

An Effective Approach to High Blood Pressure Control A Science Advisory From the American Heart Association, the American College of Cardiology, and the Centers for Disease Control and Prevention

Alan S. Go, MD; Mary Ann Bauman, MD; Sallyann M. Coleman King, MD, MSc;
Gregg C. Fonarow, MD, FAHA, FACC; Willie Lawrence, MD, FAHA, FACC;
Kim A. Williams, MD, FAHA, FACC; Eduardo Sanchez, MD, MPH

Cardiovascular diseases, including heart disease, hypertension, and heart failure, along with stroke, continue to be leading causes of death in the United States.^{1,2} Hypertension currently affects nearly 78 million* adults in the United States and is also a major modifiable risk factor for other cardiovascular diseases and stroke.¹ According to data from the National Health and Nutrition Evaluation Survey (NHANES) in 2007 to 2010, 81.5% of those with hypertension are aware they have it, and 74.9% are being treated, but only 52.5% are under control, with significant variation across different patient subgroups.^{1,4-7} Of those with uncontrolled hypertension, 89.4% reported having a usual source of health care, and 85.2% reported having health insurance.³ This is the current status, despite the fact that therapies to lower blood pressure and associated risks of cardiovascular events and death have been available for decades, and various education and quality improvement efforts have been targeted at patients and healthcare providers.

The direct and indirect costs of hypertension are enormous, considering the number of patients and their families impacted, and the healthcare dollars spent on treatment and blood pressure-related complications.⁸ Currently, hypertension affects 46% of patients with known cardiovascular disease and 72% of those who have had a stroke, and it is listed as a primary or contributing cause in ≈15% of the 2.4

million deaths in 2009.¹ In 2008, the total estimated direct and indirect cost of hypertension was estimated at \$69.9 billion.⁸ Thus, it is imperative to identify, disseminate, and implement more effective approaches to achieve optimal control of this condition.

High-quality blood pressure management is multifactorial and requires the engagement of patients, families, providers, and healthcare delivery systems and communities. This includes expanding patient and healthcare provider awareness, appropriate lifestyle modifications, access to care, evidence-based treatment, a high level of medication adherence, and adequate follow-up.⁹ Recognizing the urgent need to address inadequate control, the American Heart Association (AHA) has made hypertension a primary focus area of its 2014 to 2017 strategic plan, because it seeks to improve the cardiovascular health of all Americans by 20% and reduce the death rate from cardiovascular disease and stroke by 20% by 2020.¹⁰ Similarly, Million Hearts, a US Department of Health and Human Services initiative spearheaded by the Centers for Disease Control and Prevention (CDC) and the Centers for Medicare & Medicaid Services to prevent a million heart attacks and strokes by 2017, has focused its first 2 years on actions to improve and achieve control of hypertension.¹¹

We believe that the identification of best practice, evidence-based management algorithms leading to standardization of treatment is a critical element in helping to achieve these

*The estimate is based on the hypertension definition of blood pressure reading $\geq 140/90$ mm Hg, current use of antihypertensive medications, or being told about having hypertension on 2 occasions by a healthcare provider. When the third component of the definition is excluded, the estimated number of prevalence cases among US adults would be 67 million.³

The American Heart Association and the American College of Cardiology make every effort to avoid any actual or potential conflicts of interest that may arise as a result of an outside relationship or a personal, professional, or business interest of a member of the writing panel. Specifically, all members of the writing group are required to complete and submit a Disclosure Questionnaire showing all such relationships that might be perceived as real or potential conflicts of interest.

The online-only Data Supplement is available with this article at <http://hyper.ahajournals.org/lookup/suppl/doi:10.1161/HYP.0000000000000003/-/DC1>. This document was approved by the American Heart Association Science Advisory and Coordinating Committee, the American College of Cardiology Board of Trustees, and the Centers for Disease Control and Prevention in November 2013.

The American Heart Association requests that this document be cited as follows: Go AS, Bauman MA, Coleman King SM, Fonarow GC, Lawrence W, Williams KA, Sanchez E. An effective approach to high blood pressure control: a science advisory from the American Heart Association, the American College of Cardiology, and the Centers for Disease Control and Prevention. *Hypertension*. 2014;63:878–885.

This article has been copublished in the *Journal of the American College of Cardiology*. Copies: This document is available on the World Wide Web sites of the American Heart Association (my.americanheart.org) and the American College of Cardiology (<http://www.cardiosource.org/>). A copy of the document is available at <http://my.americanheart.org/statements> by selecting either the “By Topic” link or the “By Publication Date” link. To purchase additional reprints, call 843-216-2533 or e-mail kelle.ramsay@wolterskluwer.com.

Expert peer review of AHA Scientific Statements is conducted by the AHA Office of Science Operations. For more on AHA statements and guidelines development, visit <http://my.americanheart.org/statements> and select the “Policies and Development” link.

(*Hypertension*. 2014;63:878–885.)

