Prevalence, Awareness, and Management of Hypertension, Dyslipidemia, and Diabetes Among United States Adults Aged 65 and Older

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Background. Adults aged 65 and older are disproportionately affected by hypertension, dyslipidemia, and diabetes, which are established risk factors for cardiovascular disease (CVD). Although risk reduction strategies among older adults, including control of CVD risk factors, can lead to a decline in premature CVD morbidity and mortality, the prevalence of these risk factors has generally increased in the past decade among elders and risk factor control rates have been suboptimal. We assess prevalence, awareness, treatment, and control rates among U.S. adults aged 65 and older with respect to hypertension, dyslipidemia, and diabetes and describe predictors associated with awareness and management of these factors.

Methods. Analysis of nationally representative data collected from adults aged 65 and older (*n* = 3,810) participating in the National Health and Nutrition Examination Survey 1999–2004.

Results. Women have a significantly higher prevalence of hypertension than men (76.6% vs 63.0%) and a significantly lower rate of control when treated pharmacologically (42.9% vs 57.9%). Dyslipidemia prevalence is 60.3% overall, and women are significantly more likely to be aware of their condition than men (71.1% vs 59.1%). Diabetes affects 21.2% of older adults, and 50.9% of prevalent cases are treated pharmacologically. Goal attainment among those treated is problematic for all three conditions—hypertension (48.8%), dyslipidemia (64.9%), and diabetes (50.4%). Having two or more doctor visits annually is associated with goal attainment for dyslipidemia.

Conclusions. Knowledge of cardiovascular health in older adults and understanding gender gaps in awareness can help physicians and policymakers improve disease management and patient education programs.

Key Words: Hypertension—High cholestrol—Diabetes—Prevalance—Older adults.

HYPERTENSION, dyslipidemia, and diabetes are established risk factors for cardiovascular disease (CVD) morbidity and mortality (1). Adults aged 65 and older are disproportionately affected by these factors, and although they make up only 12% of the total United States (U.S.) population, they incur 62% of national health care expenses for heart conditions (2,3). CVD risk reduction strategies among older adults can lead to a decline in premature CVD morbidity and mortality (4–7). However, the past decade has shown a general increase in CVD risk factors in this population along with suboptimal control rates. CVD mortality remains the number one cause of death among adults aged 65 and older, accounting for 31% of all deaths in this age group in 2003 (8–11).

The prevalence and management (treatment and control) of cardiovascular risk factors among elderly people aged 65 and older has not been well described, yet this population will nearly double from 37 million in 2005 to 72 million in 2030 (2,12) presenting challenges to the Centers for Medicare and Medicaid Services, which provides the primary health insurance program, Medicare, to most of these adults. Knowledge of the current magnitude of hypertension, dyslipidemia, and diabetes in this population is important for health care resource allocation, disease management, and education (13,14).

The National Health and Nutrition Examination Survey (NHANES) is a nationally representative survey of noninstitutionalized adults providing data on a wide variety of health conditions through in-person interviews at home, followed by clinical examinations and laboratory tests in a mobile examination center (15).

This study presents national-level data from the NHANES 1999–2004 to estimate the prevalence, awareness, pharmacologic treatment, and control of hypertension, dyslipidemia, and diabetes among adults 65 years of age and older. A number of publications have used the NHANES 2003–2004 data to report on aspects of hypertension, high cholesterol, or diabetes in selected subpopulations; however, these have not specifically addressed awareness, treatment, and control in adults aged 65 and older (8,9,16–19). Our study updates the current literature with analyses of these three cardiovascular risk factors, combining the NHANES 2003–2004 with the NHANES 1999–2002 data in order to present a more robust sample. Prevalence estimates in this study are based on clinical examination rather than self-reported data; therefore, prevalence rates for each condition include diagnosed and undiagnosed disease. We also present predictors of awareness, treatment, and control for these three CVD risk factors.

