JAMA | US Preventive Services Task Force | RECOMMENDATION STATEMENT

Screening for Hypertension in Adults
US Preventive Services Task Force Reaffirmation Recommendation Statement

US Preventive Services Task Force

IMPORTANCE Hypertension is a prevalent condition that affects approximately 45% of the adult US population and is the most commonly diagnosed condition at outpatient office visits. Hypertension is a major contributing risk factor for heart failure, myocardial infarction, stroke, and chronic kidney disease.

OBJECTIVE To reaffirm its 2015 recommendation, the US Preventive Services Task Force (USPSTF) commissioned a systematic review to evaluate the benefits and harms of screening for hypertension in adults, the accuracy of office blood pressure measurement for initial screening, and the accuracy of various confirmatory blood pressure measurement methods.

POPULATION Adults 18 years or older without known hypertension.

EVIDENCE ASSESSMENT Using a reaffirmation deliberation process, the USPSTF concludes with high certainty that screening for hypertension in adults has substantial net benefit.

RECOMMENDATION The USPSTF recommends screening for hypertension in adults 18 years or older with office blood pressure measurement. The USPSTF recommends obtaining blood pressure measurements outside of the clinical setting for diagnostic confirmation before starting treatment. (A recommendation)

JAMA. 2021;325(16):1650-1656. doi:10.1001/jama.2021.4987

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Summary of Recommendation

Adults 18 years or older without known hypertension	The USPSTF recommends screening for hypertension in adults 18 years or older with office blood pressure measurement (OBPM).The USPSTF recommends obtaining blood pressure measurements outside of the clinical setting for diagnostic confirmation before starting treatment.	A

See the Figure for a more detailed summary of the recommendations for clinicians. USPSTF indicates US Preventive Services Task Force.

See the Summary of Recommendation figure.

Importance

Hypertension is a prevalent condition, affects approximately 45% of the adult US population,[1] and is the most commonly diagnosed condition at outpatient office visits. Hypertension is a major contributing risk factor for heart failure, myocardial infarction, stroke, and chronic kidney disease.

USPSTF Assessment of Magnitude of Net Benefit

Reaffirmation

In 2015, the US Preventive Services Task Force (USPSTF) reviewed the evidence for screening for hypertension in adults and issued an A recommendation.[2] The USPSTF has decided to use a reaffirmation deliberation process to update this A recommendation.

Figure. Clinician Summary: Screening for Hypertension in Adults

What does the USPSTF recommend?	**Screen** adults for hypertension. **Grade: A**
To whom does this recommendation apply?	Adults 18 years or older without known hypertension.
What's new?	This recommendation is consistent with the 2015 USPSTF recommendation. The USPSTF continues to recommend screening for hypertension in adults 18 years or older.
How to implement this recommendation?	1. **Screen:** Measure blood pressure with an office blood pressure measurement. 2. **Confirm:** Take blood pressure measurements outside of the clinical setting to confirm a hypertension diagnosis before starting treatment. Ways to measure blood pressure outside of the clinical setting include • Ambulatory blood pressure monitoring: patients wear a programmed portable device that automatically takes blood pressure measurements, typically in 20- to 30-minute intervals over 12 to 24 hours while patients go about their normal activities or are sleeping. • Home blood pressure monitoring: patients measure their own blood pressure at home with an automated device. Measurements are taken much less frequently than with ambulatory blood pressure monitoring (eg, 1 to 2 times a day or week, although they can be spread out over more time). • Blood pressure measurements should be taken at the brachial artery (upper arm) with a validated and accurate device in a seated position after 5 minutes of rest.
How often?	Although evidence on optimal screening intervals is limited, reasonable options include • Screening for hypertension every year in adults 40 years or older and in adults at increased risk for hypertension (such as Black persons, persons with high-normal blood pressure, or persons who are overweight or obese). • Screening less frequently (ie, every 3-5 years) as appropriate for adults aged 18 to 39 years not at increased risk for hypertension and with a prior normal blood pressure reading.
What are other relevant USPSTF recommendations?	The USPSTF has several recommendations addressing cardiovascular health: • Risk assessment for cardiovascular disease with nontraditional risk factors • Screening for atrial fibrillation with electrocardiography • Behavioral counseling interventions to promote a healthy diet and physical activity for cardiovascular disease prevention: ◦ In adults with cardiovascular risk factors ◦ In adults without known cardiovascular risk factors • Statin use for the primary prevention of cardiovascular disease in adults • Aspirin use to prevent cardiovascular disease and colorectal cancer • Screening for high blood pressure in children and adolescents These recommendations are available at https://www.uspreventiveservicestaskforce.org
Where to read the full recommendation statement?	Visit the USPSTF website (https://www.uspreventiveservicestaskforce.org) to read the full recommendation statement. This includes more details on the rationale of the recommendation, including benefits and harms; supporting evidence; and recommendations of others.

