

# Assessing blood pressure control in patients treated for hypertension: comparing different measurements and targets

Gillian Manning, Andrew Brooks, Barbara Slinn, Michael W Millar-Craig and Richard Donnelly

## ABSTRACT

We examined how different methods and definitions of blood pressure affect the achievement of targets in general practice. There was a wide range in the proportion of treated patients achieving the different target levels recommended by the National Institute for Health and Clinical Excellence, British Hypertension Society and the general medical services contract. Among non-diabetic patients this ranged from; 10–37% (average office), 15–39% (standardised nurse measurement), 11–49% (last recorded) and 31–56% (ambulatory blood pressure). Defining targets without a clear definition of how blood pressure should be measured is largely meaningless and ignoring ambulatory blood pressure results in many patients being classified incorrectly as failing to achieve targets.

### Keywords

blood pressure control; guidelines; hypertension.

## INTRODUCTION

In the light of major clinical trials showing that small differences in blood pressure account for large differences in cardiovascular outcome, recent guidelines from the British Hypertension Society (BHS)<sup>1</sup> and the National Institute for Health and Clinical Excellence (NICE)<sup>2</sup> have defined challenging levels of target blood pressure for treated hypertensive patients. The importance of tight blood pressure control is also reflected in the general medical services (GMS) contract, but these documents differ in terms of the target level and which measure of blood pressure should be used for quality assurance purposes. It is known that the 'white coat' effect is important in assessing blood pressure control and that repeated measurements by a nurse in primary care provides a better assessment than readings by a doctor.<sup>3</sup> For example, should practices use the last recorded office blood pressure, average office blood pressure over several attendances, or perform ambulatory blood pressure monitoring on an annual basis to derive average daytime and 24-hour ambulatory blood pressure? The purpose of this study was to compare how different blood pressure measurements affect the proportion of patients in a single GP practice who meet the various targets.

## METHOD

Between 1997 and 2001 all treated hypertensive patients aged 50–75 years ( $n = 601$ ) attending routine follow-up in a single general practice were identified. An audit of GP notes was undertaken by one investigator. Patients were subsequently invited to the newly established nurse-led hypertension clinic for standardised office blood pressure measurement and 24-hour ambulatory blood pressure monitoring. Data was collected on a standardised form and entered into a computer database. Three measures of office blood pressure were identified for each patient:

**G Manning**, PhD, lecturer, School of Medical & Surgical Sciences, The University of Nottingham, Nottingham.

**A Brooks**, MRCP, GP; **B Slinn**, SRN, practice nurse, Lister House Surgery and Oakwood Medical Centre, Derby.

**MW Millar-Craig**, MD, FRCP, consultant cardiologist, Derby Hospitals NHS Foundation Trust, Derby. **R Donnelly**, PhD, MD, FRCP, FRACP, professor of vascular medicine, School of Medical & Surgical Sciences, The University of Nottingham, Nottingham; Derby Hospitals NHS Foundation Trust, Derby.

### Address for correspondence

Dr Gillian Manning, The University of Nottingham Medical School, Derby City General Hospital, Derby, DE22 3DT.  
E-mail: Gillian.manning@nottingham.ac.uk

**Submitted:** 19 May 2005; **Editor's response:** 26 August 2005; **final acceptance:** 9 November 2005.

©British Journal of General Practice 2006; 56: 375–377.

## How this fits in

Blood pressure control of treated hypertensive patients is often poor and new targets for primary care have been proposed and included in the general medical services contract. This paper highlights differences in the proportion of treated hypertensive patients achieving target blood pressure control dependant upon how blood pressure is measured and suggests that specific guidance should be provided given that the measurement is used as a quality indicator of clinical practice.

- average office blood pressure (the average of all documented blood pressure measurements in the previous year);
- last recorded blood pressure (most recent blood pressure measurement); and
- standardised nurse measurement of blood pressure on the study visit (average of three measurements).

Ambulatory blood pressure profiles were analysed to derive the average awake ambulatory blood pressure for individual patients.

The proportion of patients meeting the blood

pressure targets defined by BHS, NICE and the GMS contract were determined for each of the three office measures of blood pressure. Average awake ambulatory blood pressure measurements were compared against the specific ambulatory blood pressure targets defined by the BHS.<sup>4</sup>

## RESULTS

A total of 514 patients agreed to participate in the study (86% of the practice population of patients treated for hypertension aged 50–75 years; 13.5% diabetic). Thirty patients had transferred out of the practice or died between the audit date and clinic appointment and the remaining 57 declined to attend the nurse-led clinic. Average office blood pressure was available in 432/514 (84%) of recruited patients, 16% had no recorded blood pressure measurement in previous year). There were significant differences between the three measures of office blood pressure in terms of the proportion of patients meeting each target. For example, using average, last and nurse blood pressure resulted in 37%, 49% and 39% of the population, respectively, achieving the GMS target of <150/90 mmHg (Table 1). Ambulatory blood pressure results were available in 445 (87%) of recruited patients. The commonest reasons for ambulatory blood pressure data being unavailable were the presence of cardiac arrhythmias or the

**Table 1. Proportion of patients achieving target blood pressure based on four different methods and target levels of blood pressure defined by three different guideline groups.**

