

Self monitoring of blood pressure at home

Is an important adjunct to clinic measurements

Although measurement of blood pressure in the clinic is said to be the cornerstone of decision making in hypertension, such measurements may be unrepresentative of a patient's true blood pressure because of random fluctuations and the white coat effect.¹⁻⁴ In addition, doctors rarely measure blood pressure according to recommended standards.⁴ Aimed at improving hypertension management, the 2003 US Joint National Committee recommends the use of self monitoring of blood pressure before considering the more expensive, but better validated ambulatory monitoring of blood pressure.² Both the Joint National Committee and the 2003 guidelines from the European Society of Hypertension and the European Society of Cardiology suggest that self monitoring might also be used as an alternative to ambulatory monitoring for the diagnosis of white coat hypertension.^{1,2} The 2004 British Hypertension Society guidelines also acknowledge the increasing use of self monitoring in clinical practice and provide a threshold level for the diagnosis of hypertension (more than 135/85 mm Hg).³ In addition, two websites (www.bhs.soc.org and www.dablededucational.org) provide information on validated devices for self monitoring.

Cross sectional data and one outcome trial have shown that, as with ambulatory monitoring, self monitoring values are lower than clinic blood pressure measurements.^{5,6} Self monitoring has several advantages over clinic measurements—by allowing multiple readings averaged over time and by taking measurements in people's usual environment, a more reproducible blood pressure value is produced that is devoid of the white coat and placebo effects.⁴ More importantly, two outcome studies have shown that self monitoring predicts cardiovascular outcome better than clinic measurements.^{7,8} Preliminary evidence also shows that self monitoring may improve control of blood pressure by improving compliance, as patients become more involved in their care.⁹ It has also been suggested that self monitoring might reduce healthcare costs by reducing the number of clinic visits.⁴

Most self monitoring devices are self activated, and misreporting of blood pressure readings is possible.⁴ Recently, the use of memory equipped devices has reduced such error, which can also be avoided by adopting telemedicine techniques, which lead to further improvement in controlling blood pressure.¹ Although the technique is easy to learn, some patients may not be good candidates for self monitoring, which may result in anxiety or modification of treatment by the patient.

An important application of self monitoring is to detect white coat hypertension.¹⁰ Although some have suggested that self monitoring may represent a cheaper alternative method to detect this condition, it probably cannot replace ambulatory monitoring.^{11,12} It can, however, be used as a screening test that requires confirmation with ambulatory monitoring.¹⁰⁻¹² The low

Recommendations for clinical use⁴

- Self monitoring of blood pressure is useful in detecting white coat hypertension among patients with persistently raised clinic blood pressure (on at least three visits) and no evidence of damage to the target organ. The diagnosis requires confirmation with ambulatory monitoring. If self monitoring is high then treatment should be considered according to the overall cardiovascular risk.
- Further important indications for self monitoring are improvement of patients' compliance and long term follow up of patients with hypertension under treatment
- Self monitoring should be done by trained patients under medical supervision. Training should include information about hypertension, procedure for self monitoring, advice on equipment and its proper use, and interpretation of protocol and data
- Carefully trained patients can obtain accurate readings when monitoring themselves by using the conventional auscultatory technique. Fully automated memory equipped electronic devices are preferable because they require less training, prevent observer and reporting bias, and allow for average readings over defined intervals and comparison with previous periods
- Few of the devices available on the market are accurate. Wrist and finger devices are not recommended. Patients should be warned that devices for self monitoring are often put on the market without having been independently validated. Up to date information about validated devices is provided by the website www.dablededucational.org
- The average of self monitoring measurements over three to seven days, with duplicate, seated, morning and evening readings per day, yields reliable data. Measurements of the first day should be discarded because they might not be representative. For long term observation, measurements might be repeated for one week every three months. Overuse of the method and self modification of treatment should be avoided
- Average self monitored blood pressure $\geq 135/85$ mmHg indicates high blood pressure and $< 130/80$ mmHg normal blood pressure. Elevation of self monitored blood pressure should not in itself be an indication for drug treatment, which should be dependent also on the overall cardiovascular risk profile

cost and wide availability of self monitoring devices also favour their use as a screening method. Self monitoring is clearly more appropriate than ambulatory monitoring for the long term follow up of treated patients because of its lower cost and greater convenience for repeated measurements.⁴ However, ambulatory monitoring is regarded as superior to self monitoring because it allows for measurements over a full 24 hour period and has better outcome data to support its use.⁴

Given the fallibility of conventional blood pressure measurement, self monitoring of blood pressure provides supplementary information to practising

BMJ 2004;329:870-1

doctors enabling a more precise diagnosis and more accurate titration of treatment in the long term follow up of hypertension.

George Stergiou *assistant professor of medicine*

Hypertension Center, Third University Department of Medicine, Sotiria Hospital, 152 Mesogion Avenue, Athens 11527 Greece

Thomas Mengden *assistant medical director, head of division*

Division of Hypertension and Vascular Medicine, Medizinische Poliklinik, University Clinic Bonn, Wilhelmstrasse 35, D-53111 Bonn, Germany

Paul L Padfield *consultant physician*

Department of Medical Sciences, Western General Hospital, Edinburgh EH4 2HU

Gianfranco Parati *associate professor of medicine*

University of Milano-Bicocca, Cardiology II, S. Luca Hospital, via Spagnoleto, 3, 20149-Milan, Italy

Eoin O'Brien *professor of cardiovascular pharmacology*

On behalf of the working group on blood pressure monitoring of the European Society of Hypertension

ADAPT Centre and Blood Pressure Unit, Beaumont Hospital and Department of Clinical Pharmacology, Royal College of Surgeons in Ireland, Dublin 9, Ireland (eobrien@iol.ie)

Competing interests: Various device manufacturing companies for blood pressure measuring devices, including devices for self measurement, have funded the costs of validation studies done by EOB over the past 10 years; the results of all such research have been published in peer reviewed journals.

