The 2017 U.S. Hypertension Diagnostic Criteria Facilitate the Advancement of Hypertension Prevention and Treatment Concepts with the Times (Postprint)

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Abstract

Hypertension is the primary and modifiable risk factor contributing to increased incidence and mortality of cardiovascular disease among Chinese residents. Since the etiology remains unclear in most hypertensive patients, prevention and control strategies for hypertension both domestically and internationally have consistently adopted a "treatment-oriented" approach, with the primary objective of improving awareness, treatment, and control rates among hypertensive patients. Due to the long-term absence of effective strategies to curb the onset of hypertension, the prevalence of hypertension in China has been continuously increasing across all age groups, with a particularly notable upward trend among young and middle-aged populations. Numerous studies have demonstrated that individuals with blood pressure values in the $130_{139/80}89$ mmHg range (1 mmHg = 0.133 kPa) are at the highest risk. In 2017, multiple professional associations in the United States jointly released the world' s first new diagnostic standard for hypertension, lowering the previous diagnostic threshold from 140/90 mmHg to 130/80 mmHg, thereby directly incorporating high-risk populations for hypertension development into the hypertension category and prioritizing early lifestyle intervention strategies. This article analyzes and explores the motivations behind the downward revision of the U.S. hypertension diagnostic criteria and its reference significance for hypertension prevention and control efforts in China.

Full Text

Preamble

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Title: The New Definition of Hypertension in 2017 ACC/AHA Hypertension Guidelines May Boost Updating Strategies for Hypertension Prevention and Treatment

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Abstract: Hypertension is the top modifiable cause for the incidence and mortality of cardiovascular disease in China. Because the etiology of hypertension is not clear in most patients, current antihypertensive strategy focuses on treatment rather than prevention. The main goals are to increase the awareness rate, treatment rate, and control rate for patients with hypertension. Due to the lack of effective strategies to prevent the occurrence of hypertension, the prevalence rate of hypertension has been increasing in all age groups of adults in China, especially in young and middle-aged Chinese. Many studies show that people with so-called prehypertension (SBP of 130 to 139 mm Hg or DBP of 80 to 89 mm Hg) have the highest risk of future hypertension. For the first time in the world, the 2017 ACC/AHA hypertension guideline redefined hypertension by including prehypertension as stage 1 hypertension and recommended early lifestyle modification as the priority strategy for these patients. This article discusses the motivation and rationale of the new definition of hypertension issued by 2017 ACC/AHA, and analyzes the potential significance and positive impact on the development of hypertension prevention and treatment in China.

Keywords: hypertension; diagnosis; criteria

1. Reflection on the Current "Treatment-Focused" Hypertension Strategy

Cardiovascular diseases, primarily coronary atherosclerotic heart disease and stroke, are currently the leading causes of death among Chinese residents. The absolute burden of morbidity and mortality from these diseases will continue to increase, with population aging being the key factor driving this rising cardiovascular disease burden. The continuous increase in the absolute number and relative proportion of elderly populations is an inevitable result of socioeconomic development. Under the combined effects of improved nutrition, living conditions, widespread infectious disease vaccination, and enhanced medical accessibility, life expectancy and healthy life expectancy have significantly extended, approaching levels seen in developed countries. The increased cardiovascular burden from population aging has considerable inevitability, as human cardiovascular and other systems undergo degenerative changes with age, gradually reducing the ability to resist, recover from, and respond to various pathogenic factors and existing diseases.

To a considerable extent, this also stems from the cumulative exposure to vari-

ous risk factors that many elderly individuals have experienced since their youth and middle age, including smoking habits, unhealthy dietary patterns, and lack of physical exercise, which cause long-term, sustained, and irreversible damage to the cardiovascular system. Currently, the primary prevention strategy for hypertension in China focuses on improving awareness, treatment, and control rates among diagnosed patients. However, over 90% of hypertensive patients have primary hypertension, and etiological research has yet to achieve breakthrough progress. In the absence of clear causes, precise individual prevention strategies are lacking. While antihypertensive therapy has obtained sufficient evidence for preventing cardiovascular and cerebrovascular diseases, the long-standing approach both domestically and internationally has been to adopt a treatment threshold of 140/90 mmHg, with the core goal of increasing awareness, treatment, and control rates among those already diagnosed.

