

Insurance Status Among Adults With Hypertension—The Impact of Underinsurance

Jing Fang, MD, MS; Guixiang Zhao, MD, PhD; Guijing Wang, PhD; Carma Ayala, PhD; Fleetwood Loustalot, PhD, FNP

Background—Hypertension is a major risk factor for heart disease and stroke. Health insurance coverage affects hypertension treatment and control, but limited information is available for US adults with hypertension who are classified as underinsured.

Methods and Results—Using Behavioral Risk Factor Surveillance System 2013 data, we identified adults with self-reported hypertension. On the basis of self-reported health insurance status and health care–related financial burdens, participants were categorized as uninsured, underinsured, or adequately insured. Proxies for health care received included whether they reported taking antihypertensive medications and whether they visited a doctor for a routine checkup in the past year. We assessed the association between health insurance status and health care received, adjusting for selected sociodemographic characteristics. Among 123 257 participants from 38 states and District of Columbia with self-reported hypertension, 12% were uninsured, 26% were underinsured, and 62% were adequately insured. In adjusted models using adequately insured participants as referent, both uninsured (adjusted odds ratio, 0.39; 95% CI, 0.35–0.43) and underinsured (0.83, 0.76–0.89) participants were less likely to report using antihypertensive medication than those of adequately insured participants. Similarly, adjusted odds ratio of visiting a doctor for routine checkup in the past year were 0.25 (0.23–0.28) for those who were uninsured and 0.78 (0.72–0.84) for those who were underinsured compared to those with adequate insurance.

Conclusions—Uninsured and underinsured participants with hypertension were less likely to report receiving care compared to those with adequate insurance coverage. Disparities in health care coverage may necessitate targeted interventions, even among people with health insurance. (*J Am Heart Assoc.* 2016;5:e004313 doi: 10.1161/JAHA.116.004313)

Key Words: hypertension • insurance status • underinsured • using antihypertensive medication • visiting doctor office within past year

Hypertension affects one third of adults in the United States¹ and is a major risk factor for heart disease and stroke,² the first and fifth leading causes of death.³ Although awareness and treatment of hypertension have improved in recent decades,^{4,5} just over half (53%) of adults with hypertension have their blood pressure (BP) under control.⁶ Those who report barriers to health care are less likely to have their BP controlled than those who report no barriers.^{7,8} In addition, awareness of hypertension is higher among those who report adequate health care access.^{7,8} We previously estimated that around 20% of US adults with hypertension reported barriers to health care, with significant geographical and sociodemographic disparities,⁹ and having no health

insurance was the most important barrier to health care access.

However, having health insurance does not guarantee accessible to adequate care. Those who have health insurance coverage but still report financial barriers in getting care may forgo or delay necessary care, which has historically been defined as underinsured.¹⁰ Although less is known about the impact of being underinsured than that of having adequate or no insurance, previous reports found that people who were classified as underinsured had similar adverse health impacts to those classified as uninsured.¹¹ Limited information is available on people with hypertension across health care insurance categories. The objective of this study

From the Divisions for Heart Disease and Stroke Prevention (J.F., G.W., C.A., F.L.) and Population Health (G.Z.), National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention, Atlanta, GA.

Correspondence to: Jing Fang, MD, MS, Division for Heart Disease and Stroke Prevention, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention, 4770 Buford Hwy, NE, MS F-72, Atlanta, GA 30341. E-mail: jfang@cdc.gov

Received August 9, 2016; accepted October 26, 2016.

© 2016 The Authors. Published on behalf of the American Heart Association, Inc., by Wiley Blackwell. This is an open access article under the terms of the Creative Commons Attribution-NonCommercial License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited and is not used for commercial purposes.

was to assess health care use and health insurance status among people with hypertension.

