

The Surgeon General's Call to Action to  
**Control Hypertension**





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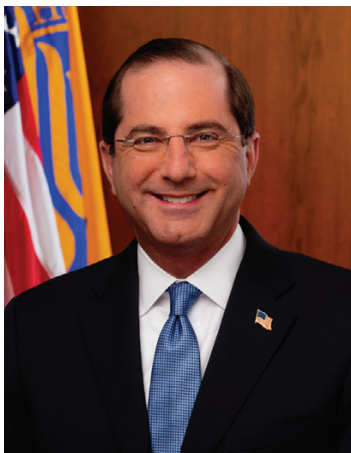
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**Control Hypertension**



## Message from the Secretary, U.S. Department of Health and Human Services



As a nation, our ability to improve hypertension control requires focus. We must focus on better using the interventions that we already know work, and we must focus on conducting science that supports the creation of new, innovative interventions. As Secretary, I have a unique perspective across multiple sectors that influence hypertension control, including the roles that social services, health insurers, patient care, research, public health, and the pharmaceutical industry can play.

While we normally look to the health care sector to combat chronic diseases, the high burden of hypertension requires us to expand our partnerships across settings to maximize our collective influence.

I am excited about *The Surgeon General's Call to Action to Control Hypertension*, because it includes specific hypertension control goals for our nation and provides proven strategies and relevant resources that multiple sectors can use immediately.

The data speak for themselves—nearly one in two adults have hypertension, and only about one in four people with hypertension have it under control. This places millions of Americans at heightened risk for heart disease and stroke, the first and fifth leading causes of death in the United States.

We must address this threat to our health. The time to act is now.

Alex M. Azar II  
Secretary  
U.S. Department of Health and Human Services

## Foreword from the Surgeon General, U.S. Department of Health and Human Services



As a physician, I've seen firsthand the devastating effects of hypertension. Left uncontrolled, it leads to heart attacks, stroke, kidney disease, and cognitive decline in later life, and it can impact mother and baby during and after pregnancy. In addition, as evidenced from the global COVID-19 outbreak earlier in the year, we've seen the broad impact of preventable health conditions on worse outcomes.

Hypertension is unfortunately common, but there are interventions and programs that have been successful in improving control. Our country has many hypertension control champions—doctors, practices, communities, and health systems that have excelled at achieving high rates of hypertension control among their patients. We need to learn from their many years of “blood, sweat, and tears” and apply their principles in new settings.

While hypertension is more prominent among older adults, it is not simply a condition of the elderly. All ages are impacted, and early identification and long-term control can preserve cardiovascular health now and into the future. We know that lifestyle changes, such as being physically active and adopting a healthy diet, can promote hypertension control, yet many communities have significant barriers that prevent people from making these changes. We also know that many people with hypertension require medications to achieve control. Access to high-quality health care, prescription of appropriate medications, and clinical and community support are needed to prevent and treat hypertension, publicize local resources, and establish a plan for care supportive of long-term control.

*The Surgeon General's Call to Action to Control Hypertension* summarizes recent data on hypertension control, identifies select goals and strategies, and provides recommendations for areas of focus when resources are limited. While the recent trends don't look good—we've hit a plateau in hypertension control—I believe that with focus and collaboration, we can improve our trajectory.

Join me in taking control of hypertension across our nation. Together, we've got this!

Jerome M. Adams, MD, MPH  
Vice Admiral, U.S. Public Health Service  
Surgeon General  
U.S. Department of Health and Human Services

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# Introduction

Hypertension, or high blood pressure, affects nearly one in two U.S. adults and is a major preventable risk factor for heart disease and stroke.<sup>1</sup> Despite the common nature of this condition and a large amount of national attention,<sup>2,3</sup> only about 24% (26 million) have their blood pressure controlled to  $\leq 130/80$  mmHg.<sup>1</sup> Regardless of the threshold used to measure control, national rates have stagnated and disparities persist.<sup>3,4</sup> *The Surgeon General's Call to Action to Control Hypertension* seeks to avert the negative health effects of hypertension across the U.S. by identifying interventions that can be implemented, adapted, and expanded across diverse settings.

The *Call to Action* is divided into three sections. **Section 1** summarizes the current state of hypertension control, including the economic costs and disparities between different population groups. It notes that progress in hypertension control has been demonstrated in communities and health care systems across the country.<sup>5,6,7</sup> In many areas, we know what works, but we need to replicate and expand these efforts and continue to explore new interventions to achieve control across all population groups.

**Section 2** presents three overall goals to support improvements in hypertension control:

**Goal 1.** Make hypertension control a national priority.

**Goal 2.** Ensure that the places where people live, learn, work, and play support hypertension control.

**Goal 3.** Optimize patient care for hypertension control.

These goals take into account the need for national attention on hypertension control because of its broad adverse effects on health. They also recognize that community and clinical interventions designed to improve control must address the social determinants of health. Each goal is supported by strategies intended to accelerate actions to achieve success. The strategies were selected according to available scientific literature, identified promising practices, and expert opinion.

**Section 3** identifies the sectors that can influence hypertension control. Diverse activities across many sectors are needed. Recognizing the importance of these sectors, *Call to Action Guides* were developed to provide sector-specific recommendations and resources. A significant amount of existing resources were identified during the development of this publication. Efforts were made to highlight these resources and not duplicate efforts.

To improve hypertension control across the U.S. for all populations, we need broadscale, culturally sensitive, and diverse interventions that address the social determinants of health. Although progress in hypertension control has stalled at the national level, our efforts must not. Many strategic partners have devoted significant energy to advancing hypertension control across our nation. This *Call to Action* seeks to further support and amplify those efforts. The challenge is significant, but the tools are plentiful. *Together, we've got this!*

# Section 1. Evidence and the Need for Action

## Hypertension in the United States

Hypertension is a major preventable risk factor for heart disease and stroke, which are the first and fifth leading causes of death in the U.S., respectively.<sup>1</sup> Clinicians diagnose patients with hypertension, make decisions about treatment recommendations, and determine control status by comparing patients' systolic and diastolic blood pressure readings to defined thresholds (e.g.,  $\geq 130/80$  mmHg). If left uncontrolled, hypertension can also increase a person's risk of developing other health conditions, including heart failure, kidney disease, pregnancy complications, and cognitive decline in later life.<sup>8</sup> The negative health effects of hypertension may be avoided with the use of evidence-based interventions, and multiple sectors can play an active role in implementing, adapting, and expanding these interventions across the U.S.

Although many of the interventions described in this publication can help prevent hypertension, the focus of this *Call to Action* is on improving control among the millions of U.S. adults who already have hypertension. Applying the criteria from the most recent national hypertension guideline,<sup>8</sup> nearly half of U.S. adults (108 million) have hypertension and are recommended to make lifestyle changes and, if appropriate, take antihypertension medication to lower their blood pressure (Figure 1). Among the

**Figure 1. Prevalence, Control Status, and Treatment of Hypertension Among U.S. Adults, National Health and Nutrition Examination Survey, 2013–2016**



<sup>a</sup> Based on the American College of Cardiology and American Heart Association's 2017 Hypertension Clinical Practice guideline for adults aged 18 years or older who have blood pressure  $\geq 130/80$  mmHg or who are currently using prescription medication to lower their blood pressure.

<sup>b</sup> Among those recommended to take prescription medication and make lifestyle changes.

**Source:** Centers for Disease Control and Prevention (CDC). Hypertension Cascade: Hypertension Prevalence, Treatment and Control Estimates Among US Adults Aged 18 Years and Older Applying the Criteria From the American College of Cardiology and American Heart Association's 2017 Hypertension Guideline—NHANES 2013–2016. Atlanta, GA: US Department of Health and Human Services; 2019.



87 million U.S. adults with hypertension who are estimated to have received recommendations to make lifestyle changes and take medication, hypertension control rates are alarmingly inadequate. About 71% (61 million) have uncontrolled hypertension ( $\geq 130/80$  mmHg).

To achieve control below the 130/80-mmHg threshold, many adults (31 million) who are already taking medication may need to have their prescription adjusted.<sup>1</sup> Another 30 million adults whose blood pressure is at levels where medication use is recommended but who are untreated may need to be assessed for starting medication and making lifestyle changes. These estimates are derived from clinical guidelines and applied to a population health perspective. Individual treatment plans and target thresholds may vary due to age, co-morbidities, or other factors, and maintaining a consistent medical home can allow for specific tailoring of recommendations. The most recent national guidelines also include additional categories of blood pressure thresholds (Normal:  $<120$  and  $<80$  mmHg; Elevated: 120–129 and  $<80$  mmHg; Hypertension Stage 1: 130–139 or 80–89 mmHg; Hypertension Stage 2:  $\geq 140$  or  $\geq 90$  mmHg), with lower blood pressure generally associated with improved outcomes.<sup>8</sup>

Improving management of hypertension has been traditionally described in terms of improving *awareness* (the percentage of people who have hypertension and know they have it), *treatment* (the percentage who have hypertension and are receiving recommended care), and *control* (the percentage who have hypertension and whose blood pressure has been lowered below specified thresholds). Assessing progress in each of these indicator areas can help identify potential gaps in care, and it offers opportunities for action.

Low awareness of hypertension in a population may indicate a lack of access to and engagement with the health care system, which may require interventions that draw on community and clinical resources to increase blood pressure screening and take action if high values are found. Low treatment rates in a population may indicate a lack of access to care, low rates of health literacy, cost barriers, or a lack of action by individuals (e.g., nonadherence to recommended treatment) or clinicians (e.g., clinical inertia) to address hypertension. Interventions that have proven to be effective in reducing treatment gaps in both community and clinical settings are those that provide individuals, families, clinicians, and community-based care coordinators and programs with the knowledge, tools, and resources needed to ensure that individuals receive guideline-recommended care. Hypertension control is key to reducing the risk of future cardiovascular events in a population. It is potentially the most important indicator to use to evaluate the overall effectiveness of interventions designed to manage blood pressure in a health care practice, health care system, or community.