METHODS

Study Population

We analyzed the sample of older adults (65 years of age or older, $n = 3,810$) participating in NHANES 1999–2004, a continuing statistical survey of the noninstitutionalized civilian U.S. population, sponsored by the National Center for Health Statistics. All study participants have blood pressure measurements taken, whereas those in the NHANES morning subset ($n = 1,556$) also have measurements taken of fasting plasma glucose and lipids.

Study Definitions

In accordance with American Diabetes Association criteria for epidemiological studies (20), study participants were considered to have diabetes if they met one or more of the following conditions: their fasting plasma glucose level was ≥126 mg/dL, or they reported being told by a physician that they had diabetes, or they were taking glucose-lowering medications. A person was considered "aware" if he/she responded positively to the question, "Have you ever been told by a doctor that you have diabetes or sugar diabetes?" Study participants who reported taking insulin or oral hypoglycemic agents were classified as "treated." A treated person was considered "controlled" if HbA1c was less than 7%.

Hypertension was defined in accordance with the Seventh report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7) (7). A person was deemed to have hypertension if the NHANES examination indicated that, based on the average of three measurements, the systolic blood pressure (SBP) was ≥140 mm Hg, or the diastolic blood pressure (DBP) was ≥90 mm Hg, or if he/she reported current use of antihypertensive medication. Consequently, a person who may have been informed that he/she had hypertension, but who was not on medication and who tested normotensive on the day of the examination was not classified as a prevalent case of hypertension. A person with hypertension according to the JNC 7 definition was considered "aware" if he/she gave a positive response to the question, "Have you ever been told by a doctor or other health professional that you had hypertension, also called high blood pressure?" A person with hypertension was classified as "treated" if he/she reported taking antihypertensive medication at the time of the survey. A treated person was considered "controlled" if his/her average SBP was <140 mm Hg and average DBP was <90 mm Hg.

Study participants were classified as having dyslipidemia if their low-density lipoprotein (LDL) cholesterol exceeded the appropriate risk-based threshold established by the National Cholesterol Education Panel (NCEP) Adult Treatment Panel III (ATP III) (4) or if they reported taking an antihyperlipidemic drug at the time of the examination. Similar to hypertension, this definition excludes persons who report having previously been told that they had high cholesterol but who test negative in NHANES and are not on medication. A person with dyslipidemia according to the ATP III definition was considered "aware" if he/she gave a positive response to the question, "Have you ever been told by a doctor or other health professional that your blood cholesterol level was high?" Those who reported taking prescribed medicine to lower their blood cholesterol were considered "treated." A treated person was classified as "controlled" if his/her LDL was lower than the appropriate NCEP-ATP III goal.

Data Analysis

We applied survey weights to the NHANES 1999–2004 data to derive population estimates of the prevalence of diabetes, hypertension, and dyslipidemia, as well as awareness, treatment, and control rates of these conditions among persons aged 65 or older. Calculations were

Table 1. Demographic Characteristics of U.S. Adults 65 Years of Age and Older, National Health and Nutrition Examination Survey 1999–2004

Characteristic	N	Weighted %	Standard Error
Sex			
Male	1,890	42.7	0.7
Female	1,920	57.3	0.7
Age (y)			
65–74	1,942	55.2	1.3
75–84	1,400	35.3	1.0
≥85	468	9.5	0.6
Race/ethnicity			
White, non-Hispanic	2,344	83.0	1.8
Black, non-Hispanic	570	7.9	1.0
Hispanic	828	6.9	1.7
Other, non-Hispanic	68	2.2	0.4
Married/living with partner			
Yes	2,075	58.2	1.4
No	1,618	41.8	1.4
Education			
Less than high school	1,659	32.2	1.7
High school or more	2,132	67.8	1.7
Have usual health care provider			
Yes	3,615	96.8	0.4
No	151	3.2	0.4
Doctor visits past year			
0	209	4.8	0.5
1	393	10.5	0.5
2–3	1,007	27.0	1.1
4–9	1,395	37.1	1.1
≥10	802	20.7	0.9
Retiree health insurance			
Private	304	7.7	0.9
Government	1,936	47.1	1.5
Both	1,423	44.2	1.5
None	83	1.0	0.2

