Ethnic, Gender, and Age-Related Differences in Treatment and Control of Dyslipidemia in Hypertensive Patients

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Background: Demographic differences in management of concomitant lipid disorders among hypertensive patients may contribute to health disparities.

Objectives: Assess demographic differences in lipid control rates and treatment patterns among dyslipidemic hypertensive patients in primary care.

Methods: Demographic information, blood pressure, LDL-cholesterol, and medications were obtained on 72,351 hypertensive patients from 262 primary care providers at 69 sites in the Southeast. Analysis focused on a dyslipidemic hypertensive subset.

Results: Among 72,351 hypertensives, 38,116 were dyslipidemic. Fifty-two percent of patients did not have a cholesterol measurement documented in the past year. Women and patients <40 years old were less likely to have an annual cholesterol measurement than men and older, same-race counterparts ($P \leq .001$). Thirty-five percent of all hypertensive dyslipidemic patients had not been prescribed any anti-lipidemic medication, whereas 15% were on a statin and another anti-lipidemic. Women received fewer statin prescriptions than men (47.7% vs 65.1%, $P \leq .0001$). Fewer African Americans (AA) than Caucasians (C) reached LDL levels of <100 or <130 mg/dL ($P \leq .0001$). Among C and AA patients, those <40 years old were less likely than older, same-race counterparts to have reached LDL<100 or <130 mg/dL ($P \leq .001$). Younger patients had fewer annual cholesterol measurements and were less likely to receive anti-lipidemic medication and to have LDL controlled than older, same-race counter-parts in each ethnic group ($P \leq .0001$).

Conclusions: Demographic characteristics of hypertensive patients, especially younger age group, are associated with significant differences in diagnostic testing, treatment, and control of hyperlipidemia in primary care. This primary care information can be used to guide education and policy interventions to improve outcomes and reduce disparities. (*Ethn Dis*. 2005;15:11–16)

Key Words: Age, Dyslipidemia, Gender, Hypertension, Race, Treatment

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Background

Hypertension and hyperlipidemia are associated with other cardiovascular (CV) risk factors and independently contribute to ethnic differences in health outcomes.[1–3] Hypertensive patients are more likely to have lipid disorders than their normotensive counterparts. Controlling elevated cholesterol levels among patients with hypertension reduces health events and disparities.[4,5]

Multiple barriers to better blood pressure (BP) and lipid control exist.[6] An estimated 30% of patients with hypertension and ~50% of patients meeting criteria to receive lipid-lowering therapy are not aware of their diagnoses.[5,7] Patient compliance is also a major issue. Research indicates that approximately 60% of hypertensive patients are not interested in or adherent with lifestyle changes that could lower their BP.[6,8] When medication is prescribed, ~50% of hypertensive patients and ~70% of dyslipidemic patients discontinue treatment within the first year.[9,10] Furthermore, approximately half of hypertensive patients who remain on therapy take <80% of the prescribed doses.[11] In addition to patients' medication compliance, limited access to regular primary care and cost of treatment emerge as other barriers to improving both BP and lipid control.[11–14]

Evidence suggests that primary care providers have a major impact on blood pressure and lipid control rates among their patients. However, a large proportion of providers are unfamiliar with treatment guidelines or are reluctant to titrate and add medications, even when BP and lipid values are poorly controlled.[15–19] Tailored interventions that focus on primary care providers or ancillary care providers such as pharmacists, dieticians, and nurses can positively impact patient adherence and blood pressure and lipid control rates.[20–25]

The US population is aging and becoming more obese and ethnically diverse, factors that are associated with greater prevalence of hypertension, dyslipidemia, and related complications.[7,26–29] These demographic shifts will facilitate a continued trend toward increased coronary morbidity and mortality unless large-scale proactive measures are taken. Furthermore, the economic benefits of controlling CV risk factors to both individual patients and the overall healthcare system are well established and further underscore the importance of reducing coronary heart disease (CHD) among American adults.[30]

Ethnic disparities in the quantity and quality of health care received have been well documented,[31,32] and these disparities extend to clinical management of dyslipidemias.[33,34] Efforts to focus the clinician on treatment guidelines, evidence-based practices, and individualized medication management can improve outcomes and reduce disparities.[35–42]