Awareness, treatment, and control of hypertension are important across the lifespan. Although most of the goals and strategies identified in this *Call to Action* focus on improving hypertension control among adults because of the high rates in this population, hypertension—or the path toward developing hypertension—can begin in childhood or adolescence.<sup>9</sup> Early identification of hypertension and related risk factors among young people can allow for early intervention to prevent progression of this condition and support successful transition from pediatric to adult care.<sup>10,11</sup> Although many of the clinical and community approaches in this *Call to Action* are relevant across the lifespan, unique aspects of blood pressure management for young people would likely require additional strategies and resources beyond those presented in this publication.

In this *Call to Action*, the term “sectors” refers to groups that may use the information in this publication for action, including government entities, organizations, and industries that have a stake in the health of the communities they serve. For each sector we highlight, we recommend specific strategies they can use to take advantage of their unique resources and opportunities for intervention to collectively support achievement of local and national hypertension control goals.

## Control Is Possible

High levels of hypertension control can be achieved in clinical settings and communities.<sup>5,6,12,13</sup> Many health care providers—from large integrated health care systems to community health centers serving different populations to individual health care providers—have demonstrated significant improvements in hypertension control in their patient populations and been recognized nationally for their efforts.<sup>6,12,13</sup> They have done so by making hypertension control a priority, implementing evidence-based strategies, and being dedicated to monitoring improvement over time.<sup>6,7,14,15,16,17,18,19,20</sup> These strategies include the following:

- Enhancing electronic health record systems to improve clinical workflows and provide decision support tools.
- Implementing treatment protocols.
- Expanding the use of integrated care teams.
- Providing clinician feedback on performance.
- Prioritizing medication intensification and adherence.
- Promoting shared management through self-measured blood pressure monitoring.

Some communities have also taken steps to develop policies and programs that implement many of the strategies included in this *Call to Action* and worked with partners in other sectors to amplify their efforts to make population-level improvements in hypertension control.<sup>5</sup>

## Barriers to Control

Despite the successes that many health systems and communities have had in achieving high rates of hypertension control, significant barriers still exist. These barriers include individuals having inadequate health insurance coverage, high deductibles and copayments, or limited access to health care services, which can limit their receipt of hypertension-related care.<sup>21,22,23</sup> Individuals may have low levels of health literacy and complex medical management needs that may prevent them from accessing or using medications and technology (e.g., self-measured blood pressure monitors) to help them lower their blood pressure.<sup>24,25</sup> Further, although advice from a clinician is a critical first step that empowers many individuals to attempt lifestyle changes to manage their blood pressure,<sup>26</sup> it can be insufficient when not adequately supported by policy, systemic, and environmental interventions that make it easier for people to make healthy choices.<sup>27,28,29</sup> For example, people may have limited access to safe areas to be physically active or to transportation to receive health care services, or they may have physical or mental disabilities or time limitations because of caregiver and work responsibilities.<sup>30,31,32,33,34,35</sup> Mental health challenges can complicate hypertension management, and engagement of a mental health clinician may be needed to meet collaborative goals.<sup>36,37</sup> In addition, these barriers may occur in tandem and can be either compounded or mitigated by people's past or existing experiences, beliefs, biases, and cultures.<sup>30,38,39,40</sup> Understanding these factors and the role they may play in limiting or supporting hypertension control is important for improving adherence to prescribed therapy and recommended lifestyle changes.

## Promoting Health Equity

***“Achieving health equity requires valuing everyone equally with focused and ongoing societal efforts to address avoidable inequalities, historical and contemporary injustices, and the elimination of health and health care disparities.”***

*—National Stakeholder Strategy for Achieving Health Equity. National Partnership for Action to End Health Disparities.*

Health equity has been defined as being achieved when every person has the opportunity to “attain their full health potential and that no one should be disadvantaged from achieving this potential because of their social position or other socially determined circumstance.”<sup>41,42</sup> Health inequities may be demonstrated in differences in length and quality of life, rates and severity of disease, rates of death, and access to prevention and treatment.<sup>43</sup> Health disparities have been defined by many groups and generally refer to differences that may adversely affect groups of people who have “systematically experienced greater obstacles to health based on their racial or ethnic group; religion; socioeconomic status; sex; age; mental health; cognitive, sensory, or physical disability; sexual orientation; geographic location; or other characteristics historically linked to discrimination or exclusion.”<sup>44,45</sup>

In the U.S., certain groups of people have disproportionately high rates of hypertension and its related health consequences. Prevalence is higher among older adults and is also notably higher among certain racial and ethnic groups, especially non-Hispanic blacks.<sup>46</sup> Although several modifiable and nonmodifiable factors are regularly recognized

as contributing to hypertension, a “third arm of risk,” identified as the social determinants of health, should be prioritized.<sup>47</sup> Social determinants of health, such as inequalities in the distribution of social, economic, and environmental conditions needed for health, have been associated with hypertension risk among non-Hispanic blacks and other minority groups.<sup>47,48</sup> Psychosocial and socioeconomic stressors—such as low socioeconomic status, depression, job stress, financial stress, segregated neighborhoods, and neighborhood poverty level—also contribute to the risk of hypertension.<sup>49,50,51,52,53</sup> In addition, past research has shown an association between racial discrimination and hypertension.<sup>54,55</sup> Health inequities and disparities extend beyond prevalence and are present across all aspects of hypertension, from awareness to disease severity to treatment and control.<sup>3,56</sup>

To identify and address these health inequities and disparities and to promote health equity in communities and across various sectors, we need to better understand why these differences exist, identify success stories and areas where inequities or disparities have been reduced, identify and address barriers, and use community resources to initiate change. Surveillance or electronic health record data can be used to identify populations and communities with the highest rates so interventions can focus on those most in need. Human, technical, and financial resources can be allocated equitably to communities to address factors that contribute to disparities. Key partners, resources, and gaps in support can be identified in communities to address areas of need. Tailored policy, system, and environmental approaches, which are considered broad-scale, sustainable, and potentially scalable, are also needed to promote continued change within communities and to establish communities as places of opportunity for health and prosperity for all.<sup>57</sup>

The need for broadscale actions has never been more relevant. In 2020, disparities in the burden of disease—especially among minority populations—have been recognized during the COVID-19 pandemic. A growing body of evidence has shown that people with underlying health conditions, including cardiovascular disease, are at increased risk of worse outcomes related to COVID-19 infection.<sup>58</sup> Infectious disease outbreaks can be amplified when they occur in populations with high rates of chronic disease, because they may affect the clinical course of the infectious disease or limit the ongoing management of the underlying chronic disease.<sup>59</sup> Therefore, population health efforts that promote cardiovascular health, especially those that address social determinants of health, are needed now more than ever.



## Why Now?

Intervention is needed now because progress on reducing cardiovascular disease deaths, including among younger adults, has stalled.<sup>60</sup> In addition, the U.S. population is aging,<sup>61</sup> and there is more recognition of the negative health effects of uncontrolled hypertension.<sup>62</sup> Fortunately, changes in health care systems, such as protocol-driven and team-based care, have been shown to improve hypertension control across many different populations groups.<sup>6,7,14,15</sup> A growing number of success stories from across the country suggest that focused efforts can inspire rapid, far-reaching progress.<sup>5,6,7</sup> Therefore, we have many of the tools and resources we need to accelerate progress in hypertension control. Now we need to apply them more widely. This *Call to Action* provides targeted strategies that different sectors can take to collectively improve hypertension control across the U.S. The time to act is now. ***Together, we've got this!***

## Section 2. Goals and Strategies: The Call to Action

### Goal 1. Make Hypertension Control a National Priority

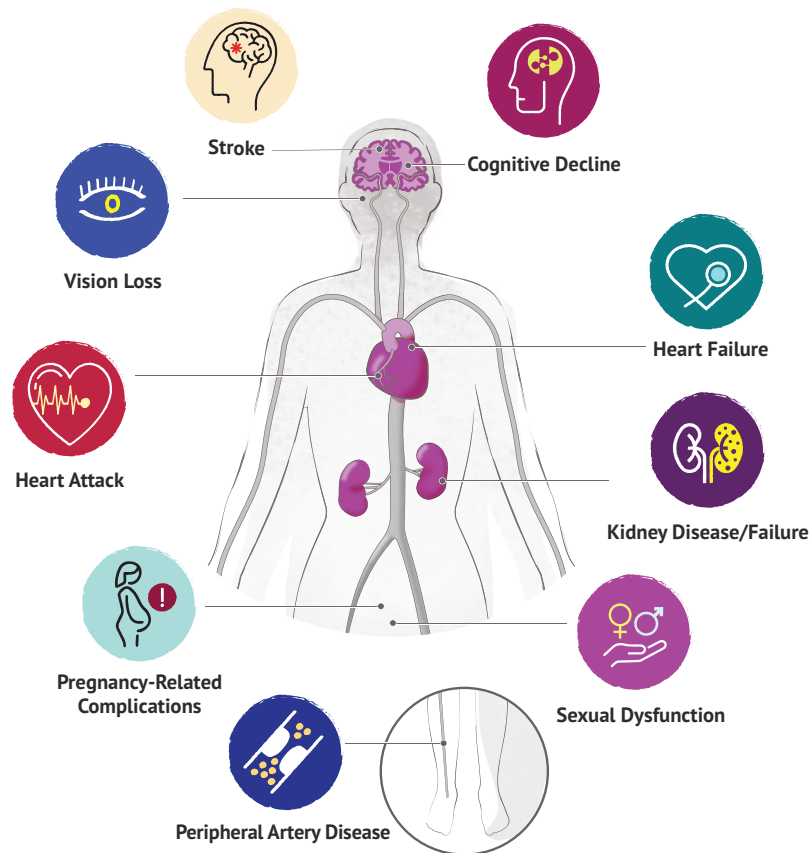
As a nation, we need to better coordinate our approach to hypertension across sectors. Risk factors for hypertension and barriers to control are complex. So too are the diverse populations that hypertension affects and the many different settings and sectors that can play a role in identifying, treating, and controlling hypertension. Our solutions must be multifaceted, multisector, and adaptable. Major improvements in hypertension control will take thoughtful efforts that take advantage of the unique assets of many sectors, including public health, clinical medicine, business and industry, insurance payers, community organizations, and government agencies. Making hypertension control a national priority allows members of multiple sectors to work together to achieve the best cardiovascular health for our nation.