The USPSTF recognizes that clinical decisions involve more considerations than evidence alone. Clinicians should understand the evidence but individualize decision-making to the specific patient or situation.

USPSTF indicates US Preventive Services Task Force.

Table. Summary of USPSTF Rationale

Rationale	Assessment
Detection	• Initial 1-time screening with office blood pressure measurement has adequate specificity but low sensitivity for detecting hypertension. • The USPSTF found adequate evidence that an initial positive screening result can be confirmed by home-based blood pressure measurement or ambulatory blood pressure monitoring.
Benefits of early detection and intervention and treatment	The USPSTF found convincing evidence that screening for hypertension with office blood pressure measurement and treatment of hypertension in adults substantially reduce the incidence of cardiovascular events.
Harms of early detection and intervention and treatment	The USPSTF found convincing evidence that screening for and treatment of hypertension detected in clinical office settings have few major harms.
USPSTF assessment	Using a reaffirmation deliberation process, the USPSTF concludes with high certainty that screening for hypertension in adults has substantial net benefit.

Abbreviation: USPSTF, US Preventive Services Task Force.

The USPSTF uses the reaffirmation process for well-established, evidence-based standards of practice in current primary care practice for which only a very high level of evidence would justify a change in the grade of the recommendation.[3] In its deliberation of the evidence, the USPSTF considers whether any new evidence is of sufficient strength and quality to change its previous conclusions about the evidence.

Using a reaffirmation deliberation process, the USPSTF concludes with high certainty that screening for hypertension in adults has **substantial net benefit**.

See the **Figure**, **Table**, and the eFigure in the Supplement for more information on the USPSTF recommendation rationale and assessment. For more details on the methods the USPSTF uses to determine the net benefit, see the USPSTF Procedure Manual.[3]

Practice Considerations

Patient Population Under Consideration

This recommendation applies to adults 18 years or older without known hypertension.

Definitions

Increasing blood pressure predicts an increased risk of cardiovascular disease.[4,5] Generally, the threshold used to define hypertension vs normal blood pressure by various organizations ranges from 130/80 mm Hg or greater to 140/90 mm Hg or greater.[6,7] For the purposes of this recommendation, the USPSTF reviewed evidence from studies that included any threshold used to define hypertension.[8,9] Hypertension (also referred to as "sustained hypertension") is when a person has repeatedly high blood pressure measurements over time and in various settings.

