Will Stroke Prevention Strategies in China Change Under New Hypertension Standards? Postprint

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Abstract

Hypertension is the most important risk factor for stroke. Currently, hypertension control in China is suboptimal, with low rates of awareness, treatment, and control. In 2017, the American Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults updated the diagnostic criteria for hypertension, establishing a threshold of 130/80 mm Hg (1 mm Hg = 0.133 kPa) and formulated new treatment targets and management strategies under this standard. This guideline was primarily based on the findings of the Systolic Blood Pressure Intervention Trial (SPRINT), which demonstrated that intensive blood pressure lowering therapy, compared with standard antihypertensive treatment, could reduce the incidence of cardiovascular events and all-cause mortality. However, this criterion simultaneously leads to a substantial increase in the number of patients diagnosed with hypertension and will affect treatment measures for a large proportion of the population, including the elderly and frail individuals, thereby increasing economic burden while also elevating adverse reactions in special populations, which is detrimental to hypertension prevention and control as well as individualized treatment. Therefore, under this hypertension standard and in conjunction with existing evidence, it is recommended that stroke prevention strategies in China, particularly primary prevention, should be modified.

Full Text

Will China' s Stroke Prevention Strategies Change with New Hypertension Standards?

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Abstract

Hypertension is the most important risk factor for stroke, yet its control remains suboptimal in China, with low rates of awareness, treatment, and control. The 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 redefined hypertension, setting the threshold at 130/80 mmHg (1 mmHg = 0.133 kPa). This guideline, based primarily on the Systolic Blood Pressure Intervention Trial (SPRINT), established new therapeutic targets and management strategies under this standard. SPRINT demonstrated that intensive antihypertensive therapy reduces cardiovascular event incidence and all-cause mortality compared with standard treatment. However, this new standard substantially increases the number of patients classified as hypertensive and affects treatment measures for most populations, including the elderly and frail. While increasing economic burden, it also raises adverse reactions in special populations, which is not conducive to effective hypertension prevention and individualized treatment. Therefore, based on existing evidence, we suggest that stroke prevention strategies in China, particularly primary prevention, should be adjusted accordingly under this new hypertension standard.

Keywords: hypertension; guideline; stroke prevention; antihypertensive therapy

1. Definition and Classification of Hypertension

The 2017 US hypertension guideline redefined hypertension, establishing a threshold of 130/80 mmHg. This classification was primarily based on the SPRINT study, which showed that intensive blood pressure lowering significantly reduced cardiovascular events and all-cause mortality compared to standard therapy. The new classification includes normal blood pressure (<120/<80 mmHg), elevated blood pressure (120-129/<80 mmHg), Stage 1 hypertension (130-139/80-89 mmHg), and Stage 2 hypertension (140/ 90 mmHg). When systolic and diastolic pressures fall into different categories, the higher category is used for classification. This new standard has drawn considerable attention from cardiovascular and cerebrovascular disease experts in China, as it would substantially increase the number of individuals diagnosed with hypertension.

In contrast, the 2018 European Society of Cardiology/European Society of Hypertension (ESC/ESH) guideline and Chinese hypertension guidelines continued using previous definitions, classifying hypertension as 140/90 mmHg. These guidelines emphasize cardiovascular risk stratification and individual differences

among populations. The European and Chinese approaches consider that while intensive blood pressure reduction demonstrates preventive benefits, it also increases the incidence of serious adverse events such as electrolyte disturbances and acute kidney injury. Therefore, they maintain that clinical hypertension management should consider both risk stratification and patient tolerance.

shows the 2017 US guideline' s classification system. Compared to normal blood pressure, Stage 1 hypertension (130-139/80-89 mmHg) carries significantly increased cardiovascular risk. Meta-analyses have demonstrated that baseline prehypertension is associated with increased stroke risk, with risk ratios progressively rising across blood pressure categories.

2. Primary Prevention of Hypertension

2.1 Overall Treatment Strategy

The 2017 US and 2018 European hypertension guidelines differ substantially in their treatment approaches. The US guideline adopts a more aggressive strategy, recommending medication for Stage 2 hypertension (140/90 mmHg) or Stage 1 hypertension with clinical atherosclerotic cardiovascular disease (ASCVD) or high ASCVD risk. The European guideline, however, emphasizes individualized treatment based on hypertension-mediated organ damage, hypertension classification, and overall cardiovascular risk, highlighting differences in treatment responses among various populations.

2.2 Timing of Treatment Initiation

The US guideline recommends lifestyle modification alone for adults with elevated blood pressure (120-129/<80 mmHg) and most Stage 1 hypertensive patients without ASCVD. Medication is indicated for Stage 2 hypertension or Stage 1 with established ASCVD or high ASCVD risk. The European and Chinese guidelines take a more conservative approach, recommending lifestyle modification first for most patients, with medication added if blood pressure remains uncontrolled after lifestyle interventions.

The most significant change in the US guideline is initiating medication for high-risk and very-high-risk patients, including those with diabetes or multiple target organ damage, at blood pressure levels of (130-139)/(85-89) mmHg. This represents a more aggressive approach than previous guidelines, focusing on the detrimental effects of blood pressure across different risk categories.

2.3 Blood Pressure Targets

The US guideline sets a universal target of <130/80 mmHg for all hypertensive patients. The European guideline stratifies targets by population: for adults under 65 years, the target is <130 mmHg systolic; for those 65-80 years, <130-139 mmHg; and for those over 80 years, <150 mmHg. Both guidelines emphasize that treatment should be individualized based on patient tolerance, particularly

in elderly populations where hypotension and adverse events like syncope occur more frequently than in younger patients.

