Response to Does Atrial Fibrillation Affect the Automated Oscillometric Blood Pressure Measurement?

We thank Stergiou and coworkers for their interest in our study.1 The authors criticize that we did not use a validation protocol. The present study examines the impact of one single parameter (atrial fibrillation, AF) on the accuracy of oscillometry. It is not a validation study. The performance of a device in a validation procedure is determined by a broad variety of parameters. Bland–Altman analysis—as used in our study—is the statistical gold standard to assess the accuracy of a measurement technique and allows to analyze the impact of a single parameter like AF by statistical comparison of the resulting biases.2 Furthermore, the statement “the AAMI protocol (150 measurements) is the statistical gold standard to assess the accuracy of a measurement technique and allows to analyze the impact of a single parameter like AF by statistical comparison of the resulting biases” is only true for systolic blood pressure, because the diastolic bias exceeded 5 mmHg. Concerning Stergiou’s question of a potentially underpowered study regarding systolic pressure in AF, it may be of interest that the number of measurements per patient was in the range of the requested number of measurements in the AAMI protocol (150 measurements).

The following 2 issues have to be clearly differentiated: first, the impact of AF on the accuracy of measurements; second, the problem that blood pressure monitors that have successfully passed validation protocols fail to prove the same accuracy in clinical practice—as was evident in our study. It has to be kept in mind that prior validations of the devices used sphygmomanometry as reference. Moreover, validation protocols unfortunately do not mandatorily require the inclusion of elderly subjects with a higher degree of arteriosclerosis. We have previously shown that the accuracy of oscillometry is impaired by an increase of pulse pressure as a footprint of vascular ageing.3 As mentioned in that article, we, therefore, strongly recommend the mandatory inclusion of elderly subjects in future validation protocols.

The authors remarked the high bias of pulse pressure. The underestimation of systolic and overestimation of diastolic blood pressure is a general problem of oscillometry that has been repeatedly described independent of AF.4

We agree with the authors that the results of 2 single devices cannot be extrapolated to the oscillometric technique in general. Therefore, we want to repeat the last sentence of the discussion: “The study should be repeated using oscillometric devices from other manufacturers, since the software tools for the handling of arrhythmia might differ.” Following the recommendation of American and European guidelines to perform repeated blood pressure measurements in patients with AF, we conducted triplicate measurements. Stergiou asked for an additional analysis of the individual readings. Necessarily, mean biases remain unchanged and standard deviations slightly increase. Our study revealed that AF is associated with a higher intravindividual variability of blood pressure measurements. Therefore, the study should not be misinterpreted in a way that AF has no effect on the accuracy of oscillometry. The key conclusion is that repeated measurements are necessary to compensate this problem. This finding is of special relevance for the multitude of elderly subjects with AF that are unable to perform sphygmomanometric self-measurements.

Disclosures

None.

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