Assessment of Risk

Although all adults should be screened for hypertension, risk factors that increase a person's risk for the condition include older age, Black race, family history, excess weight and obesity, lifestyle habits (lack of physical activity, stress, and tobacco use), and dietary factors (diet high in fat or sodium, diet low in potassium, or excessive alcohol intake).[8-10]

Screening Tests

Initial screening for hypertension should be performed with office blood pressure measurement (OBPM). Office blood pressure measurement is most commonly performed using a manual or automated sphygmomanometer.[8,9] Various OBPM protocols are available; however, in the studies reviewed by the USPSTF, OBPM was measured at the brachial artery (upper arm) with the patient most commonly in a seated position after 5 minutes of rest and medical personnel present during measurement.[8,9] Ambulatory blood pressure monitoring (ABPM) and home blood pressure monitoring (HBPM) with validated and accurate devices should be used outside of a clinical setting to confirm a diagnosis of hypertension before starting treatment. Ambulatory blood pressure monitoring involves wearing a programmed device that automatically takes frequent blood pressure measurements over the course of a day (or day and night); HBPM involves patients measuring their own blood pressure at home with an HBPM device.

Screening Intervals

Available evidence on optimal screening intervals for hypertension remains limited.[8,9] The USPSTF suggests annual screening for hypertension in adults 40 years or older and for adults at increased risk for hypertension (such as Black persons, persons with high-normal blood pressure, or persons who are overweight or obese). Screening less frequently (ie, every 3 to 5 years) is appropriate for adults aged 18 to 39 years not at increased risk for hypertension and with a prior normal blood pressure reading.

Treatment

The benefits of treatment of hypertension in preventing important health outcomes such as stroke, heart failure, and coronary heart disease events are well documented.[11] Treatment can include lifestyle changes, pharmacotherapy, or both. Selection of treatment can vary depending on severity of blood pressure elevation, age, and other risk factors.

Implementation

Ambulatory blood pressure monitoring offers the most evidence-based risk information for future cardiovascular events. Ambulatory blood pressure monitoring devices are small portable machines that record blood pressure noninvasively at typically 20- to 30-minute intervals over 12 to 24 hours while patients go about their normal activities or are sleeping. Home blood pressure monitoring devices are fully automated oscillometer devices that record measurements taken from the patient's brachial artery. Home blood pressure monitoring devices are activated by patients or caregivers and measurements are taken much less frequently than with ABPM (eg, 1 to 2 times a day or week, although the blood pressure measurements can be spread out over more time).

Additional Tools and Resources

Hypertension resources for health professionals are available through these resources:

- The Surgeon General's Call to Action to Control Hypertension https://www.cdc.gov/bloodpressure/docs/SG-CTA-HTN-Control-Report-508.pdf
- Centers for Disease Control and Prevention's Hypertension Resources for Health Professionals https://www.cdc.gov/bloodpressure/educational_materials.htm;
- Million Hearts Initiative https://millionhearts.hhs.gov/

Information on how to measure blood pressure is available at https://www.cdc.gov/bloodpressure/measure.htm. The Community Preventive Services Task Force has several resources related to community-focused interventions for blood pressure monitoring, management, and control, available at https://www.thecommunityguide.org/topic/cardiovascular-disease.

Other Related USPSTF Recommendations

The USPSTF has several recommendations addressing cardiovascular health.

- Risk assessment for cardiovascular disease with nontraditional risk factors[12]

- Screening for atrial fibrillation with electrocardiography[13]
- Behavioral counseling interventions to promote a healthy diet and physical activity for cardiovascular disease prevention
  - In adults with cardiovascular risk factors[14]
  - In adults without known cardiovascular risk factors[15]
- Statin use for the primary prevention of cardiovascular disease in adults[16]
- Aspirin use to prevent cardiovascular disease and colorectal cancer[17]
- Screening for high blood pressure in children and adolescents[18]

Reaffirmation of Previous USPSTF Recommendation

This recommendation is a reaffirmation of the 2015 recommendation statement on screening for high blood pressure in adults (A recommendation). The USPSTF has issued an A recommendation on screening for high blood pressure in adults since 1996 (updated in 2003, reaffirmed in 2007, and then updated in 2015). In 2015, the USPSTF recommended screening for high blood pressure in adults 18 years or older and obtaining measurements outside of the clinical setting for diagnostic confirmation before starting treatment. The USPSTF found no new substantial evidence that could change its recommendation and therefore reaffirms its recommendation. The current reaffirmation clarifies that initial screening should be performed with OBPM, updates language to be more consistent with current evidence, and clarifies implementation strategies.