Treatment of lipid disorders in hypertensive patients is important for reducing adverse outcomes, and elevated low-density lipoprotein cholesterol (LDL-c) is often uncontrolled. While many cholesterol-lowering agents are available, statins have been well estab-

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lished through multiple large trials as the most effective and well-tolerated medication class for reducing LDL-c.[43–45] Statins have been found to significantly reduce CHD morbidity and mortality in studies of both primary and secondary interventions.[46] Further distinguishing these medications from other cholesterol-lowering treatments is accumulating evidence associating statins with improved outcomes in lipid-related diagnoses such as acute coronary syndrome, end-stage renal disease, stroke, and peripheral artery disease.[47]

This study focuses on the diagnosis, treatment, and control (management) of elevated LDL-c among hypertensive patients seen by primary healthcare providers at multiple sites throughout South Carolina. The report describes the effect of age, gender, and ethnicity on the management of elevated LDL-c among hypertensive patients in primary care settings.

METHODS

Data were obtained on 72,351 hypertensive patients from 262 primary care providers at 69 practice sites in the Southeast that were participating in the Hypertension Initiative of South Carolina. This large, dynamic database recruits primary care physicians to track treatment patterns and cardiovascular risk factor control among their hypertensive patients through a record auditing and feedback process. Physician participation is voluntary and the Hypertension Initiative database currently includes group and solo private practices in addition to large multisite health systems.

Data are obtained by reporting cards (22% of records) or by downloading electronic medical records (EMR) (78% of records). While some variations in the data may be due to differences in collection method, evaluation of these differences was not included in this study. All data monitoring and review procedures were approved by the Office for Research Protection and Integrity at the Medical University of South Carolina to ensure appropriate patient confidentiality safeguards were in place and that the study complied with the Health Insurance Portability and Accountability Act.

For purposes of this study, patients with hypertension were defined as those with a diagnosis of hypertension documented in the medical record with the exclusion of gestational (pregnancy-induced) hypertension. Concomitant lipid disorders were also based on diagnoses included in the report cards or EMR. Lipid-lowering therapy was defined as documented recommendation in the report cards or EMR for lipid-lowering agents including statins, fibrate, and nicotinic acid. To be included in analysis, patients had to have a diagnosis of both hypertension and dyslipidemia. Other diagnoses did not exclude patients from analysis and only medications of interest to this study were captured into the dataset for analysis.

The dataset subset was captured from the overall database and exported to STATA® for analysis. Analyses compared proportions among the sub-samples of interest using the normal-theory method for testing binomial proportions, weighting each sample proportion by the number in the subset (*N*) and introducing a continuity correction in the numerator to better accommodate the normal approximation to the binomial.

RESULTS

Among 72,351 patients with diagnosed hypertension enrolled in the Hypertension Initiative of South Carolina database, 38,116 were also dyslipidemic. Of these dyslipidemic hypertensives, 48.8% (18,593) were Caucasian (C), 26.6% (10,132) were African American (AA), and 24.6% (9,391) were of other or unknown race. Sixty-five percent of dyslipidemic hypertensives were men, 35% were women, and gender was unknown for 69 patients. The mean age for the overall sample was 64 ± 12.3; men were slightly older on average than women (66 vs 62; standard deviation 12.3). The most recent BP was <140/90 in 49% of these patients (*N*=35,578). Inclusion criteria were dual diagnosis of hypertension and dyslipidemia. Other conditions may exist but were not analyzed. However, given the large number of patients and broad range of practices from which records were drawn, the sample was likely generally representative of the population of dyslipidemic hypertensives.

Of these records, 78.2% came from EMR download and 21.8% came from hand-written reporting cards. The proportions of C and AA patients with each type of record were: EMR (88% vs 65%) and paper (13% vs 35%) respectively. Of patients with EMR records, 88% were C and 13% were AA. Of patients with paper records, 65% were C and 35% were AA.

Among the 38,116 dyslipidemic hypertensives, 65.8% (*N*=25,090) had received a recommendation from their provider for lipid-lowering therapy (prescription) and 34.2% (*N*=13,026) were not on any anti-lipidemic medications (Table 1). In the overall sample, 22,175 (58.2%) were prescribed a statin, 2,915 (7.6%) were prescribed a non-statin lipid-lowering agent, and 5,600 (14.7%) were prescribed both a statin and non-stain agent (combination therapy) (Table 1). Among only those patients who were prescribed lipid-lowering therapy (*N*=25,090), 88.3% were prescribed a statin, 11.6% were prescribed a non-statin lipid lowering agent, and 22.3% prescribed both a statin and a non-statin medication (combination therapy).

