

## Vital Signs: Awareness and Treatment of Uncontrolled Hypertension Among Adults — United States, 2003–2010

### Abstract

**Background:** Hypertension is a leading risk factor for cardiovascular disease and a significant cause of morbidity and mortality. This report uses data from the National Health and Nutrition Examination Survey (NHANES) to examine awareness and pharmacologic treatment of uncontrolled hypertension among U.S. adults with hypertension and focuses on three groups: those who are unaware of their hypertension, those who are aware but not treated with medication, and those who are aware and pharmacologically treated with medication but still have uncontrolled hypertension.

**Methods:** CDC analyzed data from the NHANES 2003–2010 to estimate the prevalence of hypertension awareness and treatment among adults with uncontrolled hypertension. Hypertension was defined as an average systolic blood pressure (SBP)  $\geq 140$  mmHg or an average diastolic blood pressure (DBP)  $\geq 90$  mmHg, or currently using blood pressure (BP)-lowering medication. Uncontrolled hypertension was defined as an average SBP  $\geq 140$  mmHg or an average DBP  $\geq 90$  mmHg, among those with hypertension.

**Results:** The overall prevalence of hypertension among U.S. adults aged  $\geq 18$  years in 2003–2010 was 30.4% or an estimated 66.9 million. Among those with hypertension, an estimated 35.8 million (53.5%) did not have their hypertension controlled. Among these, an estimated 14.1 million (39.4%) were not aware of their hypertension, an estimated 5.7 million (15.8%) were aware of their hypertension but were not receiving pharmacologic treatment, and an estimated 16.0 million (44.8%) were aware of their hypertension and were being treated with medication. Of the 35.8 million U.S. adults with uncontrolled hypertension, 89.4% reported having a usual source of health care, and 85.2% reported having health insurance.

**Implications for Public Health Practice:** Nearly 90% of U.S. adults with uncontrolled hypertension have a usual source of health care and insurance, representing a missed opportunity for hypertension control. Improved hypertension control will require an expanded effort and an increased focus on BP from health-care systems, clinicians, and individuals.

### Introduction

Hypertension is a leading risk factor for cardiovascular disease, a major cause of morbidity and mortality, and costs \$131 billion annually in health-care expenditures (1–3). A previous report documented that during 2005–2008, nearly one third of U.S. adults had hypertension, and less than half had it under control (4). Uncontrolled hypertension among adults with hypertension is associated with increased mortality (5). Adequate hypertension treatment and control can reduce the incidence of first and recurrent heart attacks and strokes, heart failure, and chronic

kidney disease, and can save lives (1,2,5,6). This report uses data from the National Health and Nutrition Examination Survey (NHANES) to examine awareness and treatment among U.S. adults with uncontrolled hypertension. This report focuses on three groups of adults with uncontrolled hypertension: those who are unaware of their hypertension, those who are aware but not treated with medication, and those who are aware and treated with medication but still have uncontrolled hypertension. The findings in this report can be used to target populations to improve hypertension control in the United States.



## Methods

NHANES is a complex, multistage probability sample of the U.S. civilian, noninstitutionalized population (7). The survey includes a household interview and a detailed physical examination. To obtain statistically stable estimates, data were analyzed from the most recent four 2-year survey cycles (2003–2010) in which a total of 22,992 participants aged  $\geq 18$  years were interviewed and examined.\* Excluded from this analysis were pregnant women ( $n = 732$ ), those missing blood pressure (BP) measurements or missing information on self-reported current use of hypertension medication ( $n = 1,318$ ), and participants missing data on covariates of interest ( $n = 183$ ). Some participants were excluded based on more than one criterion, yielding an eligible sample of 20,811. Hypertension was defined as an average systolic BP (SBP)  $\geq 140$  mmHg or an average diastolic BP (DBP)  $\geq 90$  mmHg, based on the average of up to three BP measurements<sup>†</sup> (7), or currently using BP-lowering medication. Uncontrolled hypertension was defined as an average SBP  $\geq 140$  mmHg or an average DBP  $\geq 90$  mmHg, among those with hypertension. Participants with uncontrolled hypertension were considered aware of their condition if they responded “yes” to the question “Have you ever been told by a doctor or other health professional that you had hypertension, also called high blood pressure?” Participants were classified as being treated for their hypertension if they answered “yes” to both of the following questions: “Because of your high blood pressure/hypertension, have you ever been told to take prescribed medicine?” and “Are you currently taking medication to lower your blood pressure?” Health insurance coverage referred to coverage at the time of interview; public insurance includes Medicaid, Children’s Health Insurance Program (CHIP), state-sponsored or other government-sponsored health plan, Medicare, or military health plan (e.g., TRICARE, VA, or CHAMP-VA). The prevalence of uncontrolled hypertension was examined among those with hypertension, as well as the prevalence of awareness and treatment among those with uncontrolled hypertension. In addition, the prevalence of stage 2 hypertension (SBP  $\geq 160$  mmHg or DBP  $\geq 100$  mmHg) was estimated among those with uncontrolled hypertension (1).