Supporting Evidence

Scope of Review

The USPSTF commissioned a systematic review to evaluate the benefits and harms of screening for hypertension in adults, the accuracy of OBPM for initial screening, and the accuracy of various confirmatory blood pressure measurement methods.[8,9]

Accuracy of Screening Tests

The USPSTF reviewed evidence from 20 studies (n = 12 614) on the test accuracy of OBPM for initial screening for hypertension.[8,9] In all studies, blood pressure was measured at the brachial artery and ABPM was used as the reference standard. Studies reflected a wide range of clinical characteristics and most commonly included community-based samples; mean ages of participants ranged from 25 to 70 years, and 37.9% to 72.3% of participants were women.[8,9] Although reported less frequently, race/ethnicity was predominately White in those studies that did report it.[8,9] Meta-analyses of 15 studies (n = 11 309) showed a pooled sensitivity of 0.54 (95% CI, 0.37-0.70) and a pooled specificity of 0.90 (95% CI, 0.84-0.95) when using an OBPM threshold of 140/90 mm Hg compared with a reference 24-hour ABPM of 130/80 mm Hg or reference daytime ABPM of 135/85 mm Hg.[8,9]

Eighteen studies (n = 57 128) provided evidence on the accuracy of various methods to evaluate adults who initially screened positive for hypertension by OBPM.[8,9] Again, blood pressure was taken at the brachial artery and ABPM was used as the reference standard in all studies. The mean age of study participants was generally older (46-60 years), reflecting the preselected study populations. Zero percent to 66.7% of study participants were women. Again, few studies reported race/ethnicity of participants and those that did included predominantly White participants. Meta-analysis of 8 studies (n = 53 183) of repeat OBPM showed a pooled sensitivity of 0.80 (95% CI, 0.68-0.88) and pooled specificity of 0.55 (95% CI, 0.42-0.66) using an OBPM threshold of 140/90 mm Hg compared with a reference 24-hour ABPM of 130/80 mm Hg or reference daytime ABPM of 135/85 mm Hg. Meta-analysis of 4 studies (n = 1001) on HBPM found a pooled sensitivity of 0.84 (95% CI, 0.76-0.90) and a pooled specificity of 0.60 (95% CI, 0.48-0.71) using an HBPM threshold of 135/85 mm Hg compared with a reference 24-hour ABPM of 130/80 mm Hg or reference daytime ABPM of 135/85 mm Hg. Limited evidence is available on the accuracy of automated office-based blood pressure measurement (taking repeated measurements while the patient is alone in a quiet room).[8,9]

Benefits of Early Detection

No trials have compared the effectiveness of screening for hypertension vs no screening. However, a Canadian community-based, c luster randomized clinical trial[8,9,19] evaluated a multicomponent cardiovascular disease health promotion program that assessed cardiovascular disease outcomes of 140 642 community members in 39 clusters.[8,9,19] Community residents (targeted age of 65 years or older) were invited to pharmacy-based blood pressure screening and a cardiovascular disease risk assessment. Risk-specific educational materials were provided and results were communicated to the participant's clinician. At 1 year of follow-up, a 9% reduction in the number of hospital admissions for acute myocardial infarction, congestive heart failure, or stroke was found; however, no difference in all-cause mortality was noted.[20] Although there is limited direct trial evidence on benefits of screening for hypertension on health outcomes, based on the available indirect evidence on the accuracy of screening tests for hypertension and robust foundational evidence showing that treatment of hypertension (detected in office-based settings) improves health outcomes,[11] the USPSTF found convincing evidence that screening for hypertension in adults provides health benefits.

