What is the best way to identify patients with white-coat hypertension?

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EVIDENCE-BASED ANSWER

Ambulatory blood pressure monitoring is currently the gold standard for detecting patients with white-coat hypertension. Women and all patients with lower office systolic blood pressures, stage I hypertension, and no target organ damage are more likely to have white-coat hypertension (strength of recommendation [SOR]: **B**, based on prospective cohort studies) (**TABLE**).

Self or home blood pressure monitoring has also been used to detect patients with white-coat hypertension. However, it has a low sensitivity (61%–68%) and low positive predictive value (PV+) (33%–48%) (SOR: **B**, short-term prospective cohort studies).

CLINICAL COMMENTARY

Ambulatory BP monitoring better than home monitoring for ruling out white-coat hypertension

Landmark placebo-controlled outcome-based trials demonstrating reduced morbidity and mortality with hypertension treatment did not differentiate essential from white-coat hypertension. Patients were included based on elevated office-based blood pressure measurements. Since we now know that the prevalence of white-coat hypertension is high, it should be ruled out before implementing antihypertensive therapy.

Ambulatory blood pressure monitoring is more accurate than home monitoring for ruling out white-coat hypertension. However, ease, simplicity, and availability makes home monitoring a more realistic option for routine clinical practice. When home blood pressure monitoring is used, reliable measurement devices (eg, newer automatic or manual home devices) should be used and patients should be instructed regarding proper use and documentation of blood pressure values to facilitate an appropriate clinical assessment.

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Evidence summary

White coat hypertension, also known as isolated office hypertension, refers to elevated blood pressures in a medical setting and normal blood pressures during regular daily life. Patients with white-coat hypertension are defined as patients 1) with an office blood pressure of >140 mm Hg systolic or >90 mm Hg diastolic on at least 3 separate office visits with 2 measurements each visit and 2) mean daytime blood pressure of <135 mm Hg systolic and <85 mm Hg diastolic on ambulatory blood pressure monitoring.[1] Other measures of normal blood pressure on ambulatory blood pressure monitoring are <130/80 mm Hg for full 24-hour blood pressure and <120/70 mm Hg for night-time blood pressure.[2] A recent Clinical Inquiry summarized 3 cohort trials—2 showed white-coat hypertension patients had lower risk of cardiovascular events and 1 showed no difference between patients with white-coat hypertension and patients with sustained hypertension.[3] Identifying patients with white-coat hypertension is important to avoid overtreating individuals at lower risk of cardiovascular events.

Which patients with elevated blood pressure on repeated visits have white-coat hypertension? In studies of patients, most of whom have Stage I hypertension (140–159/90–99 mm Hg), anywhere from 10% to 50% have white-coat hyper-

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FAST TRACK

Women, older patients, and those with lower and fewer office blood pressure measurements were more likely to have white-coat hypertension

TABLE

Patient attributes and white-coat hypertension

ATTRIBUTE	SUBJECTS	COMPARISON	*P* VALUE
Gender, % with WCH	5716*	17% of females 14% of males	<.001
% female WCH v SH group	1564†	45% v 33%	.002
Ratio female: male with WCH	2634§	Odds ratio=1.92 (95% CI, 1.45–2.54)	<.001
Mean age, WCH vs SH	1564†	40 vs 39 years	.52
% with WCH in 4 age groups	5716*	<35 y=12%, 35–50 y=14%, 50–65 y=16%, >65 y=17%	<.001
Currently smoking, % with WCH	5716*	No=16.7%, Yes=11.3%	<.001
Currently smoking % WCH v SH	1564†	7% v 24%	.04
BMI, % WCH in 3 groups	5716*	< 25=16% 25–30=15% >30=15%	NS
BMI, WCH group vs SH group	1564† 414‡	25.4 vs 25.9 23.9 vs 24.7	NS <.05
Original clinic SBP, % with WCH	5716*	140–159=31.2% 160–170=18.7% 171–180=11.8%	<.001
	2492§	140–150=65% 151–160=53% 161–170=33%	.004
LV Mass (g), WCH v SH	1564†	160 vs 180	.001
LV Mass Index (g/m2) WCH v SH	414‡	126 vs 136	<.01

WCH, white coat hypertension; SBP, systolic blood pressure; SH, sustained hypertension; CI, confidence interval; BMI, body-mass index; NS, not significant; LV, left ventricular.
*Patients referred to a blood pressure unit over 22-year period.[7]
† A combination of 2 studies of clinic patients with stage I hypertension (140–159/90–99 mm Hg).[2]
‡ 50-year-old men in a community in Finland invited to a health survey with a 20-year follow-up.[6]
§ Data from 24 pooled studies of ambulatory blood pressure monitoring.[4]

tension (**TABLE**). In a joint multivariate analysis of 2 cohort studies, which enrolled 1564 subjects with uncomplicated stage I hypertension, white-coat hypertension was associated with lower office systolic blood pressure, female gender, and nonsmoking.[2] Similarly, a large international database of 2492 subjects found that women, older subjects, and those with lower and fewer office systolic blood pressure measurements were more likely to have white-coat hypertension.[4] In another analysis of 1333 Italian subjects, the prevalence of white-coat hypertension was 33.3% in those with stage I hypertension, 11% with stage II, and 3 % with stage III.[5] A study of more than 600 men over 20

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years in Finland compared those who developed white-coat hypertension and those with sustained hypertension. The hypertensive patients had more microalbuminuria, a greater left ventricular mass on echo, increased cholesterol esters, and a greater body-mass index (all $P \leq .05$) than patients with white-coat hypertension. Smoking status was similar in both groups, in contrast to other studies.[6] A recent study did not find body-mass index distinguished white-coat hypertension from sustained hypertension.[7]

Using home blood pressure as a screening tool is a problem because of the low sensitivity and poor PV+. In the THOP study (247 subjects), which used ambulatory blood pressure monitoring as the reference method, home blood pressure had a high specificity (89%) and high negative predictive value (PV–) (97%) but a lower sensitivity (68%) and low PPV (33%).[8] In other words, if home blood pressure shows hypertension, there is a 97% chance the patient has sustained hypertension, but if home blood pressure returns to normal in patients with office hypertension, two thirds of patients will still have sustained hypertension. In another study that enrolled patients from a hypertension clinic, 133 untreated patients with diastolic blood pressure 90 to 115 mm Hg underwent ambulatory blood pressure monitoring for a reference standard. The sensitivity of home blood pressure monitoring in identifying white-coat hypertension was 61% and the PV+ was 48%.[9]

FAST TRACK

If home blood pressure returns to normal in those with office hypertension, two thirds will still have sustained hypertension

Recommendations from others

The European Society of Hypertension Working Group on Blood Pressure Monitoring recommends that subjects with blood pressure 140–159/90–99 mm Hg at several visits should have ambulatory blood pressure monitoring because 33% of those people will have white-coat hypertension. Women, nonsmokers, those with recent hypertension, a limited number of blood pressure determinations and small left ventricular mass on echo should also have ambulatory blood pressure monitoring. There should be a search for metabolic risk factors and target organ damage. Those patients aware that their blood pressures are lower outside the office should be considered for ambulatory blood pressure monitoring.[10]

The latest Joint National Committee report (JNC VII) indicates that ambulatory blood pressure monitoring may be useful to detect white-coat hypertension among patients with hypertension and no target organ damage, and those with episodic hypertension.[11]

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