Table 1. Pharmacological management of hyperlipidemia by gender and race

Medications	All Patients (*N* = 38,116)	C Males (*N* = 13,114)	AA Males (*N* = 5,586)	C Females (*N* = 5,345)	AA Females (*N* = 4,480)
Neither drug	13,026	3,547	1,857	2,426	1,927
	(34.2%)	(27.0%)	(33.2%)	(45.4%)	(43.0%)
Statin	22,175	8,686	3,489	2,332	2,355
	(58.2%)	(66.2%)	(62.5%)	(43.6%)	(52.6%)
*AL + statin	5,600	2,345	656	719	540
	(14.7%)	(17.9%)	(11.7%)	(13.5%)	(12.1%)
*AL no statin	2,915	881	240	587	198
	(7.6%)	(6.7%)	(4.3%)	(11.0%)	(4.4%)

* AL = anti-lipidemic.

Overall, C and AA patients received about the same number of prescriptions for statins (59.7% vs 58.1%, *P*=NS). However, among women, fewer C than AA women were prescribed these agents (43.6% vs 52.6%, *P*<.0001) and, overall, women were less likely to be prescribed statins than men (47.7% vs 65.1%, *P*<.0001) (Table 1).

The gender difference was also significant when proportions of premenopausal (<45 years old) women on statin (26.1%, *P*<.0001) and postmenopausal (>45 years old) women on statin (50.8%, *P*<.0001) were each compared to the proportion of all men on statin (65.1%).

The percentage of untreated dyslipidemic patients was similar in both racial groups (C 32.2% vs AA 36.4%, *P*=NS). Women were significantly less likely than men to receive medication to treat diagnosed hyperlipidemia (44.3% vs 28.9%, *P*<.0001). Among racial groups, AA men were more likely to be untreated than C men (33.2% vs. 27.0%, *P*<.05) (Table 1). In all gender and race groups, C males were the most likely to receive combination therapy (17.9%) and AA males were least likely to receive multiple agents to control their dyslipidemia (11.7%) (Table 1).

When stratified by age, analysis showed 58.4% of the youngest patients (<40 years old) and 40.1% of those <60 years old had not been prescribed any medication for their hyperlipidemia (Figure 1). African-American and C groups had similar rates of untreated dyslipidemics in both the <40-year-old group: (AA 61.8% vs C 60%); and in the <60-year-old group (AA 39.7% vs C 39.5%) (Figure 1). Furthermore, for both C and AA patients, those in the youngest age group (<40 years old) were less likely to be treated compared to their same-race counterparts in older age groups (C *P*<.0001 and AA *P*<.0001) (Figure 1).

These age group differences persisted when various treatment modalities were compared. In both racial groups, significantly fewer of the youngest patients (<40 years old) had been prescribed a statin medication (C *P*<.0001 and AA *P*<.0001) or combination therapy when compared to older, same-race patients (C *P*<.0001 and AA *P*<.0001) (Figure 1).

There was no LDL-c value on record within the last year for 52.1% (*N*=19,841) of dyslipidemic hypertensive patients in the database (Table 2). Among all gender and race groups, C women were least likely to have an annual LDL-c measurement (57%), followed by C males (46.8%), AA males (45.2%), and AA women (43.2%).

When stratified by age and compared by racial group, over half of patients in the youngest group (<40 years old) of each race had no LDL-c measurement within the last year (Table 2). For both C and AA patients, those in the youngest age group (<40 years old) were significantly less likely to have a LDL-c value within the last year compared to older, same-race patients (C *P*<.0001 and AA *P*<.001) (Table 2).