Harms of Early Detection

The USPSTF reviewed 13 studies (n = 5150) that reported on harms of screening for hypertension.[8,9] Results from 5 studies (n = 1321) suggested that screening is not associated with any substantial short-term quality of life changes or adverse psychological outcomes. Evidence from 2 work-site studies (n = 502) reported mixed findings on whether absenteeism increased with screening. Seven studies (n = 3505) reported minor adverse events such as sleep disturbance, pain/discomfort, bruising, and skin irritation with ABPM. Overall, the USPSTF determined that the harms of screening for hypertension are minor.

Response to Public Comment

A draft version of this recommendation statement was posted for public comment on the USPSTF website from June 23 through July 20, 2020. Several comments requested clarification about specific techniques to accurately measure blood pressure and the use of validated blood pressure devices at the brachial artery. A brief description of how blood pressure was measured in studies is included in the Practice Considerations section, and language clarifying that the blood pressure measurements included in this review were taken at the brachial artery has been added. More resources

for accurately measuring blood pressure are provided in the Additional Tools and Resources section. Other organizations provide information on validated devices, which is described in the Recommendations of Others section. Some comments expressed concern about the burden and barriers patients may experience trying to measure their blood pressure outside of a clinic setting. Resources to address these issues were added in the Additional Tools and Resources section. Comments regarding in-office blood pressure monitoring recommended adding annual screening during wellness visits for patients aged 18 to 40 years. Available evidence on optimal screening intervals for hypertension remains limited; however, the screening intervals described in the Practice Considerations section are based on the best available data.

How Does Evidence Fit With Biological Understanding?

There are different types of hypertension, including "sustained" hypertension (blood pressure measurements that are high when obtained both in a clinical office setting and outside the office, referred to as "hypertension" in the current recommendation), "white coat" hypertension (blood pressure measurements that are high when obtained in a clinical office setting but normal when obtained outside the office), and "masked" hypertension (blood pressure measurements that are high when obtained outside the office but normal when obtained in clinical office settings). Cardiovascular disease risk is highest among persons with sustained hypertension, followed by those with masked hypertension and then those with white coat hypertension.[20-25] The prevalence of white coat hypertension and masked hypertension in the US is unknown, but estimates based on data from international cohorts[26] are 8% and 14%, respectively.[8] Analyses of participants of a US-based study estimates a prevalence of 12.3% for masked hypertension.[27]

White coat hypertension can be detected by obtaining out-of-office blood pressure measurements (either through HBPM or ABPM) after an elevated blood pressure measurement is detected in the office. Masked hypertension is more difficult to identify and can only be detected when out-of-office blood pressure measurements are obtained. Current screening algorithms that focus on performing OBPM first, then following up with ABPM or HBPM in persons with elevated blood pressure measured with OBPM are not able to identify persons with masked hypertension. The USPSTF hypothesizes that screening strategies that use OBPM for both initial screening and confirmation, with traditional thresholds, would miss a greater number of cases of sustained hypertension and would lead to overtreatment of a greater number of cases of white coat hypertension. Follow-up ABPM or HBPM after an initial positive OBPM screening result would result in fewer cases of sustained hypertension being missed and fewer cases of white coat hypertension being overtreated. Confirmation with ABPM would result in the greatest number of cases of sustained hypertension being identified without any cases of white coat hypertension being treated (by definition, ABPM is considered the gold standard). Importantly, cases of masked hypertension would be missed with all 3 of these screening strategies, at least when using OBPM with traditional thresholds.

Although the association of masked hypertension and white coat hypertension with increased cardiovascular risk has been well documented, it is unclear whether treatment of either of these types of hypertension improves health outcomes. The USPSTF considers this a critical evidence gap.

Research Needs and Gaps

The association of masked hypertension and white coat hypertension with increased cardiovascular risk has been well documented; however, more evidence is needed to understand whether early detection and treatment of these hypertension types lead to an improvement in health. More research is needed on the following.