Table 2. Hypertension, Dyslipidemia, and Diabetes Prevalence, Awareness, Treatment, and Control Among U.S. Adults 65 Years of Age and Older, National Health and Nutrition Examination Survey 1999–2004

	Hypertension				Dyslipidemia				Diabetes			
Characteristic	Prevalence (N = 3,653)	Awareness (N = 2,603)	Treatment (N = 2,603)	Control Among Treated (n = 1,627)	Prevalence (N = 1,494)	Awareness (N = 879)	Treatment (N = 879)	Control Among Treated (N = 328)	Prevalence (N = 1,556)	Awareness (N = 328)	Treatment (N = 328)	Control Among Treated (N = 581)
Sex												
Total	70.8 (1.1)	75.9 (1.2)	69.3 (1.5)	48.8 (1.6)	60.3 (1.5)	65.7 (2.1)	43.2 (2.0)	64.9 (3.5)	21.2 (1.6)	71.4 (2.8)	50.9 (3.6)	50.4 (2.7)
Male	63.0 (1.7)	76.3 (1.6)	70.2 (1.7)	57.9 (2.3)	62.3 (2.3)	59.1 (2.9)	40.9 (2.8)	62.9 (4.2)	23.3 (2.2)	63.6 (3.6)	45.1 (5.9)	48.4 (3.9)
Female	76.6 (1.1)‡	75.7 (1.5)	68.8 (2.0)	42.9 (2.2)‡	58.7 (1.9)	71.1 (2.3)‡	45.1 (2.4)	66.4 (4.9)	19.5 (2.0)	78.5 (3.4)†	56.2 (4.5)	52.0 (3.6)
Age (y)												
65–74	66.5 (1.5)	78.0 (1.4)	71.8 (1.7)	54.0 (2.3)	63.7 (2.2)	67.7 (3.5)	44.8 (2.9)	65.5 (4.3)	23.4 (2.3)	71.4 (3.0)	51.5 (4.6)	47.2 (3.5)
75–84	75.7 (1.4)‡	75.0 (1.5)	67.5 (2.1)	41.7 (2.5)‡	58.7 (2.3)	67.7 (2.4)	44.4 (2.8)	63.5 (5.5)	19.1 (1.9)	68.4 (6.7)	49.6 (7.0)	54.6 (4.5)
≥85	78.1 (2.4)‡	68.6 (2.7)†	63.5 (3.0)*	44.6 (5.4)	45.5 (4.4)‡	39.2 (4.9)‡	23.6 (3.9)‡	67.9 (12.2)	14.6 (3.3)*	85.8 (4.9)*	51.0 (8.4)	60.1 (10.8)

Notes: *p ≤ .05 difference between male and female, or between the age group and age 65–74.

†p ≤ .01 difference between male and female, or between the age group and age 65–74.

‡p ≤ .001 difference between male and female, or between the age group and age 65–74.

Table 3. Logistic Regression Models of Predictors of Awareness, Treatment, and Control of Hypertension Among U.S. Adults 65 Years of Age and Older, National Health and Nutrition Examination Survey 1999–2004