Methods

Data

The Behavioral Risk Factor Surveillance System (BRFSS) is an annual health surveillance system that conducts telephone surveys to track health conditions and health-related behaviors in all 50 US states, three Trust Territories, and the District of Columbia (DC). These surveys have been conducted by Departments of Health from each state and territory, with assistance from the Centers for Disease Control and Prevention (CDC), since 1984. BRFSS applies a random-digit dialing method to obtain a sample of adults (aged 18 years or older) who represent the civilian, noninstitutionalized population. Detailed information is available at www.cdc.gov/brfss. In 2013, the survey was conducted with both landline and cell phone panels. The core component was conducted in all 50 US states, DC, Guam, and Puerto Rico, and the optional module “Health Care Access” was used by 38 states, DC, and Puerto Rico. We report findings from this module in 38 US states (Alabama, Alaska, Arizona, California, Colorado, Connecticut, Delaware, Florida, Georgia, Idaho, Indiana, Iowa, Kentucky, Louisiana, Maryland, Massachusetts, Michigan, Minnesota, Montana, Nebraska, Nevada, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Rhode Island, South Carolina, Tennessee, Utah, Vermont, Virginia, Washington, West Virginia, and Wisconsin) and DC. In 2013, the BRFSS state median response rate was 46.4% and ranged from 29.0% to 60.3%.

We report only on participants with self-reported hypertension, defined by an affirmative response to the question, “Have you ever been told by a doctor, nurse, or other health professional that you have high blood pressure?” Participants with borderline hypertension or prehypertension, as well as women who were told they had hypertension only during pregnancy, were not included.

Health insurance status was defined by the question, “Do you have any kind of health care coverage, including health insurance, prepaid plans such as HMOs, or government plans, such as Medicare or Indian Health Services?” Those who answered “no” were categorized as “uninsured.” Those who answered “yes” were then asked the following four questions: (1) “Was there a time in the past 12 months when you needed to see a doctor but could not because of cost?”; (2) “Was there a time in the past 12 months when you did not take your medication as prescribed because of cost? Do not include over-the-counter medication.”; (3) “In the past 12 months was there any time when you did not have any health insurance or coverage?”; and (4) “Do you currently

have any medical bills that are being paid off over time?” Participants who answered “yes” to any of these 4 questions were categorized as “underinsured.” Participants who answered “no” to all these questions were categorized as “adequately insured” using classifications and terminology from previous reports.^{12,13}

Health care received was defined using the following questions: (1) using antihypertensive medication—participants answering “yes” to the question, “Are you currently taking medicine for your high blood pressure?”; (2) visited a doctor within the past year for routine care—participants who answered “within past year (anytime less than 12 months)” to the question, “About how long has it been since you last visited a doctor for a routine checkup? (A routine checkup is a general physical exam, not an exam for a specific injury, illness, or condition).”

Sociodemographic characteristics collected were age (18–44, 45–64, and ≥65 years), sex, race/ethnicity (non-Hispanic white, non-Hispanic black, Hispanic, and non-Hispanic other), level of education (less than high school, high school graduate, some college, and college graduate and above), and household income (<\$25 000, \$25 000–\$49 999, or ≥\$50 000). Comorbid conditions collected were self-reported coronary heart disease (CHD), stroke, and diabetes mellitus. Self-reported height and weight were used to determine body mass index (BMI) in kg/m², which was categorized as normal weight (<25.0), overweight (25.0–29.9), or obese (≥30.0). The BRFSS survey was approved by CDC institutional review committee. We used the publically available data set without any personal identifiable information.

Statistical Analysis

We assessed the distributions of health insurance status (uninsured, underinsured, and adequately insured) overall and by sociodemographic characteristics. We then measured the crude and age-standardized prevalence of using antihypertensive medications and visiting a doctor in the past year by health insurance status, using the 2000 US Census standard projected population, with age distribution 18 to 24, 25 to 44, 45 to 64, and ≥65 years as standards.¹⁴ To account for potential biases introduced by Medicare eligibility, we then assessed the age-stratified prevalence (18–64 years, ≥65 years) by insurance status.