- The benefits and harms of early detection and treatment of masked hypertension and white coat hypertension:
  - Does early detection of masked hypertension and white coat hypertension lead to improved health outcomes?
  - Does treating masked hypertension improve cardiovascular health outcomes?
  - Does treating white coat hypertension cause harms?
- The prevalence of masked hypertension and white coat hypertension in the US.
- How frequently do adults transition between the different types of hypertension, and how long is the length of time it takes to transition (eg, what percentage of persons with masked hypertension transition to sustained hypertension, and how long does that transition take)?
- Identification of feasible methods for early detection of masked hypertension.
- Inclusion of diverse and underrepresented persons in all of the above studies is needed to determine optimal screening for all types of hypertension.

Recommendations of Others

The report from the panel members of the Eighth Joint National Committee did not address the diagnosis of hypertension in its 2014 guidelines.[11] The Seventh Joint National Committee recommended screening for high blood pressure at least once every 2 years in adults with blood pressure less than 120/80 mm Hg and every year in adults with blood pressure of 120 to 139/80 to 89 mm Hg.[6] The American College of Cardiology and the American Heart Association recommend proper measurement methods be used for diagnosis and management of high blood pressure and that out-of-office blood pressure measurement be performed to confirm the diagnosis of hypertension.[7,28] They also suggest screening for masked hypertension with ABPM or HBPM in adults who consistently have systolic blood pressure measurements of 120 to 129 mm Hg or diastolic blood pressure measurements of 75 to 79 mm Hg in the office[7,28] and screening for white coat hypertension in adults who consistently have systolic blood pressure measurements of 130 to 160 mm Hg or diastolic measurements of 80 to 100 mm Hg in the office. Additionally, in 2019, the Centers for Medicare & Medicaid Services added coverage of ABPM to diagnose patients with suspected white coat and masked hypertension.[29] In 2020, the American Heart Association and the American Medical Association released a joint statement supporting out-of-office self-measurement of blood pressure using a validated device to evaluate hypertension.[30,31] The American Academy of Family Physicians supports the 2015 USPSTF recommendation statement on screening for high blood pressure.[32]

ARTICLE INFORMATION

Accepted for Publication: March 17, 2021.

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Author Contributions: Dr Krist had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis. The USPSTF members contributed equally to the recommendation statement.

Conflict of Interest Disclosures: Authors followed the policy regarding conflicts of interest described at https://www.uspreventiveservicestaskforce.org/Page/Name/conflict-of-interest-disclosures. All members of the USPSTF receive travel reimbursement and an honorarium for participating in USPSTF meetings.

Funding/Support: The USPSTF is an independent, voluntary body. The US Congress mandates that the Agency for Healthcare Research and Quality (AHRQ) support the operations of the USPSTF.

Role of the Funder/Sponsor: AHRQ staff assisted in the following: development and review of the research plan, commission of the systematic evidence review from an Evidence-based Practice Center, coordination of expert review and public comment of the draft evidence report and draft recommendation statement, and the writing and preparation of the final recommendation statement and its submission for publication. AHRQ staff had no role in the approval of the final recommendation statement or the decision to submit for publication.

Disclaimer: Recommendations made by the USPSTF are independent of the US government. They should not be construed as an official position of AHRQ or the US Department of Health and Human Services.

Additional Contributions: We thank Brandy Peaker, MD, MPH (AHRQ), who contributed to the writing of the manuscript, and Lisa Nicolella, MA (AHRQ), who assisted with coordination and editing.

Additional Information: The US Preventive Services Task Force (USPSTF) makes recommendations about the effectiveness of specific preventive care services for patients without obvious related signs or symptoms. It bases its recommendations on the evidence of both the benefits and harms of the service and an assessment of the balance. The USPSTF does not consider the costs of providing a service in this assessment. The USPSTF recognizes that clinical decisions involve more considerations than evidence alone. Clinicians should understand the evidence but individualize decision-making to the specific patient or situation. Similarly, the USPSTF notes that policy and coverage decisions involve considerations in addition to the evidence of clinical benefits and harms.

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