© 2013 The Authors. *Hypertension* is published on behalf of the American Heart Association, Inc., by Wolters Kluwer; the *Journal of the American College of Cardiology* is published on behalf of the American College of Cardiology Foundation by Elsevier Inc. This is an open access article under the terms of the Creative Commons Attribution Non-Commercial-NoDerivs License, which permits use, distribution, and reproduction in any medium, provided that the Contribution is properly cited, the use is non-commercial, and no modifications or adaptations are made.

ambitious national goals at a population level. In this article, we describe the value of hypertension treatment algorithms, provide criteria for effective hypertension management algorithms, describe an AHA/American College of Cardiology (ACC)/CDC–recommended treatment algorithm based on current guidelines, and describe examples of other specific algorithms that have been associated with improved blood pressure on a large scale.

The Value of Hypertension Treatment Algorithms as Part of a Multifactorial Approach to Improve Blood Pressure Control

As described previously, despite the strong evidence and consensus regarding the treatment and control of high blood pressure,^{9,12} as well as the availability of many different therapeutic options, achieving success in hypertension control at both the individual patient level and, even more importantly, the population level, has remained a major challenge nationally.

Although there is no single explanation for the poor hypertension control seen in many patient subgroups, the fragmentation of health care for many patients and the lack of consistent implementation of system-level solutions in clinical practice and healthcare delivery systems appear to be important contributors. Efforts focused primarily on educating patients and providers about hypertension and the benefits of its treatment have not been sufficient in bringing hypertension under control. Similarly, interventions targeting only physicians have not led to consistent and meaningful improvements on a large scale.¹³ However, there are examples of substantial success that could be emulated and scaled with a high likelihood of important benefit.

To reduce the prevalence of hypertension in the United States,^{10,14} system-level approaches will be needed. Successful examples from other medical areas where a system-level approach has been taken include reducing medical errors and improving patient safety in the hospital setting¹⁵; improving the inpatient treatment and outcomes of acute myocardial infarction, heart failure, stroke, and cardiopulmonary resuscitation¹⁶; reducing health disparities in the treatment of cardiovascular conditions¹⁶; early detection and intervention in sepsis to lower case fatality^{17,18}; and reducing hospital-acquired infections.^{19,20} In the case of hypertension, system-level methods can address multiple factors in a coordinated manner:

- Identifying all patients eligible for management
- Monitoring at the practice/population level
- Increasing patient and provider awareness
- Providing an effective diagnosis and treatment guideline
- Systematic follow-up of patients for the initiation and intensification of therapy
- Clarifying roles of healthcare providers to implement a team approach
- Reducing barriers for patients to receive and adhere to medications and to implement lifestyle modifications
- Leveraging the electronic medical record systems being established throughout the United States to support each of these steps

Several examples of success with the use of a system-level paradigm have been recently reported. For example, within Kaiser Permanente Northern California, a large integrated healthcare delivery system caring for >3 million members, a

regional hypertension program was implemented involving 5 major components: creation and maintenance of a health system-wide electronic hypertension registry, tracking hypertension control rates with regular feedback to providers at a facility and provider level, development and frequent updating of an evidence-based treatment guideline, promotion of single-pill combination therapies, and using medical assistants for follow-up blood pressure checks to facilitate necessary treatment intensification. Between 2001 and 2009, the number of patients with hypertension increased from 349 937 to 652 763, but the proportion of hypertensive patients meeting target blood pressure goals improved substantially from 44% to >80%, and continued to improve to >87% in 2011.²¹ Favorable hypertension control rates have been observed in other healthcare delivery systems,²² as well as in coordinated health systems such as the Veterans Affairs medical system.^{23–25}

Developing, disseminating, and implementing an effective hypertension treatment algorithm is a critical part of a multipronged, systematic approach to controlling hypertension, because it facilitates clinical decision making, provides a default approach with proven benefits, and engages multiple providers in a coordinated manner. We describe next the principles for developing such an algorithm.

Principles for Algorithm Development

The following is a summary of principles recommended by the AHA, ACC, and CDC for creating an effective hypertension management algorithm:

1. Base algorithm components and processes on the best available science
2. Format to be simple to update as better information becomes available
3. Create feasible, simple implementation strategy
4. Include patient version at appropriate scientific and language literacy level
5. Consider costs of diagnosis, monitoring, and treatment
6. Develop algorithm in format easily used within a team approach to health care
7. Develop algorithm in a format able to be incorporated into electronic health records for use as clinical decision support
8. Include a disclaimer to ensure that the algorithm is not used to counter the treating healthcare provider's best clinical judgment

The purpose of these principles is to establish a common platform for the development and implementation of hypertension management algorithms tailored to different practice settings and populations. We note that the last principle supports the notion that treatment guidelines serve to facilitate a systematic approach to the management of hypertension, but provide appropriate modifications based on specific patient characteristics, preferences, and other pragmatic factors (eg, cost, pill burden, risks of certain side effects) to optimize a personalized approach to the care of individual patients.^{9,12,26,27} In addition, ongoing randomized clinical trials (eg, Systolic Blood Pressure Intervention Trial [SPRINT])²⁸ are addressing optimal blood pressure targets for specific patient subgroups such as the elderly and patients with chronic kidney disease to maximize net clinical benefit and avoid unnecessary complications.

AHA/ACC/CDC Hypertension Treatment Algorithm

In the Appendix is a template outlining a general approach for an effective treatment algorithm that incorporates the principles described previously and balances applicability to the largest number of hypertensive patients with the flexibility and the level of detail to support individualization of therapy.