All analyses were conducted using statistical software to account for sampling weights and to adjust variance estimates for the multistage, clustered sample design. Because trends over time were not examined and multiple cycles of the survey were collapsed, prevalence estimates were not age

\* Mobile examination center response rates for NHANES ranged from 75% to 77% during the study period.

<sup>†</sup> This study used the average of up to three BP measurements, obtained under standardized conditions during a single physical examination at the mobile examination center. Approximately 95% of participants had two or three complete BP measurements during the study period. For participants with only one BP measurement, that single measurement was used.

adjusted. Population counts were calculated using the Current Population Surveys provided by NHANES, by averaging the population for the four cycles examined.<sup>§</sup>

## Results

The overall prevalence of hypertension among U.S. adults aged  $\geq 18$  years during 2003–2010 was 30.4%, representing an estimated 66.9 million persons, of whom an estimated 35.8 million (53.5%) had uncontrolled hypertension (Figure). The prevalence of uncontrolled hypertension among adults with hypertension was highest among those who reported receiving no medical care in the previous year (93.3%), those without a usual source of health care (87.4%), and those without health insurance (71.8%) (Table 1). Among the 35.8 million persons with uncontrolled hypertension, 32.0 million (89.4%) reported having a usual source of health care, 31.4 million (87.7%) received medical care in the previous year, and 30.5 million (85.2%) had health insurance. More than half (51.8%), an estimated 14.1 million, of Medicare beneficiaries with hypertension had uncontrolled hypertension. Approximately 9.1 million adults had stage 2 hypertension, representing 13.6% of all adults with hypertension and 25.4% of those with uncontrolled hypertension.

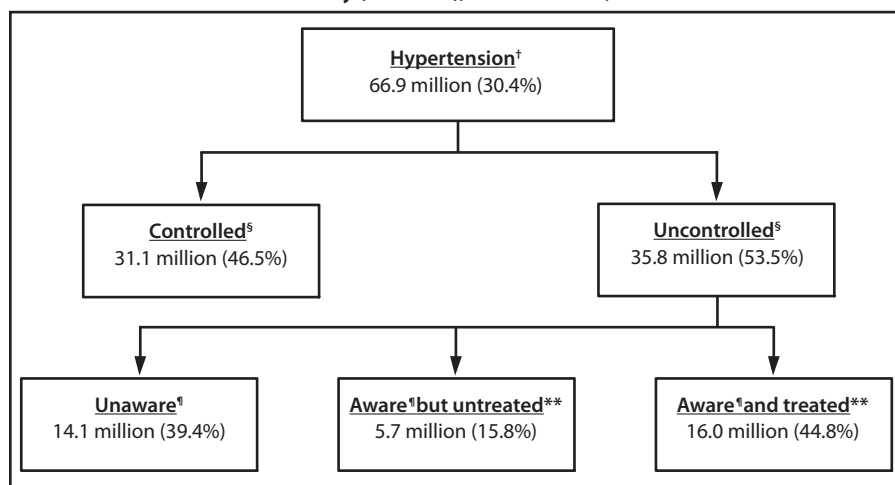
Among adults with uncontrolled hypertension, an estimated 14.1 million (39.4%) were unaware of their hypertension (Table 2); the prevalence of being unaware was highest among those who reported not receiving health care in the previous year (71.5%), those without a usual source of health care (64.3%), adults aged 18–44 years (56.6%), and those without health insurance (51.9%). An estimated 5.7 million adults (15.8%) were aware but not pharmacologically treated for hypertension; the prevalence of being aware yet untreated for hypertension was highest among those without a usual source of health care (25.6%), adults aged 18–44 years (25.4%), those of Hispanic ethnicity other than Mexican-Americans (24.8%), and those without health insurance (23.5%). An estimated 16.0 million (44.8%) were aware of their hypertension and pharmacologically treated; the prevalence of being aware and treated with medication was highest among Medicare beneficiaries (60.6%), those aged  $\geq 65$  years (59.9%), and those who reported receiving medical care two or more times in the previous year (55.3%).