#### Strategy A. Increase awareness of the health risks of uncontrolled hypertension.

The prevalence of hypertension has remained generally stable over the past 20 years, and limited gains have been made in improving hypertension control during the past decade.<sup>4,63,64</sup> Estimates indicate that more than one in three U.S. adults with hypertension are not aware that they have the condition, with variations in awareness among subgroups and geography.<sup>62,65,66</sup> Hypertension has been called a “silent killer” because it generally has no noticeable signs or symptoms.<sup>67,68,69</sup> Without awareness and action, uncontrolled hypertension can damage many body systems and organs, including the heart, brain, kidneys, and eyes, and it can lead to a wide range of complications (**Figure 2**). Awareness of the association between hypertension and negative health outcomes is generally higher for cardiovascular events such as heart attack, heart failure, and stroke than for conditions such as kidney disease, blindness, or cognitive decline.<sup>70</sup>

Despite the lack of awareness, hypertension and its effects are common. Annually, about 500,000 U.S. deaths have hypertension as a primary or contributing cause.<sup>71</sup> Although risk increases with age, adults who have hypertension before age 40 years are at even higher risk of having a cardiovascular event later in life.<sup>72</sup>

**Figure 2. Health Problems Caused by Hypertension**



**Sources:**

Whelton PK, Carey RM, Aronow WS, et al. 2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults: Executive Summary: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. *Hypertension*. 2018;71(6):1269-1324.

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Wang, X., Huang, W. & Zhang, Y. Relation between hypertension and erectile dysfunction: a meta-analysis of cross-section studies. *Int J Impot Res*. 2018;30(3):141-146.

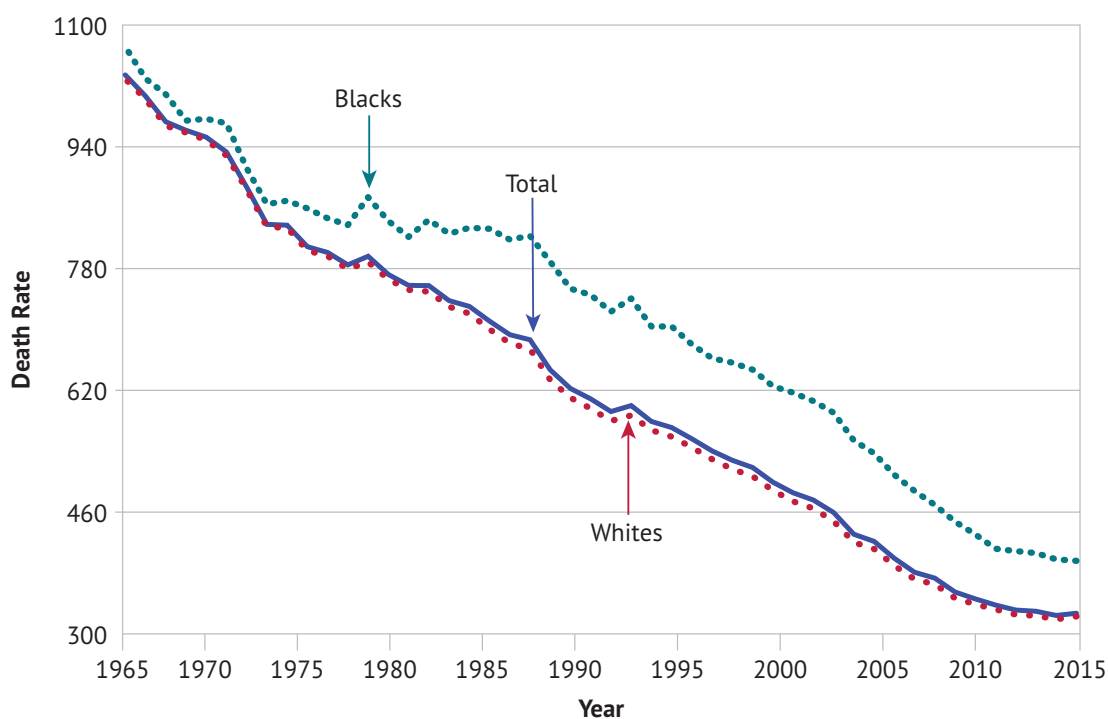
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## Hypertension and Heart Disease

Left unchecked, hypertension can cause structural and functional damage to the heart and vascular system over time that can ultimately lead to dysfunction.<sup>73,74,75,76</sup> It is a leading risk factor for heart disease, which is the leading cause of death in the U.S., accounting for about one in every four deaths.<sup>77</sup> Nationally, the heart disease death rate declined at a rate of about 2.4% per year from the 1960s to the 1970s, with little difference between racial and ethnic groups. In the 1970s, deaths began to decline more slowly for non-Hispanic blacks than for non-Hispanic whites (Figure 3).<sup>78</sup> This disparity persists today, and death rates continue to be higher among non-Hispanic blacks.<sup>78</sup>

Similar disparities in heart disease rates exist across the U.S. From 1973 to 2010, the concentration of counties with high rates of heart disease deaths shifted from the Northeast to the South, with a nearly twofold increase in geographic inequality among counties.<sup>79</sup> Since 2011, the rate of premature death from heart disease has remained stagnant among U.S. adults aged 25–64 years, and in 2017, heart disease still accounted for almost one in five deaths in this age group.<sup>63</sup>

**Figure 3. Heart Disease Death Rates and Annual Percentage Changes Among Adults Aged ≥35 Years, by Race, United States, 1968–2015**



**Note:** Rate is age standardized to the 2000 U.S. standard population.

**Source:** Van Dyke M, Greer S, Odom E, et al. Heart Disease Death Rates Among Blacks and Whites Aged ≥35 Years – United States, 1968–2015. *MMWR Surveill Summ* 2018;67(No. SS-5):1–11. DOI: <http://dx.doi.org/10.15585/mmwr.ss6705a1>

## Hypertension and Stroke

Hypertension is a leading risk factor for stroke, which is the third leading cause of death for women and the fifth leading cause for men, as well as the leading cause of adult disability, in the U.S.<sup>80</sup> In 2018, stroke accounted for nearly 150,000 deaths, representing about one in every six U.S. deaths.<sup>77</sup> About one in four strokes is recurrent, and recurrent strokes are generally associated with a higher 30-day death rate (about 41%) compared to primary strokes (about 22%).<sup>81</sup> Hypertension is recognized as the most important risk factor for stroke, and this condition is commonly present for all types of strokes.<sup>82,83</sup> Sustained levels of elevated blood pressure may damage the lining of blood vessel walls, which weakens them and makes them more vulnerable to blockages and rupture, particularly in the brain.<sup>84</sup> Variability in blood pressure levels and episodic hypertension may also increase stroke risk.<sup>85</sup>

Stroke is largely preventable if hypertension is treated.<sup>86</sup> Overall, hypertension treatment trials have shown that treatment results in reduced risk of stroke.<sup>87</sup> Initiating antihypertensive treatment for primary or secondary stroke prevention is important for risk reduction.<sup>88,89</sup> Although stroke incidence has been declining over the past several decades,<sup>2,90</sup> disparities exist in stroke risk, incidence, and mortality.<sup>91,92</sup> Stroke incidence is higher in the southeastern U.S., an area commonly referred to as the “Stroke Belt,”<sup>93</sup> and among non-Hispanic blacks and Hispanics compared to non-Hispanic whites.<sup>62,92,94,95</sup> Non-Hispanic blacks are five times more likely than non-Hispanic whites to experience a stroke at age 45 years.<sup>91</sup> This disparity may be due in part to differences in the prevalence of hypertension and control in these populations, as well as the differential effect of hypertension.<sup>96</sup> For each 10-mmHg increase in systolic blood pressure, stroke risk increases by 8% for non-Hispanic whites but by 24% for non-Hispanic blacks, which indicates that hypertension is a bigger contributor to stroke risk for the latter group.<sup>96</sup>

## Hypertension and Cognitive Impairment

Hypertension has been associated with various cognitive outcomes, including executive dysfunction, slowing of mental processing speed, and memory deficits as well as cognitive impairment and major neurocognitive disorder (dementia).<sup>97,98,99,100</sup> Uncontrolled hypertension during midlife (aged 45–65 years) raises the risk of cognitive impairment and dementia later in life.<sup>101,102</sup> Not only is sustained hypertension harmful for cognition, but more variability in blood pressure is also associated with dementia in some populations.<sup>103</sup> Hypertension is associated with the severity of “diffuse white matter disease,” a very common condition that is easily detectable as hyperintensities on brain MRI scans. Persons with diffuse white matter disease are at increased risk of developing cognitive impairment.<sup>104</sup> In the first interventional trial of its size and scope to examine a modifiable risk factor for dementia, the SPRINT MIND study established that intensively lowering blood pressure in participants (≥50 years) with vascular risk factors decreased their risk for developing mild cognitive impairment by approximately 20% and reduced progression of white matter hyperintensities on brain scans.<sup>105,106</sup> Less is understood about the cognitive effects of hypertension among those aged 65 years or older, though the elderly individuals in the SPRINT MIND trial did benefit from aggressive blood pressure control.<sup>101,105</sup> A general scientific consensus is emerging that blood pressure control can play an important role in reducing the risk of cognitive decline and possibly dementia, and improving hypertension control at every age is an important safeguard for vascular health and, in turn, brain health.<sup>101,107,108</sup>

