

CLINICAL ALERT

## An Effective Approach to High Blood Pressure Control<sup>☆</sup>



A Science Advisory From the American Heart Association, the American College of Cardiology, and the Centers for Disease Control and Prevention

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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  $\approx 15\%$  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 U.S. 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).

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\*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 U.S. adults would be 67 million (3).

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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 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 setting (15); improving the inpatient treatment and outcomes of acute myocardial infarction, heart failure, stroke, and cardiopulmonary resuscitation (16); reducing health disparities in the treatment of cardiovascular conditions (16); 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

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