	Hypertension		
	Awareness, OR (95% CI) (N = 2,190)	Treatment OR (95% CI) (N = 2,190)	Control Among Treated, OR (95% CI) (N = 1,391)
Sex			
Female	0.82 (0.62–1.09)	0.84 (0.64–1.12)	0.51 (0.39–0.68)‡
Male	1.0	1.0	1.0
Age (y)			
≥85	0.54 (0.40–0.72)‡	0.60 (0.45–0.81)‡	0.68 (0.37–1.23)
75–84	0.71 (0.53–0.95)*	0.70 (0.52–0.94)*	0.59 (0.44–0.80)‡
65–74	1.0	1.0	1.0
Education			
High school or more	0.93 (0.70–1.23)	0.88 (0.73–1.07)	1.18 (0.87–1.60)
Less than high school	1.0	1.0	1.0
Doctor visits past year			
≥10	5.13 (3.11–8.47)‡	5.84 (3.62–9.41)‡	1.48 (0.90–2.42)
2–9	3.83 (2.65–5.52)‡	4.09 (2.66–6.29)‡	1.21 (0.75–1.97)
1 or none	1.0	1.0	1.0
Married/living with partner			
Yes	0.91 (0.71–1.17)	0.96 (0.75–1.21)	0.76 (0.54–1.07)
No	1.0	1.0	1.0
Have usual health care provider			
Yes	2.87 (1.26–6.51)*	5.10 (2.65–9.83)‡	0.72 (0.36–1.43)
No	1.0	1.0	1.0
Household income			
<$15,000	1.30 (0.89–1.89)	1.20 (0.83–1.74)	0.91 (0.60–1.39)
$15,000 to <$45,000	1.03 (0.74–1.43)	0.97 (0.73–1.28)	0.92 (0.66–1.29)
≥$45,000	1.0	1.0	1.0

Notes: OR = odds ratio; CI = confidence interval.
*$p \leq .05$.
‡$p \leq .001$.

performed using SAS version 9.1 (SAS Institute Inc., Cary, NC, 2004), and standard errors and *p* values computed using the procedure SURVEYFREQ, which takes into account the effect on estimator variance attributable to the complex NHANES multistage stratified cluster sample design. To determine independent risk factors, multivariate logistic regression models were estimated incorporating covariates for sex, age, usual place of care, doctor visits in past year, household income, living with spouse/partner, and education level. The models were estimated using the SAS SURVEYLOGISTIC procedure.

RESULTS

Table 1 shows the characteristics of adults aged 65 and older in the United States. Based on NHANES 1999–2004, 55.2% are 65–74 years old, more than half of all elders are married or living with a partner, and virtually all older adults are insured.

The overall prevalence of hypertension (Table 2) among older adults is 70.8%, with prevalence increasing as age increases. Women have a significantly higher prevalence of hypertension than men (76.6% vs 63.0%) and a significantly lower rate of control on treatment (42.9% vs 57.9%). At 54.0%, blood pressure control is higher among the youngest old (age 65–74) compared with 41.7% and 44.6% in the two older age groups (ages 75–84, ≥85), respectively. Overall, 42% of older adults have uncontrolled isolated systolic hypertension (SBP ≥140 mm Hg and DBP <90 mm Hg [data not shown]). Women have significantly higher levels than men of isolated SBP ≥140 mm Hg and <160 mm Hg (28.6% vs 22.1%, *p* <.0002) and of isolated SBP of 160 mm Hg or greater (21.0% vs 10.1%, *p* < .0001). Isolated systolic hypertension accounts for 88.4% of undiagnosed hypertension among older adults.

Dyslipidemia prevalence (Table 2) is 60.3% overall. Men are significantly less likely to be aware of their condition than women (59.1% vs 71.1%), although both genders are equally likely to be treated (40.9% vs 45.1%). The oldest old have a significantly lower prevalence, are less aware, and have a lower treatment rate for dyslipidemia than the youngest old. Two thirds of all older adults medically treated for dyslipidemia reach their LDL cholesterol goal.

Table 4. Logistic Regression Models of Predictors of Awareness, Treatment, and Control of Dyslipidemia Among U.S. Adults Aged 65 and Older, National Health and Nutrition Examination Survey 1999–2004