## Conclusion and Comment

The results of this analysis indicate that more than half (53.5%) of the estimated 66.9 million U.S. adults with hypertension had uncontrolled hypertension during the

<sup>§</sup> Additional information is available at [http://www.cdc.gov/nchs/nhanes/response\\_rates\\_cps.htm](http://www.cdc.gov/nchs/nhanes/response_rates_cps.htm)

**FIGURE.** Number and percentage of adults aged  $\geq 18$  years who had hypertension, who had controlled or uncontrolled hypertension, and who were aware and/or pharmacologically treated for hypertension among those with uncontrolled hypertension — National Health and Nutrition Examination Survey (NHANES), United States, 2003–2010\*



\* Weighted population counts based on the Current Population Survey totals averaged across the four NHANES cycles (2003–2004, 2005–2006, 2007–2008, and 2009–2010).

† Hypertension is defined as an average systolic blood pressure  $\geq 140$  mmHg, an average diastolic blood pressure  $\geq 90$  mmHg, or reported current use of blood pressure–lowering medication.

§ Uncontrolled hypertension is defined as an average systolic blood pressure  $\geq 140$  mmHg or an average diastolic blood pressure  $\geq 90$  mmHg, among those with hypertension.

¶ Unaware defined as a “no” answer to the question, “Have you ever been told by a doctor or other health professional that you had hypertension, also called high blood pressure?” Aware defined as a “yes” answer to that question. Calculated among those with uncontrolled hypertension.

\*\* Treated defined as an answer of “yes” to both of the following questions: “Because of your high blood pressure/hypertension, have you ever been told to take prescribed medicine?” and “Are you currently taking medication to lower your blood pressure?” Untreated defined as an answer of “no” to either of these questions. Calculated among those with uncontrolled hypertension.

period 2003–2010. Nearly 90% of the 35.8 million U.S. adults with uncontrolled hypertension had a usual source of health care, had health insurance coverage, and received health care in the previous year, all of which indicate potential missed opportunities by individuals, health-care providers, and health-care systems to improve hypertension control. Improved hypertension control will require an expanded effort and increased focus on hypertension from patients, health-care systems, and clinicians.

Hypertension control can be challenging to achieve, with barriers to hypertension control attributed to patients, health-care providers, and health-care systems, and the silent nature of the disease (8). Moreover, even modest elevations in BP increase the risk for cardiovascular disease and mortality. For every 20-mmHg increase in SBP beginning at 115 mmHg, or 10-mmHg increase in DBP beginning at 75 mmHg, mortality from ischemic heart disease and stroke are doubled (1). Furthermore, nearly 30% of adults with uncontrolled hypertension who are aware of their hypertension and pharmacologically treated have stage 2 hypertension (SBP  $\geq 160$  mmHg or DBP  $\geq 100$  mmHg); these patients have significantly elevated BP and are at high risk for adverse cardiovascular

events (1). Increased focus on BP from clinicians and health-care systems is essential for improving hypertension control, with all health-care providers participating, not just primary-care providers. Clinical strategies to improve hypertension control include using evidence-based practice guidelines, innovative health-care delivery models, such as team-based care, patient-centered medical homes, and interventions to promote medication adherence (Box). Team-based care, recommended by the Community Preventive Services Task Force, promotes improved communication with patients and other health-care providers and adherence to evidence-based guidelines, such as BP guidelines from the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (1,9,10). In addition, individuals also can play an important role in achieving greater hypertension control by improving medication adherence, measuring their own BP, and eating a lower-sodium diet.