Although this strategy has gradually improved these metrics in China, the overall prevalence of hypertension and the prevalence across all age groups have consistently increased. The number of patients requiring medication and intensive control continues to grow. Hypertension often lacks specific symptoms, making early detection difficult. When first identified, elevated blood pressure has often been present for many years, with pathological damage to the cardiovascular system already established, requiring higher doses of antihypertensive drugs or combination therapy to achieve target blood pressure levels. Recent surveys indicate that blood pressure control rates among treated patients in China are only 37.5%, with awareness rates at 24.5% and treatment rates at 9.9% in certain populations [2-4]. This passive "treating after the fact" strategy appears increasingly inadequate to effectively combat the growing burden of cardiovascular and cerebrovascular diseases caused by hypertension. As the saying goes, "trying to stop flowing water by cutting it with a knife only makes it flow more" —this approach warrants skeptical examination. Breakthrough updates to current prevention and treatment strategies are needed while strengthening etiological research.

2. The 2017 Hypertension Diagnostic Criteria: An Innovative Strategy Shift

Accumulating research demonstrates that the duration of exposure to risk factors critically influences cardiovascular system damage. In March 2017, multiple US professional associations jointly released new hypertension guidelines that unexpectedly revised the long-standing diagnostic threshold. The guidelines redefined blood pressure in the (130-139)/(80-89) mmHg range (1 mmHg = 0.133 kPa) as Stage 1 hypertension, while 140/90 mmHg became Stage 2 hypertension. The motivations for this modification include: (1) Hypertension is the leading but modifiable risk factor for cardiovascular disease mortality in the US, and the second most important modifiable risk factor for all-cause mortality after smoking. Given that hypertension' s impact on cardiovascular and cerebrovascular disease risk far exceeds other risk factors, hypertension prevention and control

must be the top priority in cardiovascular disease prevention strategies, with young and middle-aged populations as the key focus [10]; (2) The relationship between blood pressure and cardiovascular disease risk is continuous. Multiple meta-analyses show that compared to individuals with blood pressure <120/80 mmHg, those with (120-129)/(80-84) mmHg have a 10-50% increased risk of coronary heart disease or stroke, while those with (130-139)/(85-89) mmHg have a 50% increased risk [5-6]; (3) Americans have a high lifetime risk of hypertension—93% of Chinese individuals will develop hypertension defined by the original 140/90 mmHg threshold during their lifetime, with most coming from those with baseline blood pressure in the (130-139)/(80-89) mmHg range [7-9]; (4) Early prevention through lifestyle intervention or medication can prevent further blood pressure elevation [11].

Lowering the diagnostic threshold helps identify high-risk populations earlier and promotes further blood pressure reduction, maximizing the cardiovascular preventive effects of blood pressure control. The new guidelines prioritize lifestyle modification for Stage 1 hypertension patients, representing a clear strategic shift toward earlier intervention. By reclassifying previously untreated high-risk individuals as hypertensive, the guidelines promote early lifestyle intervention and necessary pharmacological treatment, advancing US hypertension prevention strategies.

Although the US diagnostic standard sparked global controversy, it has begun influencing international practice. The 2018 European ESC/ESH guidelines, while not immediately adopting the lower threshold, modified their recommendations to consider antihypertensive drug therapy for high-risk patients with cardiovascular disease in the (130-139)/(85-89) mmHg range [17]. Chinese professional associations have also evolved their guidance. The Chinese Hypertension Prevention and Treatment Guidelines (2018) incorporated prehypertension into cardiovascular risk stratification, classifying patients based on target organ damage and clinical complications into low-risk, moderate-risk, high-risk, and very high-risk categories [18]. The Chinese Medical Doctor Association' s Hypertension Committee explicitly recommended more active lifestyle intervention or drug therapy for high-risk individuals in the (130-139)/(85-89) mmHg range, providing an important foundation for shifting from treatment-focused to prevention-focused strategies.