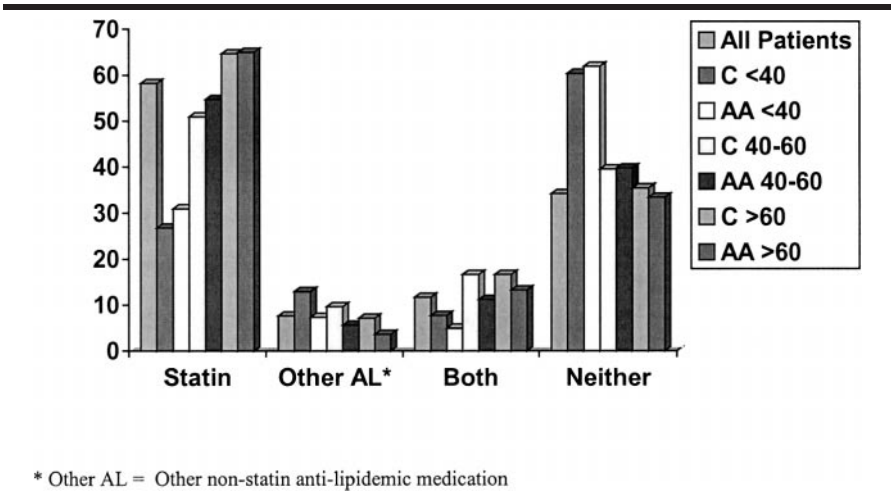

Fig 1. Pharmacological treatment of dyslipidemic hypertensive patients (*N*=38,116) by race and age

Table 2. LDL-c rates of annual measurement and control by race, age, and gender

	All Patients	<40	40–60	>60
C (*N*)/AA (*N*)	C (18593)/AA (10132)	C (456)/AA (369)	C (5897)/AA (4474)	C (12110)/AA (5140)
M (*N*)/F (*N*)	M (24845)/F (13202)	M (669)/F (495)	M (8578)/F (4901)	M (15494)/F (7631)
No annual measurement				
C (%)/AA (%)	49.8/44.3*	63.8/51.2†	50.4/42.4*	48.4/43.8*
M (%)/F (%)	49.3/57.1*	61.9/65.1	49.2/55.6*	43.3/56.8*
<130 mg/dL				
C (%)/AA (%)	46.1/37.1*	26.8/29.0	37.2/33.4†	51.2/40.3*
M (%)/F (%)	42.1/36.6*	22.9/24.8	34.1/31.5†	47.3/40.6*
<100 mg/dL				
C (%)/AA (%)	23.6 (15.0)*	9.2/3.3†	16.6/12.9*	27.4/17.5*
M (%)/F (%)	20.8/16.2*	6.7/6.9	14.8/12.7†	24.7/19.1*

C = Caucasian; AA = African American; M = male; F = female.
* $P<.0001$; †$P<.05$.

Among AA patients between 40 and 60 years old, 42% had no LDL-c measurement in the last year, and among C, 50.4% of patients in this mid-range age group had no LDL-c measurement in the last year (Table 2).

Among all patients with a cholesterol value on record, significant differences were seen between racial groups at both the <100 mg/dL ($P<.0001$) and <130 mg/dL ($P<.0001$) levels of LDL-c control. In both cases, more C than AA patients had reached these levels of cholesterol control (Table 2). The differences persisted when patients were stratified by gender (Table 2).

Age group differences persisted when comparing levels of LDL-c control among same-race patients. In both racial groups, significantly fewer of the youngest patients (<40 years old) had attained cholesterol control either at the <130 mg/dL level or the <100 mg/dL level when compared to their older, same-race counterparts (Table 2).

Although the majority of dyslipidemic patients had received a recommendation for either a statin or non-statin lipid lowering agent, a substantial number had not received a recommendation for anti-lipidemic drug therapy.

DISCUSSION

More than 50% of hypertensive patients in this primary care database had a concomitant diagnosis of a lipid disorder, despite the fact that a substantial proportion did not have lipid values documented in the prior year. Although the majority of dyslipidemic patients had received a recommendation for either a statin or non-statin lipid lowering agent, a substantial number had not received a recommendation for anti-lipidemic drug therapy.

The greatest opportunity for intervention appears to be with younger patients. Regardless of race, this cohort of young, dyslipidemic patients was least likely to have had an LDL-c measurement in the past year, least likely to have been prescribed any pharmacologic treatment, and least likely to have reached LDL-c controlled to the target of either <130 mg/dL or <100 mg/dL.