Using logistic regression models with “adequately insured” as the referent, we assessed the odds of using antihypertensive medications and visiting a doctor within the past year for routine care by health insurance status, while adjusting for age, sex, race/ethnicity, education, income, and comorbidity of CHD, stroke, diabetes mellitus, and obesity (those with BMI ≥30).¹⁵ All analyses accounted for the BRFSS complex sample design by using SAS-callable SUDAAN (version 10; Research

Triangle Institute, Research Triangle Park, NC). All estimates are reported as weighted estimates according to BRFSS sampling design variables.

Results

In 2013, 365 688 adults from 38 states and DC responded to the BRFSS health care access module, 364 626 (99.7%) responded to the self-reported hypertension question, and 147 788 reported that they had hypertension. The estimated prevalence of self-reported hypertension was 32.5% (95% CI, 32.2–32.8%). Of the 147 788 participants with self-reported hypertension, 25 711 (17.2%) were missing data on covariates and were excluded. The final analytic sample was 122 077. Prevalence of self-reported hypertension was 32.6% (95% CI, 32.3–32.9%). In general, compared to respondents without hypertension (who were excluded), those with self-reported hypertension were more likely to have insurance (88% vs 81%). However, the percentage of underinsurance and adequate insurance were also higher among respondents with

hypertension compared to those without (26% vs 22% for underinsurance and 62% vs 59% for adequate insurance).

Among the participants with hypertension, 12.1% were uninsured, 26.3% were underinsured, and 61.6% were adequately insured. Insurance status by demographic characteristics is presented in Table 1. Younger participants (age, 18–24) had the highest percentage of being uninsured compared to the other ages. Non-Hispanic blacks had the highest percentage classified as underinsured, whereas Hispanics had the highest percentage of uninsured. The percentage of adequately insured increased with level of education and household income.

Table 2 shows that participants who were uninsured and underinsured had a significantly lower unadjusted prevalence of using antihypertensive medications and visiting a doctor's office for a routine checkup in the past year than those with adequate insurance. After age adjustment, no difference was noted between underinsured and adequately insured participants. When the estimates were stratified by age (18–64 and ≥65 years), the difference between underinsured and

Table 1. Percentage (95% CI) of Insurance Status by Demographic Characteristics Among Adults With Self-Reported Hypertension, BRFSS 2013

	N	Uninsured	Underinsured	Adequately Insured	P Value*
Total	122 077	12.1 (11.6–12.5)	26.3 (25.8–26.8)	61.6 (61.1–62.2)	
Age, y					
18 to 44	13 220	23.4 (22.2–24.7)	31.9 (30.5–33.3)	44.7 (43.2–46.2)	<0.001
45 to 64	50 748	15.0 (14.4–15.7)	30.4 (29.6–31.2)	54.6 (53.7–55.5)	
≥65	58 109	1.2 (1.0–1.4)	17.6 (17.0–18.3)	81.2 (80.5–81.9)	
Sex					
Men	53 832	13.1 (12.5–13.8)	24.3 (23.6–25.0)	62.6 (61.8–63.5)	<0.001
Women	68 245	10.9 (10.4–11.4)	28.6 (27.9–29.3)	60.5 (59.7–61.3)	
Race/ethnicity					
Non-Hispanic white	96 822	8.9 (8.5–9.3)	23.6 (23.1–24.1)	67.5 (66.9–68.0)	<0.001
Non-Hispanic black	13 881	15.2 (14.1–16.2)	35.0 (33.6–36.5)	49.8 (48.3–51.4)	
Hispanics	5692	26.5 (24.3–28.7)	30.1 (27.9–32.4)	43.4 (41.0–45.9)	
Non-Hispanic others	5682	12.2 (10.0–14.8)	27.6 (24.8–30.7)	60.2 (56.8–63.5)	
Education					
<High school	11 815	22.7 (21.1–24.3)	31.7 (30.0–33.3)	45.6 (43.9–47.5)	<0.001
High school	39 083	12.6 (11.9–13.3)	27.2 (26.3–28.1)	60.2 (59.2–61.2)	
Some college	34 209	10.6 (9.9–11.3)	27.6 (26.6–28.5)	61.8 (60.8–62.9)	
≥College	36 970	5.2 (4.7–5.7)	19.2 (18.5–20.0)	75.6 (74.7–76.4)	
Household income					
<\$25K	43 887	21.9 (21.1–22.8)	32.3 (31.4–33.2)	45.8 (44.9–46.8)	<0.001
\$25K to \$49 999	34 424	11.2 (10.4–12.1)	28.4 (27.4–29.4)	60.4 (59.3–61.5)	
≥\$50K	43 766	3.4 (3.0–3.9)	19.3 (18.6–20.0)	77.3 (76.5–78.1)	