## Hypertensive Disorders in Pregnancy

Hypertensive disorders of pregnancy are increasingly common and are among the leading causes of maternal and neonatal disease and death in the U.S.<sup>109,110,111</sup> Some women have hypertension before becoming pregnant (chronic hypertension), while others develop it for the first time during pregnancy (gestational hypertension). Preeclampsia is high blood pressure with signs of problems with the kidneys, liver, or other organs (or multiple organs) that starts during pregnancy or the postpartum period and can be superimposed on chronic hypertension.<sup>112</sup>

About nine in 100 delivery hospitalizations include a diagnosis of a hypertensive disorder.<sup>113</sup> Hypertensive disorders with onset during pregnancy are responsible for 7.8% of all pregnancy-related deaths.<sup>114,115</sup> Associations have been reported between having a history of hypertensive disorders in



pregnancy and a risk of future coronary heart disease, heart failure, stroke, hypertension, diabetes, abnormal heart rhythms, end-stage kidney disease, and cardiomyopathy.<sup>109</sup> Gestational hypertension is present in about 2%–3% of pregnancies and preeclampsia in about 3% of pregnancies.<sup>113,116,117,118</sup> Some disorders, such as gestational hypertension and preeclampsia, usually resolve in the postpartum period (defined as up to 12 weeks after delivery),<sup>119,120</sup> but these conditions may increase a woman's chances of having hypertension later in life, as well as her risk of heart disease.<sup>121</sup> Hypertensive disorders of pregnancy can also cause serious adverse outcomes for infants, including fetal or neonatal disease or death and low birth weight.<sup>119,122</sup> Disparities in hypertensive disorders of pregnancy have been identified, and additional research is needed to better appreciate the causes and implications.<sup>123</sup> However, control of hypertensive disorders improves outcomes for the mother and infant.<sup>112</sup>

## Hypertension and Kidney Disease

Hypertension and chronic kidney disease (CKD) are interrelated conditions, meaning that hypertension can both cause and result from CKD.<sup>124</sup> High consumption of salt and low consumption of water in the general U.S. population may contribute to the development of both conditions.<sup>125</sup> Hypertension is one of the leading risk factors for developing CKD and a major contributor to the progression of kidney disease.<sup>126</sup> Hypertension is more common in people with kidney disease, and control is more difficult in people with CKD. About 31% of adults with blood pressure >130/80 mmHg are estimated to have CKD, and most do not know that they have it.<sup>127,128,129</sup>

Uncontrolled hypertension can cause arteries around the kidneys to narrow, weaken, or harden, leading to kidney damage and kidney failure.<sup>130</sup> Individuals with CKD have a lower blood pressure threshold at which kidney damage may occur compared to people without CKD.<sup>131</sup> They are also at higher risk of heart disease, stroke, and death.<sup>126,132</sup> Disparities by sex and by racial and ethnic group have been reported in the incidence, treatment, and progression of CKD, as well as in the control of hypertension in adults with CKD.<sup>124,133</sup> Non-Hispanic blacks are 3.3 times more likely and Hispanics and American Indians and Alaska Natives 1.7 times more likely to develop kidney failure compared to non-Hispanic whites.<sup>134</sup> The reason for these disparities is unclear, with some research pointing to the higher rates of diabetes and hypertension among these racial and ethnic groups compared to non-Hispanic whites.<sup>135,136</sup>

## Strategy B. Recognize the substantial economic costs of uncontrolled hypertension.

Uncontrolled hypertension is costly—both to individuals and to the nation. In the U.S., total medical costs associated with hypertension, including health care services and medications, are estimated to be \$131 billion to \$198 billion each year.<sup>137,138,139</sup> By 2035, total direct and indirect costs are expected to exceed an estimated \$220 billion a year.<sup>140</sup> Increases in costs associated with hypertension are also projected to be higher for Hispanics and non-Hispanic blacks than for non-Hispanic whites.<sup>140</sup> At the individual level, health care services are about \$2,500 more per year for people with hypertension compared to those without this condition and over \$4,000 more per year for people who also have diabetes.<sup>137</sup>

The cost of hypertension also extends beyond the health care setting. From 2008 to 2011, absenteeism from work associated with hypertension cost employers an estimated \$10.3 billion per year, equaling about \$300 per employee per year.<sup>141</sup> In contrast, the cost of hypertension management is lower than the long-term costs associated with its many complications.<sup>142</sup>

The majority of people with hypertension require medication—often more than one medication—to achieve control. Nearly all first-line medications used to manage hypertension are widely available and available in generic form. A one-year supply of antihypertensive medication costs about \$350, including costs paid by both the insurer and the individual.<sup>139</sup> However, with about 650 million prescriptions filled annually, total spending on medication alone is about \$29 billion, including \$3.4 billion that is directly paid by individuals.<sup>139</sup> These estimates are expected to increase after the most recent national guidelines modified the definition of hypertension in adults in 2017, which increased the number of people recommended to take medication to achieve control.<sup>8</sup>

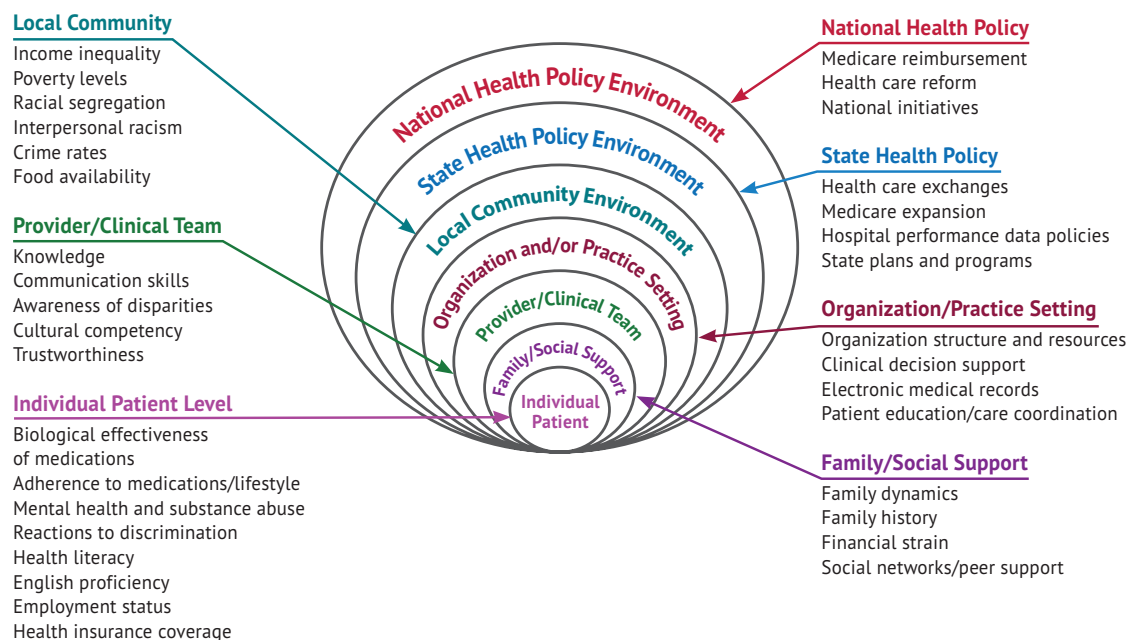
## Strategy C. Eliminate disparities in the treatment and control of hypertension.

Early and consistent access to health care can reduce or prevent hospitalizations and poor outcomes related to hypertension. However, as noted in Section 2, disparities exist in hypertension control, the adoption of healthy behaviors, and the presence of risk factors.<sup>143,144,145</sup> As noted by Geoffrey Rose in his book *The Strategy of Preventive Medicine*, “the primary determinants of disease are mainly economic and social, and therefore its remedies must also be economic and social.”<sup>146</sup> Factors that influence these disparities include inequalities in the distribution of social, economic, and environmental conditions needed for health. Collectively, these factors are referred to as social determinants of health, or “conditions in the environment in which people are born, live, learn, work, play, worship, and age that affect a wide range of health, functioning, and quality-of-life outcomes and risks.”<sup>147</sup> These factors can be the primary drivers of health because they affect biology, physiology, health behaviors, health factors, clinical management, clinical outcomes, and community health.<sup>47,148</sup>

Multiple factors contribute to disparities in hypertension, and these factors are influenced at multiple levels, including by individual patient factors, family and social support, health care providers and clinical teams, health care organization and practice settings, local communities, and state and national health policies (Figure 4).

Reducing disparities in hypertension control likely requires greater commitment to eliminating differences in access to quality health care while also addressing a variety of social factors that influence overall health.<sup>47</sup> Culturally competent best practices that support individuals, their families, and clinicians

**Figure 4. Multilevel Influences on Disparities in Hypertension Prevention and Control**



**Source:** Mueller M, Purnell TS, Mensah GA, Cooper LA. Reducing racial and ethnic disparities in hypertension prevention and control: what will it take to translate research into practice and policy? *Am J Hypertens.* 2015;28(6):699–704.

*“There is no known biological reason why every population should not be as healthy as the best.... The primary determinants of disease are mainly economic and social, and therefore its remedies must also be economic and social.”*

—Geoffrey Rose, author of *The Strategy of Preventive Medicine*

within unique communities are needed.<sup>149</sup> This may include increasing clinician awareness of disparities in the communities they serve and how their awareness may influence the care provided.<sup>150</sup> A substantial gap exists between our knowledge of what works and what is actually being done to improve hypertension control across diverse communities, although promising examples of effective interventions exist.<sup>15,151,152,153</sup> For example, interventions that incorporate addressing social determinants of health have been shown to help individuals improve both their systolic and diastolic blood pressure.<sup>154</sup> However, limited data are available, and additional research is needed to understand how these factors can be integrated effectively into interventions.

One way to close the gap between knowledge and action is to ensure that the needs of individuals and specific populations drive translation research<sup>155</sup> and that this research systematically evaluates which interventions work for which populations and in which settings<sup>156</sup>

and whether they are culturally relevant and sensitive. Affected individuals, clinicians, and communities should be brought into the process early and often to help assess the implementation and adaptation of best practices. Ideally, these partners can help researchers prioritize funding and identify champions that are already using emerging and promising practices in communities facing disparities. We need to re-envision how and where care is provided, particularly in areas where people get health care from a variety of sources, and remove barriers. This approach will require action where people live, work, and play, with a focus on achieving health equity and eliminating disparities.