Several existing algorithms for hypertension treatment in large healthcare settings associated with improved blood pressure in populations²¹ have also been reviewed, which included a look at both private and public systems, systems with regional reach, and an algorithm used by the US Department of Veterans Affairs, that are in support of the recommended principles. These algorithms can either be found in the online-only Data Supplement or are available for public use within the resources and tools section of the Million Hearts initiative Web site at <http://millionhearts.hhs.gov/resources.html>.

Call-to-Action, Next Steps, and Conclusions

It is critical that the AHA, ACC, and CDC, together with other organizations, continue to identify, define, and implement exemplary local, regional, and national programs that facilitate better blood pressure awareness, treatment, and control together with improving other cardiovascular health factors and behaviors.^{11,15,29–32} Arming healthcare providers, health systems, and communities with proven tools, algorithms, strategies, programs, and other best practices along with expertise and technical assistance for improving blood pressure awareness, treatment, and control is essential to reducing the tremendous burden of cardiovascular risk.^{30,33}

This advisory serves as a call to action for broad-based efforts to improve hypertension awareness, treatment, and the proportion of patients treated and controlled. There is a clear need to provide enhanced, evidence-based, blood pressure treatment systems for providers, including the standardization of protocols and algorithms, incentives for improved performance based on achieving and maintaining patients at blood pressure goals, and technology-facilitated clinical decision support and feedback.³⁴ As noted previously, health system-wide implementation of focused evidence-based hypertension treatment algorithms together with regularly scheduled performance feedback within a coordinated multifactorial management program have been associated with substantially improved hypertension control in large populations and varied clinical practice settings.^{21,33–35} This approach can facilitate the ability to emphasize existing evidence-based recommendations and integrate new evidence as it becomes available. Successful best practices or innovations can be further identified and then disseminated health system wide.²¹ Such an approach is scalable, sustainable, and of high value, especially as the use of electronic medical records becomes even more widespread nationally.^{21,34–36} This advisory has provided a number of examples of algorithms from successful programs that can be readily implemented in diverse healthcare settings. Greater participation in innovative programs such as the AHA's Heart 360 personal health record,³⁷ AHA/American Stroke Association's Get With The Guidelines Program,³⁸ the AHA/American Diabetes Association/American Cancer Society Guideline Advantage Program,³⁹ the US Department of Health and Human Services Million Hearts initiative,^{11,15,30,31} ACC's National Cardiovascular Data Registries,⁴⁰ and the CDC Coverdell Stroke registry⁴¹ should also be encouraged and incentivized.

Further engaging individuals in the hypertension control process, motivating more proactive management through shared accountability, and incentives for blood pressure treatment and control are also essential.³⁰ There are also opportunities for the increased role of pharmacists and other community-based providers in hypertension treatment and control.^{30,36,42} There is also great potential to apply an innovative mix of health information technology, peer support, feedback, and incentive programs designed to drive actionable, patient-centered blood pressure awareness, treatment, and control programs. Workplace and community-based wellness programs can also have significant impact.³⁰

It is also vital that these programs are implemented among broader segments of the population. Disparities/inequities in hypertension awareness, treatment, and control continue to exist in a number of patient subgroups.^{7,43} Intervention programs for hypertension should be specifically targeted to groups with the greatest cardiovascular risk and disease burden based on clinical risk factors and appropriate consideration of sex, race, ethnicity, socioeconomic status, disability, and geographic location.³⁰ Additional research is needed to better define blood pressure treatment goals, especially in specific populations, including by age, sex, race, ethnicity, and comorbid conditions. It is also essential that there be adequate representation of these patient populations in the study of optimal blood pressure goals, as well as new hypertension treatment technologies (eg, catheter-based renal sympathetic denervation).

The AHA, ACC, CDC, and other organizations should continue to foster effective activities regarding hypertension that include surveillance, education and media, organizational partnerships, and environmental and policy changes.³⁰ Building on such programs as the

- AHA's Life's Simple 7 program,⁴⁴ with a longitudinal cardiovascular health tracking system, patient-oriented clinical decision support tool, individual patient-oriented cardiovascular health performance measures, and data feedback, and
- ACC's CardioSmart Patient Education Portal,⁴⁵ with a customized patient dashboard for blood pressure management, an interactive workbook to educate and motivate better health, and a patient text messaging program providing heart healthy tips aimed at primary prevention

should be considered within a comprehensive system-level management program. This approach may help to facilitate and incentivize improvement in blood pressure control and cardiovascular health, as well as enhance real-time surveillance of cardiovascular health. Further research efforts to enhance specific interventions for improving patient adherence and to identify optimal patient-centered, value-oriented systems of care should continue to be supported.