	Dyslipidemia		
	Awareness, OR (95% CI) (N = 746)	Treatment, OR (95% CI) (N = 746)	Control Among Treated, OR (95% CI) (N = 286)
Sex			
Female	2.60 (1.74–3.88)‡	1.56 (1.10–2.22)*	1.19 (0.57–2.45)
Male	1.0	1.0	1.0
Age (y)			
≥85	0.29 (0.14–0.58)‡	0.38 (0.22–0.66)‡	1.36 (0.34–5.54)
75–84	0.98 (0.62–1.55)	0.91 (0.60–1.36)	0.99 (0.53–1.84)
65–74	1.0	1.0	1.0
Education			
High school or more	1.39 (1.03–1.87)*	1.62 (1.19–2.22)†	1.26 (0.84–1.89)
Less than high school	1.0	1.0	1.0
Doctor visits past year			
≥10	1.92 (1.09–3.37)*	3.27 (1.59–6.73)†	2.93 (1.03–8.33)*
2–9	1.89 (1.16–3.10)*	4.14 (2.33–7.36)‡	5.50 (2.29–13.21)‡
1 or none	1.0	1.0	1.0
Married/living with partner			
Yes	1.40 (0.78–2.51)	1.42 (0.88–2.31)	0.99 (0.44–2.23)
No	1.0	1.0	1.0
Have usual health care provider			
Yes	2.49 (0.99–6.27)	1.85 (0.53–6.43)	0.81 (0.29–2.22)
No	1.0	1.0	1.0
Household income			
<$15,000	0.36 (0.23–0.56)‡	0.61 (0.32–1.15)	0.39 (0.16–0.96)*
$15,000 to <$45,000	0.73 (0.48–1.12)	1.38 (0.79–2.41)	0.62 (0.32–1.20)
≥$45,000	1.0	1.0	1.0

Notes: OR = odds ratio; CI = confidence interval.

$*p \leq .05$.

$\dagger p \leq .01$.

$\ddagger p \leq .001$.

Diabetes (Table 2) affects 21.2% of adults 65 years of age and older. The awareness rate for diabetes (71.4%) is driven by a significantly higher awareness among women than among men (78.5% vs 63.6%). Half of all prevalent diabetes cases are treated pharmacologically, and only half of all treated cases reach HbA1c goal attainment of <7%.

Predictors of Awareness, Treatment, and Control

Tables 3, 4, and 5 present the results of estimating separate logistic regression models for the rates of awareness, pharmacologic treatment, and control of the three conditions, adjusting for the effects of age, sex, education, number of doctor visits, living arrangement, having a usual health care provider and annual household income.

For elders with hypertension, higher age is associated with lower rates of awareness (odds ratio [OR] = 0.71 [age 75–84] and 0.54 [age ≥85] vs age 65–74), treatment (OR = 0.70 [age 75–84] and 0.60 [age ≥85] vs age 65–74), and control (OR = 0.59 [age 75–84] vs age 65–74). Among those with dyslipidemia, the oldest (age ≥85) have significantly lower rates of awareness and treatment (OR = 0.29

and 0.38 vs age 65–74, respectively). Although there are no significant differences between the sexes in awareness or treatment for hypertension, women on treatment are only half as likely as men to have their blood pressure controlled (OR = 0.51). Women are more likely than men to be aware and treated for dyslipidemia (OR = 2.60 and 1.56, respectively) and more likely to be aware of their diabetes (OR = 3.14). There are no significant associations between education (high school or more) and awareness, treatment, or control of hypertension and diabetes, however, education is positively associated with awareness (OR = 1.39) and treatment (OR = 1.62) of dyslipidemia. The number of doctor visits in the past year is positively and strongly associated with awareness and treatment of all three conditions. Living arrangement (married/living with partner) is not associated with awareness, treatment, or control of any of the conditions. Elders who have a usual health care provider are far more likely than those who do not have a usual provider to be aware (OR = 2.87) and treated (OR = 5.10) for their hypertension. Elders with low annual household income (less than $15,000 in 2002 dollars) are much less likely than those with income more than $45,000 to be

Table 5. Logistic Regression Models of Predictors of Awareness, Treatment, and Control of Diabetes Among U.S. Adults Aged 65 and Older, National Health and Nutrition Examination Survey 1999–2004