*P value was obtained through chi-square test. BRFSS indicates Behavioral Risk Factor Surveillance System; K, thousand.

Table 2. Crude, Age-Standardized, and Age-Stratified Percentage* of Using Antihypertensive Medications and Visiting the Doctor for Routine Checkup Within 1 Year, BRFSS 2013

	Uninsured	Underinsured	Adequately Insured
Total			
Crude percentage			
Using antihypertensive medicine	49.5 (47.6–51.4) ^{†§}	75.1 (74.0–76.2) [†]	81.7 (81.1–82.3)
Visit doctor within 1 year	51.4 (49.5–53.4) ^{†§}	80.9 (80.0–81.8) [†]	85.9 (85.4–86.5)
Age-standardized percentage			
Using antihypertensive medicine	46.8 (45.1–48.6) ^{†§}	62.4 (61.0–63.8)	61.6 (60.5–62.8)
Visit doctor within 1 year	53.7 (51.5–55.9) ^{†§}	78.0 (76.5–79.5)	79.6 (78.5–80.8)
Age-stratified			
18 to 64 years			
Using antihypertensive medicine	48.2 (46.2–50.1) ^{†§}	70.0 (68.7–71.3) [‡]	72.2 (71.2–73.2)
Visit doctor within 1 year	50.5 (48.5–52.4) ^{†§}	78.6 (77.4–79.6) [†]	81.6 (80.7–82.4)
≥65 years			
Using antihypertensive medicine	86.7 (80.1–91.4)	92.2 (91.0–93.1)	93.2 (92.8–93.6)
Visit doctor within 1 year	80.0 (72.7–85.7) ^{‡§}	88.9 (87.6–90.0) [†]	91.2 (90.7–91.8)

*Percentages were obtained through SUDAAN “PROC DESCRIPT” statement and *P* values were obtained by *t* test. Because there were multiple comparisons, Bonferroni correction was applied. We used 2000 US projected population for age-standardized estimates. BRFSS indicates Behavioral Risk Factor Surveillance System.

[†]*P*<0.01 and [‡]*P*<0.05 compared with adequately insured.

[§]*P*<0.01 compared with underinsured.

adequately insured was observed for visiting a doctor within 1 year, but not using antihypertensive medicine for both age groups (Table 2).

In adjusted logistic regression analyses, we assessed the odds of antihypertensive medication use and visiting a doctor within the past year by insurance status, using adequately insured as the referent, adjusting for age, sex, race/ethnicity,

education, income, and history of diabetes mellitus, CHD, stroke, and BMI (Table 3). Compared to adults classified as adequately insured, those who were uninsured were 61% less likely to report antihypertensive medication use and 75% less likely to have visited the doctor within the past year. Adults who were underinsured were 17% less likely to report antihypertensive medication use and 22% less likely to have

Table 3. Total and Age-Specific Adjusted* Odd Ratios of Using Antihypertensive Medications and Visiting the Doctor Within the Past Year by Insurance Status, Using Underinsured as Referent Among Adults With Self-Reported Hypertension, BRFSS, 2013