BP screening, measurement, and control are key performance measures for several quality-improvement and reporting initiatives from the Centers for Medicare & Medicaid Services and other health-improvement initiatives and are based on National Quality Forum and Healthcare Effectiveness Data and Information Set hypertension-control measures. A number of programs contain quality reporting measures addressing hypertension control.<sup>‡</sup> BP measures are key components of most electronic health records (EHRs). Health information technology, including EHRs, registries, and clinical decision support, helps clinicians improve care and target interventions to patients needing intensified care (9). A recent

<sup>‡</sup> Information about the Physician Quality Reporting System, for example, is available at [https://www.cms.gov/medicare/quality-initiatives-patient-assessment-instruments/pqrs/downloads/2012pqrs\\_medicareehr-incentpilot\\_final508\\_1-13-2012.pdf](https://www.cms.gov/medicare/quality-initiatives-patient-assessment-instruments/pqrs/downloads/2012pqrs_medicareehr-incentpilot_final508_1-13-2012.pdf). Information about Meaningful Use Stage 1 and 2 Clinical Quality Measures is available at [http://www.hrsa.gov/healthit/meaningfuluse/mu%20stage1%20cqm/mucqm\\_.html](http://www.hrsa.gov/healthit/meaningfuluse/mu%20stage1%20cqm/mucqm_.html) and <http://www.gpo.gov/fdsys/pkg/FR-2012-03-07/pdf/2012-4443.pdf>, respectively. Information about the Million Hearts initiative is available at <http://millionhearts.hhs.gov/aboutmh/achieving-goals.html>. Information about the Healthcare Effectiveness Data and Information Set is available at <http://www.ncqa.org/LinkClick.aspx?fileticket=J8kEuhuPqk%3d&tabid=836>. Information about the National Committee for Quality Assurance’s recognition program for patient-centered medical homes is available at <http://www.ncqa.org/tabid/631/default.aspx>. Information about Accountable Care Organizations is available at [http://www.cms.gov/medicare/medicare-fee-for-service-payment/sharesavingsprogram/downloads/aco\\_qualitymeasures.pdf](http://www.cms.gov/medicare/medicare-fee-for-service-payment/sharesavingsprogram/downloads/aco_qualitymeasures.pdf). Finally, information about *Healthy People 2020* is available at <http://www.healthypeople.gov/2020/topics/objectives2020/objectiveslist.aspx?topicid=21>.

**TABLE 1. Prevalence of uncontrolled hypertension\* among adults aged ≥18 years with hypertension,† by selected characteristics — National Health and Nutrition Examination Survey (NHANES), United States, 2003–2010**

Characteristic	No. in sample <sup>§</sup>	% <sup>¶</sup>	(95% CI)	No.**	p-value <sup>††</sup>
<b>Total</b>	<b>7,350</b>	<b>53.5</b>	<b>(51.5–55.4)</b>	<b>35.8</b>	
<b>Sex</b>					
Men	3,626	55.0	(52.3–57.7)	17.5	0.034
Women	3,724	52.1	(50.1–54.1)	18.4	
<b>Age group (yrs)</b>					
18–44	867	61.6	(56.7–66.3)	6.6	<0.001
45–64	2,872	51.1	(48.3–54.0)	15.3	
≥65	3,611	53.0	(50.9–55.1)	13.4	
65–79	2,538	49.7	(47.3–52.0)	9.0	
≥80	1,073	62.1	(58.4–65.7)	4.5	
<b>Race/Ethnicity<sup>§§</sup></b>					
White, non-Hispanic	3,792	51.5	(49.2–53.9)	24.9	<0.001 <sup>¶¶¶</sup>
Black, non-Hispanic	1,798	57.0	(54.3–59.7)	5.4	
Hispanic	1,498	63.1	(59.5–66.6)	3.5	<0.001 <sup>****</sup>
Mexican-American	1,062	64.6	(61.7–67.3)	2.2	
Other Hispanic	436	60.7	(52.9–68.0)	1.4	
<b>Poverty to income ratio<sup>¶¶</sup></b>					
<100%	1,163	59.0	(54.4–63.6)	4.0	<0.001
100%–299%	3,210	55.6	(53.0–58.1)	14.3	
300%–499%	1,317	52.1	(48.4–55.9)	8.0	
≥500%	1,108	47.5	(44.3–50.8)	7.1	
<b>Education (among those aged ≥25 yrs)</b>					
<High school diploma	2,461	57.4	(54.9–59.8)	8.7	<0.001
High school diploma	1,868	53.2	(50.3–56.1)	9.9	
Some college	1,791	54.4	(51.0–57.6)	10.1	
≥College degree	1,152	47.0	(42.9–51.1)	6.5	
<b>Usual source of care<sup>***</sup></b>					
Yes	6,869	51.1	(49.2–53.1)	32.0	<0.001
No	481	87.4	(81.6–91.5)	3.8	
<b>Times received health care in past 12 mos<sup>†††</sup></b>					
0	538	93.3	(89.6–95.7)	4.3	<0.001
1	797	68.0	(62.1–73.4)	5.6	
≥2	6,015	47.8	(45.9–49.7)	25.8	
<b>Health insurance status<sup>§§§</sup></b>					
Any health insurance	6,433	51.2	(49.3–53.2)	30.5	<0.001 <sup>††††</sup>
Medicare	3,697	51.8	(49.8–53.9)	14.1	
Private	2,142	51.0	(47.9–54.1)	14.1	<0.001 <sup>§§§§</sup>
Public	594	49.1	(43.3–54.9)	2.3	
Uninsured	917	71.8	(67.9–75.3)	5.3	