	Diabetes		
	Awareness, OR (95% CI) (N = 284)	Treatment, OR (95% CI) (N = 284)	Control Among Treated, OR (95% CI) (N = 498)
Sex			
Female	3.14 (1.59–6.18)‡	1.59 (0.81–3.08)	1.00 (0.60–1.66)
Male	1.0	1.0	1.0
Age (y)			
≥85	2.20 (0.66–7.35)	0.91 (0.38–2.21)	2.16 (0.79–5.91)
75–84	0.60 (0.28–1.26)	0.87 (0.45–1.66)	1.43 (0.87–2.35)
65–74	1.0	1.0	1.0
Education			
High school or more	1.30 (0.64–2.64)	0.69 (0.38–1.28)	1.66 (0.92–2.97)
Less than high school	1.0	1.0	1.0
Doctor visits past year			
≥10	7.24 (3.02–17.33)‡	7.56 (2.29–24.91)‡	0.34 (0.07–1.64)
2–9	1.95 (0.93–4.09)	3.59 (1.26–10.22)*	0.37 (0.08–1.80)
1 or none	1.0	1.0	1.0
Married/living with partner			
Yes	1.71 (0.83–3.52)	1.02 (0.47–2.25)	0.72 (0.44–1.17)
No	1.0	1.0	1.0
Have usual health care provider			
Yes	0.57 (0.09–3.54)	1.43 (0.24–8.63)	1.51 (0.30–7.70)
No	1.0	1.0	1.0
Household income			
<$15,000	0.67 (0.21–2.20)	0.52 (0.20–1.36)	0.75 (0.37–1.51)
$15,000 to <$45,000	0.36 (0.15–0.85)*	0.49 (0.23–1.05)	0.81 (0.44–1.49)
≥$45,000	1.0	1.0	1.0

Notes: OR = odds ratio; CI = confidence interval.

*$p \leq .05$.

‡$p \leq .001$.

aware or controlled on treatment for their dyslipidemia (OR = 0.36 and 0.39, respectively). Those in the middle-income range of $15,000–$45,000 are less likely than persons with household income more than $45,000 to be aware of their diabetes (OR = 0.36).

DISCUSSION

Using the combined NHANES 1999–2004 data, these analyses provide up-to-date estimates of prevalence, awareness, treatment, and control of hypertension, dyslipidemia, and diabetes among adults aged 65 and older in the United States. Our results are consistent with previous studies of prevalence of these three cardiovascular risk factors in older adults (8–10,16,17); expand the body of knowledge regarding awareness, treatment, and control rates; and identify gender disparities among the rates.

We found that older women are more likely than older men to have hypertension, equally likely to be aware and treated, but less likely to have their blood pressure controlled on pharmacotherapy. Older women have a higher prevalence than men of isolated systolic hypertension. Ap-proximately half of all older adults treated for hypertension achieve blood pressure control. This finding is consistent with recent studies showing a positive trend of increasing blood pressure control among older adults (age ≥60) in the NHANES study population (18,21). The improvement in control may be due, in part, to physician education and changing practice patterns based on the JNC 7 guidelines (7). Notwithstanding this success, in the present study, women are only half as likely as men (after adjusting for covariates) to attain blood pressure goal. A similar finding for women (age ≥20) was reported in a previous NHANES 1999–2002 study of racial disparities in hypertension, after adjusting for race (22), suggesting that additional blood pressure control programs specifically targeted toward women are warranted. The paradigm shift of the JNC emphasizing the importance of diagnosing and treating systolic hypertension among older adults (23,24) further merits the need for such gender-specific programs.

We found the prevalence of dyslipidemia to be similar by gender, with women more likely to be aware and treated. Although overall treatment is only 43%, there has been a suggestive upward trend of pharmacological treatment for

dyslipidemia among older adults (age ≥60), based on estimates from the NHANES data (16). This trend may be attributed to some degree, to increasing adoption of the NCEP guidelines (4). Control rates for dyslipidemia in this study are similar by gender and by age groups.

Our study found that women with diabetes are more likely than men to be aware of their condition and that only 50% of patients on pharmacotherapy are controlled (HbA1c <7%). Other studies in various clinical settings have documented poor diabetes control among the elderly adults (25,26). This study provides newer evidence that confirms the need for improved quality of care.

