Undiagnosed Hypertension and Hypercholesterolemia Among Uninsured and Insured Adults in the Third National Health and Nutrition Examination Survey

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Uninsured adults are much less likely than insured adults to receive routine checkups or preventive services, including screening for hypertension and hypercholesterolemia.[1] To obtain nationally representative estimates of undiagnosed hypertension and hypercholesterolemia by insurance status, we analyzed the Third National Health and Nutrition Examination Survey (NHANES III).[2,3]

METHODS

The NHANES III was conducted during 1988 through 1994 by the National Center for Health Statistics in a probability sample of the civilian, noninstitutionalized US population. Of the 39 695 people sampled, 33 994 (85.6%) completed a standardized

English or Spanish interview, and 30 818 (77.6%) underwent clinical testing at an examination center.[4] Participants reported their health insurance during the prior month, sociodemographic characteristics (age, gender, race/ethnicity, income, education, region), access to care (regular site of care, regular provider, last contact with health professional), previous diagnoses of hypertension and hypercholesterolemia, and current use of prescribed medicines for these conditions. Blood pressure and serum cholesterol were measured with standardized protocols.[5,6] We defined *hypertension* as average systolic blood pressure readings greater than 140 mm Hg or diastolic blood pressure readings greater than 90 mm Hg or taking antihypertensive medicine, and we defined *hypercholesterolemia* as a serum cholesterol level greater than 240 mg/dL or taking lipid-lowering medicine.[3,5,7–10]

We studied 10 998 adults aged 25 to 64 years who reported their insurance status. In descriptive analyses, we assessed the proportions of adults with undiagnosed hypertension and hypercholesterolemia by insurance status, sociodemographic characteristics, and access to care. We used logistic regression to assess the adjusted relative odds of undiagnosed hypertension and hypercholesterolemia by insurance status, and we controlled for the sociodemographic characteristics listed in the previous paragraph. We then added the 3 access measures mentioned earlier as potential mechanisms of insurance effects. We used CAT statistical software to obtain multiple imputed values for respondents with missing data on income (6.2%) and education (0.5%).[11] We used SUDAAN software to calculate accurate standard errors and statistical tests under the complex survey design.[12,13]

RESULTS

Among the 10 998 adults aged 25 to 64 years who reported their insurance status, 10 946 (99.5%) had their blood pressure recorded, and 10 387 (94.4%) underwent serum cholesterol testing. In each of these groups, 13.2% of the adults were uninsured. Uninsured adults had a lower prevalence of hypercholesterolemia than did insured adults

TABLE 1—Characteristics of Uninsured and Insured Adults Aged 25–64 Years With Hypertension and Hypercholesterolemia

Characteristic	Adults With Hypertension[a]			Adults With Hypercholesterolemia[a]		
	Uninsured, % (n = 343)	Insured, % (n = 2031)	P[b]	Uninsured, % (n = 322)	Insured, % (n = 1630)	P[b]
Age, y			.22			.12
25–34	14.6	9.4		24.9	15.5	
35–44	23.9	24.6		34.1	24.3	
45–54	29.1	27.3		22.4	28.6	
55–64	32.4	38.8		18.6	31.6	
Female	52.7	43.9	.02	53.8	49.8	.48
Race/Ethnicity			.03			<.001
White	60.6	74.6		57.0	80.9	
Black	19.6	17.1		11.6	8.5	
Hispanic	17.7	6.0		30.8	7.7	
Other	2.1	2.3		0.8	2.9	
Annual family income, $			<.001			<.001
<15 000	51.6	16.7		50.3	11.4	
15 000–24 999	23.1	17.8		23.3	17.6	
25 000–34 999	8.8	17.2		14.5	16.9	
35 000–49 999	9.9	20.0		6.9	24.5	
≥ 50 000	6.6	26.2		5.0	29.6	
Education			<.001			<.001
< High school graduate	40.1	26.8		47.9	21.6	
High school graduate	53.6	55.5		38.9	58.0	
College graduate	6.3	17.7		13.3	20.4	
Region			.15			.02
Northeast	12.0	22.6		10.2	26.0	
Midwest	26.2	23.1		18.5	23.0	
South	48.7	38.5		46.8	32.0	
West	13.1	15.8		24.5	19.0	
Regular site of care	68.6	88.6	<.001	62.4	84.5	.001
Regular health care provider	58.3	78.9	<.001	45.6	74.5	<.001
Last contact with a health professional, mo			.002			.03
<11	67.0	82.0		64.1	78.6	
12–23	8.5	6.5		11.7	7.2	
24–59	13.6	7.2		14.2	8.2	
≥ 60	10.7	4.3		10.0	6.1	

[a]Percentages are weighted to represent the civilian, noninstitutionalized US population.
[b]Pearson χ^2 test used.