	Uninsured	Underinsured	Adequately Insured
Total			
Using antihypertensive medicine	0.39 (0.35–0.43) [†]	0.83 (0.76–0.89) [†]	1.00
Visiting the doctor within 1 year	0.25 (0.23–0.28) [†]	0.78 (0.72–0.84) [†]	1.00
18 to 64 years			
Using antihypertensive medicine	0.40 (0.35–0.45) [†]	0.86 (0.79–0.94) [†]	1.00
Visiting the doctor within 1 year	0.26 (0.23–0.29) [†]	0.80 (0.73–0.88) [†]	1.00
≥65 years			
Using antihypertensive medicine	0.49 (0.30–0.80) [†]	0.79 (0.67–0.94) [‡]	1.00
Visiting the doctor within 1 year	0.44 (0.29–0.67) [†]	0.77 (0.66–0.91) [†]	1.00

*Adjusted for age, sex, race/ethnicity, education, income, history of diabetes mellitus, CHD, stroke, and BMI. BMI indicates body mass index; BRFSS, Behavioral Risk Factor Surveillance System; CHD, coronary heart disease.

[†]*P*<0.01.

[‡]*P*<0.05.

visited the doctor within the past year than those classified as adequately insured (Table 3). When the sample was stratified by age, those aged 18 to 64 years who were uninsured were 60% less likely to use antihypertensive medications and 74% less likely to visit the doctor within the past year, and those who were underinsured were 14% and 20% less likely to report antihypertensive medication use and visit doctor in the past year than those who were adequately insured (Table 3). Among those aged ≥ 65 years, compared to adequately insured, uninsured adults were 51% less likely to report antihypertensive medication use and 56% less likely to have visited the doctor within the past year. Underinsured adults were 21% less likely to use antihypertensive medication and 23% less likely to have visited the doctor within the past year (Table 3).

Discussion

Among US adults with hypertension, 12% had no health insurance coverage and an additional 26% were underinsured. These individuals require long-term chronic disease management, and adequate health care access is a necessity. Our findings suggest that even among those who had health insurance, barriers to receiving and complying with recommended health care advice was a challenge. For example, underinsured adults with hypertension were less likely to report using antihypertensive medication and visiting the doctor in the past year compared to those who were adequately insured.

Having no health insurance has been routinely linked to poor health outcomes.^{16–18} The *2013 National Healthcare Quality Report*¹⁹ and *2014 National Healthcare Disparities Report*²⁰ from the Agency for Healthcare Research and Quality found that having health insurance was a key factor in obtaining adequate health care. In an earlier report on US adults with hypertension, nearly 20% reported barriers to health care, and having no health insurance was the most important barrier identified.⁸ However, the impact of underinsurance on hypertension care has received less attention.

The 2013 BRFSS Health Care Access module provided the opportunity to identify those who are underinsured—participants with financial barriers to needed health care. In our study, these participants included those who stated that they had been diagnosed with hypertension, with any type of health insurance, but who also reported financial barriers to getting health care, including those who were (1) unable to see a doctor in the past year because of cost, (2) unable to take prescription medication in the past year because of cost, (3) without health insurance at some point during the past year, or (4) still paying off medical bills. Although having out-of-pocket expenditures greater than 10% of household income (or $\geq 5\%$ of household income when income is below 200% of the federal poverty level) is an important criterion to define

underinsurance,²¹ the BRFSS optional module did not include a question about out-of-pocket health care expenses. Therefore, the definition of underinsurance in this study was based on financial burden and gaps in coverage.¹² Previous studies have shown that individuals with a recent gap in insurance coverage were more likely to forgo needed health care provider visits or to be unable to refill needed prescribed medications compared to those with continuous coverage.¹³

The distribution of participants classified as underinsured in this report was similar to that of other surveys. For example, the proportion of those classified as underinsured was higher among younger adults, racial/ethnic minorities, and those with lower levels of education and lower household income.²² The finding that a significantly higher proportion of participants aged 65 years or older had adequate insurance suggests that factors other than income (such as Medicare) were also related to insurance status, given that the census report showed that 2013 median income was lower among those aged ≥ 65 years (\$37 907) than those aged 18 to 64 years (\$61 252).²³