**Abbreviation:** CI = confidence interval.

\* Uncontrolled hypertension was defined as an average systolic blood pressure ≥140 mmHg or an average diastolic blood pressure ≥90 mmHg. Calculated among those with hypertension. Pregnant women were excluded.

† Hypertension was defined as an average systolic blood pressure ≥140 mmHg, or an average diastolic blood pressure ≥90 mmHg, or self-reported current use of blood pressure-lowering medication.

§ Unweighted sample size.

¶ Weighted, unadjusted estimates.

\*\* Weighted population counts (in millions) based on the Current Population Survey totals averaged across the four NHANES cycles (2003–2004, 2005–2006, 2007–2008, and 2009–2010).

†† Unadjusted chi-square test for differences in the prevalence of uncontrolled hypertension by characteristics. Those of “other” racial/ethnic groups, those missing poverty to income ratio, or those aged <25 years (for education status) were not included in tests of independence between those subgroups and blood pressure control.

§§ Participants of other racial/ethnic groups included in analysis but not reported.

¶¶ Participants missing poverty to income ratio included in analysis but not reported.

\*\*\* Participants were asked, “Is there a place that you usually go when you are sick or need advice about your health?” Yes responses include those who answered “yes” or “there is more than one place.”

††† Participants were asked, “During the last 12 months how many times have you seen a doctor or other health professional about your health at a doctor’s office, a clinic, hospital emergency room, at home or some other place? Do not include times you were hospitalized overnight.”

§§§ Medicare includes all participants who had Medicare. Private does not include those participants with Medicare. Other public insurance includes participants who only reported Indian Health Service. Uninsured includes participants with single service plan only.

¶¶¶ Unadjusted chi-square test of independence for the prevalence of uncontrolled hypertension between the following racial/ethnic groups: non-Hispanic white, non-Hispanic black, and Hispanics.

\*\*\*\* Unadjusted chi-square test of independence for the prevalence of uncontrolled hypertension between the following racial/ethnic groups: non-Hispanic white, non-Hispanic black, Mexican-American, and other Hispanic.

†††† Unadjusted chi-square test of independence for the prevalence of uncontrolled hypertension between having any health insurance versus having no health insurance.

§§§§ Unadjusted chi-square test of independence for the prevalence of uncontrolled hypertension between the following health insurance status groups among those with any health insurance: Medicare, private insurance, and public insurance.

**TABLE 2. Prevalence of awareness\* and pharmacologic treatment status† among adults aged ≥18 years with uncontrolled hypertension,§ by selected characteristics — National Health and Nutrition Examination Survey (NHANES), United States, 2003–2010**