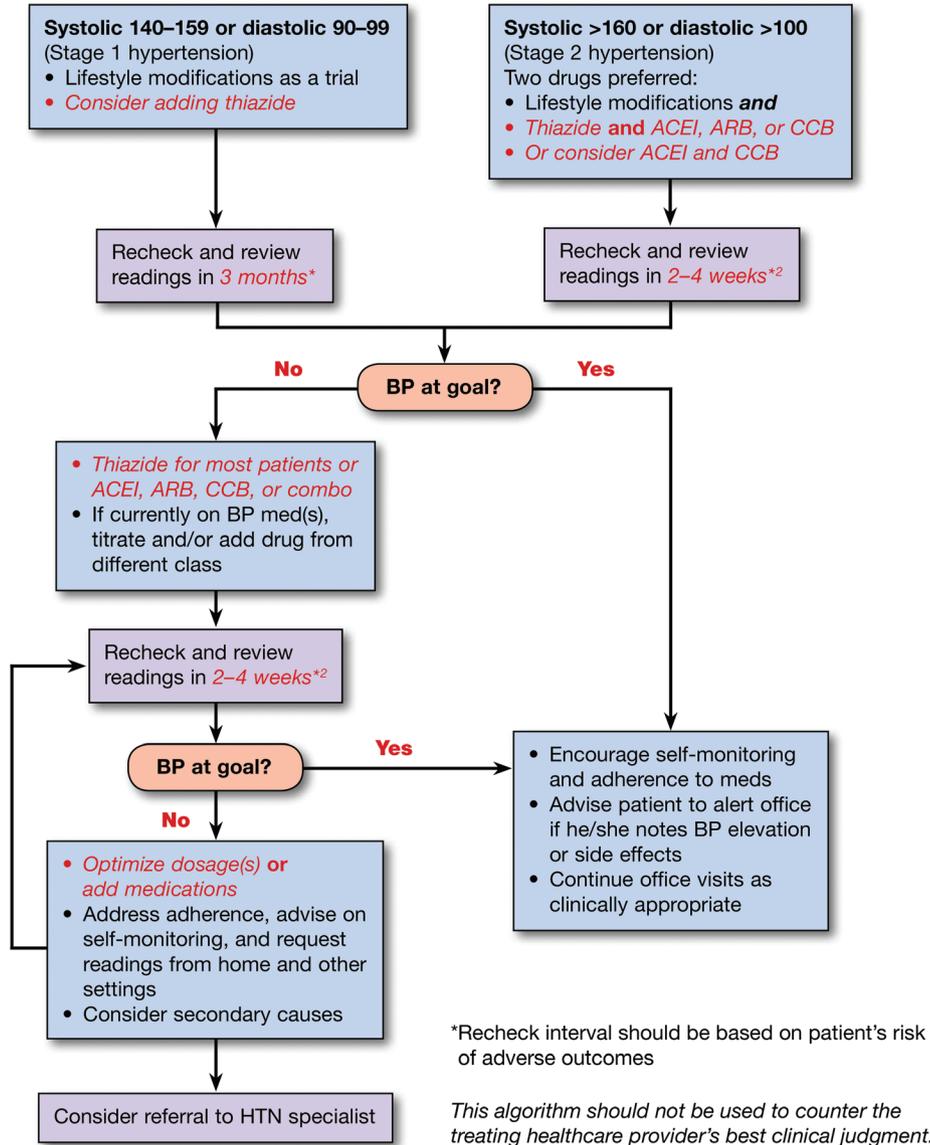
This advisory is intended to complement and support clinical guidelines, providing clinicians and health systems tools to improve the treatment and control of hypertension. The prevention of heart disease and stroke mandates a greater emphasis on the population-wide improvement of blood pressure awareness, treatment, and control together with other cardiovascular health factors.^{15,26,46}

Appendix

Controlling hypertension in adults (see next pages for the treatment algorithm).

Appendix

Controlling Hypertension in Adults¹



© 2013 The Authors. Hypertension is published on behalf of the American Heart Association, Inc., by Wolters Kluwer; the Journal of the American College of Cardiology is published on behalf of the American College of Cardiology Foundation by Elsevier Inc. This is an open access article under the terms of the Creative Commons Attribution Non-Commercial-NoDerivs License, which permits use, distribution, and reproduction in any medium, provided that the Contribution is properly cited, the use is non-commercial, and no modifications or adaptations are made.

Controlling Hypertension in Adults

The blood pressure (BP) goal for an individual is set by utilizing a combination of factors including scientific evidence, clinical judgment, and patient tolerance. For most people, the goal is <140 and <90;³ however, lower targets may be appropriate for some populations such as African-Americans, the elderly, or patients with LV hypertrophy, systolic or diastolic LV dysfunction, diabetes mellitus or chronic kidney disease. Lifestyle modifications (LM) should be initiated in all patients with hypertension (HTN) and they should be assessed for target organ damage and existing cardiovascular disease. Self-monitoring⁴ is encouraged for most patients throughout their care, and requesting and reviewing readings from home and community settings can help the provider assist the patient in achieving and maintaining good control. For patients with hypertension in combination with certain clinical conditions, specific medications should be considered first-line treatments.