The fact that one quarter of participants with hypertension were classified as underinsured has important implications for hypertension management. Findings in this report indicate that antihypertensive medication use and regular interactions with the health care system for routine checkups were lower among underinsured participants than those with adequate insurance. Using antihypertensive medication and regular health care provider visits are both critical to successful hypertension control and prevention of heart disease and stroke. This finding was consistent with those of earlier studies that concluded that people who are underinsured are more likely to skip needed care with the concern of their ability to pay for the care received^{21,22} and were less likely to receive the recommended needed care than those with adequate insurance.^{24,25} Together, these findings show that the health care system should seek to reduce the barriers for these patients to achieve BP control.

Whereas BP control ($<140/90$ mm Hg) would be the ideal measure for assessment of hypertension management, BRFSS does not collect direct BP measurements. Therefore, we were unable to assess BP control among BRFSS participants who reported diagnosed hypertension. Instead, we used antihypertensive medication use and visiting a doctor for a routine checkup in the past year as proxy assessment for hypertension management. Previous research has found that antihypertensive medication use^{2,26} and regular doctor visits²⁷ were related to better BP control.

This report has several limitations. First, all information collected from the BRFSS is self-reported and subject to recall biases. An earlier study reported that around 20% of adults with hypertension are unaware of the condition,²⁸ leading to under-reporting of barriers to care in this population. In

addition, adults with health insurance are more likely to be aware of their hypertension than those without insurance.²⁹ Second, the BRFSS does not provide information on BP measurement, and we cannot assess the proportion of BP control, an important indicator of hypertension management. Third, the survey provided no information about the out-of-pocket health care expenditures, so we were unable to assess the health care expenditure as a proportion of household income, which is considered a standard assessment of underinsurance.^{30,31} In fact, it is possible that some participants aged ≥ 65 years who were categorized as adequately insured would be categorized as underinsured if we defined underinsurance using the criterion of $\geq 5\%$ of total income spent on out-of-pocket health care expenditures. Finally, given that only 38 states and DC used the Health Care Access Module, the data may not be nationally representative. Nevertheless, the BRFSS, with its large sample survey of self-reported demographic and health-related information, provides the unique opportunity to report insurance status and relevant health care service among people with hypertension.

Perspectives

Among adults with self-reported hypertension, health insurance status was associated with health care received, but having health insurance was not a guarantee of receiving care. Adults with health insurance, but who also reported financial difficulty in obtaining medical care, were associated with less care for hypertension compared to those with adequate health insurance. This is likely to impact participants' ability to control their hypertension. In fact, some adults classified as adequately insured may be functionally underinsured. For example, some older adults with lower income and high out-of-pocket health care expenditures may be misclassified in this context and have significant barriers to healthcare. Clinical and public health practitioners, as well as policy makers, should be aware of the heterogeneous nature of insurance coverage when developing interventions and activities to improve hypertension control. System-level and community-linked interventions, such as those recommended by the Community Preventive Services Task Force (www.thecommunityguide.org/topic/cardiovascular-disease), should be promoted. Sustainable interventions and examples from the task force to improve hypertension control relevant for this context include reducing out-of-pocket costs and integrating team-based care into the clinical environment.³²

Acknowledgments

We thank the BRFSS coordinators from states and members of the Survey Operation Team in the CDC for their help in collecting the

data. The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the CDC.

Disclosures

None.