(15.8% vs 19.3%, P=.04) and a similar rate of hypertension (14.7% vs 17.1%, P=.14). Compared with insured adults, uninsured adults with each condition were younger and more likely to be Hispanic and had lower income, less education, and worse access to care (Table 1).

Among adults with hypertension or hypercholesterolemia, those without health insurance were significantly more likely than insured adults to be unaware of their condition (Table 2). Undiagnosed hypertension was more common in younger adults, men, and people with less access to care. Undiagnosed hypercholesterolemia was more common among younger adults, Black adults, and those with low incomes or less access to care.

After we adjusted for sociodemographic characteristics, uninsured adults were significantly more likely than insured adults to be unaware of their hypertension (odds ratio [OR]=1.93; 95% confidence interval [CI]=1.24, 3.02; P=.004) or hypercholesterolemia (OR=1.97; 95% CI=1.23, 3.15; P=.005). With further adjustment for access measures, differences by insurance status were substantially reduced and not statistically significant for undiagnosed hypertension (OR=1.47; 95% CI=0.89, 2.45; P=.13) but remained significant for undiagnosed hypercholesterolemia (OR=1.66; 95% CI=1.01, 2.71; P=.04). Adults without recent contact with a health professional (e.g., more than 5 years vs less than 1 year) were much more likely to have undiagnosed hypertension (adjusted OR=5.28; 95% CI=2.72, 10.24; P<.001) and hypercholesterolemia (adjusted OR=4.76; 95% CI=2.07, 10.92; P<.001). Young adults also were significantly more likely to be unaware of these conditions. Race, ethnicity, income, and region were not associated with either condition being undiagnosed in multivariate models, and interactions of insurance status with race, ethnicity, and income were not statistically significant (data not shown).

DISCUSSION

Uninsured adults were much less likely to be aware of their hypertension and hypercholesterolemia than insured adults with these conditions. Basic measures of access to care explained much of these differences. Among long-term uninsured adults, these conditions probably remain undetected even more commonly than among all uninsured adults.[1]

Strengths of our study included the nationally representative sample and standardized clinical measurements. We did not have longitudinal data, however, to assess whether undiagnosed cardiovascular risk factors were associated with worse clinical outcomes. A prior study of earlier NHANES I participants found that adjusted mortality was significantly higher for uninsured adults than for privately insured adults.[14]

To achieve better outcomes, awareness of hypertension and hypercholesterolemia must be followed by changes in lifestyle or use of effective drugs that reduce blood pressure or lipid levels.[9,10] In our study, hypertension and hypercholesterolemia were

TABLE 2—Proportions of Adults Aged 25–64 Years With Undiagnosed Hypertension and Hypercholesterolemia, by Insurance Status and Other Characteristics

Characteristic	% With Undiagnosed Hypertension[a]	P[b]	% With Undiagnosed Hypercholesterolemia[a]	P[b]
Insurance status		.03		<.001
Uninsured	41.0		70.6	
Insured	28.6		51.2	
Age, y		.05		<.001
25–34	43.1		76.0	
35–44	30.3		60.2	
45–54	26.1		47.5	
55–64	29.3		40.2	
Gender		<.001		.12
Female	22.1		50.9	
Male	36.5		55.6	
Race/Ethnicity		.07		<.001
White	28.9		51.5	
Black	27.8		63.6	
Hispanic	37.7		51.9	
Other	59.7		74.8	
Annual family income, $		.64		.02
<15 000	29.1		62.2	
15 000–24 999	33.7		53.2	
25 000–34 999	27.2		51.4	
35 000–49 999	30.3		56.8	
≥ 50 000	29.8		46.3	
Education		.12		.81
<High school graduate	25.4		54.9	
High school graduate	31.0		53.1	
College graduate	34.3		51.7	
Region		.15		.03
Northeast	33.2		56.6	
Midwest	26.4		43.0	
South	28.3		56.8	
West	35.5		54.8	
Regular site of care		<.001		.003
No	55.4		66.5	
Yes	26.0		50.4	
Regular health care provider		<.001		<.001
No	47.9		67.0	
Yes	24.6		47.8	
Last contact with a health professional, mo		<.001		<.001
<11	23.9		46.8	
12–23	41.0		67.1	
24–59	57.4		78.1	
≥60	70.3		80.0	

[a]Percentages are weighted to represent the civilian, noninstitutionalized US population.
[b]Pearson χ^2 test used.

often undetected among both uninsured and insured adults who had seen a health professional in the prior year, so more systematic efforts are needed to diagnose these conditions among all adults.[3,9,10,15] Our findings suggest that uninsured adults in particular would benefit from detecting and treating these insidious risk factors for adverse cardiovascular outcomes. ■

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Human Participant Protection
Because this study used publicly available anonymous data, it was deemed exempt from human subjects review by the committee on human studies at Harvard Medical School.

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