Characteristic	No. in sample¶	Unaware*			Aware* and untreated†			Aware* and treated†			p-value§§
		%**	(95% CI)	No.††	%**	(95% CI)	No.††	%**	(95% CI)	No.††	
<b>Total</b>	<b>4,056</b>	<b>39.4</b>	<b>(37.2–41.5)</b>	<b>14.1</b>	<b>15.8</b>	<b>(14.0–17.8)</b>	<b>5.7</b>	<b>44.8</b>	<b>(42.5–47.2)</b>	<b>16.0</b>	
<b>Sex</b>											
Men	2,047	43.7	(40.8–46.8)	7.6	18.3	(15.9–20.9)	3.2	38.0	(35.3–40.8)	6.6	<0.001
Women	2,009	35.0	(32.3–37.9)	6.4	13.4	(11.2–16.1)	2.5	51.6	(48.7–54.4)	9.5	
<b>Age group (yrs)</b>											
18–44	570	56.6	(51.4–61.7)	3.7	25.4	(21.0–30.3)	1.7	18.0	(14.7–21.9)	1.2	
45–64	1,500	38.4	(35.3–41.6)	5.9	19.1	(16.6–22.0)	2.9	42.5	(39.1–45.9)	6.5	
≥65	1,986	32.4	(29.7–35.2)	4.4	7.7	(6.3–9.3)	1.0	59.9	(57.3–62.5)	8.0	<0.001
65–79	1,309	31.2	(27.6–35.0)	2.8	7.3	(5.7–9.5)	0.7	61.5	(58.0–64.8)	5.5	
≥80	677	35.1	(31.2–39.1)	1.6	8.3	(6.3–11.0)	0.4	56.6	(52.5–60.6)	2.6	<0.001
<b>Race/Ethnicity¶¶</b>											
White, non-Hispanic	1,987	40.4	(37.6–43.2)	10.0	15.3	(13.1–17.8)	3.8	44.3	(41.5–47.2)	11.0	0.001****
Black, non-Hispanic	1,017	33.2	(29.4–37.3)	1.8	15.6	(13.5–17.9)	0.8	51.2	(47.0–55.4)	2.7	
Hispanic	899	43.8	(39.5–48.2)	1.5	18.8	(14.6–23.9)	0.7	37.4	(33.2–41.7)	1.3	
Mexican-American	662	48.1	(43.2–53.0)	1.0	15.4	(11.7–20.0)	0.3	36.6	(30.8–42.8)	0.8	0.001††††
Other Hispanic	237	36.4	(28.1–45.6)	0.5	24.8	(17.2–34.5)	0.3	38.8	(31.9–46.2)	0.5	
<b>Poverty to income ratio***</b>											
<100%	691	36.5	(31.0–42.5)	1.5	16.2	(13.1–19.9)	0.6	47.3	(41.5–53.1)	1.9	0.030
100%–299%	1,823	38.1	(35.4–40.8)	5.5	13.6	(11.8–15.7)	1.9	48.3	(45.4–51.3)	6.9	
300%–499%	678	38.2	(34.2–42.4)	3.1	19.5	(15.8–23.7)	1.6	42.3	(38.1–46.6)	3.4	
≥500%	541	45.1	(39.2–51.1)	3.2	15.1	(11.1–20.3)	1.1	39.8	(34.7–45.2)	2.8	
<b>Education (among those aged ≥25 yrs)</b>											
<High school diploma	1,438	36.6	(33.3–40.1)	3.2	15.4	(12.6–18.6)	1.3	48.0	(45.0–51.0)	4.2	0.278
High school diploma	1,022	37.6	(34.6–40.7)	3.7	15.7	(13.1–18.7)	1.6	46.7	(43.1–50.3)	4.6	
Some college	974	38.3	(34.1–42.6)	3.9	15.6	(12.7–19.1)	1.6	46.1	(41.8–50.4)	4.7	
≥College degree	556	44.0	(38.5–49.7)	2.9	16.2	(12.5–20.7)	1.1	39.8	(34.1–45.8)	2.6	
<b>Usual source of care†††</b>											
Yes	3,635	36.4	(34.0–38.9)	11.7	14.7	(12.8–16.7)	4.7	48.9	(46.3–51.5)	15.7	<0.001
No	421	64.3	(57.5–70.5)	2.4	25.6	(20.4–31.7)	1.0	10.1	(7.0–14.5)	0.4	
<b>Times received health care in past 12 mos§§§</b>											
0	496	71.5	(66.0–76.4)	3.1	22.0	(17.2–27.8)	0.9	6.5	(4.1–10.1)	0.3	<0.001
1	557	53.1	(47.8–58.3)	3.0	20.8	(16.3–26.1)	1.2	26.1	(22.0–30.7)	1.5	
≥2	3,003	31.0	(28.5–33.6)	8.0	13.7	(11.9–15.7)	3.5	55.3	(52.7–58.0)	14.3	
<b>Health insurance status¶¶¶</b>											
Any health insurance	3,403	37.2	(35.0–39.4)	11.3	14.5	(12.7–16.6)	4.4	48.3	(45.8–50.8)	14.7	<0.001§§§§
Medicare	1,977	31.1	(28.4–33.8)	4.4	8.3	(7.0–9.9)	1.2	60.6	(57.8–63.3)	8.6	<0.001¶¶¶¶
Private	1,140	42.9	(39.1–46.7)	6.0	20.3	(17.1–24.0)	2.9	36.8	(33.1–40.6)	5.2	
Public	286	40.0	(32.5–48.0)	0.9	17.1	(11.7–24.2)	0.4	42.9	(35.1–51.1)	1.0	
Uninsured	653	51.9	(46.7–57.1)	2.7	23.5	(20.0–27.3)	1.2	24.6	(20.0–29.8)	1.3	

