Triage for Out-of-Office Blood Pressure

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Around the globe, hypertension is the major cause of fatal and nonfatal cardiac, neurological, vascular and renal disease. Hypertension is treatable; the treatment works. How are these facts to be applied across the spectrum of economies and healthcare delivery systems from highly developed nations to low- and middle-income countries? Even within the developed nations, there are subpopulations with limited healthcare resources.1

Recent guidelines have recommended that the various diagnoses for hypertension be defined by results of 24-hour ambulatory blood pressure monitoring (ABPM). This recommendation is based on compelling evidence from long-term prospective surveys relating the results of ABPM to event rates for cardiovascular disease, stroke, and renal disease. Home blood pressure monitoring is still an improvement compared with usual office measurements for defining white coat hypertension (WCH) and Masked hypertension (MH). ABPM remains the domain of hypertension specialists; it requires equipment, software, trained technicians, and the fiscal resources that limit its use to a small fraction of the hypertensive population even in highly developed nations. Home blood pressure monitoring is used more widely with devices easily purchased at reasonable prices.2 HPBM can be linked to telemedicine strategies for surveillance that can reduce office visits for those who have telephones (preferably smart phones or home computers).3

However, a more accurate office-based strategy to minimize the demand for out-of-office testing could prove valuable, and one such strategy is described in this issue of Hypertension.4

Consider the usual detection of hypertension in the context of a busy practice of adult family practice or internal medicine. A nurse or assistant measures blood pressure once. If that pressure is deemed to be normal, no other step is taken. If the blood pressure is elevated, the physician may make a second measurement to classify the patient as normal or hypertensive, a simple binary process, unless WCH or MH are considered apart. The first one was discarded, and the subsequent 5 were averaged for the final determination. Myers et al compared the BpTru average pressure with the first pressure and awake ABPM pressures in Canadian general practices. BpTru average pressures correlated far better with day-time ABPM pressures compared with first office pressures.6 Furthermore, there was a clear reduction from the first measurement to the subsequent ones.

When more measurements of blood pressure are taken at one visit, the average and trend (difference from first to subsequent) can be calculated. Blood pressure measurement alone, however, omits use of patient characteristics in triaging to the prediction of WCH or MH. Yet studies have suggested that some are more or less likely to have WCH or MH on the basis of other additional traits: sex, age, and others.7 A comprehensive model including pressure and relevant traits might improve triage classification into the 3 categories: normal pressure, sustained high pressure (hypertension), and need for out-of-office pressure. This sensible approach has been evaluated in a large number of adults enrolled in several surveys from the United Kingdom and Canada and presented in this issue of Hypertension as the Predicting Out-of-Office Blood Pressure in the Clinic (PROOF-BP) study.4

The PROOF-BP investigators approached the triage problem by developing a prediction model based on information from 991 participants in 2 trials (the derivation cohort) in which multiple clinic pressures, taken with a suitable device, and relevant traits were combined to generate model systolic and diastolic pressures. The validation cohort consisted of 1172 participants from 4 separate trials. The final version of the model included age, first clinic pressure, difference between first and last clinic pressure (of 3–5 readings), pulse pressure, body mass index, alcohol consumption (unit/week), years of hypertension, sex, use of prescribed medication (yes/no), smoking status, and history of cardiovascular disease. The model-derived systolic and diastolic pressures proved to be highly accurate for predicting measured out-of-office pressures as a guide to whether ABPM or home blood pressure monitoring are needed. Those with model-calculated pressures >140/90 mm Hg were confidently predicted to be hypertensive, whereas those with model-calculated pressures <130/80 mm Hg were predicted to be normal. Those with model-predicted pressures <145/90 mm Hg and >130/80 mm Hg would be referred for out-of-office monitoring (Figure). For those

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with office hypertension based on a single reading, the model-based triage would reduce the demand for out-of-office pressures by nearly 50%. The equations can easily be programmed for a smart phone or laptop computer; an app is likely to become available.

The importance of this new information lies in the size and diversity of the cohorts and the clear indication that several traits add precision to the blood pressures alone for predicting who would be most likely to benefit from out-of-office pressures were they available. Where out-of-office pressures are not available or feasible, model-predicted pressures would then become the basis for decisions to observe and follow or begin or intensify anti-hypertensive treatment.

The populations used to derive the PROOF-BP equations were from the United Kingdom and Canada, but diverse including significant numbers of UK-White, Afro-Caribbean, and South Asian participants. These subgroups are apparently similar with regard to patterns of out-of-office blood pressure. However, more populations need to be assessed to determine whether the parameters used in the PROOF-BP model will apply more generally. African American groups should be studied. Their blood pressure patterns may be different from non-African American cohorts by having higher nighttime pressures. Their blood pressure patterns may be different from those with limited healthcare resources and uncertain healthcare literacy, the PROOF-BP approach may make a major addition to the worldwide imperative for better and affordable management of hypertension.

Disclosures

None.

References


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