Suggested Medications for Treatment of Hypertension in Presence of Certain Medical Conditions

- Coronary artery disease/Post MI: *BB, ACEI*
- Systolic heart failure: *ACEI or ARB, BB, ALDO ANTAG, thiazide*
- Diastolic heart failure: *ACEI or ARB, BB, thiazide*
- Diabetes: *ACEI or ARB, thiazide, BB, CCB*
- Kidney disease: *ACEI or ARB*
- Stroke or TIA: *thiazide, ACEI*

Lifestyle Modifications³ (LM)

Modification	Recommendation	Approximate SBP Reduction (Range)**
Reduce weight	Maintain normal body weight (body mass index 18.5–24.9 kg/m ²)	5–20 mm Hg/10 kg
Adopt DASH ⁵ eating plan	Consume a diet rich in fruits, vegetables, and low-fat dairy products with a reduced content of saturated and total fat	8–14 mm Hg
Lower sodium intake ⁶	a. Consume no more than 2,400 mg of sodium/day; b. Further reduction of sodium intake to 1,500 mg/day is desirable since it is associated with even greater reduction in BP; and c. Reduce intake by at least 1,000 mg/day since that will lower BP, even if the desired daily sodium intake is not achieved	2–8 mm Hg
Physical activity	Engage in regular aerobic physical activity such as brisk walking (at least 30 min per day, most days of the week)	4–9 mm Hg
Moderation of alcohol consumption	Limit consumption to no more than 2 drinks (e.g., 24 oz beer, 10 oz wine, or 3 oz 80-proof whiskey) per day in most men, and to no more than 1 drink per day in women and lighter weight persons	2–4 mm Hg

* DASH, dietary approaches to stop hypertension

** The effects of implementing these modifications are dose and time dependent, and could be greater for some individuals

Abbreviations

ACEI, angiotensin-converting-enzyme inhibitor; ALDO ANTAG, aldosterone antagonist; ARB, angiotensin II receptor blocker; BB, β -blocker; BP, blood pressure; CCB, calcium channel blocker; HTN, hypertension; MI, myocardial infarction; SBP, systolic blood pressure; TIA, transient ischemic attack

References

1. Go AS, Bauman M, Coleman King SM, Fonarow GC, Lawrence W, Williams K, Sanchez E. An effective approach to high blood pressure control: a science advisory from the American Heart Association, the American College of Cardiology, and the Centers for Disease Control and Prevention. *Hypertension*. 2013; published online before print November 15, 2013. 10.1161/HYP.0000000000000003.
2. Jaffe MG, Lee GA, Young JD, Sidney S, Go AS. Improved Blood Pressure Control Associated with a Large-Scale Hypertension Program. *JAMA*. 2013;310(7):699-705.
3. National Heart, Lung, and Blood Institute, National Institutes of Health. *The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure — Complete Report*. National Heart, Lung, and Blood Institute, National Institutes of Health. NIH Publication No. 04-5230, 2004.
4. Centers for Disease Control and Prevention. *Self-Measured Blood Pressure Monitoring: Action Steps for Public Health Practitioners*. Atlanta, GA: Centers for Disease Control and Prevention, US Dept of Health and Human Services; 2013.
5. Sacks FM, Svetkey LP, Vollmer WM, et al. Effects on blood pressure of reduced dietary sodium and the Dietary Approaches to Stop Hypertension (DASH) diet. DASH-Sodium Collaborative Research Group. *N Engl J Med*. 2001;344:3-10.
6. Eckel RH, Jakicic JM, Ard JD, Hubbard VS, de Jesus JM, Lee I-M, Lichtenstein AH, Loria CM, Millen BE, Houston Miller N, Nonas CA, Sacks FM, Smith SC Jr, Svetkey LP, Wadden TW, Yanovski SZ. 2013 AHA/ACC guideline on lifestyle management to reduce cardiovascular risk: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines. *Circulation*. 2013; published online before print November 12, 2013. 10.1161/01.cir.0000437740.48606.d1.

Disclosures

Writing Group Disclosures

Writing Group Member	Employment	Research Grant	Other Research Support	Speakers' Bureau/ Honoraria	Expert Witness	Ownership Interest	Consultant/ Advisory Board	Other
Alan S. Go	Kaiser Permanente Northern California	NIH†	None	None	None	None	None	None
Mary Ann Bauman	INTEGRIS Health, Inc	None	None	None	None	None	None	None
Sallyann M. Coleman King	CDC	None	None	None	None	None	None	None
Gregg C. Fonarow	UCLA	AHRQ†; NIH†	None	None	None	None	Novartis†; Bayer*; Johnson & Johnson*; Medtronic*	None
Willie Lawrence	HCA and Midwest Heart and Vascular Associates	No	No	No	No	No	BCBS KC (Credentials Committee, P & T Committee)*	Wife is CFO Childrens' Mercy Hospital, KC†
Eduardo Sanchez	American Heart Association (since April 15, 2013); Blue Cross and Blue Shield of Texas (through April 15, 2013)	None	None	None	None	None	None	None
Kim A. Williams	Rush University	None	None	None	None	None	None	None

This table represents the relationships of writing group members that may be perceived as actual or reasonably perceived conflicts of interest as reported on the Disclosure Questionnaire, which all members of the writing group are required to complete and submit. A relationship is considered to be "significant" if (a) the person receives \$10 000 or more during any 12-month period, or 5% or more of the person's gross income; or (b) the person owns 5% or more of the voting stock or share of the entity, or owns \$10 000 or more of the fair market value of the entity. A relationship is considered to be "modest" if it is less than "significant" under the preceding definition.

*Modest.

†Significant.