Abbreviation: CI = confidence interval.

\* Unaware defined as a “no” answer to the question, “Have you ever been told by a doctor or other health professional that you had hypertension, also called high blood pressure?” Aware defined as a “yes” answer to that question. Calculated among those with uncontrolled hypertension.

† Treated defined as an answer of “yes” to both of the following questions: “Because of your high blood pressure/hypertension, have you ever been told to take prescribed medicine?” and “Are you currently taking medication to lower your blood pressure?” Untreated defined as an answer of “no” to either of these questions. Calculated among those with uncontrolled hypertension.

§ Uncontrolled hypertension was defined as an average systolic blood pressure ≥140 mmHg or an average diastolic blood pressure ≥90 mmHg. Calculated among those with hypertension. Pregnant women were excluded.

¶ Unweighted sample size.

\*\* Weighted, unadjusted estimates.

†† Weighted population counts (in millions) based on the Current Population Survey totals averaged across the four NHANES cycles (2003–2004, 2005–2006, 2007–2008, and 2009–2010).

§§ Unadjusted chi-square test for differences in awareness/treatment status, by selected characteristics. Those of “other” racial/ethnic groups, those missing poverty to income ratio, or those aged <25 years (for education status) were not included in tests of independence between those subgroups and awareness/treatment status.

¶¶ Participants of other racial/ethnic groups included in analysis but not reported.

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††† Participants were asked, “Is there a place that you usually go when you are sick or need advice about your health?” Yes responses include those who answered “yes” or “there is more than one place.”

§§§ Participants were asked, “During the last 12 months how many times have you seen a doctor or other health professional about your health at a doctor’s office, a clinic, hospital emergency room, at home or some other place? Do not include times you were hospitalized overnight.”

¶¶¶ Medicare includes all participants who had Medicare. Private does not include those participants with Medicare. Other public insurance includes participants who only reported Indian Health Service. Uninsured includes participants with single service plan only.

§§§§ Unadjusted chi-square test of independence between awareness/treatment status and the following racial/ethnic groups: non-Hispanic white, non-Hispanic black, and Hispanics.

¶¶¶¶ Unadjusted chi-square test of independence between awareness/treatment status and the following racial-ethnic groups: non-Hispanic white, non-Hispanic black, Mexican-American, and other Hispanic.

§§§§§ Unadjusted chi-square test of independence between awareness/treatment status and having any health insurance versus having no health insurance.

¶¶¶¶¶ Unadjusted chi-square test of independence between awareness/treatment status and the following insurance status groups among those with any health insurance: Medicare, private insurance, and public insurance.

**BOX. Strategies to improve hypertension control in the clinical setting**

- Improve recognition and diagnosis of hypertension.
- Increase knowledge of and adherence to hypertension guidelines.
- Use innovative health-care delivery models, such as team-based care, patient-centered medical homes, pharmacist interventions, and other interventions to promote medication adherence.
- Optimize dosing and use of effective combinations of antihypertensive medications and lifestyle counseling through an organized regular review of the patients' treatment.
- Monitor patients' progress towards hypertension control.
- Promote self-monitoring of blood pressure by patients and provide effective self-management education.
- Promote healthy lifestyles for all patients
  - Eating a healthy diet, including reduced sodium consumption, and increased consumption of potassium, fruits, and vegetables.
  - Regular physical activity.
  - Weight loss among those who are overweight or obese.

**Sources:** Glynn LG, Murphy AW, Smith SM, Schroeder K, Fahey T. Interventions used to improve control of blood pressure in patients with hypertension. *Cochrane Database Syst Rev* 2010;(3):CD005182.