## Goal 2. Ensure That the Places Where People Live, Learn, Work, and Play Support Hypertension Control

Living a heart-healthy lifestyle is a cornerstone of hypertension control,<sup>8</sup> and it can be cultivated through community support. Lifestyle changes that support hypertension control and broader cardiovascular health include increasing physical activity, adopting a healthy diet, not smoking, maintaining a healthy weight, and consuming alcohol in moderation if at all.<sup>8</sup> These actions are more easily implemented when they are part of everyday life. Health is determined in part by where we are born and where we age, as well as the locations where children and adults spend most of their time—school, worksites, and home.<sup>157</sup> The U.S. Department of Health and Human Services’ Healthy People initiative recognizes the need for “social, physical, and economic environments that promote attaining full potential for health and well-being for all.”<sup>158</sup> Specific objectives designed to promote these environments are included in the Healthy People 2030 national health agenda, alongside objectives promoting improvements in hypertension control. Similarly, the Office of the Surgeon General selected Community Health and Economic Prosperity as a priority area of focus and encourages U.S. businesses to implement solutions to help improve and sustain the health of their communities.<sup>159</sup>

Clinical guidelines for blood pressure management highlight the importance of nonpharmacological interventions and lifestyle change to improving cardiovascular health.<sup>1,8</sup> Current national guidelines recommend that 21 million U.S. adults with hypertension and nearly 30 million with elevated blood pressure make lifestyle changes alone without the addition of medication.<sup>1</sup> A majority of this population has reported trying to make healthy lifestyle changes, including 60% who tried to lose weight in the past year, 39% who tried to reduce their sodium intake, 41% who were inactive and tried to increase their physical activity, and 51% who were current smokers who tried to quit.<sup>26</sup>

When equivalent clinical outcomes are suggested by either behavioral or pharmacologic treatment, individuals with hypertension would prefer to make lifestyle changes over medication treatment.<sup>160</sup> However, lifestyle change can be difficult and may require several conditions to be successful. Examples

of these conditions include continuous engagement by participants, interventions that have been proved effective but are flexible enough to adapt to participants' differing needs, and participants' belief in their own ability to make changes.<sup>160,161</sup> For people with hypertension who need to make lifestyle changes and take medications to achieve control, clinicians should provide continued support to prevent reliance on medication treatment alone and should engage behavioral health specialists when appropriate to support sustained change.<sup>8,162</sup> In addition, clinicians should be equipped during educational training to support the integration and prioritization of lifestyle and behavioral factors that influence control of hypertension and associated chronic diseases.<sup>163</sup>

Community-level strategies that change the environment where people live, work, learn, and play may have the greatest influence on health outcomes.<sup>164,165</sup> When used effectively, these strategies can create an environment where people are more compelled to adopt or continue heart-healthy behaviors. For example, policies that benefit the overall community, such as increasing the availability of low-sodium options in the food supply, can support a heart-healthy diet.<sup>166</sup> Options for buying healthier foods can be expanded in low-income neighborhoods<sup>167</sup> and potentially coupled with educational initiatives, prioritizing improvements in school nutrition programs, and changes in food assistance programs.<sup>168,169</sup> Interventions in school systems can be connected to broader community and family initiatives to confer additional benefit.<sup>170</sup> Community-level strategies designed to improve hypertension control need to be multipronged in order to promote opportunities for healthy choices and address factors such as unequal economic opportunities, unequal access to resources, and insufficient investments in communities.

## **Strategy A. Promote access to and availability of physical activity opportunities within communities.**

Physical activity has broad health benefits, including improvements in measures of cardiovascular health such as blood pressure, blood lipids, and blood glucose and in measures of noncardiovascular health such as mental health, physical strength, balance, and endurance.<sup>171</sup> Physical activity helps people with hypertension lower their blood pressure. Although antihypertensive medications tend to reduce a person's systolic blood pressure more than a structured exercise routine, all types of activity (endurance, resistance, or a combination of both) are effective and may lower systolic blood pressure by more than 8 mmHg among people with hypertension.<sup>172</sup> Despite these benefits, only about half of U.S. adults meet current aerobic physical activity recommendations to get at least 150 minutes of moderate-intensity activity each week. Nearly one in four U.S. adults are inactive and do not get any activity.<sup>173</sup> Sedentary behavior is also associated with increased risks of various chronic diseases and death.<sup>174</sup> Participation in physical activity is a cornerstone of lifestyle change recommendations to control hypertension.<sup>8</sup>

Physical activity can occur in many ways. Organized activities such as recreational sports are available in many communities and can provide both a social and cardiovascular benefit.<sup>175</sup> Nonorganized activities such as running or cycling have similar benefits. Walking has been specifically identified as a public health strategy to increase participation in physical activity, because it is an easy way to begin and maintain an active lifestyle throughout life.<sup>176</sup> Children and families can walk to and from school.<sup>177,178,179</sup> Employers can adopt worksite programs and policies that promote walking to improve the health of their employees, which may also reduce health care costs and improve productivity among working-age adults.<sup>180</sup> Among older adults, who have the highest prevalence of hypertension, structured walking programs can reduce mobility disability.<sup>181</sup> Walking is multipurpose—it improves health and can be used for transportation to get to work or other destinations while also providing an opportunity to socialize. Social supports, such as peer support programs, have been effective in encouraging walking and other forms of activity.<sup>182</sup>

The built environment, safety, and participation in physical activity are closely associated.<sup>32,33,34,35</sup> Walkable communities are often safer because of design features such as crossing signals, pedestrian and bike routes, and speed reduction features to slow vehicles.<sup>183</sup> Adults and children are more likely to

walk in a safe environment than in an unsafe environment.<sup>33,34,35</sup> Safety from traffic or crime—perceived or actual—has been associated with physical activity, particularly in low-income neighborhoods.<sup>184,185,186</sup> Highly walkable neighborhoods promote both walkability and social cohesion, and both of these elements may help older adults meet physical activity recommendations.<sup>187</sup>

Instituting policies or supporting recognized strategies that enable the creation of healthy and safe physical environments can enhance the sustainability of interventions designed to promote physical activity. For example, in the Complete Streets approach, city planners design streets to ensure safe access for drivers, pedestrians of all physical abilities, transit users, and bicyclists.<sup>188</sup> National initiatives such as Active People, Healthy Nation<sup>SM</sup>; Million Hearts<sup>®</sup>; Safer People, Safer Streets; and Safe Routes to School recommend that communities create activity-friendly routes to everyday destinations, including worksites, schools, and places where people shop, to support participation in physical activity. This evidence-based approach combines interventions designed to improve transportation systems with those designed to improve land use and community design. The goal is to promote safety and convenience while making physical activity options available to people of all abilities.<sup>189,190,191,192</sup>

## **Strategy B. Promote access to and availability of healthy food options within communities.**

Population-level strategies that create healthy nutrition environments are also important to hypertension control and in the elimination of disparities in the consumption of a healthy diet. Unhealthy dietary patterns are linked to increases in hypertension, obesity, and other negative health outcomes related to cardiovascular disease.<sup>193,194</sup> The *2015–2020 Dietary Guidelines for Americans* includes recommendations for food composition and emphasizes a healthy eating pattern that includes a variety of vegetables; whole fruits; grains (whole grains at least half of the time); fat-free or low-fat dairy; a variety of protein sources, including seafood, lean meat, legumes, nuts and seeds; and healthy oils.<sup>195</sup> It also recommends limiting saturated fats, trans fats, added sugars, and excess sodium.<sup>195</sup> A commonly used dietary strategy to lower sodium intake is the Dietary Approaches to Stop Hypertension (DASH) eating plan, which has strong evidence for its ability to lower blood pressure.<sup>196</sup> Disparities in hypertension are associated with a number of factors, and the higher burden of hypertension among non-Hispanic blacks may be in part driven by increased salt sensitivity, highlighting the importance of dietary intervention in hypertension management.<sup>197,198</sup>

These healthy eating patterns are appropriate throughout life, meaning that everyone, from children to older adults, can benefit from healthy food and beverage choices. Highly processed and prepackaged foods are often selected because they are fast or “easy” to obtain, but they may contain excessive fat or sodium, which may contribute to hypertension and other cardiovascular or chronic conditions.<sup>195</sup> Most U.S. adults consume more than the recommended sodium limit of less than 2,300 mg per day.<sup>199</sup> Programs such as the Sodium Reduction in Communities Program, the National Salt and Sugar Reduction Initiative, and Million Hearts<sup>®</sup> seek to increase the availability of low-sodium options in the U.S. food supply.<sup>166,191,200</sup> This goal can be met through healthy procurement policies and nutrition standards for packaged and prepared foods and meal preparation practices that reduce the amount of sodium and increase the offerings of healthy foods in the institutional food settings.<sup>201</sup> Increasing awareness of healthy eating patterns and ensuring access to nutritious, affordable, and high-quality food options for all residents should be a priority for communities.

## **Strategy C. Promote links between clinical services and community programs.**

Every effort should be made to use community resources that support hypertension control. The desired connections to vital community resources can be bolstered when an emphasis is placed on linking community resources and clinical services. Key activities include increasing access to community resources, collaborating with community health workers and lay health partners, and using population health management tools. These activities support referral of individuals to resources outside of the primary care setting for blood pressure management services, as well as to physical activity, nutrition,



and pharmacist-based interventions, including medication therapy management.<sup>1</sup> Lessons learned from partners that have successfully established clinical and community links can be shared and replicated.<sup>202</sup>

Identifying community resources and improving clinicians' awareness of them may help promote lifestyle changes among people with hypertension. This sharing of the responsibility of care with community organizations may lead to a more effective use of existing resources and better care delivery. Awareness of community resources has been linked to referrals among clinicians, and this increased awareness can promote the use of evidence-based interventions in local communities.<sup>203</sup> For example, the U.S. Preventive Services Task Force recommends offering or referring adults who are overweight or have obesity and have additional cardiovascular disease risk factors (e.g., hypertension) to intensive behavioral counseling interventions to promote a healthy diet and physical activity for cardiovascular disease prevention.<sup>204,205</sup> Although active participation in this type of intervention has been proven effective, people's ability to access and use these services may be limited by multiple factors in both clinical and community settings. Simply referring individuals for services, without considering barriers to access, may limit the benefit of the intervention.