Reviewer Disclosures

Reviewer	Employment	Research Grant	Other Research Support	Speakers' Bureau/Honoraria	Expert Witness	Ownership Interest	Consultant/ Advisory Board	Other
Robert M. Carey	University of Virginia Health System	NIH†	None	None	None	None	None	None
Gregory D. Fink	Michigan State University	NIH† (money paid to institution); AHA† (money paid to institution); Medtronic*	None	None	None	None	None	None
John M. Flack	Wayne State University	NIH*; Novartis*; Medtronic*	None	Novartis†	None	None	Novartis†; NIH*; Medtronic*; Back Beat Hypertension*; NIVasc*	None
Daniel W. Jones	University of Mississippi	None	None	None	None	None	None	None
Janet Wright	CDC	None	None	None	None	None	None	None

This table represents the relationships of reviewers that may be perceived as actual or reasonably perceived conflicts of interest as reported on the Disclosure Questionnaire, which all reviewers are required to complete and submit. A relationship is considered to be "significant" if (a) the person receives \$10 000 or more during any 12-month period, or 5% or more of the person's gross income; or (b) the person owns 5% or more of the voting stock or share of the entity, or owns \$10 000 or more of the fair market value of the entity. A relationship is considered to be "modest" if it is less than "significant" under the preceding definition.

*Modest.

†Significant.