In our study, treatment and goal attainment rates for all three conditions are suboptimal. Continued physician efforts to improve treatment rates and successfully treat patients to goal are needed. Although our study shows that increasing numbers of doctor visits are associated with awareness and treatment for all three conditions, and with goal attainment for dyslipidemia, the interpretation of this finding is ambiguous. It may be that more frequent visits provide added opportunity for physicians to detect and treat undiagnosed disease, or the causality may be reversed, and those who already are aware and/or treated make more visits for the purpose of refilling prescriptions or monitoring treatment effectiveness. The reasons for the visits cannot be determined using the NHANES data.

An important national public health effort to reduce CVD risk factor burden through the *Healthy People 2010* has had ongoing successes (16,27), and knowledge of our study's findings on gender differences in awareness and control may be useful to clinicians in the effort to improve outcomes.

The strengths of this study include its population-based sampling frame and the availability of clinical measurements to determine undiagnosed and diagnosed disease prevalence and to determine goal attainment. Additionally, using 6 years of NHANES data provides a large sample and precise estimates of conditions affecting older adults. To our knowledge, this is the first study to use NHANES 1999–2004 to report on the prevalence and management of CVD risk factors among adults 65 years and older. Such information may be helpful to health care decision makers. A limitation in our study is that physician-specific variables, such as practitioner age, group practice size and setting (eg, university medical center), and practice patterns are not available in NHANES. It is also likely that we overestimated blood pressure control rates. We used a blood pressure goal of <140/90 mm Hg for adults with hypertension with and without diabetes, a method that has been applied in other studies (8,9). The current blood pressure goal for adults with hypertension and with diabetes is <130/80 mm Hg (7). Applying this threshold to adults with hypertension and with diabetes would result in a lower estimate of blood pressure control (7,9).

Our study provides insight into a number of controllable risk factors affecting the U.S. population of adults 65 years

and older. This population has a high prevalence of hypertension, dyslipidemia, and diabetes. Women with hypertension are disproportionately affected by higher prevalence and lower control rates than men. Women with dyslipidemia or diabetes are more likely than men to be aware of their condition. Understanding gaps in awareness can lead to improved treatment rates. For all three conditions, improvements in treatment and control rates are needed. In light of the expected growth in this population, patient education and targeted efforts to improve disease management are clearly indicated.

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REFERENCES

1. Rosamond W, Flegal K, Friday G, et al. Heart disease and stroke statistics—2007 update: a report from the American Heart Association Statistics Committee and Stroke Statistics Subcommittee. *Circulation*. 2007;115:e69–e171.

2. U.S. Census Bureau, Population Division. Table 2: Annual estimates of the population by selected age groups and sex for the United States: April 1, 2000 to July 1, 2006 (NC-EST2005-02). Washington, DC: U.S. Census Bureau. Available at: http://www.census.gov/popest/national/asrh/NC-EST2005/NC-EST2005-02.xls. Accessed on April 11, 2007.

3. Agency for Healthcare Research and Quality. Total expenses for conditions by site of service: United States, 2004. Medical Expenditure Panel Survey Component Data (generated interactively). Rockville, Md: Agency for Healthcare Research and Quality. Available at: http://www.meps.ahrq.gov/mepsweb. Accessed on March 16, 2007.

4. Expert Panel on Detection, Evaluation, And Treatment of High Blood Cholesterol In Adults (Adult Treatment Panel III). Executive Summary of The Third Report of The National Cholesterol Education Program (NCEP). *JAMA*. 2001;285:2486–2497.

5. 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;110:227–239.

6. Grundy SM, Benjamin IJ, Burke GL, et al. Diabetes and cardiovascular disease: a statement for healthcare professionals from the American Heart Association. *Circulation*. 1999;100:1134–1146.

7. Chobanian AV, Bakris GL, Black HR, et al. Seventh report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. *Hypertension*. 2003;42:1206–1252.

8. Fields LE, Burt VL, Cutler JA, Hughes J, Roccella EJ, Sorlie P. The burden of adult hypertension in the United States 1999 to 2000: a rising tide. *Hypertension*. 2004;44:398–404.