3. Secondary Prevention of Hypertension

3.1 Blood Pressure Management in Acute Intracerebral Hemorrhage

For adult patients with acute intracerebral hemorrhage and systolic blood pressure between 150-220 mmHg, both US and European guidelines recommend prompt blood pressure reduction with close monitoring. Rapid reduction to <140 mmHg is considered safe and may improve functional outcomes, though recent trials (INTERACT, INTERACT2, ATACH, ATACH-2) show mixed results. The ATACH-2 trial found that intensive reduction to 110-139 mmHg within 4.5 hours of hemorrhage onset did not improve mortality or disability but increased renal adverse events. Therefore, guidelines do not recommend rapid reduction to <140 mmHg for all patients, and treatment should be individualized.

3.2 Blood Pressure Management in Acute Ischemic Stroke

For patients eligible for intravenous thrombolysis with recombinant tissue-type plasminogen activator (rt-PA), blood pressure should be controlled below 185/110 mmHg before treatment and below 180/105 mmHg after treatment initiation. For non-thrombolysis patients, guidelines remain cautious about blood pressure reduction in the acute phase, as the benefits are uncertain. The 2018 US guideline and Chinese guidelines are consistent in recommending that blood pressure should not be lowered too aggressively in acute ischemic stroke, with careful monitoring for changes and adverse reactions.

3.3 Prevention of Stroke Recurrence

For secondary prevention after stroke or transient ischemic attack (TIA), both US and European guidelines recommend initiating or resuming antihypertensive medication several days after the event, with a target of <140/90 mmHg. The US guideline recommends thiazide diuretics, ACE inhibitors, or ARBs, sometimes combined with calcium channel blockers. The European guideline similarly recommends ACEI/ARB or thiazide diuretics, with beta-blockers as alternatives. Drug selection should be based on indications, contraindications, and comorbidities.

For patients with intracranial atherosclerotic stenosis (70-99%), both guidelines caution against excessive blood pressure lowering due to risk of hypoperfusion. The target is generally <140/90 mmHg, with individualized adjustment based on tolerance. Recent studies on secondary prevention blood pressure targets have yielded inconsistent results, leading to conservative recommendations, especially for bilateral carotid stenosis >75%.

4. Blood Pressure Control in Elderly Populations

Elderly hypertension is predominantly isolated systolic hypertension, where diastolic pressure is not elevated. However, treatment reduces both systolic and diastolic pressures, requiring careful attention to avoid excessive diastolic reduction and consequent hypoperfusion.

The US SPRINT study demonstrated that intensive blood pressure control reduced cardiovascular events and all-cause mortality in elderly patients, though adverse events like electrolyte disturbances and acute kidney injury increased. The European HYVET trial showed that antihypertensive treatment in very elderly patients (80 years) also reduced stroke incidence and mortality. However, European guidelines emphasize patient tolerance, recommending a target of <150 mmHg for those over 80 years, with careful monitoring for adverse reactions.

For patients aged 65-80 years, the European guideline recommends a target of 130-139 mmHg, with possible further reduction to 130 mmHg if tolerated. For those over 80 years, the target is <150 mmHg, with medication initiated only if systolic pressure remains 160 mmHg after lifestyle modification. The US guideline is more aggressive, recommending <130 mmHg for all adults if tolerated, but this may not be suitable for all elderly patients.

5. Discussion

China' s current hypertension management situation is concerning. The China PEACE study, a nationwide screening of 1.7 million adults aged 35-75, found a hypertension prevalence of 44.7% using the 140/90 mmHg standard, with awareness, treatment, and control rates of only 44.7%, 30.1%, and 7.2% respectively. A 2017 nationwide survey showed age-standardized stroke prevalence of 1114.8/100,000, incidence of 246.8/100,000, and mortality of 114.8/100,000, with hypertension being the most common risk factor (88% of stroke patients).

Given these realities, the new US hypertension standard is not suitable for widespread implementation in China. With current control rates already low, drastically lowering the diagnostic threshold would increase the patient population, raise healthcare costs, and potentially increase adverse events without proportional benefits. Therefore, China' s hypertension definition should not be changed dramatically.

However, stroke prevention strategies can be adjusted based on new evidence. For high-risk patients with blood pressure (130-139)/(80-89) mmHg, particularly those with diabetes, multiple target organ damage, or established ASCVD, more aggressive treatment can be considered. The target blood pressure can be appropriately lowered, but systolic pressure should not fall below 120 mmHg and diastolic below 60 mmHg, with close monitoring for hypoperfusion and adverse drug reactions.

Both US and European guidelines emphasize lifestyle intervention as fundamen-

tal to stroke prevention. Non-pharmacological measures including dietary modification, sodium restriction, weight control, and exercise should be implemented throughout the prevention process. For medication initiation, decisions should be based on comprehensive assessment of ASCVD risk, target organ damage, and comorbidities. Thiazide diuretics and ACEI/ARB are preferred first-line agents, with individualized selection based on patient characteristics.

For elderly populations, treatment must balance benefits and risks. While intensive therapy can reduce mortality, it also increases adverse events. Therefore, a cautious yet not overly conservative approach is needed, with strict monitoring of blood pressure changes and adverse reactions.

In conclusion, considering China' s stroke and hypertension burden, the US guideline' s new definition is not appropriate for China at this time. Stroke prevention strategies should be refined based on evidence, emphasizing lifestyle intervention, individualized treatment, and careful risk-benefit assessment, particularly for high-risk patients and the elderly.

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