References

- Mozaffarian D, Benjamin EJ, Go AS, Arnett DK, Blaha MJ, Cushman M, Das SR, de Ferranti S, Després JP, Fullerton HJ, Howard VJ, Huffman MD, Isasi CR, Jiménez MC, Judd SE, Kissela BM, Lichtman JH, Lisabeth LD, Liu S, Mackey RH, Magid DJ, McGuire DK, Mohler ER III, Moy CS, Muntner P, Mussolino ME, Nasir K, Neumar RW, Nichol G, Palaniappan L, Pandey DK, Reeves MJ, Rodriguez CJ, Rosamond W, Sorlie PD, Stein J, Towfighi A, Turan TN, Virani SS, Woo D, Yeh RW, Turner MB; on behalf of the American Heart Association Statistics Committee and Stroke Statistics Subcommittee. Heart Disease and Stroke Statistics—2016 update: a report from the American Heart Association. *Circulation*. 2016;133:e38–e360.
- Chobanian AV, Bakris GL, Black HR, Cushman WC, Green LA, Izzo JL Jr, Jones DW, Materson BJ, Oparil S, Wright JT Jr, Roccella EJ; Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. National Heart, Lung, and Blood Institute; National High Blood Pressure Education Program Coordinating Committee. Seventh report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. *Hypertension*. 2003;42:1206–1252.
- Murphy SL, Kochanek KD, Xu J, Arias E. Mortality in the United States, 2014. *NCHS Data Brief*. 2015;229:1–8.
- Valderrama AL, Gillespie C, Coleman S, George MG, Hong Y. Vital signs: awareness and treatment of uncontrolled hypertension among adults—United States, 2003–2010. *MMWR Morb Mortal Wkly Rep*. 2012;61:703–709.
- Guo F, He D, Zhang W, Walton RG. Trends in prevalence, awareness, management, and control of hypertension among United States adults, 1999 to 2010. *J Am Coll Cardiol*. 2012;60:599–606.
- Yoon SS, Fryar CD, Carroll MD. Hypertension prevalence and control among adults: United States, 2011–2014. *NCHS Data Brief*. 2015;220:1–8.
- Yoon PW, Gillespie CD, George MG, Wall HK. Control of hypertension among adults—National Health and Nutrition Examination Survey, United States, 2005–2008. *MMWR Suppl*. 2012;61:19–25.
- Wilper AP, Woolhandler S, Lasser KE, McCormick D, Bor DH, Himmelstein DU. Hypertension, diabetes, and elevated cholesterol among insured and uninsured U.S. adults. *Health Aff (Millwood)*. 2009;28:w1151–w1159.
- Fang J, Yang Q, Ayala C, Loustalot F. Disparities in access to care among US adults with self-reported hypertension. *Am J Hypertens*. 2014;27:1377–1386.
- Woolhandler S, Himmelstein DU. Life or debt: underinsurance in America. *J Gen Intern Med*. 2013;28:1122–1124.
- Schoen C, Doty MM, Robertson RH, Collins SR. Affordable Care Act reforms could reduce the number of underinsured US adults by 70 percent. *Health Aff (Millwood)*. 2011;30:1762–1771.
- Dumont D, Cooper T, Jiang Y. Uninsurance is only half the problem: underinsurance and healthcare-related financial burden in RI. *R I Med J (2013)*. 2014;98:46–49.
- Schoen C, DesRoches C. Uninsured and unstably insured: the importance of continuous insurance coverage. *Health Serv Res*. 2000;35(1 Pt 2):187–206.
- Klein RJ, Schoenborn CA. Age adjustment using the 2000 projected U.S. population. *Healthy People 2000 Stat Notes*. 2001;20:1–9.
- Bieler GS, Brown GG, Williams RL, Brogan DJ. Estimating model-adjusted risks, risk differences, and risk ratios from complex survey data. *Am J Epidemiol*. 2010;171:618–623.
- Baker DW, Sudano JJ, Durazo-Arvizu R, Feinglass J, Witt WP, Thompson J. Health insurance coverage and the risk of decline in overall health and death among the near elderly, 1992–2002. *Med Care*. 2006;44:277–282.
- McWilliams JM, Zaslavsky AM, Meara E, Ayanian JZ. Health insurance coverage and mortality among the near-elderly. *Health Aff (Millwood)*. 2004;23:223–233.
- Sorlie PD, Johnson NJ, Backlund E, Bradham DD. Mortality in the uninsured compared with that in persons with public and private health insurance. *Arch Intern Med*. 1994;154:2409–2416.
- Agency for Healthcare Research and Quality. 2013 National Healthcare Quality Report. Rockville, MD. AHRQ Publication No. 14-0005 May 2014.

