Do differences in blood pressure between arms matter?

In *The Lancet*, Christopher Clark and colleagues present data from a systematic review and meta-analysis assessing the available evidence linking differences in blood pressure between arms with both central and peripheral vascular disease. They establish that systolic differences of at least 15 mm Hg are associated with an increased risk of peripheral vascular disease (relative risk 2.5, 95% CI 1.6–3.8) and report weaker but significant associations with cerebrovascular disease and mortality. When subclavian stenoses are angiographically proven, Clark and co-workers estimate that the mean difference in blood pressure between arms is 36.9 mm Hg (95% CI 35.4–38.4), and rates of subclavian stenosis are high when differences are present.

National and international hypertension guidelines have recommended measurement of blood pressure in both arms for some years, but the justification has been poor and subsequent adoption in primary care negligible. The main reason for these recommendations has been reduction of measurement error, although the European Society of Hypertension and European Society of Cardiology guidelines refer to differences between arms as a sign of peripheral vascular disease. Key issues are how to measure such differences, which measurement of blood pressure to use, and what to do when a difference is detected.

Method of measurement is important because the prevalence of a difference more than doubles with sequential measurement (one arm then the other) compared with simultaneous measurement of both arms with two sphygmomanometers or specialised machines. Preliminary data suggest that the significant differences recorded with sequential measurement are due to the so-called white-coat effect. Few family doctors will have two sphygmomanometers in their clinic rooms, but a spare model of the accurate digital monitors now in common use could easily be available. The alternative, historically, has been for measurement to depend on the side of the desk a patient sits and hence which arm is nearer to the physician. Clark and co-workers suggest that variation caused by method of measurement is no longer acceptable.

In view of the association with vascular disease, guideline recommendations to use the highest blood pressure seem appropriate. No studies of peripheral vascular disease included a reference standard that used definitive diagnosis rather than reduced ankle-brachial pressure index. Therefore, although an asymptomatic difference might prompt checking of this index, no findings suggest what to do afterwards. Clark and colleagues’ data for increased cardiovascular mortality in the presence of a difference suggest that treatment with lipid-lowering and antiplatelet drugs could be indicated after detection of a difference, but such an approach has not been tested in randomised trials.

However, not all studies in Clark and colleagues’ review used the simultaneous measurement method and most included patients known or thought to be at increased cardiovascular risk. Therefore, how useful bilateral measurements of blood pressure are in people with essential hypertension and no additional risk factors is unclear. Many studies in the review were cross-sectional, so whether differences in systolic blood pressure are predictive of future disease or a marker of existing disease is impossible to establish. Although the three cohort studies included in the review did show that differences in systolic blood pressure were associated with increased cardiovascular mortality, the effect size (hazard ratio 1.7, 95% CI 1.1–2.5) is of a magnitude that does not exclude the possibility of residual confounding.

This report has several implications. First, the high specificity (96%) of the association between a difference in systolic blood pressure between arms of more than...
15 mm Hg and peripheral vascular disease justifies use of this measure as a sign of disease. Second, the low sensitivity (15%) shows that measurement of differences is of little value as a screening test for peripheral vascular disease, and ankle-brachial pressure indices will still be necessary for diagnosis. Third, the high prevalence of differences in some of the studies (eg, 7% of participants had an inter-arm difference of 15 mm Hg or higher in one community-dwelling cohort) suggests that many people with hypertension will be missed when blood pressure is measured in only one arm. Further research is needed to clarify whether substantial differences between arms should prompt aggressive management of cardiovascular risk factors. Overall, Clark and colleagues’ systematic review and meta-analysis supports existing guidelines stating that blood pressure should be measured in both arms. Ascertainment of differences should become part of routine care, as opposed to a guideline recommendation that is mostly ignored.

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We declare that we have no conflicts of interest.