

COMMENTARY

Who removes the mask of hypertension?

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This issue of *Hypertension Research* features an article by Wenjin *et al.*¹ about masked hypertension in patients on maintenance dialysis. Ever since it became possible to monitor ambulatory blood pressure non-invasively over prolonged periods of time, the discrepancies between the results of such measurements and office pressure measurements have received a great deal of attention.² Not surprisingly, most studies have focused on the white coat effect and white coat hypertension because both are relatively easy to detect. The opposite phenomenon, masked hypertension, is probably often missed because it can be diagnosed only when a practitioner decides to perform multiple out-of-hospital measurements on patients deemed to be normotensive on the basis of office blood pressure measurements. The European Society of Hypertension recommends reserving the term ‘masked hypertension’ to describe untreated individuals,³ but it is also increasingly being applied to treated patients who are normotensive in the office but hypertensive otherwise. In this respect, the term ‘masked uncontrolled hypertension’ (MUCH) is often used. Wenjin *et al.*¹ have addressed this MUCH phenomenon in relation to vascular function in a large group of patients on maintenance hemodialysis. Using different definitions of MUCH, they have found that this condition affects a large proportion of dialysis patients with controlled predialysis blood pressure and is associated with increased pulse wave velocity. A connection between masked hypertension and increased pulse wave velocity has also been found in other populations,⁴ thus indicating that patients with MUCH have more advanced vascular disease and, therefore, are

at greater risk of cardiovascular complications. This finding is consistent with results from other studies in essential hypertensives showing that the prognosis of patients with masked hypertension is at least comparable to that of patients with sustained hypertension.⁵ The office *vs.* ambulatory blood pressure trial was the first to show that ambulatory blood pressure measurements add prognostic value beyond office measurements in treated hypertensive patients.⁶ In fact, in patients who were adequately treated on the basis of their office blood pressure values, those who still had an elevated systolic blood pressure detected through ambulatory monitoring fared worse than those with normal ambulatory measurements. In other words, essential hypertensive patients with MUCH require more medical attention and probably more aggressive treatment than those who are found to be normotensive on all measurement occasions.

Despite the attractiveness of a term such as MUCH, it should be noted that this designation is prone to errors and biases. Indeed, treated patients, if they are not resistant or non-adherent, usually have blood pressures that are close to the desired level of 140/90 mm Hg. When a patient has a blood pressure of 138/88 mm Hg in both office and ambulatory monitoring measurements, a diagnosis of masked hypertension, or, for that matter, MUCH, would have to be made if the definition were strictly followed. However, there is probably no physician who would intensify treatment in such a patient. Another problem is illustrated in Figure 1. If multiple comparisons of office and ambulatory pressure were obtained for the same patient, there would be a certain degree of variability in both measurements. The collection of these measurement points can be graphically displayed as a circle (Figure 1). When the entire data set lies within the normotensive range (point A), a diagnosis of ‘true’ normotension

can safely be made. Similarly, when all the data points are well in the hypertensive range, it is justified to make a diagnosis of ‘true’ hypertension (point B). However, if all the measurements are close to the upper limit of what is considered normal, that is, 140-/90 mm Hg in the office and 130/80 for 24-h monitoring, the decision becomes much more difficult. Under those conditions, patients may sometimes exhibit normal pressure or a slightly elevated pressure, but may also sometimes have white coat or masked hypertension (point C). Thus, interpretations based on only one assessment may easily lead to misclassification. This problem may well have influenced the conclusions of Wenjin *et al.*¹ Although they were careful to base the level of predialysis blood pressure on the average of multiple office readings, which had been obtained over a 2-week period, they measured 24-h blood pressure only once. Moreover, they considered a recording valid when at least 12 measurements during the daytime were available. Thus, only 25% of the programmed 48 measurements were sufficient for inclusion in the analysis—a low number of measurements that may be the cause for concern. Therefore, the very high prevalence of MUCH in the dialysis patients must be interpreted with caution. The observation that this prevalence ranged from 43 to 75%, depending on the definition of ambulatory pressure, adds to the uncertainty.

All these considerations raise another and perhaps more fundamental question: what is the rationale for making a distinction between ‘ordinary’ hypertension, masked hypertension and possibly even white coat hypertension? Surely, this type of grouping reflects our natural desire to categorize or label people, but it seems that we have forgotten the lessons of Sir George Pickering, who repeatedly cautioned that any attempt to separate normal from high blood pressure is arbitrary

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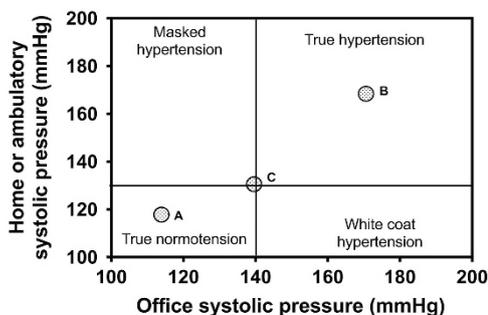


Figure 1 Schematic drawing of the relationship between office and home or ambulatory pressure measurements.

and described the ‘fallacy of the dividing line’.⁷ In regard to classifying a patient as having masked hypertension, there are in fact two dividing lines involved: one for office pressure and one for ambulatory pressure. In Figure 1, if the dividing line of office pressure is moved to the left or the line of out-of-office pressure is moved downward, the prevalence of the various categories is markedly altered. In the study by Wenjin *et al.*,¹ the different numbers for the prevalence of MUCH in relation to the various definitions of ambulatory pressure (daytime, nighttime or 24 h) exemplify this problem.

Finally, we should realize that the manner in which graphs of the relationship between office and ambulatory pressures are presented is slightly odd. Because office pressure is still plotted on the *x* axis, it may implicitly be assumed to be the independent variable or, for that matter, the main determinant of prognosis. If, on the other hand, ambulatory pressure were considered the main driver of

prognosis (and doing so is not unreasonable, given many epidemiological data), the situation suddenly becomes clearer. For practical purposes, a threshold of ambulatory pressure could still be used for the diagnosis of hypertension or the indication for treatment, but then every individual above that threshold would be at risk and therefore a potential candidate for treatment, regardless of whether office pressure is high, normal, or low, as in the case of masked hypertension. In fact, the term ‘masked hypertension’ would not even be necessary anymore. All patients below the agreed threshold of pressure would have a relatively good prognosis, regardless of whether the office pressure is low, normal or high, as in the case of white coat hypertension. This simplification has advantages because it not only is easier for the practicing physician but also obviates the need to design studies in allegedly different categories of patients. We may even think of abandoning

office pressure measurements altogether and of taking off the mask.

CONFLICT OF INTEREST

The author declare no conflict of interest.

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