Some programs have recommended developing an inventory of community resources in collaboration with local partners as a way to better link clinical care and community supports.<sup>206</sup> Targeting other settings where adults spend significant portions of their day may also be helpful, and this approach can help link clinical and community settings. For example, employers can support hypertension control by providing health-related educational services, promoting self-measured blood pressure monitoring and medication adherence, and giving employees places and time to be active in the workplace. These policies may result in a healthier workforce.<sup>207</sup>

Whatever approach is used, simply referring individuals for traditional lifestyle change services may be too limited. Clinicians should screen families to find out if they have barriers to receiving this type of care.<sup>208</sup> Because of the time constraints in the clinical environment, systems must be in place to help clinicians meet this recommendation. Diverse clinical and community partnerships (e.g., linkage of screening programs in dental practices or community establishments such as barbershops with health systems managing hypertension) may improve links to the many programs and supports available across communities.

### Goal 3. Optimize Patient Care for Hypertension Control

Patients receiving clinical care for uncontrolled hypertension need the best care possible to support medication initiation, intensification, and adherence and to help them make needed lifestyle changes. Health care settings need to implement standardized hypertension care across their health care teams. *Clinical inertia* (also called therapeutic inertia) happens when a clinician does not initiate or intensify therapy in a patient who has not achieved therapeutic goals.<sup>209,210</sup> This problem is especially common in chronic disease care, including hypertension control.<sup>211</sup> Early models of clinical inertia suggest that 70% of it is due to physician and health system factors related to time constraints, reactive versus proactive care, inefficient electronic health record workflows, and underused care teams, while 30% is due to patient factors such as denial of disease and medication attitudes and adherence.<sup>210,212</sup> Strategies that target both clinical and patient factors can help overcome clinical inertia.

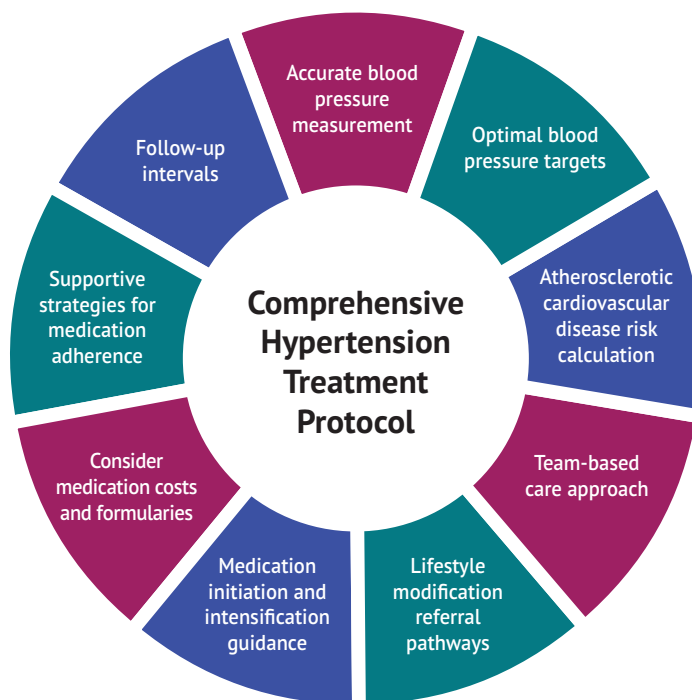
Studies suggest that younger adults are less likely than older adults to have their hypertension diagnosed and treated,<sup>213</sup> that younger men are much less likely to have their hypertension controlled than their female counterparts or older adults,<sup>4</sup> and that non-Hispanic blacks develop hypertension at younger ages and with worse severity than non-Hispanic whites.<sup>214</sup> Despite strong indications to do so, clinicians and their patients may hesitate to initiate a medication treatment that could be lifelong. Simulation modeling research has shown that hypertension control could be improved through additional treatment (i.e., intensification) alone, even in the absence of improved medication adherence or follow-up visit interval.<sup>215</sup>

## Strategy A. Advance the use of standardized treatment approaches and guideline-recommended care.

Standardized treatment protocols, also called care pathways and algorithms, can help overcome clinical inertia (i.e., failure to set targets and advance care to reach goals) and organize care. Treatment protocols can help identify patients eligible for clinical management, reduce variations and disparities in care, prompt medication initiation and intensification, standardize timely patient follow-up, reinforce lifestyle counseling and referrals, and empower all members of the clinical team to engage in patient management.<sup>216</sup> Health care systems that have demonstrated improvements in hypertension control and other chronic disease indicators often attribute part of their success to the use of protocols.<sup>14,15</sup> Clinical efficiencies may also create opportunities for clinicians to develop more extensive relationships with patients or encourage shared decision making between the clinical team and patients, both of which have been associated with positive outcomes.<sup>217,218</sup> When systems are assessed to look for efficiencies and ways to improve, opportunities to enhance the clinician–patient relationship should also be considered.<sup>217,219</sup>

A comprehensive hypertension treatment protocol has multiple elements, including optimal blood pressure targets, a team-based care approach, lifestyle modification referral pathways, medication initiation and intensification guidance, and follow-up intervals (Figure 5).<sup>220</sup> Where allowed by law, medication change protocols for nurses, pharmacists, and other team members are recommended to ensure that each team member's activities within his or her scope of practice are being maximized.<sup>221</sup> Treatment protocols provide guidance when the science that supports a specific treatment is clear and

**Figure 5. Characteristics of a Comprehensive Treatment Protocol for Hypertension Management**



**Source:** Figure adapted from Centers for Disease Control and Prevention. *Hypertension Control Change Package*. 2nd ed. Atlanta, GA: Centers for Disease Control and Prevention, U.S. Dept of Health and Human Services; 2020.

there is consensus from the care team; they are not meant to supersede clinical judgment but may support consistent receipt of care across all groups.<sup>216</sup> Modifications to the health system to better manage hypertension can also be used to improve care of other chronic diseases.

Treatment protocols should also include guidance on how to measure blood pressure accurately, which is necessary for effective management. Inaccurate measurements are frequently related to errors in technique or improper equipment selection.<sup>222,223</sup> Standardized protocols are needed to guide selection of proper equipment (e.g., a validated and regularly calibrated device, appropriate cuff size for arm), to guide assessment (e.g., resting period before measurement, seated position, feet on floor), and for staff training.<sup>224,225</sup> Other forms of measurement (e.g., ambulatory blood pressure measurement, self-monitored blood pressure) may be more appropriate to detect different patterns of hypertension (e.g., white coat hypertension, masked hypertension) and are useful tools in regular clinical practice.<sup>224,225</sup> Such a focus on blood pressure control in health care systems can lead to success in eliminating racial/ethnic disparities in hypertension.<sup>226</sup>

## **Strategy B. Promote the use of health care teams to manage hypertension.**

At the center of the health care team is the patient, who should be empowered to be the advocate for their health. Each individual should know their own blood pressure number and its ramifications for their own long-term health and be encouraged to work with their clinicians to bring their blood pressure under control. Clinicians have ever-increasing demands to see more patients, capture data in electronic health records, meet administrative criteria, and report on quality metrics, all while delivering patient-centered care. To meet these demands, clinicians will need to use multidisciplinary care teams for hypertension control effectively.<sup>227</sup> This team approach is central to holistic care models such as the Patient-Centered Medical Home.<sup>228</sup> Nurse practitioners and physician assistants already provide advanced primary care services in many medical settings. Nurses, pharmacists, and community health workers can also play unique and important roles in care delivery, and strong evidence supports their use for hypertension control in particular.<sup>229,230</sup> Teams may consist of diverse members (e.g., dietitians, mental health providers) and expand into diverse settings (e.g., dental practices) depending on access and availability. If all team members perform at the highest level of their training and licensure, patients with complex health problems and acute concerns can receive the care they need from clinicians with advanced training while other team members support chronic disease management.

Nurses are versatile team members who can play a range of roles to support hypertension care and increase patient satisfaction.<sup>231,232</sup> They can educate patients on blood pressure medications, medication adherence strategies, and self-measured blood pressure monitoring; counsel patients and help them build skills for lifestyle changes; intensify medication therapy using a standardized protocol; and lead population health management and quality improvement activities.<sup>230,233,234</sup>

Pharmacists can also be integral members of the hypertension care team. They can educate patients as part of medication therapy management, which includes services that help patients take medications as directed by their clinical team. This approach has been shown to improve medication adherence.<sup>229,235,236,237</sup> Clinicians can coordinate with pharmacists directly through large health systems or in the community through collaborative practice agreements. Including pharmacists in community-based efforts to improve hypertension control among underserved populations through active medication management has also proved promising and could be implemented in an alternative care model to enhance traditional primary care.<sup>151,152</sup>

Community health workers, also known as patient navigators and promotoras or promotores de salud in Spanish, are lay health advisors who promote health and prevent disease in their own community.<sup>238</sup> Strong evidence supports their inclusion in care teams to improve hypertension control.<sup>238</sup> Because community health workers may live in or have a close understanding of the communities they serve, they can often reach underserved populations and may be effective in addressing hypertension-related health



disparities. They can help with a broad range of linguistically and culturally appropriate health promotion and disease prevention strategies, including outreach, blood pressure screening, informal counseling, education, and social support. Interventions that include community health workers have been deemed cost-effective for cardiovascular disease prevention, which includes hypertension control.<sup>239</sup> Licensed clinicians can partner with community health workers to improve support for patients with hypertension, through either direct employment or volunteer agreements.<sup>238</sup>

## Strategy C. Empower and equip patients to use self-measured blood pressure monitoring and medication adherence strategies.