References

- Go AS, Mozaffarian D, Roger VL, Benjamin EJ, Berry JD, Borden WB, Bravata DM, Dai S, Ford ES, Fox CS, Franco S, Fullerton HJ, Gillespie C, Hailpern SM, Heit JA, Howard VJ, Huffman MD, Kissela BM, Kittner SJ, Lackland DT, Lichtman JH, Lisabeth LD, Magid D, Marcus GM, Marelli A, Matchar DB, McGuire D, Mohler E, Moy CS, Mussolino ME, Nichol G, Paynter NP, Schreiner PJ, Sorlie PD, Stein J, Turan TN, Virani SS, Wong ND, Woo D, Turner MB; on behalf of the American Heart Association Statistics Committee and Stroke Statistics Subcommittee. Heart disease and stroke statistics—2013 update: a report from the American Heart Association. *Circulation*. 2013;127:e6–e245.
- Murphy SL, Xu JQ, Kochanek KD. *Deaths: Final Data for 2010*. National Vital Statistics Reports, vol 61, No. 4. Hyattsville, MD: National Center for Health Statistics; 2013.
- Centers for Disease Control and Prevention. Vital signs: prevalence, treatment, and control of hypertension—United States, 2003–2010. *MMWR Morb Mortal Wkly Rep*. 2012;61:703–709.
- Yoon SS, Burt V, Louis T, Carroll MD. Hypertension among adults in the United States, 2009–2010. *NCHS Data Brief*. 2012;1–8.
- Egan BM, Li J, Qanungo S, Wolfman TE. Blood pressure and cholesterol control in hypertensive hypercholesterolemic patients: National Health and Nutrition Examination Surveys 1988–2010. *Circulation*. 2013;128:29–41.
- Kuznik A, Mardekian J, Tarasenko L. Evaluation of cardiovascular disease burden and therapeutic goal attainment in us adults with chronic kidney disease: an analysis of National Health and Nutrition Examination Survey data, 2001–2010. *BMC Nephrol*. 2013;14:132.
- Centers for Disease Control and Prevention. Racial/ethnic disparities in the awareness, treatment, and control of hypertension – United States, 2003–2010. *MMWR Morb Mortal Wkly Rep*. 2013;62:351–355.
- Heidenreich PA, Trogdon JG, Khavjou OA, Butler J, Dracup K, Ezekowitz MD, Finkelstein EA, Hong Y, Johnston SC, Khera A, Lloyd-Jones DM, Nelson SA, Nichol G, Orenstein D, Wilson PW, Woo YJ; on behalf of the American Heart Association Advocacy Coordinating Committee; Stroke Council; Council on Cardiovascular Radiology and Intervention; Council on Clinical Cardiology; Council on Epidemiology and Prevention; Council on Arteriosclerosis, Thrombosis, and Vascular Biology; Council on Cardiopulmonary, Critical Care, Perioperative and Resuscitation; Council on Cardiovascular Nursing; Council on the Kidney in Cardiovascular Disease; Council on Cardiovascular Surgery and Anesthesia, and Interdisciplinary Council on Quality of Care and Outcomes Research. Forecasting the future of cardiovascular disease in the United States: a policy statement from the American Heart Association. *Circulation*. 2011;123:933–944.
- Chobanian AV, Bakris GL, Black HR, Cushman WC, Green LA, Izzo JL Jr, Jones DW, Materson BJ, Oparil S, Wright JT Jr, Roccella EJ; the 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.
- Lloyd-Jones DM, Hong Y, Labarthe D, Mozaffarian D, Appel LJ, Van Horn L, Greenlund K, Daniels S, Nichol G, Tomaselli GF, Arnett DK, Fonarow GC, Ho PM, Lauer MS, Masoudi FA, Robertson RM, Roger V, Schwamm LH, Sorlie P, Yancy CW, Rosamond WD; on behalf of American Heart Association Strategic Planning Task Force and Statistics Committee. Defining and setting national goals for cardiovascular health promotion and disease reduction: the American Heart Association's Strategic Impact Goal through 2020 and beyond. *Circulation*. 2010;121:586–613.
- Frieden TR, Berwick DM. The “Million Hearts” initiative—preventing heart attacks and strokes. *N Engl J Med*. 2011;365:e27.
- Mancia G, Fagard R, Narkiewicz K, Redon J, Zanchetti A, Bohm M, Christiaens T, Cifkova R, De Backer G, Dominiczak A, Galderisi M, Grobbee DE, Jaarsma T, Kirchhof P, Kjeldsen SE, Laurent S, Manolis AJ, Nilsson PM, Ruilope LM, Schmieder RE, Sirnes PA, Sleight P, Viigimaa M, Waeber B, Zannad F, Burnier M, Ambrosioni E, Caulfield M, Coca A, Olsen MH, Tsoufis C, van de Borne P, Zamora JL, Achenbach S, Baumgartner H, Bax JJ, Bueno H, Dean V, Deaton C, Erol C, Ferrari R, Hasdai D, Hoes AW, Knuuti J, Kolh P, Lancellotti P, Linhart A, Nihoyannopoulos P, Piepoli MF, Ponikowski P, Tamargo JL, Tenders M, Torbicki A, Wijns W, Windecker S, Clement DL, Gillebert TC, Rosei EA, Anker SD, Bauersachs J, Hitij JB, Caulfield M, De Buyzere M, De Geest S, Derumeaux GA, Erdine S, Farsang C, Funck-Brentano C, Gerc V, Germano G, Gielen S, Haller H, Jordan J, Kahan T, Komajda M, Lovic D, Mahrholdt H, Ostergren J, Parati G, Perk J, Polonia J, Popescu BA, Reiner Z, Ryden L, Sirenko Y, Stanton A, Struijker-Boudier H, Vlachopoulos C, Volpe M, Wood DA. 2013 ESH/ESC guidelines for the management of arterial hypertension: the Task Force for the Management of Arterial Hypertension of the European Society of Hypertension (ESH) and of the European Society of Cardiology (ESC). *Eur Heart J*. 2013;34:2159–2219.
- 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;CD005182.
- Healthy People 2020. Heart disease and stroke. <http://www.healthypeople.gov/2020/topicsobjectives2020/objectiveslist.aspx?topicId=21>. Accessed November 11, 2013.
- Kohn LT, Corrigan JM, Donaldson MS, eds. *To Err Is Human: Building a Safer Health System*. Washington, DC: National Academy Press; 2000.
- Ellrodt AG, Fonarow GC, Schwamm LH, Albert N, Bhatt DL, Cannon CP, Hernandez AF, Hlatky MA, Luepker RV, Peterson PN, Reeves M, Smith EE. Synthesizing lessons learned from Get With The Guidelines: the value of disease-based registries in improving quality and outcomes. *Circulation*. 2013;128:2447–2460.
- Rivers E, Nguyen B, Havstad S, Ressler J, Muzzin A, Knoblich B, Peterson E, Tomlanovich M. Early goal-directed therapy in the treatment of severe sepsis and septic shock. *N Engl J Med*. 2001;345:1368–1377.
- Rivers EP, Coba V, Whitmill M. Early goal-directed therapy in severe sepsis and septic shock: a contemporary review of the literature. *Curr Opin Anaesthesiol*. 2008;21:128–140.
- Wheeler DS, Giaccone MJ, Hutchinson N, Haygood M, Bondurant P, Demmel K, Kotagal UR, Connelly B, Corcoran MS, Line K, Rich K, Schoettler PJ, Brill R. A hospital-wide quality-improvement collaborative to reduce catheter-associated bloodstream infections. *Pediatrics*. 2011;128:e995–e1004; quiz e1004–e1007.
- Morris AC, Hay AW, Swann DG, Everingham K, McCulloch C, McNulty J, Brooks O, Laursen IF, Cook B, Walsh TS. Reducing ventilator-associated pneumonia in intensive care: Impact of implementing a care bundle. *Crit Care Med*. 2011;39:2218–2224.
- Jaffe MG, Lee GA, Young JD, Sidney S, Go AS. Improved blood pressure control associated with a large-scale hypertension program. *JAMA*. 2013;310:699–705.
- California Department of Managed Healthcare. California health plans vs. national top 10 performance. Right Care Initiative: Selected HEDIS Measures. 2012. <http://www.dmh.ca.gov/library/reports/news/rci/top-10plans.pdf>. Accessed November 11, 2013.
- Department of Veterans Affairs, Veterans Health Administration, Office of Quality and Safety. 2009 VHA facility quality and safety report. 2009. <http://www.va.gov/health/docs/HospitalReportCard2009.pdf>. Accessed November 11, 2013.
- US Veterans Health Administration. Report to the Appropriations Committee of the US House of Representatives in response to House Appropriations report No. 110-186, accompanying public law 110-161, the Consolidated Appropriations Act, 2008. Washington, DC: Department of Veterans Affairs, Veterans Health Administration; 2008.
- Department of Veterans Affairs, Veterans Health Administration, Office of Quality and Safety. 2010 VHA facility quality and safety report. <http://www.va.gov/health/docs/HospitalReportCard2010.pdf>. Accessed November 11, 2013.
- KDIGO clinical practice guideline for the management of blood pressure in chronic kidney disease. Methods for guideline development. *Kidney Int Suppl*. 2012;2:388–397.
- American Diabetes Association. Standards of medical care in diabetes—2013. *Diabetes Care*. 2013;36(suppl 1):S11–S66.
- Systolic Blood Pressure Intervention Trial (SPRINT). 2013. <http://clinicaltrials.gov/ct2/show/NCT01206062>. Accessed November 11, 2013.
- Tomaselli GF, Harty MB, Horton K, Schoeberl M. The American Heart Association and the Million Hearts Initiative: a presidential advisory from the American Heart Association. *Circulation*. 2011;124:1795–1799.
- Pearson TA, Palaniappan LP, Artinian NT, Carnethon MR, Criqui MH, Daniels SR, Fonarow GC, Fortmann SP, Franklin BA, Galloway JM, Goff DC Jr, Heath GW, Frank AT, Kris-Etherton PM, Labarthe DR, Murabito JM, Sacco RL, Sasseon C, Turner MB; on behalf of American Heart Association Council on Epidemiology and Prevention. American Heart Association guide for improving cardiovascular health at the community level, 2013 update: a scientific statement for public health practitioners, healthcare providers, and health policy makers. *Circulation*. 2013;127:1730–1753.
- Jones DW, Peterson ED, Bonow RO, Masoudi FA, Fonarow GC, Smith SC Jr, Solis P, Girgus M, Hinton PC, Leonard A, Gibbons RJ. Translating research into practice for healthcare providers: the American Heart Association's strategy for building healthier lives, free of cardiovascular diseases and stroke. *Circulation*. 2008;118:687–696.