9. Hajjar I, Kotchen TA. Trends in prevalence, awareness, treatment, and control of hypertension in the United States, 1988–2000. *JAMA*. 2003; 290:199–206.

10. Smith NL, Savage PJ, Heckbert SR, et al. Glucose, blood pressure, and lipid control in older people with and without diabetes mellitus: the Cardiovascular Health Study. *J Am Geriatr Soc*. 2002;50:416–423.

11. Heron MP, Smith BL. Deaths: leading causes for 2003. *Natl Vital Stat Rep*. 2007;55:1–92.

12. He W, Sengupta M, Velkoff VA, et al. 2005. *U.S. Census Bureau, Current Population Reports, P23-209. 65+ in the United States: 2005*. Washington, DC: U.S. Government Printing Office; 2005.

13. Hogan P, Dall T, Nikolov P. Economic costs of diabetes in the US in 2002. *Diabetes Care*. 2003;26:917–932.

14. Druss BG, Marcus SC, Olfson M, Tanielian T, Elinson L, Pincus HA. Comparing the national economic burden of five chronic conditions. *Health Aff (Millwood)*. 2001;20:233–241.

15. National Center for Health Statistics. Centers for Disease Control and Prevention. National Health and Nutrition Examination Survey. Hyattsville, Md: National Center for Health Statistics. Centers for Disease Control and Prevention. Available at: http://www.cdc.gov/nchs/nhanes.htm. Accessed on April 11, 2007.

16. Carroll MD, Lacher DA, Sorlie PD, et al. Trends in serum lipids and lipoproteins of adults, 1960–2002. *JAMA*. 2005;294:1773–1781.

17. Cowie CC, Rust KF, Byrd-Holt DD, et al. Prevalence of diabetes and impaired fasting glucose in adults in the U.S. population: National Health And Nutrition Examination Survey 1999–2002. *Diabetes Care*. 2006;29:1263–1268.

18. Ong KL, Cheung BM, Man YB, Lau CP, Lam KS. Prevalence, awareness, treatment, and control of hypertension among United States adults 1999–2004. *Hypertension*. 2007;49:69–75.

19. Ostchega Y, Dillon CF, Hughes JP, et al. Prevalence, awareness, treatment, and control in older U.S. adults: data from the National Health and Nutrition Examination Survey 1988 to 2004. *JAGS*. 2007; 55:1056–1065.

20. Report of the Expert Committee on the Diagnosis and Classification of Diabetes Mellitus. *Diabetes Care*. 2003;26(Supp l):S5–S20.

21. Cheung BM, Ong KL, Man YB, Lam KS, Lau CP. Prevalence, awareness, treatment, and control of hypertension: United States National Health and Nutrition Examination Survey 2001–2002. *J Clin Hypertens (Greenwich)*. 2006;8:93–98.

22. Hertz RP, Unger AN, Cornell JA, Saunders E. Racial disparities in hypertension prevalence, awareness, and management. *Arch Intern Med*. 2005;165:2098–2104.

23. Izzo JL, Levy DL, Black HR. Importance of systolic blood pressure in older Americans. *Hypertension*. 2000;35:1021–1024.

24. Chobanian AV. Isolated systolic hypertension in the elderly. *N Engl J Med*. 2007;357:789–796.

25. McBean AM, Huang Z, Virnig BA, Lurie N, Musgrave D. Racial variation in the control of diabetes among elderly Medicare managed care beneficiaries. *Diabetes Care*. 2003;26:3250–3256.

26. Huang ES, Sachs GA, Chin MH. Implications of new geriatric diabetes care guidelines for the assessment of quality of care in older patients. *Med Care*. 2006;44:373–377.

27. U.S. Department of Health and Human Services, Office of Disease Prevention and Health Promotion. *Healthy People 2010, Objectives for Improving Health (Part A: Focus Areas 5, 12)*. Rockville, Md: U.S. Department of Health and Human Services, Office of Disease Prevention and Health Promotion. Available at http://www.healthy-people.gov/document/tableofcontents.htm#parta. Accessed on April 11, 2007.