Patients should be empowered to know their blood pressure numbers to encourage active engagement in management and goal setting. Evidence from numerous systematic reviews and meta-analyses show that self-measured blood pressure monitoring, with co-interventions that include counseling, telephone support, or telemonitoring, is an effective way to manage hypertension.<sup>8,240,241,242,243,244,245</sup> Self-measured blood pressure monitoring also has been shown to improve medication adherence and help reduce clinical inertia, and it is supported by clinical guidelines for confirming a diagnosis of hypertension.<sup>246,247</sup>

Ideal self-measured blood pressure monitoring begins with teaching a patient how to select a validated home blood pressure monitor with an appropriate cuff size, comparing the home monitor with an office monitor to check its accuracy, providing a protocol for monitoring that includes duration and frequency, and identifying how patients will return readings to the clinical team.<sup>248</sup> Ideally, the patient transmits their readings, medication side effects, and challenges with lifestyle changes electronically to the clinical team. A clinician can then read and interpret the home readings and electronically transmit back medication changes or lifestyle change advice.<sup>249</sup> This feedback loop enhances patient engagement in care and provides timely information to the clinical team to improve care (Figure 6). Investing in effective, integrated, and secure data-sharing systems across both clinical and community settings and using technology to help patients manage their own care reduce barriers to comprehensive care.<sup>19,250</sup> If electronic transfer of information is not available to patients, more basic techniques (e.g., logbooks) can be utilized to record information.

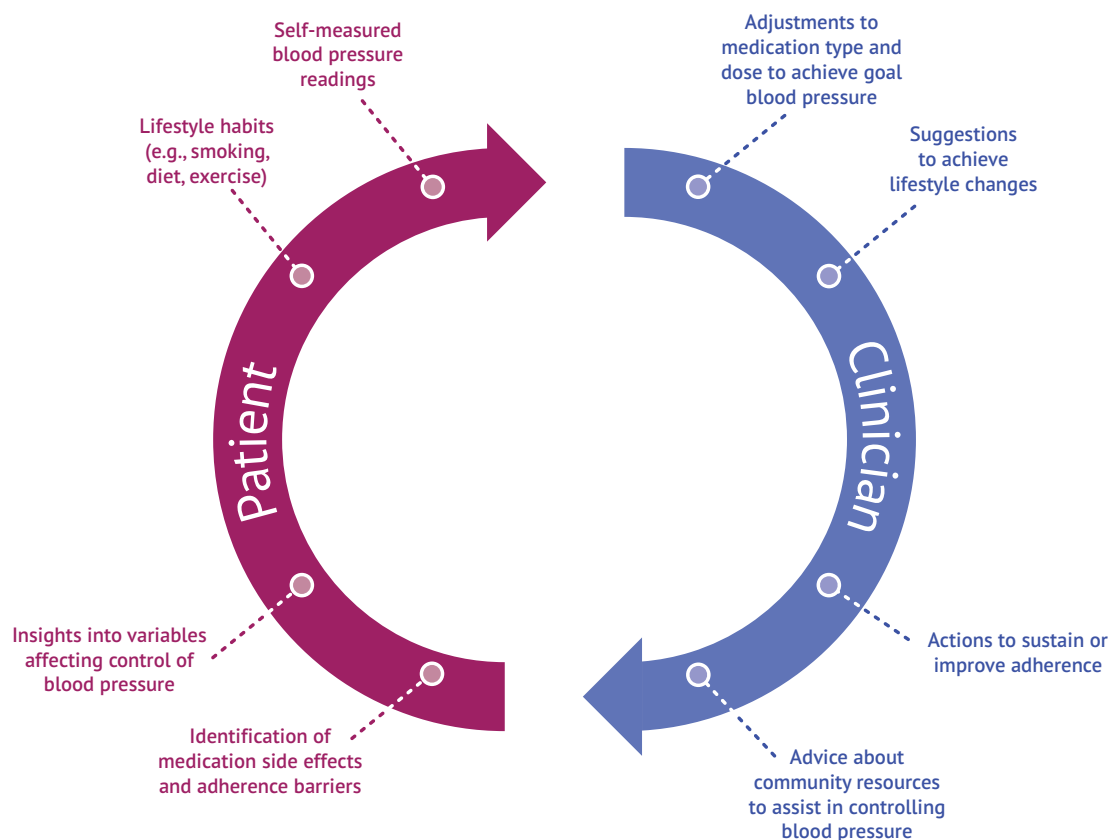
Guidance documents exist to help clinicians, public health professionals, and payers implement self-measured blood pressure monitoring among patients, but studies have shown that only about 40% of people with hypertension do so.<sup>251,252,253,254,255,256</sup> This percentage is likely an overestimate, because it does not reflect real-world challenges to people measuring and reporting their own blood pressure. Limited published data indicate that self-measured blood pressure monitoring is frequently recommended by clinicians, but policies and systems needed for ideal implementation are not in place.<sup>257,258</sup> The wide availability of free blood pressure machines in pharmacies, grocery stores, and other businesses offers another opportunity for everyone to know their blood pressure. However, the accuracy of store-based devices needs to be regularly calibrated in a standardized manner and customized to different arms sizes to avoid the provision of misinformation.<sup>259</sup>

***“Drugs don’t work in patients who don’t take them.”***

—C. Everett Koop, former U.S. Surgeon General

There are many evidence-based or promising practices that clinical teams and patients can use to improve medication adherence. Yet nonadherence, or not taking medications for hypertension control as prescribed, is common.<sup>260,261,262</sup> Whenever possible, clinicians should prescribe in a way that simplifies patient medication regimens, minimizes patient cost, and reduces other barriers related to how medications are obtained. One evidence-based strategy for improving adherence is reducing or eliminating co-payments, which can be achieved by using a patient’s insurance formulary and selecting generic formulations whenever appropriate.<sup>21</sup> Medication regimens can also be simplified through fixed-dose combination pill prescriptions (where two or more medications are included in a single pill), longer-duration prescriptions (90 days vs. 30 days), and lower dosing frequency (one time a day vs. two or more times a day).<sup>263,264</sup>

**Figure 6. Feedback Loop Supporting Effective Use of Self-Measured Blood Pressure Monitoring**



**Source:** Centers for Disease Control and Prevention. [Self-Measured Blood Pressure Monitoring: Actions Steps for Clinicians](#).

The use of electronic prescribing may reduce the likelihood that patients will lose or not fill prescriptions. This approach also takes advantage of existing pharmacy reminder and automated refill systems. Medication synchronization, where prescriptions are assembled to allow for a single pickup from the pharmacy, are more convenient for patients and may increase adherence to medication regimens, especially complicated regimens.<sup>265</sup>

The care team can also recommend that patients use reminders systems such as labeled pill containers or cell phone apps to ensure that prescribed medications are taken as directed.<sup>266</sup> Patient education on how and why medications should be taken as prescribed is critical for improving adherence, and potential side effects should be discussed. Disparities exist in medication adherence even when access to medications is equitable, with poorer adherence among non-Hispanic blacks compared to non-Hispanic whites.<sup>39</sup> Because these differences are intertwined with social determinants of health and cultural beliefs, strategies that emphasize the importance of maintaining medication routines and address patients' belief systems may need to be used.<sup>39,145</sup>

## Strategy D. Recognize and reward clinicians and health systems that excel in hypertension control.

Clinical teams understand how uncontrolled hypertension can increase a patient's risk of disease and death. Given the current demands of typical patient visits, where clinicians may be focused on addressing acute issues, delivering vaccines, or addressing numerous other chronic conditions, continued diligence in improving and maintaining hypertension control may be challenging. One approach to help clinicians and health systems focus on hypertension control is to track their performance and provide incentives for effective management, such as pay-for-quality initiatives and recognition programs.

Formal measurement of clinical quality can be used to bolster accountability. Clinical quality measures for hypertension control can be embedded into systems to track performance. Hypertension control measures, such as those developed by the National Quality Forum (NQF) or included in the National Committee for Quality Assurance's Healthcare Effectiveness Data and Information Set, have been commonly used. For example, NQF 0018 defines hypertension control as the percentage of patients aged 18–85 years who had a diagnosis of hypertension and whose blood pressure was adequately controlled (reduced to <140/90 mmHg) during the measurement year.<sup>267</sup> This measure is included in the Health Resources and Services Administration's Uniform Data System, several pay-for-quality initiatives from the Centers for Medicare & Medicaid Services, and various clinical data registries.<sup>268</sup>

Performance on hypertension control measures can also be used for recognition programs. Formal and informal recognition may improve hypertension control by highlighting exemplars in the field, which gives them public recognition, reinforces their performance, and demonstrates to others that achieving a high level of hypertension control is possible.<sup>12</sup> Formal recognition programs include CDC's Million Hearts® Hypertension Control Challenge, the American Medical Association and American Heart Association's Target: BP™ initiative,<sup>13</sup> and the Health Resources and Services Administration's Health Center Program.<sup>269</sup> These programs recognize clinicians, health systems, and community health centers for high performance, defined as at least 70% to 80% (depending on the program) of patients having their blood pressure under control. Specific examples of high-performing health systems have been documented and can be utilized to replicate success in other communities.<sup>12</sup>

## Section 3. Sector-Specific Actions

Proven strategies to effectively manage hypertension are readily available, and groups throughout the country have had success implementing them.<sup>6,7</sup> However, the efforts of many sectors are needed to ensure that these strategies reach people in every community and population group. This section provides an overview of the sectors that can work together to promote hypertension control. It describes each sector's potential role in improving hypertension control nationally, as well as the benefit of bringing multiple sectors together in these efforts. One-page guides were developed for some sectors to highlight the health, economic, and societal reasons why hypertension control is important to each sector. These guides provide specific actions that sector members can take, as well as resources to support their efforts.

