	7.8 (± 3.9)
Married, n (%)	503(40.3)	545(32.7)	432(35.2)	460(28.3)	334(32.0)	343(24.7)	199(30.3)	200(24.6)
Currently Working, n (%)	136(10.9)	183(11.0)	101(8.2)	137(8.4)	67(6.4)	92(6.6)	35(5.3)	49(6.0)
Annual Household Income (< $15000)	702(56.3)	1,300(78.1)	637(51.9)	1,212(74.4)	475(45.5)	918(66.1)	295(44.9)	567(69.7)
Respondent Lives In A Rural Area, n (%)	601(48.2)	978(58.7)	586(47.8)	963(59.2)	506(48.5)	815(58.7)	323(49.2)	490(60.3)
Health Characteristics								
Respondent Smoke Regularly, n (%)	228(18.3)	260(15.6)	137(11.2)	196(12.0)	89(8.5)	131(9.4)	54(8.2)	59(7.3)
Mean Body Mass Index (± SD)	25.8 (± 4.4)	27.9 (± 5.3)	25.5 (± 4.6)	27.4 (± 5.4)	25.5 (± 4.5)	27.4 (± 5.4)	25.2 (± 4.9)	27.2 (± 5.7)
Controlled Blood Pressure Status, n (%)	300(24.0)	478(28.7)	438(35.7)	597(36.7)	336(32.2)	490(35.3)	250(38.1)	360(44.3)
Currently Using Prescribed Hypertensive Medication, n (%)	633(50.7)	986(59.2)	564(46.0)	882(54.2)	418(40.0)	679(48.9)	217(33.0)	312(38.4)
Health Services								
Resided in Nursing Home In The Past 12 Months, n (%)	34(2.7)	15(0.9)	89(7.3)	82(5.0)	149(14.3)	140(10.1)	104(15.8)	107(13.2)
Put Off Going To The Doctor When Necessary, n (%)	167(13.4)	173(10.4)	106(8.6)	112(6.9)	58(5.6)	60(4.3)	31(4.7)	25(3.1)
Satisfied With The Medical Care Received, n (%)	1,100(88.1)	1,435(86.2)	974(79.4)	1,287(79.1)	786(75.3)	989(71.3)	540(82.2)	632(77.7)

	Wave 1 N=2,913		Wave 2 N =2,855		Wave 3 N =2,432		Wave 4 N =1,470	
	Caucasian	**African American**	**Caucasian**	**African American**	**Caucasian**	**African American**	**Caucasian**	**African American**
N	**1,248**	**1,665**	**1,227**	**1,628**	**1,044**	**1,388**	**657**	**813**
Received Care In Public Facility, n (%)	126(10.1)	570(34.2)	133(10.8)	573(35.2)	73(7.0)	427(30.8)	42(6.4)	189(23.2)
Health Care Provider Characteristics								
Minority Physician, n (%)	61(4.9)	617(37.1)	66(5.4)	479(29.4)	71(6.8)	434(31.3)	52(7.9)	278(34.2)
Male Physician, n (%)	1,033(82.8)	1,108(66.5)	908(74.0)	895(55.0)	745(71.4)	776(55.9)	466(70.9)	496(61.0)
Mean Age (± SD)	52.5 (± 11.1)	49.7 (± 12.5)	51.9 (± 11.0)	50.3 (± 12.7)	50.0 (± 11.3)	50.2 (± 11.8)	49.9 (± 9.7)	51.7 (± 11.3)
Mean Years Since Medical School Grad (± SD)	26.7 (± 11.6)	22.4 (± 12.4)	25.6 (± 11.5)	22.8 (± 12.6)	23.4 (± 12.1)	22.6 (± 11.9)	23.1 (± 10.4)	24.3 (± 11.5)
General/Family Physician Specialty, n (%)	469(37.6)	715(42.9)	419(34.1)	541(33.2)	367(35.2)	473(34.1)	210(32.0)	272(33.5)

Table 3

Model of changes in current medication use among elderly Caucasian EPESE respondents, waves 1–4