- Available at: <http://www.ahrq.gov/research/findings/nhqrdr/nhqr13/index.html>. Accessed November 29, 2016.
20. 2014 National Healthcare Quality and Disparities Report. Rockville, MD: Agency for Healthcare Research and Quality; 2015. AHRQ Pub. No. 15-0007.
 21. Schoen C, Collins SR, Kriss JL, Doty MM. How many are underinsured? Trend among U.S. adults, 2003 and 2007 *Health Aff (Millwood)*. 2008;27:w298–w309.
 22. Lavarreda SA, Brown ER, Bolduc CD. Underinsurance in the United States: an interaction of costs to consumers, benefit design, and access to care. *Annu Rev Public Health*. 2011;32:471–482.
 23. DeNavas-Walt C, Proctor BD. U.S. Census Bureau, Current Population Reports, P60-252, Income and Poverty in the United States: 2014. Washington, DC: U.S. Government Printing Office; 2015.
 24. Institute of Medicine. *Financing Vaccines in the 21st Century: Assuring Access and Availability*. Washington, DC: National Academies Press; 2003.
 25. Orenstein WA, Douglas RG, Rodewald LE, Hinman AR. Immunizations in the United States: success, structure, and stress. *Health Aff (Millwood)*. 2005;24:599–610.
 26. Cushman WC, Ford CE, Cutler JA, Margolis KL, Davis BR, Grimm RH, Black HR, Hamilton BP, Holland J, Nwachuku C, Papademetriou V, Probstfield J, Wright JT Jr, Alderman MH, Weiss RJ, Piller L, Bettencourt J, Walsh SM; ALLHAT Collaborative Research Group. Success and predictors of blood pressure control in diverse North American settings: the antihypertensive and lipid-lowering treatment to prevent heart attack trial (ALLHAT). *J Clin Hypertens (Greenwich)*. 2002;4:393–404.
 27. Fontil V, Bibbins-Domingo K, Kazi DS, Sidney S, Coxson PG, Khanna R, Victor RG, Pletcher MJ. Simulating strategies for improving control of hypertension among patients with usual source of care in the United States: the blood pressure control model. *J Gen Intern Med*. 2015;30:1147–1155.
 28. Yoon S, Ostchega Y, Louis T. Recent trends in the prevalence of high blood pressure and its treatment and control, 1999–2008. *NCHS Data Brief*. 2010;48:1–8.
 29. Schober SE, Makuc DM, Zhang C, Kennedy-Stephenson J, Burt V. Health insurance affects diagnosis and control of hypercholesterolemia and hypertension among adults aged 20–64: United States, 2005–2008. *NCHS Data Brief*. 2011;57:1–8.
 30. Cardinali G, Rhyne RL, Fleg A, Corum BN, Tsewang D, Jo A, Leiderman J, North C. Underinsurance before the implementation of the Affordable Care Act: from the Research Involving Outpatient Settings Network (RIOS Net). *J Am Board Fam Med*. 2014;27:855–857.
 31. Voorhees K, Fernald DH, Emsermann C, Zittleman L, Smith PC, Parnes B, Winkelmann K, Westfall JM; State Networks of Colorado Ambulatory Practices and Partners. Underinsurance in primary care: a report from the State Networks of Colorado Ambulatory Practices and Partners (SNOCAP). *J Am Board Fam Med*. 2008;21:309–316.
 32. Njie GJ, Finnie RK, Acharya SD, Jacob V, Proia KK, Hopkins DP, Pronk NP, Goetzel RZ, Kottke TE, Rask KJ, Lackland DT, Braun LT; Community Preventive Services Task Force. Reducing medication costs to prevent cardiovascular disease: a Community Guide systematic review. *Prev Chronic Dis*. 2015;12:150242.