Multilevel and multisector interventions designed to improve chronic disease care are guided by a framework called the Chronic Care Model.<sup>270</sup> When applied to hypertension control, the individual with hypertension is at the center of the model, because individuals must take an active role in managing their own condition to reduce their risk of heart disease, stroke, and other outcomes and maximize their quantity and quality of life.<sup>271</sup> However, multiple intrinsic and extrinsic factors exist that can make it hard for individuals to control their blood pressure.<sup>272,273,274</sup> Some groups may face particular challenges in achieving hypertension control. For example, younger adults have the highest percentages of underdetection and underdiagnosis of hypertension, as well as the highest percentages of nonadherence to recommended treatment, likely because of infrequent interaction with the health care system.<sup>213,273,274</sup> Other demographic groups (e.g., non-Hispanic blacks) also have low rates of hypertension control for several reasons, many of which are potentially modifiable.<sup>3,275,276</sup> Examples include being in clinical and community environments that are not conducive to getting guideline-recommended hypertension management care or supportive of healthy lifestyle behaviors.<sup>275,277</sup>

To help overcome barriers to care, the federal government, as well as state and local governments, can use the multiple sectors they work within to create environments that are conducive to helping people control their hypertension. For example, governments can fund and conduct research,<sup>278,279,280</sup> support programs,<sup>281,282</sup> and adopt policy and system approaches<sup>27</sup> that help ensure that people with hypertension have access to community and clinical resources that encourage healthy lifestyle behaviors and provide the best care. Because governments have competing demands for finite resources, external groups seeking support for their efforts must make the health and economic case for investing in hypertension control, including what actions will have the highest return on investment if they are funded.<sup>283</sup>

Public health professionals, health care professionals, and their professional associations and societies can work together to make the case for investing in hypertension control by describing the problems associated with uncontrolled hypertension.<sup>1,3</sup> They can also identify the groups at highest risk<sup>1,3</sup> and highlight the resources needed in the communities and individuals they serve.<sup>6,3</sup> However, each of these sectors can face challenges helping people control their hypertension. For example, health care professionals may be confused by conflicting clinical guidelines, including differences in the criteria recommended for diagnosis and treatment of hypertension.<sup>284</sup> They may find it hard to prioritize hypertension management as part of the daily demands of providing comprehensive care during short visits.<sup>213,285</sup> They may not use the correct techniques to measure their patients' blood pressure<sup>17,223,224</sup> or to initiate or intensify treatment as needed to achieve and maintain hypertension control.<sup>286,287</sup> These problems may be addressed by encouraging clinicians to follow clinical guidelines<sup>8</sup> that are cost-effective, evidence-based, and focused on achieving control across all populations, including patients with known disparities. Public health and health care professionals can also hold each other and the organizations they work with accountable for providing guideline-recommended care and achieving high rates of control, and they can celebrate their successes to raise awareness.<sup>6,7</sup>


Health care practices, health centers, and health systems can help their health care professionals overcome challenges and prioritize hypertension control. They can provide the necessary resources to ensure that patients with hypertension are accurately diagnosed, treated according to national guidelines, and able to control their condition. They can use system approaches that have been proven to deliver hypertension management services effectively, such as protocols to standardize patient care,<sup>17,216</sup> timely, high-quality clinical data to track and encourage high performance,<sup>14,288</sup> and multidisciplinary care teams that take advantage of the training and skills of various disciplines to provide comprehensive care.<sup>229,235</sup> One challenge to establishing care teams, however, is that reimbursement models are not always in place to support their use, especially when teams include nontraditional members such as pharmacists and community health workers.<sup>289</sup> Despite these challenges, system-level changes can better position care teams for success and result in sustainable change.

Health plans and managed care organizations can help address these and other potential barriers related to care reimbursement by implementing payment models that reinforce the use of guideline-based, high-value care.<sup>8,290</sup> In addition to adequately reimbursing team-based care interventions, health plans and managed care organizations can reduce or eliminate patient costs for lifestyle change programs such as the National Diabetes Prevention Program<sup>291</sup> and for medications that make adherence easier, such as fixed-dose combination pills.<sup>21,292</sup> They can also adopt and promote the use of updated billing codes for reimbursement of services related to self-measured blood pressure monitoring to improve hypertension diagnosis and management.<sup>224,240,293</sup> In addition, they can continue to use meaningful clinical quality measures that support hypertension control and provide incentives for high performance.<sup>294,295</sup>

To further reinforce use of these practices, employers and health plan purchasers can ensure that hypertension control is an important part of the health care benefits offered to their employees and members. These benefits can include comprehensive coverage for appropriate and affordable prescribed medications, lifestyle change programs, and blood pressure monitoring inside and outside of the clinical setting.<sup>27</sup> Employers and health plan purchasers—either individually or through participation in community coalitions—can also actively support broad application of clinical quality improvement efforts in hypertension control in their communities to guide public policy and community development efforts conducive to chronic disease prevention and management.<sup>296,297</sup>

Academic institutions and researchers can identify areas in need of further study and conduct research to fill the gaps. These may include addressing research gaps in areas such as management of different hypertension phenotypes. They can then use their findings to develop relevant resources and tools that can be used by different sectors to improve hypertension control among the populations they serve. Nongovernmental health organizations can support many of the activities described in previous sections, including convening experts to develop clinical guidelines,<sup>8</sup> identifying high performers in clinical management,<sup>13,298</sup> and ensuring that hypertension control remains a national priority. Community-based organizations and public–private partnerships, including minority-serving and faith-based organizations, can ensure that the scientific findings and resources developed by other sectors are translated into useable tools that serve the unique needs of their communities.<sup>299,300,301,302,303,304</sup> For example, community development corporations can help educate business and civic leaders about the importance of chronic disease prevention and management, including hypertension control, to both the physical and economic health of the local community.<sup>57,305</sup> Foundations, at both the national and local levels, can support this work by providing the funds needed to identify and expand best practices across communities.<sup>302</sup>

Although *Call to Action Guides* were not created for the following sectors, they still play important roles in supporting hypertension control across the U.S. For example, pharmacies should not simply be considered a way to distribute medication. Community-based pharmacists can support hypertension management in meaningful ways, including being integral members of care teams through collaborative practice agreements with local health care practices and health systems.<sup>235,236,237,306,307</sup> They can provide medication therapy management services to reconcile medication regimens, support adherence, and



recommend or make adjustments to medications to help patients lower their blood pressure.<sup>236,237</sup> Pharmacies may offer free use of blood pressure machines, placing them in a central position to offer hypertension education and link to clinical care teams. Dental practices can support the identification of those with hypertension who may not regularly visit a health care provider by integrating blood pressure assessment during intake. Practices should ideally be linked with diverse community health care providers to support access to health systems that can diagnose and manage hypertension.<sup>308</sup> Health care technology companies can support adherence by developing interoperable technological solutions that encourage patients to follow their treatment regimens, encourage healthy lifestyle behaviors, integrate self-measured blood pressure monitoring into clinical management, and support other modes of care delivery through telehealth.<sup>259,309,310,311</sup>

The pharmaceutical industry can support many of the medication-related efforts described in previous sections, and it can continue to develop new medications and treatments that decrease blood pressure and lower cardiovascular disease risk across diverse populations.<sup>307</sup>

The media can also support hypertension control. For example, if used effectively, social media can provide experiential, emotional, and social support to improve management of chronic conditions such as hypertension.<sup>312</sup> Simple, repetitive messages work best, which aligns with fact that hypertension can be reduced to a number that is easily and routinely measured. Large-scale mass media campaigns have been shown to improve healthy behaviors and connect people with resources that support healthy behaviors.<sup>313</sup> This approach could be used to improve hypertension control, and campaigns could be tailored to specific communities at high risk.<sup>301</sup> The food industry can work to increase the availability of healthy foods, including lower-sodium options for consumers. The gradual and voluntary reduction of sodium in commercially packaged and prepared foods may result in gradual gains, and proposed guidelines have been developed by the U.S. Food and Drug Administration.<sup>314</sup>

From a health and economic perspective, people need access to quality housing, transportation, education, and employment for communities to prosper.<sup>57</sup> Housing organizations can support hypertension management by coordinating services for residents through community health centers, transportation services, and social services.<sup>315</sup> Transportation systems can align with community land use and design interventions to make it safe and easy for people to be physically active and have access to quality health care services.<sup>32,189,316</sup> Educational institutions, including primary and secondary education, can provide information about the harms of uncontrolled hypertension and how behaviors early in life can influence a person's lifelong blood pressure trajectory and risk of heart disease, stroke, and other negative health outcomes.<sup>9,317,318</sup> They can also help to promote participation in physical activity and create environments that foster healthy behaviors—for example, by providing healthy food options in their facilities.



## A Vision for the Future

In 2010, the Institute of Medicine declared that hypertension prevention and control in the U.S. were in a state of neglect.<sup>27</sup> Since then, the prevalence of hypertension has remained relatively unchanged.<sup>4,64</sup> In addition, recent progress in hypertension control has stalled, and a significant portion of people with hypertension do not have the condition under control, regardless of the threshold used.<sup>1</sup>

The good news is that lifesaving gains are possible. To improve hypertension control across the U.S. and for all populations, we need broadscale, multisector, culturally sensitive, and diverse interventions. This future can only be realized if significant changes are made at national, state, and community levels to support lifestyle behaviors that we know can improve hypertension control—including physical activity and a healthy diet. Community changes support improvements in the clinical setting. We can learn from providers who successfully control hypertension among the patients in their clinics and use this knowledge to replicate and expand effective interventions. However, changes in health care systems also require a supportive environment, including expanded reimbursement for management tools, enhanced links between community programs and clinical services, and the integrated use of health technology and data systems. Novel interventions and new research are also needed to reach all populations affected by hypertension.

Although hypertension control estimates at the national level have stagnated, our efforts cannot. Many strategic partners have devoted ample energy to advancing hypertension control across our nation. This *Call to Action* seeks to further support those efforts by presenting specific goals and strategies and making sector-specific recommendations for action.

*Together, we've got this!*



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