Home Blood Pressure as a Cardiovascular Outcome Predictor

It’s Time to Take This Method Seriously

George S. Stergiou, Konstantinos C.M. Siontis, John P.A. Ioannidis

The common phenomena of white-coat and masked hypertension have established the need for assessing blood pressure (BP) out of the office, particularly using 24-hour ambulatory monitoring (ABPM). In the last 2 decades, evidence on the usefulness of the alternative method for out-of-office BP assessment, namely home BP monitoring (HBPM), has accumulated, and guidelines on this method have recently been published in the United States and Europe.1,2 As with ABPM, HBPM using this method have recently been published in the United States and Europe.1,2 As with ABPM, HBPM has accumulated, and guidelines on this method have recently been published in the United States and Europe.1,2

In this issue of Hypertension, Niiranen et al present the results of Finn-Home, an outcome study of HBPM in the general population in Finland.3 Strengths of this study are the large data set (>14,000 subject-years, with 162 documented cardiovascular events) and the use of optimal methodology for office BP measurement (nurses using mercury sphygmomanometers) and HBPM (validated electronic device and guidelines-recommended monitoring schedule with 7-day duplicate morning and evening measurements). This study contributes to the HBPM and outcome database that now comprises 8 large long-term prospective studies1–10 including 17,688 subjects and almost 100,000 person-years of follow-up (Table). There are important differences among these studies regarding the study population, the BP measurements, the definition of primary outcomes, and the methods of statistical adjustment. Studies have been performed in Europe and Japan. Five studies included general population samples,3–5,7,9 1 included patients registered in a single primary care practice after excluding those with previous cardiovascular disease,8 and 2 focused on treated hypertensives.6,10 Office BP was measured using conventional mercury sphygmomanometers, apart from the Ohasama study,4 which used electronic devices; and that of Okumiya et al,5 which did not report on office measurements. In 3 studies, office BP was measured in a single visit (2 to 3 readings),3,4,8 and in another 3 studies, it was measured in 2 visits (6 readings)6–7,9 (unclear in 1 study10). HBPM was self-performed by participants using electronic devices, apart from the Flanders study,8 where HBPM was performed in a single occasion by a physician or assistant physician using a mercury device. The HBPM schedule also varied considerably among studies, with 5 of them having morning and evening measurements5,5–7,9 and 3 having only morning measurements4,8,10. The Ohasama, SHEAF, Finn-Home, and Okumiy et al studies obtained 20 to 28 home readings,3–6 Didima obtained 12 readings,9 Flanders obtained 3 readings8 and PAMELA obtained only 2 readings7 (readings not specified in J-HEALTH10). Variations in the definitions of outcomes and adjusting factors in the multivariate analyses are shown in the Table.

Despite the considerable methodological and clinical heterogeneity of these studies, a comparison of the prognostic ability of home versus office BP measurements is possible, because in most of the studies both methods have been applied in the same subjects.3,4,6–9 All these studies consistently showed home BP to be a significant predictor of cardiovascular events (Table). More importantly, in most of the studies, the cardiovascular risk was better predicted by HBPM than by office measurements (Table).3,4,6–8 Even when the same number of home versus office measurements were compared, the prognostic ability of HBPM was again superior, suggesting that its advantage is not attributed only to the larger number of readings.4,7 A random-effects summary of the adjusted hazard ratios yields values of 1.015 (95% CI 1.010 to 1.020) and 1.024 (1.017 to 1.032) per mm Hg for systolic and diastolic home BP versus 1.007 (1.004 to 1.011) and 1.015 (1.003 to 1.026), respectively, for office BP. This difference is beyond chance for systolic BP. A more informative analysis would be to consider both HBPM and office BP measurements in the same adjusted model. This has been done in different analytic approaches in 5 studies. The Finn-Home,3 SHEAF,6 Ohasama,4 and Flanders8 studies found that HBPM, but not office BP, was significantly predictive when both were considered, whereas the PAMELA study7 found that both office and HBPM conferred independent information. One would like to see also formal reclassification analyses that examine whether the addition of HBPM changes the classification of participants into categories where different treatment would be indicated11 and thus outcomes could be improved. Ideally, reclassification evaluations could be done in an individual-level data meta-analysis to allow standardization of the estimates across different populations.

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admissions, outcome definitions, and analysis plans. Preliminarily, it seems that indeed subjects with elevated office but low home BP (white-coat phenomenon) are at low cardiovascular risk that is similar to those with controlled office and home BP, whereas subjects with uncontrolled home but low office BP (masked hypertension) are at increased risk as uncontrolled hypertensives.

Recent guidelines at both sides of the Atlantic have strongly endorsed the application of HBPM and recommended this method as a routine component of BP measurement in most patients with known or suspected hypertension. Evidence on HBPM accumulated in the last decade supports the view that this technique should no longer be regarded as complementary or a screening test requiring confirmation by ABPM, but as an alternative to ABPM for decision making in hypertension.

In many countries, the question that remains is how to make the best use of this method in routine clinical practice. With ABPM there is reassurance that an unbiased BP profile is obtained because the patient/user cannot decide the time or number of measurements, neither select which readings to report to the physician. Standardization of the monitoring schedule and reporting should also be the case for HBPM. Indeed, there is evidence that patients often misreport (under- or overreport) their HBPM values, which might mislead the physician’s decision. Current technology of HBPM software can easily implement the recommended monitoring schedule together with automated memory at low cost to ensure that an unbiased and guidelines-based assessment of home BP is made. This is an essential prerequisite for HBPM to be used by physicians in making treatment decisions in clinical practice and hopefully should also improve clinical outcomes.

Disclosures

None.

References


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