Institute of Medicine. A population-based policy and systems change approach to prevent and control hypertension. Washington, DC: The National Academies Press; 2010. Available at [http://www.nap.edu/catalog.php?record\\_id=12819](http://www.nap.edu/catalog.php?record_id=12819).

study indicated that hypertension was underdiagnosed in EHRs in outpatient clinics in the San Francisco Bay area, which serves approximately 600,000 patients (11). For patients with two or more BP readings of  $\geq 140/90$  or an antihypertensive medication prescription, only 63% had an appropriate hypertension diagnosis noted in the EHR. A study from the Geisinger Health System had a similar finding in which 30% of patients in their outpatient clinics had blood pressure measurements recorded in the EHR that met the definition for hypertension, yet were not documented as having hypertension and were not prescribed BP-lowering medications (Nirav Shah, New York State Department of Health, personal communication, 2012).

Health-care systems can adopt system-wide approaches facilitating increased hypertension identification and drug and lifestyle treatment strategies when indicated. Hypertension control rates improved from 45.7% in 2000 to 76.3% in 2010 in 15 Veterans Affairs medical centers with the implementation

of system-wide strategies, including a BP-control performance measure, automatic notification of health-care providers regarding a patient's previously elevated BP readings, electronic reminders of treatment guidelines, and systematic scheduling of follow-up visits (12). In South Carolina, the Outpatient Quality Improvement Network improved hypertension control from 49% in 2000 to 66% in 2005 among a cohort of 208,547 patients with hypertension after implementation of a hypertension initiative, including education of health-care providers regarding hypertension and the use of evidence-based guidelines, participation in a central database, and receipt of quarterly feedback reports (13).

Million Hearts, a U.S. Department of Health and Human Services initiative co-led by CDC and the Centers for Medicare & Medicaid Services, is focusing efforts on a common goal of preventing 1 million heart attacks and strokes by 2017 (9).\*\* Focused clinical and policy strategies and more effective application of health information technology are being used to improve the clinical management of hypertension, along with interventions such as aspirin therapy, cholesterol management, and smoking cessation (9). With respect to hypertension, this initiative has the goal of increasing by 10 million the number of persons in the United States whose hypertension is under control, which will help reach the objective of preventing 1 million heart attacks and strokes by 2017.

The findings in this report are subject to at least three limitations. First, NHANES surveys only the noninstitutionalized U.S. population. Military personnel and persons residing in nursing homes and other institutions are not included, which might result in underestimation of hypertension prevalence, given that older nursing home residents might have a higher prevalence of age-related hypertension. Moreover, the exclusion of military personnel might result in overestimation of the prevalence of hypertension because they might be younger, more physically fit, and have a lower prevalence of hypertension. Second, self-reported data on hypertension awareness and medication use might be subject to recall bias. Finally, this report examined hypertension treatment based only on medication use, not accounting for those using lifestyle or dietary approaches to reducing BP.

Uncontrolled hypertension affects nearly 36 million adults in the United States, yet 32 million of these adults have a usual source of health care, and 30 million have health insurance, representing a missed opportunity for hypertension control. The findings in this report can be used to target populations and refine interventions to improve hypertension control. Improved hypertension control will require an expanded effort from patients, health-care providers, and health-care systems.

\*\* Additional information is available at <http://millionhearts.hhs.gov/index.html>.

## Key Points

- Hypertension is a major risk factor for heart disease and stroke in the United States.
- Nearly one third of U.S. adults surveyed during 2003–2010 had hypertension; about half did not have it under control (systolic blood pressure [BP] <140 mmHg and diastolic BP <90 mmHg).
- About 36 million U.S. adults had uncontrolled hypertension. About 39% did not know they had it, 16% knew but were not being treated with medicines, and 45% were taking medicine but did not have it controlled.
- Nearly one fourth of adults with uncontrolled hypertension have stage 2 hypertension (systolic BP ≥160 mmHg or a diastolic BP ≥100 mmHg), putting them at higher risk for heart disease or stroke.
- Surprisingly, most people with uncontrolled hypertension did have a usual source of health care (89%). About 88% got medical care during the previous year, and 85% had health insurance.
- Improving hypertension control will take an expanded effort by health-care systems, health-care providers of all types working together, and greater attention to BP by patients.
- For more information, see [www.cdc.gov/vitalsigns](http://www.cdc.gov/vitalsigns).

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