32. Aronow WS, Fleg JL, Pepine CJ, Artinian NT, Bakris G, Brown AS, Ferdinand KC, Forcica MA, Frishman WH, Jaigobin C, Kostis JB, Mancia G, Oparil S, Ortiz E, Reisin E, Rich MW, Schocken DD, Weber MA, Wesley DJ, Harrington RA; ACCF Task Force. ACCF/AHA 2011 expert consensus document on hypertension in the elderly: a report of the American College of Cardiology Foundation Task Force on Clinical Expert Consensus Documents. *Circulation*. 2011;123:2434–2506.
33. Handler J, Lackland DT. Translation of hypertension treatment guidelines into practice: a review of implementation. *J Am Soc Hypertens*. 2011;5:197–207.
34. Aucott JN, Pelecanos E, Dombrowski R, Fuehrer SM, Laich J, Aron DC. Implementation of local guidelines for cost-effective management of hypertension. A trial of the firm system. *J Gen Intern Med*. 1996;11:139–146.
35. Choma NN, Huang RL, Dittus RS, Burnham KE, Roumie CL. Quality improvement initiatives improve hypertension care among veterans. *Circ Cardiovasc Qual Outcomes*. 2009;2:392–398.
36. Green BB, Cook AJ, Ralston JD, Fishman PA, Catz SL, Carlson J, Carrell D, Tyll L, Larson EB, Thompson RS. Effectiveness of home blood pressure monitoring, Web communication, and pharmacist care on hypertension control: a randomized controlled trial. *JAMA*. 2008;299:2857–2867.
37. American Heart Association/American Stroke Association. Heart 360. <http://www.heart360.org>. Accessed November 11, 2013.
38. American Heart Association. Get With the Guidelines. <http://www.heart.org/GWTG>. Accessed November 11, 2013.
39. American Cancer Society, American Diabetes Association, and American Heart Association/American Stroke Association. The Guideline Advantage. <http://www.th guidelineadvantage.org>. Accessed November 11, 2013.
40. American College of Cardiology Foundation. National Cardiovascular Data Registry. <https://www.ncdr.com/webncdr/>. Accessed November 11, 2013.
41. Centers for Disease Control and Prevention. State Heart Disease and Stroke Prevention Programs. Paul Coverdell National Acute Stroke Registry (PCNASR). http://www.cdc.gov/dhdsp/programs/stroke_registry.htm. Accessed November 11, 2013.
42. The Community Guide. The Guide to Community Preventive Services. Cardiovascular disease prevention and control: team-based care to improve blood pressure control. <http://www.thecommunityguide.org/cvd/teambasedcare.html>. Accessed November 11, 2013.
43. Mensah GA, Mokdad AH, Ford ES, Greenlund KJ, Croft JB. State of disparities in cardiovascular health in the United States. *Circulation*. 2005;111:1233–1241.
44. American Heart Association. My Life Check. Life's Simple 7. <http://mylifecheck.heart.org/>. Accessed November 11, 2013.
45. American College of Cardiology. CardioSmart. <https://www.cardiosmart.org/>. Accessed November 11, 2013.
46. Smith SC Jr, Chen D, Collins A, Harold JG, Jessup M, Josephson S, Logstrup S, Sacco RL, Vardas PE, Wood DA, Zoghbi WA. Moving from political declaration to action on reducing the global burden of cardiovascular diseases: a statement from the Global Cardiovascular Disease Taskforce. *Circulation*. 2013;128:2546–2548.

KEY WORDS: AHA Scientific Statements ■ hypertension