	BHS audit standard (95% CI)		BHS optimum control (95% CI)		GMS (95% CI)		NICE (95% CI)	
	Yes	No	Yes	No	Yes	No	Yes	No
Diabetes								
Office blood pressure targets (mmHg)	<140/80	<150/90	<130/80	<140/85	<145/85	<150/90	<140/80	<140/90
Average blood pressure over 1 year (n = 432)	0/68 0%	105/364 29% (23 to 35)	0/68 0%	37/364 10% (6 to 14)	5/68 7% (1 to 13)	135/364 37% (31 to 43)	0/68 0%	64/364 18% (14 to 22)
Last recorded blood pressure (n = 601)	3/81 4% (0 to 8)	167/520 32% (28 to 36)	1/81 1% (0 to 3)	58/520 11% (9 to 13)	20/81 25% (15 to 35)	253/520 49% (45 to 53)	3/81 4% (0 to 8)	167/520 32% (28 to 36)
Nurse blood pressure (n = 514)	8/71 11% (3 to 19)	152/443 34% (30 to 34)	3/71 4% (0 to 8)	68/443 15% (11 to 19)	23/71 32% (20 to 44)	174/443 39% (35 to 43)	8/71 11% (3 to 19)	117/443 26% (22 to 30)
Ambulatory blood pressure targets (BHS) (mmHg)	<140/80	<140/85	<130/75	<130/80				
Average daytime ambulatory blood pressure targets (n = 445)	23/62 37% (23 to 51)	215/383 56% (50 to 62)	12/62 19% (9 to 29)	120/383 31% (21 to 41)				

BHS = British Hypertension Society. GMS = general medical services. NICE = National Institute for Health and Clinical Excellence.

patient deciding not to undergo monitoring. Use of ambulatory blood pressure monitoring resulted in a significant increase in the proportion of patients achieving the BHS audit standard (56 versus 32%) and optimal standard (31 versus 11%) for ambulatory blood pressure ( $P<0.001$ ). This highlighted an extra 24% of patients who in fact had adequate blood pressure control.

## DISCUSSION

This study has shown that, when a single practice assesses the proportion of treated hypertensive patients achieving the recommended blood pressure targets, office and ambulatory measurements of blood pressure give markedly different results. Assessing blood pressure control based on a single measurement and/or a single visit is unlikely to be reliable, but calculating the average office blood pressure over the previous year results in significantly fewer patients achieving the GMS target.

The study sample represented 86% of the eligible patients. Office blood pressure measurements were made using calibrated mercury sphygmomanometers and ambulatory blood pressure measurements using validated, calibrated devices. Data on the pre-treatment blood pressure was not collected which may have added to the study.

Providing a high quality service for patients with hypertension is dependent on being able to correctly identify those patients with suboptimal blood pressure control in whom additional treatment is necessary, and similarly identifying patients who have adequate blood pressure control (up to 30% will show a white-coat effect) in whom the risks and costs of additional treatment can be avoided. There is recent evidence that suboptimal ambulatory blood pressure is a more powerful prognostic indicator in treated hypertensives,<sup>5</sup> and we have previously shown that annual ambulatory blood pressure monitoring is cost effective in this population of patients.<sup>6</sup>

There needs to be more specific guidance and standardisation in the methodology used for assessing blood pressure control, particularly if these measurements are being used as quality indicators of clinical practice.

## Funding body

Ambulatory blood pressure measurement devices were purchased with an unrestricted donation from Pfizer UK Ltd

## Ethics committee

Ethical approval was given by the Southern Derbyshire Local Research Ethics Committee (SDEC 98/12/139/NC)

## Competing interests

The authors have stated that there are none

## Acknowledgements

We are grateful to Carole Plant who provided administrative support for the study and Joan Waldron and her team of reception staff for obtaining patient notes.

## REFERENCES

1. Williams B, Poulter NR, Brown MJ, *et al*. Guidelines for management of hypertension: report of the fourth working party of the British Hypertension Society, 2004-BHS IV. *J Hum Hypertens* 2004; **18**: 139–185.
2. North of England Hypertension Guideline Development Group. *Essential hypertension: managing adult patients in primary care*. Centre for Health Services Research. Report 111. Newcastle: University of Newcastle, 2004.
3. Little P, Barnett J, Barnsley L, *et al*. Comparison of agreement between different measures of blood pressure in primary care and daytime ambulatory blood pressure. *BMJ* 2002; **325**: 254.
4. Ramsay LE, Williams B, Johnston D, *et al*. Guidelines for management of hypertension: report of the Third Working Party of the British Hypertension Society. *J Hum Hypertens* 1999; **13**: 569–592.
5. Clement DL, De Buyzere M, De Bacquer DA, *et al*. Prognostic value of ambulatory blood-pressure recordings in patients with treated hypertension. *N Engl J Med* 2003; **348**: 2407–2415.
6. Lorgelly P, Siatis I, Brooks A, *et al*. Is ambulatory blood pressure monitoring cost-effective in the routine surveillance of treated hypertensive patients in primary care? *Br J Gen Pract* 2003; **53**: 794–796.