3. The Critical Importance of Prehypertension Control for China' s Hypertension and Cardiovascular Disease Prevention

According to Chinese guidelines, the hypertension diagnostic standard remains 140/90 mmHg, with (130-139)/(80-89) mmHg defined as prehypertension. The latest 2018 data show that among adults aged 18-54, 23.2% have blood pressure in the (130-139)/(80-89) mmHg range—significantly higher than the 6.1% prevalence of 140/90 mmHg hypertension in the 25-34 age group. For example,

among individuals aged 25-34, 26.7% have blood pressure in the (130-139)/(80-89) mmHg range. As age increases, prevalence rises rapidly, reaching much higher levels in the 45-54 age group [2-4].

Multiple national surveys demonstrate that the proportion of young and middle-aged Chinese with prehypertension has significantly increased. These individuals represent the most important high-risk group for developing hypertension [2-4]. Two large prospective studies confirm that prehypertension is the most significant risk factor for hypertension onset [13-14]. A study of 35-64 year-olds without baseline hypertension showed that 73.2% of those with SBP 130-139 mmHg developed hypertension over time. In a risk prediction scoring system based on multiple hypertension risk factors, SBP 130-139 mmHg contributed the highest risk score, significantly exceeding the impact of obesity, family history, or even age. DBP 80-89 mmHg also substantially contributed to hypertension risk. More importantly, individuals with prehypertension already have significantly elevated cardiovascular disease risk [13]. A 2018 long-term cohort study demonstrated that after adjusting for all other factors, young and middle-aged individuals (35-59 years) with blood pressure of (130-139)/(80-89) mmHg had a 150% higher risk of acute cardiovascular events over time compared to those with blood pressure <120/80 mmHg, with 13.4% of cardiovascular events attributable to this blood pressure range [14].

These studies provide clear scientific evidence that prehypertension represents an extremely important window and target for hypertension prevention and cardiovascular disease prevention in China' s young and middle-aged population. It must be emphasized that elevated blood pressure damages small vessels, representing an important risk factor for dementia. With China' s increasing life expectancy and aging population, the disease burden is shifting alarmingly—dementia has risen from the 10th to the 5th leading cause of death in Japan, which has the world' s longest life expectancy [15-16]. Earlier blood pressure control is therefore paramount for early vascular protection and prevention of the imminent and accelerating burden of dementia.

4. The Necessity of Modifying China' s Hypertension Diagnostic Criteria

Hypertension is the foremost modifiable risk factor for cardiovascular disease morbidity and mortality in China. China' s ischemic stroke mortality is 36% higher than the global average, and its incidence continues to rise. Although hemorrhagic stroke mortality has declined, it still ranks first globally in comparison [1]. Therefore, early hypertension prevention and control should hold a more important strategic position in China' s cardiovascular disease prevention framework.

While the US diagnostic standard sparked global controversy among experts, its impact on international hypertension prevention strategies has begun. The 2018 European ESC/ESH guidelines did not immediately lower the diagnostic

threshold but modified their statement on antihypertensive drug therapy, considering medication for high-risk patients with cardiovascular disease [17]. The Chinese Hypertension Prevention and Treatment Guidelines (2018) also incorporated prehypertension into cardiovascular risk stratification [18]. The Chinese Medical Doctor Association' s Expert Consensus on Hypertension Diagnostic Criteria and Blood Pressure Targets explicitly recommended more aggressive lifestyle intervention or drug therapy for high-risk patients with prehypertension.

These professional guidelines will actively facilitate the identification of high-risk hypertension and cardiovascular disease populations in clinical practice, implementing lifestyle-focused, medication-supplemented treatment measures to better control blood pressure and promote China' s shift from treatment-focused to early prevention-focused hypertension management. Debates over whether to directly reclassify prehypertension as Stage 1 hypertension should not hinder this strategic shift. These extremely high-risk individuals should have access to reimbursed antihypertensive medications when lifestyle interventions prove insufficient or when they are willing to accept drug therapy, and physicians should have the authority to prescribe these medications. The focus of hypertension prevention in China should be on young and middle-aged populations. We anticipate that China will adopt more aggressive, prevention-focused strategies for early cardiovascular disease prevention in these critical age groups.

