Progress in blood pressure measurement: a workshop of the European Society of Hypertension

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On 13 June 2006, at the 16th annual meeting of the European Society of Hypertension, the Working Group on Blood Pressure Monitoring held a workshop on new developments in the field of blood pressure measurement. The proceedings published in this issue of *Blood Pressure Monitoring* include two papers on validation of blood pressure monitors [1,2], the protocol of the International Database on Ambulatory blood pressure monitoring in relation to Cardiovascular Outcome (IDACO) [3], a clinical paper on the role of ambulatory blood pressure monitoring in risk stratification [4], and a review on masked hypertension, also known as isolated ambulatory hypertension [5].

Manufacturers of blood pressure monitors, which have successfully passed validation, sometimes make minor modifications to a device that are cosmetic rather than functional. Modification of a device without the user being aware can have serious implications for the interpretation of the blood pressure results in a clinical or research setting. Manufacturers therefore have to inform users on any modification of their devices, but do not necessarily have to go through expensive validation studies, if minor changes are unlikely to affect measurement accuracy. The dabl Educational Trust proposed a Declaration of Blood Pressure Measuring Device Equivalence to be completed by manufacturers to assure that a nonvalidated device is identical to a validated type in all blood pressure measuring aspects and that any and all technical differences between a current and a previously validated device do not affect the accuracy of the blood pressure measurement. Atkins and O'Brien [1] described the procedure and reported their first experience with the equivalence forms for 13 devices from three manufacturers.

Clinical studies for the validation of blood pressure measuring devices are expensive, time consuming, and often produce contradictory results. Amoore and colleagues [2] pioneered the use of simulators in the validation of noninvasive oscillometric blood pressure monitors. These researchers observed encouraging agreement in device validation between a prototype simulator and the clinical validation. Moreover, they demonstrated that simulators might help in understanding the factors that influence the oscillometric measurement of blood pressure. They proposed that simulator validation should improve on, not simply replace clinical validation [2].

Thijs and colleagues [3], on behalf of the IDACO consortium, described a new resource for studying the relation between health outcomes and various components of the ambulatory blood pressure. Eligible studies are population-based, have fatal as well as nonfatal outcomes available for analysis, comply with ethical standards, and have been previously published in peer-reviewed journals. In meta-analyses on the basis of individual subject data, composite and cause-specific cardiovascular events will be related to various indexes derived by ambulatory blood pressure monitoring. The analyses will be stratified by cohort and adjusted for the conventional blood pressure and other cardiovascular risk factors [3]. The IDACO consortium published the first paper proposing outcome-driven thresholds for ambulatory blood pressure measurement [6]. A manuscript on the prognostic superiority of daytime ambulatory over conventional blood pressure is currently in press [7].

Recent hypertension guidelines strongly support the concept of the global cardiovascular risk rather than the management of single risk factors. Waeber and coworkers [4] computed the global cardiovascular risk according to the 2003 ESH/ESC guidelines [8]. They studied over 120 participants, who underwent daytime ambulatory blood pressure monitoring and imaging of their carotid and femoral arteries by ultrasound [4]. A daytime blood pressure of 135 mmHg systolic or 85 mmHg diastolic or higher, hypercholesterolaemia, and even more so, the

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presence of atherosclerotic lesions were better indicators of the global cardiovascular risk than the conventionally measured blood pressure. According to Waeber *et al.*'s report [4], further studies are urgently required to define the position of ambulatory blood pressure monitoring in the assessment of the global cardiovascular risk.

Verberk and colleagues [5] wrote a comprehensive review on masked hypertension, a condition characterized by a normal blood pressure on conventional office measurement, but hypertension on ambulatory monitoring. On balance, the reviewed studies showed that masked hypertension is a precursor of sustained hypertension, that it is a forerunner of target organ damage, and that it predicts the occurrence of cardiovascular morbidity and mortality. Both blood pressure self-measurement and ambulatory blood pressure monitoring are appropriate methods to diagnose masked hypertension. Patients with blood pressure values within a 10 mmHg range of the arbitrary threshold values for masked hypertension have the highest chance of being classified as masked hypertensive [5]. Verberk and colleagues furthermore proposed a number of research questions to elucidate the role of masked hypertension in risk stratification. They [5] placed studies of the reproducibility of this condition high on their priority list.

Since its foundation in 1999, the Working Group has organized annual workshops devoted to blood pressure measurement and *Blood Pressure Monitoring* has published 91 papers from the proceedings of these workshops. These papers and those published in this issue reflect the scientific mission of the Working Group, which is to promote accurate blood pressure measurement for the diagnosis and management of hypertension and for research into hypertension.

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