- 2003 European Society of Hypertension-European Society of Cardiology guidelines for the management of arterial hypertension. Guidelines committee. *J Hypertens* 2003;21:1011-53.
- Seventh report of the Joint National Committee on prevention, detection, evaluation, and treatment of high blood pressure. *Hypertension* 2003;42:1206-52.
- Williams B, Poulter N, Brown M, Davis M, McInnes GT, Potter JF, et al. The BHS guidelines working party, for the British Hypertension Society. British Hypertension Society guidelines for hypertension management 2004 (BHS-IV): summary. *BMJ* 2004;328:634-40.
- O'Brien E, Asmar R, Belin L, Imai Y, Mancia G, Mengden T, et al. on behalf of the European Society of Hypertension working group on blood pressure monitoring. European Society of Hypertension recommendations for conventional, ambulatory and home blood pressure measurement. *J Hypertens* 2003;21:821-48.
- Thijs L, Staessen JA, Celis H, Fagard R, De Cort P, De Gaudemaris R, et al. The international database of self-recorded blood pressure in normotensive and hypertensive subjects. *Blood Press Monit* 1999;4:77-86.
- Tsuji I, Imai Y, Nagai K, Ohkubo T, Watanabe N, Minami N, et al. Proposal of reference values for home blood pressure measurement: prognostic criteria based on a prospective observation of the general population in Ohasama, Japan. *Am J Hypertens* 1997;10:409-18.
- Ohkubo T, Imai Y, Tsuji I, Nagai K, Sakuma M, Watanabe N, et al. Home blood pressure measurement has a stronger predictive power for mortality than does screening blood pressure measurement: a population-based observation in Ohasama, Japan. *J Hypertens* 1998;16:971-5.
- Bobrie G, Chatellier G, Genes N, Clerson P, Vaur L, Vaise B, et al. Cardiovascular prognosis of "masked hypertension" detected by blood pressure self-measurement in elderly treated hypertensive patients. *JAMA* 2004;291:1342-9.
- Cappuccio FP, Kerry SM, Forbes L, Donald A. Blood pressure control by home monitoring: meta-analysis of randomised trials. *BMJ* 2004;329:145.
- Pickering TG. Self-monitoring of blood pressure. In: *Ambulatory monitoring and blood pressure variability (part 1)*. Science Press: London, 1990:8.5.
- Parati G, Stergiou G. Self measured and ambulatory blood pressure in assessing the white coat phenomenon. *J Hypertens* 2003;21:677-82.
- Verdecchia P, O'Brien E, Pickering T, Staessen JA, Parati G, Myers M, et al. on behalf of the European Society of Hypertension working group on blood pressure monitoring. Statement from the working group on blood pressure monitoring of the European Society of Hypertension. When can the practicing physician suspect white coat hypertension? *Am J Hypertens* 2003;16:87-91.

Primary care trusts

Premature reorganisation, with mergers, may be harmful

Just over two years ago, in a reorganisation of the NHS in England, 303 primary care trusts were created, each with responsibility for providing primary health care, improving health, and commissioning secondary care services for a population of around 180 000. With about 80% of NHS funding flowing directly to primary care trusts on a capitation based formula, hopes were high that these new organisations would be powerful agents for change in a more devolved, clinically driven, and locally responsive NHS.¹

Some in the NHS, however, believe that primary care trusts have failed to fulfil these expectations. There is a growing belief that many trusts are perhaps ineffective organisations—too weak to stand up to providers of acute care in tough negotiations on commissioning and too small to fulfil their public health responsibilities. Some would argue that they have so far been unable to establish strong and credible management teams.²

The unsurprising solution being mooted is a further reorganisation, in which widespread mergers of primary care trusts would reduce their number to 100-150 across England.³ Coincidentally, that is roughly how many health authorities existed before they were abolished and primary care trusts were created to take on many of their responsibilities.

Although a moratorium of sorts on wholesale organisational restructuring has been in place for the past two years in the Department of Health, some primary care trusts have already been merged in all but name. Strategic health authorities have organised them into "clusters" and appointed joint management teams.⁴ In 2005—after the next election—we expect an epidemic of mergers of primary care trusts.

So what would these mergers achieve? We have no good evidence to show that a structural reorganisation of primary care trusts would bring benefit to patients. It would lead to a distraction from the real tasks at hand such as developing clinical governance and new forms of management for chronic disease; implementing new incentive structures, such as practice based commissioning, to improve coordination of services and deal with poor morale; and using new policies such as payment by results and choice for patients as a lever for developing services that are more responsive to local people.⁵ Primary care trusts have so far made some progress, but they have important problems to tackle.^{6,7} The growing and somewhat self fulfilling beliefs that they are not fit for their purpose in the longer term and that structural reorganisation would bring improvement deserve to be challenged.