

Reduction of Cardiovascular Morbidity and Mortality in the Third World

The Importance of Accurate Blood Pressure Measurement

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See related article, pp 1047–1053

The Problem

In the pursuit of reducing cardiovascular morbidity and mortality attributable to high levels of blood pressure (BP), it should be a given that accurate measurement of BP would be the starting point. Within the developed world, however, there remain significant obstacles to such a simple standard, such as the tendency to round off measurements obtained manually in primary care (terminal digit preference). However, given the intrinsic, often considerable, variability of BP within individuals,¹ it could be argued that such niceties of accuracy are less critical and, that as the assessment of cardiovascular risk is based on several factors in addition to BP, we might put less effort into the goal of accurate BP measurement. This would be a mistake, in my opinion, and the goals of Parati et al² are laudable: we do patients and medical science a disservice by not ensuring the highest degree of precision in BP measurement.

As outlined in the accompanying article, mercury sphygmomanometers will eventually disappear, although the duration of their demise has been prolonged in many parts of the world.³ Future methodologies should include an emphasis on removing, as far as possible, the role of observers, who themselves influence the results they record. In the developed world, this and other factors have led to an explosion in the use of a technology that no longer depends on the skill of an observer with a stethoscope; instead, advances in microelectronics allow us to record brachial BP via oscillometric recorders that anyone can use.⁴

The Solution

Given the accuracy and reproducibility of these devices, it made sense for Parati et al to seek such a way forward in their attempt to develop an inexpensive and accurate device for use in low resource settings (LRS). As the authors themselves record, it is a pity that there was little real competition among the manufacturers asked to bid for this contract; one assumes that such competition was not perceived to be in their own

long-term interest. However, the researchers were provided with a device from one manufacturer, one that had been validated previously under laboratory conditions. It had been changed only insofar as the power source was now solar, and that the cuff could be inflated manually. While the monitor studied is undoubtedly inexpensive (€25), it was more expensive ultimately than that initially specified. This was accepted by the authors based on the impact of inflation over the overall lifetime of this project.

Having selected their monitor, the initial validation experiment was repeated. There was a difference in that the monitor seemed to be less accurate for diastolic blood pressure (DBP) compared with during the previous validation. Clearly, systolic blood pressure (SBP) remains the most important risk parameter as outlined by the authors, and in the field-testing phase of the study, there was remarkable identity (for both SBP and DBP) between the oscillometric and mercury measurements in 3 different centers. Therefore, I believe we can be confident that the Omron HEM-SOLAR does what is claimed of it in providing accurate measurements of BP in unselected individuals in LRS in Africa. As if that were not proof enough, both patients and operators preferred the device to equipment used for more conventional BP measurements (it is possible, however, that the novelty factor persisted even over 6 months). There should be little debate that this methodology works, at least in the short term, and allows for accurate, relatively observer-independent measurement of BP.

Discussion

Are there any caveats to such a conclusion? There are several that deserve comment. We are left only being able to recommend one manufactured device for this purpose, and arguably, that is a fair return for the risks that Omron took. Also, it is not clear whether the stated price of €25 will be maintained in a market without immediate competition.

Some of the authors of this article have, on other occasions, commented on the potential for misclassification of BP categorization (white coat hypertension, masked hypertension) by relying solely on office measurements of BP.⁵ We have little information in this particular setting as to how reproducible BP measurement will be, and the white coat effect could be as great in LRS as it is in the Western world. This is a topic for future study, and meanwhile, the establishment of accurate methodologies for measurement in LRS has to be a step forward.

Can the use of this device now be recommended for all areas within the third world? It is difficult to say yes without

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reservation as the settings for the field-testing limb of this project were deliberately chosen because “they had the facilities and expertise to carry out the study.”² These areas were regarded by the authors as having, “catchment areas covering of a range of circumstances that prevail in low resource settings,”² but it remains to be seen what future uptake and success there might be if and when this device is offered elsewhere.

Impact on Clinical Practice

What about the wider applicability of such work? If a manufacturer can be persuaded to make an inexpensive device for use in LRS, why not make one for general use? It is already the case (at least within the UK) that accurate BP monitors can be bought for even less than €25 for the Omron HEM-SOLAR; however, these may be less robust if used day in and day out in a busy clinical practice.⁶ Devices marketed for office use in the UK and elsewhere are more robust and considerably more expensive compared with the Omron HEM-SOLAR.⁷ It seems likely that it is market forces that will determine the cost and price of BP-measuring devices, and thus in developed economies the cost and/or price will always be greater. There also might be a concern that inexpensive devices destined for LRS could be sold to those who would pay a little more for unit costs.

Conclusion

For those who believe that it is not possible to manage hypertension appropriately without the use of out-of-office BP measurement,⁸ important questions remain as to whether use of the Omron HEM-SOLAR (or similar devices) will

deliver best practice; even so, it is likely to be a major advance on the status quo.

Disclosures

P.L.P. has received remunerations for speaking engagements on BP monitoring, although not from the manufacturers mentioned in the Original Article, and receives no current remuneration from commercial sources.

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