Although increased blood pressure is one of the most powerful predictors of cardiovascular morbidity, the prediction for the individual patient is relatively weak. One reason for this is the inherent variability of blood pressure and the distortions associated with clinic measurement. It is widely accepted that blood pressure measured in the clinic commonly overestimates pressure measured in nonmedical settings and that the discrepancy between the 2 varies greatly from 1 individual to another. On the grounds that it is the average level of blood pressure to which the circulation is exposed over prolonged periods of time that causes the adverse effects of hypertension, rather than the pressure at any 1 moment, such as during a clinic visit, it is logical to suppose that ambulatory blood pressure will give a better prediction of risk than clinic pressure. A subgroup of patients with mild hypertension whose blood pressure is high only in medical settings has been identified as having white coat hypertension; this group typically comprises ≈20% of the hypertensive population. This is a potentially useful concept because it may help to define a group of patients who are at relatively low risk of cardiovascular morbidity and hence do not merit antihypertensive drug treatment. However, the definition of white coat hypertension is arbitrary and depends both on the cutoff point chosen to define a hypertensive clinic pressure and a normal ambulatory pressure.

See p 1892

In this issue of Circulation, a study reported by Khattar et al on the follow-up of a cohort of hypertensive patients established by Dr Jim Raftery at Northwick Park Hospital in London throws new light on the role of 24-hour ambulatory blood pressure monitoring (ABPM) in predicting cardiovascular morbidity. The principal finding was that patients with white coat hypertension were at substantially reduced risk of morbidity compared with patients whose hypertension was sustained throughout 24 hours. The patients underwent ABPM by the intra-arterial technique, which is still considered the gold standard of blood pressure measurement but which is rarely used in epidemiological studies. A second important feature of this study was the length of follow-up, which approached 10 years. There are 2 ways of analyzing the data obtained with ABPM in prognostic studies. One is to estimate the predictive value of ambulatory pressure after controlling for clinic pressure for the entire cohort; the other is to compare the event rates in patients with sustained hypertension and those with white coat hypertension. Khattar et al chose the latter approach in their analysis of the Northwick Park study. Theirs is actually the fifth published report of the prospective significance of ambulatory blood pressure; others are on the way. The first in the series, published by Perloff et al, used noninvasive monitoring performed during the day only and reported that those whose ambulatory pressure was low in relation to their clinic pressure were at lower risk of morbidity. The second, by Verdecchia et al, monitored a group of 1187 normotensive and hypertensive individuals for 3 years. The authors identified a subgroup of patients with white coat hypertension but used somewhat different criteria than Khattar et al. Verdecchia et al used a daytime blood pressure of 131/86 mm Hg in women and 136/87 mm Hg in men for defining the upper limit of normal ambulatory pressure, whereas Khattar et al used a 24-hour average of 140/90 mm Hg, which would be equivalent to a daytime pressure ≥145/95 mm Hg. Both groups used the same cutoff point for defining clinic hypertension (140/90 mm Hg). In the study by Verdecchia et al, the morbidity differences between white coat and sustained hypertensives were more pronounced than in the Northwick Park study: Verdecchia et al reported an event rate of 0.49 per 100 patient-years in white coat hypertensives (similar to the rate of 0.47 in the normotensives); a rate of 1.79 in hypertensive dippers, who constituted the majority of the study population; and a rate of 4.99 in nondippers. The Northwick Park event rate in white coat hypertensives was higher at 1.32 per 100 patient-years, which may be attributed to the higher cutoff point for defining white coat hypertension. This would tend to include a larger number of high-risk individuals.

The third published prospective study of ABPM comprises the pilot results of a population study in Ohasama, Japan, which reported that ambulatory pressure was a better predictor of morbidity than screening pressure. No attempt was made to classify individuals as having white coat hypertension. The fourth is a study of patients with refractory hypertension, defined as a diastolic pressure >100 mm Hg while taking ≥3 antihypertensive medications. Patients were classified in 3 groups according to their daytime ambulatory pressure; those in the lowest tertile (<88 mm Hg) had a significantly lower rate of
morbidity over the next 4 years despite similar clinic pressures. Thus, although these 5 prognostic studies differed widely in design, ranging from a population study to a study of refractory hypertensives, the results all point in the same direction, namely, that ambulatory pressure gives a better prediction of prognosis after controlling for clinic pressure. The corollary is that patients with white coat hypertension have a more benign prognosis than those with sustained hypertension.

It has been suggested that white coat hypertension may simply be a precursor of sustained hypertension. Although there will undoubtedly be some true hypertensives who are misclassified as having white coat hypertension on initial assessment, the literature on this is inconsistent at present. In the Northwick Park study, no attempt was made to repeat ABPM during follow-up, but a substantial proportion of patients had a comprehensive assessment of target organ damage after an interval of 9 years. The assessment showed that only 11% of white coat hypertensives had left ventricular hypertrophy compared with 38% of sustained hypertensives, and there were similar differences in carotid artery thickening. The lesser degree of target organ damage in white coat hypertensives is not altogether surprising, since these patients had lower clinic pressures than did sustained hypertensives upon entry into the study (156/96 mm Hg compared with 164/101 mm Hg), although final clinic pressures were the same in the 2 groups. In addition, white coat hypertensives were receiving less antihypertensive medication than sustained hypertensives. All of these points are consistent with the idea that white coat hypertension is, in most individuals, a benign condition.

An argument sometimes raised against the concept of white coat hypertension is that if patients are seen a sufficient number of times in the clinic, blood pressure will return to normal. Again, this may be true in a minority of patients, but there are many in whom clinic pressure will remain high indefinitely. Thus, in the Northwick Park study, the majority of white coat hypertensives must have been considered by their physicians to be truly hypertensive during the course of the study, because 82% were taking antihypertensive medication at the end of the follow-up period.

How should these findings be put into practice? One of the trends in management of mild hypertension in recent years has been the attempt to select patients according to their overall level of risk rather than treating everyone with a clinic pressure above a certain value. Thus, the widely held view is that the attempt to select patients according to their overall level of risk rather than treating everyone with mild hypertension has been the attempt to select patients according to their overall level of risk rather than treating everyone with mild hypertension has been the attempt to select patients according to their overall level of risk rather than treating everyone with mild hypertension.

References


**KEY WORDS:** Editorials, hypertension, follow-up study, blood pressure
White Coat Hypertension: Time for Action
Thomas G. Pickering

Circulation. 1998;98:1834-1836
doi: 10.1161/01.CIR.98.18.1834

Circulation is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231
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Print ISSN: 0009-7322. Online ISSN: 1524-4539

The online version of this article, along with updated information and services, is located on the World Wide Web at:
http://circ.ahajournals.org/content/98/18/1834

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