This group is important to treat more aggressively. Although younger patients have fewer CV events, evidence indicates that the incidence of these events occurs at earlier ages in the Southeast than other regions of the country, especially among AA.[7,9] Evidence indicates that controlling CV risk factors at younger ages is associated with fewer events later in life. The Northern Manhattan Stroke Study found that the relative risk of stroke among AA <45 years old was over twice that of C patients in the same age group, and the fatality rate among young, AA patients was 38% higher than among C.[48–49] Among all patients in the database who were prescribed anti-lipidemic medication, the majority (with the exception of C females) had been prescribed one of the statins, which are well established as the preferred first-line treatment for dyslipidemia.[43–45, 50–52] Treatment of hypercholesterolemia with statins is associated with ~30% reduction in stroke in all age groups.[47,48] Hypertensive, dyslipidemic patients <40 years old were substantially less likely to have been prescribed a statin medication than their older counterparts in both ethnic groups. Although premenopausal women (<45 years) were prescribed statin medications less often than men (mean age 66 ± SD years), as might be expected, over half of hypertensive, postmenopausal women (>45 years) with a

diagnosis of dyslipidemia were not prescribed a statin medication.

Among patients receiving statins or other anti-lipidemic therapy, substantial numbers did not have their LDL-c controlled to goal levels, which suggests the need to titrate existing medications or prescribe additional medications (combination therapy). These findings are consistent with other studies that have noted physicians are not treating dyslipidemia to goals recommended by nationally established guidelines.[53,54] Although patients on complex, multiple-drug regimens encounter financial barriers in purchasing medications, creative titration, such as prescribing larger doses of statins to be taken on alternate days, has been shown to be effective in alleviating cost barriers to patient compliance while improving CVD risk factors.[55]

The largest gender and ethnic disparities identified by this analysis were among women and AA who had the lowest rates of LDL-c control, with women receiving the lowest number of prescriptions for statin medications. This finding is consistent with other studies.[32,56]

These findings suggest that primary care providers are often under-treating certain groups of dyslipidemic, hypertensive patients.[10,57] The National Cholesterol Education Program (NCEP) guidelines have been criticized because of the complexity of the recommended treatment algorithm.[58–60] Furthermore, because patients with other diagnoses (in addition to hypertension and dyslipidemia) were included in the analysis, other conditions and medication regimens likely complicated treatment decisions. However, these issues do not explain the high numbers of dyslipidemic patients receiving no annual cholesterol measurement and no anti-lipidemic medication. Additionally, substantial numbers of patients at high risk for CHD had not been prescribed any statin medications, which have been well established as the most effective treatment for improving measurements across the lipid profile.[50–52]

Some of the differences observed between racial groups was possibly due to variance in data collection methods; the majority of data (78%) came from EMR download, and the remaining 22% came from paper cards. However, within each group, the proportion of paper to EMR records was similar. Bias introduced by the differences in data entry was likely systematic, and the impact on findings would likely be insignificant. That said, whether any measurement bias exists and the amount and direction of any variation between EMR and reporting cards should be further studied and accounted for in future analyses.

While the challenges of bringing multiple CV risk factors into control are great and treatment algorithms are complex, these findings clearly indicate opportunities for improvement. Primary care physicians should be more aware of screening for dyslipidemias, especially among hypertensive patients and others at high risk for cardiovascular events. Furthermore, special attention should be directed to consistently conducting lipid screening among younger patients and women. Barriers to prescribing effective therapies for lipid disorders need to be identified and effectively addressed. Again, particular attention should be paid to prescribing and managing medications for younger patients, women, and minorities who have poorer control of LDL-c. Treating LDL-c to goal is an important objective and could be facilitated by improving annual measurement and appropriate pharmacotherapy.

A dynamic medical record audit program with effective feedback such as the Hypertension Initiative of South Carolina, could enhance CV risk factor control by increasing physician awareness of and compliance with treatment guidelines.[17,37–42]

AUTHOR CONTRIBUTIONS

Design and concept of study: Hendrix, Riehle, Egan
Acquisition of data: Hendrix
Data analysis and interpretation: Hendrix, Riehle, Egan
Manuscript draft: Hendrix, Egan
Statistical expertise: Hendrix, Riehle
Acquisition of funding: Hendrix, Egan
Administrative, technical, or material assistance: Hendrix, Riehle, Egan
Supervision: Egan

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