

# Letters to the Editor

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## Superiority of Ambulatory Over Clinic Blood Pressure Measurement

To the Editor:

Dolan et al, in a large prospective cohort study, compared the risk of all-cause mortality and cardiovascular end points associated to the increase of clinic blood pressure measurement (CBPM) and ambulatory blood pressure measurement (ABPM).<sup>1</sup> They concluded that ABPM is superior (particularly at nighttime) to CBP to predict risk, and that every patient with elevated blood pressure should have ABPM. However, these conclusions based on the data presented in this landmark article can be questioned.

The sample analyzed is not representative of the general population. The majority of patients were referred by family doctors, and the proportion of those with clinical suspicion of white-coat hypertension is not known. In this situation, the performance of clinical measurements to predict risk is worse, and the results could be biased.

The main result is a comparison between ABPM and CBPM in terms of risk associated to increases of 10 mm Hg and 5 mm Hg of systolic and diastolic blood pressures, respectively. If ABPM is a method based on multiple measurements, it has a narrower SD. Each 1-mm Hg increment will result in a greater risk, and hence, the results are obvious. This could explain the better performance of the nighttime period during which the variation of blood pressure is less pronounced in most patients. Figure 2 in the article shows that all the parameters had a continuous relationship with cardiovascular risk, and the steeper curves are those from ABPM. This kind of analysis was questioned by Sega et al<sup>2</sup> in a prospective study in general population. They found that the predictive capacity was not better for home or ABPM than for office blood pressure in terms of goodness of fit.

The recommendation to perform ABPM in all hypertensive patients must be tested in clinical trials. The unique article of Staessen et al<sup>3</sup> had a short follow-up period and was not powered to analyze hard end points.

At this point, ABPM should be performed in patients with or without hypertension with an intermediate risk profile or those with clinical suspicion of white-coat hypertension. The values of 24-hour mean blood pressure, blood pressures dipping at nighttime, the morning surge, and even blood pressure variation<sup>4</sup> may help the decision of how aggressive the prescription of preventive interventions will be.

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1. Dolan E, Stanton A, Thijia L, Atkins N, McClory S, Hond ED, McCormack P, Saessen JA, O'Brien E. Superiority of ambulatory over clinic blood pressure measurement in predicting mortality. The Dublin Outcome Study. *Hypertension*. 2005;46:156–161.
2. Sega R, Facchetti R, Bombelli M, Cesana G, Corrao G, Grassi G, Mancia G. Prognostic value of ambulatory and home blood pressures compared with office blood pressure in the general population. Follow-up results from the Pressioni Arteriose Monitorate e Loro Associazioni (PAMELA) Study. *Circulation*. 2005;111:1777–1783.
3. Staessen JA, Byttebier G, Buntinx F, Celis H, O'Brien, Fagard R. Anti-hypertensive treatment based on conventional or ambulatory blood pressure measurement. *J Am Med Assoc*. 1997;278:1065–1072.
4. Kario K. Morning surge and variability in blood pressure. A new therapeutic target? *Hypertension*. 2005;45:485–486.

## Response

We concur with Dr Gus' remark<sup>1</sup> that our study involves a referred population,<sup>2</sup> but we fail to see how this would invalidate our conclusion that ambulatory blood pressure measurement (ABPM) is superior to clinic blood pressure measurement (CBPM) in predicting cardiovascular risk. We also agree with Dr Gus that the greater number of blood pressure readings away from the clinical setting allows ABPM its additional predictive power. However, the SDs of CBPM and ABPM means across individuals were similar.<sup>2</sup> The finding that ambulatory measurements have a greater reproducibility than clinic readings within individuals has no relevance with regard to our results obtained by Cox regression because these models run across subjects.<sup>3</sup> The prognostic superiority of nighttime over daytime blood pressure might well be attributable to the higher degree of standardization inherent to the nighttime measurements. Indeed, most nighttime readings are recorded while subjects are resting in the supine position or sleeping. Physical activity, psychoemotional stress, and the clinic environment strongly influence blood pressure during the awake period of the ABPM profile, and these factors cannot be standardized.

Population studies have been a fundamental and successful approach to validating the prognostic value of ABPM. However, Sega's recent study<sup>4</sup> leaves many issues unaddressed. First, it deviates from current standards by not accounting for sex, age, and other cardiovascular risk factors. We previously demonstrated in two independent population samples that the parameters of the relationships between blood pressure and age or body mass index significantly differed depending on how blood pressure was measured.<sup>5</sup> Thus, in Cox regression, the relative hazard ratios associated with each type of blood pressure measurement might be substantially different depending on the inclusion of other explanatory variables. Furthermore, Sega did not report the likelihood ratio test statistics for the comparisons between the different types of blood pressure measurement, between daytime and nighttime BP, or between systolic and diastolic blood pressure.<sup>4</sup>

Dr Gus also suggests that ABPM should be performed in patients with a clinical suspicion of white-coat hypertension.<sup>1</sup> This recommendation effectively translates into performing ABPM in all patients with an elevated clinic BP. In keeping with other experts,<sup>6</sup> we know of no way of clinically identifying white-coat hypertension.

In conclusion, our study cohort reflects a typical referral population of patients who had or were suspected of having hypertension. On the basis of our results, in keeping with current guidelines for the management of hypertension, we recommend the use of ABPM in such patients, but we certainly do not advocate ABPM for screening purposes in the general population, as is implied by Dr Gus.

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1. Gus M. Superiority of ambulatory over clinic blood pressure measurement. *Hypertension*. 2005;46:e10.
2. Dolan E, Stanton A, Thijs L, Hinedi K, Atkins N, McClory S, Den Hond E, McCormack P, Staessen JA, O'Brien E. Superiority of ambulatory over clinic blood pressure measurement in predicting mortality. The Dublin Outcome Study. *Hypertension*. 2005;46:156–161.
3. Staessen JA, Thijs L, Parati G, Mancia G, O'Brien ET; Syst-Eur Investigators. Clinical trials with ambulatory blood pressure monitoring: fewer patients needed? *Lancet*. 1994;344:1552–1556.
4. Sega R, Facchetti R, Bombelli M, Cesana G, Corrao G, Grassi G, Mancia G. Prognostic value of ambulatory and home blood pressures compared with office blood pressure in the general population. Follow-up results from the Pressioni Arteriose Monitorate e Loro Associazione (PAMELA) Study. *Circulation*. 2005;111:1777–1783.
5. Staessen J, O'Brien E, Atkins N, Bulpitt CJ, Cox J, Fagard R, O'Malley K, Thijs L, Amery A. The increase in blood pressure with age and body mass index is overestimated by conventional sphygmomanometry. *Am J Epidemiol*. 1992;136:450–459.
6. Verdecchia P, O'Brien ET, Pickering T, Staessen JA, Parati G, Myers M, Palatini P; Europe Society of Hypertension Working Group on Blood Pressure Monitoring. When can the practicing physician suspect white coat hypertension? Statement from the Working Group on Blood Pressure Monitoring of the European Society of Hypertension. *Am J Hypertens*. 2003;16:87–91.