References

[1] Zhao D, Liu J, Wang M, et al. Epidemiology of cardiovascular disease in China: current features and implications [J]. Nat Rev Cardiol, 2018. doi: 10.1038/s41569-018-0119-4. [Epub ahead of print].

[2] National Health and Family Planning Commission. Report on the Nutrition and Health Status of Chinese Residents (2002) [R]. People' s Medical Publishing House, 2008: 23-35.

[3] National Health and Family Planning Commission. Report on Nutrition and Chronic Diseases Status of Chinese Residents (2015) [R]. People' s Medical Publishing House, 2015: 83-85.

[4] Wang Z, Chen Z, Zhang L, et al. Status of Hypertension in China: Results From the China Hypertension Survey, 2012-2015 [J]. Circulation, 2018, 137: 2344-235.

[5] Reinikainen J, Laattilcainen T, Karvanen J, et al. Lifetime cumulative risk factors predict cardiovascular disease mortality in a 50-year follow-up study in Finland [J]. Epidemiol, 2015, 44: 108-116.

[6] Liu K, Colangelo LA, Daviqus ML, et al. Can Antihypertensive Treatment Restore the Risk of Cardiovascular Disease to Ideal Levels? The Coronary

Artery Risk Development Young Adults (CARDIA) Study and the Multi-Ethnic Study of Atherosclerosis (MESA) [J]. J Am Heart Associ, 2015, 4: e002275.

[7] Wang Y, Liu J, Wang W, et al. Lifetime risk for cardiovascular disease in a Chinese population: the Chinese Multi-Provincial Cohort Study [J]. Eur J Prev Cardiol, 2015, 22: 380-388.

[8] Wang Y, Liu J, Wang W, et al. Lifetime risk of stroke in young-aged and middle-aged Chinese population: the Chinese Multi-Provincial Cohort Study [J]. J Hypertens, 2016, 34: 2434-2440.

[9] Berry JD, Dyer A, Cai X, et al. Lifetime risk of cardiovascular disease [J]. N Engl J Med, 2012, 366: 321-329.

[10] Stevens W, Peneva D, Li JZ, et al. Estimating the future burden of cardiovascular disease and the value of lipid and blood pressure control therapies in China [J]. BMC Health Serv Res, 2016, 16: 175.

[11] Whelton PK, Carey RM, Aronow WS, et al. 2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASP 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 [J]. Circulation, 2018, 138: e426-e483.

[12] Lu Y, Wang P, Zhou T, et al. Comparison of Prevalence, Awareness, Treatment, and Control of Cardiovascular Risk Factors in China and the United States [J]. J Am Heart Associ, 2018, pii: e007462.

[13] Qi Y, Han X, Zhao D, et al. Long-term cardiovascular risk associated with stage 1 hypertension defined by the 2017 ACC/AHA hypertension guideline [J]. JACC, 2018, 72: 1201-1210.

[14] Zhou M, Wang H, Zhu J, et al. Cause-specific mortality for 240 causes in China during 1990-2013: a systematic subnational analysis for the Global Burden of Disease Study 2013 [J]. Lancet, 2016, 387: 251-272.

[15] GBD 2016 cause of death collaborators. Global, regional and national age-sex specific mortality for 264 causes of death, 1980-2016: a systematic analysis for the Global Burden of Disease Study 2016 [J]. Lancet, 2017, 390: 1151-1210.

[16] Williams B, Mancia G, Spiering W, et al. 2018 ESC/ESH Guidelines for the management of arterial hypertension [J]. Eur Heart J, 2018, 39: 3021-3104.

[17] Chinese Hypertension Prevention and Treatment Guidelines Revision Committee. Chinese Hypertension Prevention and Treatment Guidelines (2018) [M]. China Medical Science and Technology Press, 2018: 10-12.

Note: Figure translations are in progress. See original paper for figures.