	Bivariate Model		Domain Model		Multivariable Model	
	OR (95% CI)	P-value	OR (95% CI)	P-value	OR (95% CI)	P-value
Demographics						
Male	0.74 (0.58, 0.95)	0.020	0.67 (0.49, 0.92)	0.012	0.69 (0.52, 0.91)	0.008
Age	1.01 (0.99, 1.03)		1.02 (0.99, 1.04)			
Years Of Education	1.04 (1.01, 1.07)	0.019	1.01 (0.97, 1.05)			
Married	0.97 (0.76, 1.23)		1.09 (0.79, 1.51)			
Currently Working	1.15 (0.78, 1.69)		1.25 (0.82, 1.92)			
Annual Household Income (<$15000)	0.80 (0.63, 1.03)	0.082~	0.77 (0.57, 1.05)			
Respondent Lives In A Rural Area	1.12 (0.88, 1.42)		1.18 (0.90, 1.54)			
Health Characteristics						
Respondent Smokes Regularly	0.90 (0.66, 1.22)		0.96 (0.69, 1.34)			
Body Mass Index	1.03 (1.00, 1.06)	0.031	1.03 (1.00, 1.06)	0.023	1.03 (1.00, 1.06)	0.039
Controlled Blood Pressure Status	0.95 (0.78, 1.16)		1.00 (0.81, 1.23)			
Health Services						
Resided in Nursing Home In The Past 12 Months	0.73 (0.52, 1.04)	0.086~	0.77 (0.48, 1.21)			
Put Off Going To The Doctor When Necessary	0.74 (0.55, 1.00)	0.051~	0.83 (0.60, 1.15)			
Satisfied With The Medical Care Received	1.44 (1.03, 2.00)	0.033	1.36 (0.96, 1.92)	0.081~	1.44 (1.01, 2.06)	0.043
Received Care In Public Facility	0.69 (0.49, 0.96)	0.029	0.72 (0.50, 1.03)	0.070~	0.72 (0.50, 1.05)	0.089~
Health Care Provider Characteristics						
Minority Physician	0.99 (0.64, 1.51)		1.01 (0.65, 1.59)			
Male Physician	0.87 (0.59, 1.30)		0.84 (0.55, 1.28)			
Age	1.00 (0.99, 1.01)		1.01 (0.95, 1.07)			
Years Since Medical School Grad	1.00 (0.99, 1.01)		0.99 (0.94, 1.04)			
General/Family Physician Specialty	0.87 (0.68, 1.10)		0.85 (0.67, 1.09)			

~ p <0.10

Table 4

Model of changes in current medication use among elderly African-American EPESE respondents, waves 1–4

	Bivariate Model		Domain Model		Multivariable Model	
	OR (95% CI)	**P-value**	**OR (95% CI)**	**P-value**	**OR (95% CI)**	**P-value**
Demographics						
Male	0.58 (0.47, 0.73)	<0.001	0.47 (0.36, 0.63)	<0.001	0.52 (0.37, 0.74)	<0.001
Age	0.99 (0.98, 1.01)		0.99 (0.97, 1.01)			
Years Of Education	1.04 (1.02, 1.07)	0.003	1.05 (1.02, 1.09)	0.005	1.02 (0.98, 1.06)	
Married	1.26 (1.01, 1.59)	0.045	1.65 (1.23, 2.22)	<0.001	1.36 (0.96, 1.91)	0.082~
Currently Working	0.80 (0.60, 1.08)		0.86 (0.60, 1.22)			
Annual Household Income (<$15000)	0.69 (0.49, 0.98)	0.039	0.91 (0.62, 1.34)			
Respondent Lives In A Rural Area	1.39 (1.13, 1.71)	0.002	1.43 (1.13, 1.81)	0.003	1.31 (0.96, 1.79)	0.093~
Health Characteristics						
Respondent Smokes Regularly	0.83 (0.63, 1.11)		0.91 (0.66, 1.25)			
Body Mass Index	1.05 (1.03, 1.07)	<0.001	1.05 (1.03, 1.07)	<0.001	1.05 (1.02, 1.08)	<0.001
Controlled Blood Pressure Status	1.23 (1.03, 1.45)	0.019	1.31 (1.08, 1.59)	0.006	1.26 (0.97, 1.65)	0.087~
Health Services						
Resided in Nursing Home In The Past 12 Months	1.72 (0.99, 2.98)	0.055~	1.82 (0.80, 4.13)			
Put Off Going To The Doctor When Necessary	0.74 (0.56, 0.98)	0.035	0.75 (0.55, 1.01)	0.055~	0.91 (0.56, 1.49)	
Satisfied With The Medical Care Received	0.94 (0.69, 1.29)		0.98 (0.71, 1.35)			
Received Care In Public Facility	0.72 (0.59, 0.87)	<0.001	0.73 (0.60, 0.89)	0.002	1.18 (0.85, 1.66)	
Health Care Provider Characteristics						
Minority Physician	1.25 (1.00, 1.55)	0.051~	1.25 (0.99, 1.57)	0.061~	1.36 (1.03, 1.80)	0.032
Male Physician	0.87 (0.66, 1.15)		0.92 (0.67, 1.25)			
Age	1.00 (0.99, 1.01)		1.00 (0.97, 1.04)			
Years Since Medical School Grad	1.00 (0.99, 1.01)		1.00 (0.96, 1.03)			
General/Family Physician Specialty	1.05 (0.84, 1.31)		1.10 (0.86, 1.40)			

~ p <0.10