

Use of evidence in hypertension guidelines: should we measure in both arms?

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ABSTRACT

For at least 25 years, hypertension guidelines have suggested measuring blood pressure in both arms, but GPs' acceptance of this is low. Current and past versions of major guidelines were identified to review and assess the degree to which they provided justification, evidence, and a description of dual-arm measurement techniques. It is suggested that if guidelines better justified recommendations and cited primary literature to support claims, a greater percentage of practitioners might accept and adhere to such guidance.

Keywords

blood pressure; guidelines; hypertension.

INTRODUCTION

Hypertension affects approximately 20% of adults worldwide and is a major, but modifiable, contributory factor in cardiovascular disease such as coronary heart disease and stroke.¹ Part of the assessment of raised blood pressure should include measurement in both arms, as around 6% of the adult population has at least a 10 mmHg difference between arms.² This proportion increases with cardiovascular risk factors such as age and diabetes.³

An anatomical explanation for this variability has been proposed but there is now evidence to suggest that inter-arm differences are caused by peripheral vascular disease suggesting a pathological, as opposed to physiological, cause. Peripheral vascular disease is a strong predictor of cardiovascular disease, which suggests that inter-arm differences may also have a prognostic value in predicting cardiovascular events.³ As such, it is very important to measure blood pressure in both arms; failure to do so may lead to:

- a delay in the diagnosis of hypertension;
- inadequate treatment of patients with hypertension; and
- physician confusion by spurious, apparent wide fluctuations during monitoring.

For many years, guidelines have suggested measuring blood pressure in both arms but have rarely given justification for doing so or described the methods of how to do this. Using a model developed by Pathman *et al*⁴ — the awareness-to-adherence model — in order for clinicians to change their practice they must first become aware of a guideline, agree with it in principle, decide it is appropriate and feasible, and then adhere to it. Most GPs are aware of the recommendation to initially measure blood pressure in both arms, but only 30% agree with it and few actually adhere to it.⁵ It is probable that if guidelines cited evidence as to why measuring blood pressure in both arms is important and how to go about it, adherence to them would be greater.

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Therefore, it was, decided to identify current and historical versions of major hypertension guidelines in the UK, Europe, Canada, US, Australia, New Zealand, Japan, and South Africa to review their inclusion of the issue of measuring in both arms. The researchers also wished to assess the degree to which the guidelines provided a justification, evidence, and a description of measurement techniques.

METHOD

To identify guidelines, MEDLINE was searched using the terms hypertension and guideline* in the title; the researchers then tracked back for earlier versions of each guideline. The section on blood-pressure measurement from each of these guidelines was then identified, and it was assessed whether the guideline suggested measurement of blood pressure in both arms and, if so, provided a justification, referred to evidence to support this, and described a method to measure blood pressure in both arms and whether the method is appropriate.

RESULTS

In total, 15 guidelines were identified, with several versions for most of these. The oldest found were the 1977 Joint National Committee (JNC) guidelines from the US, which is now in its seventh version. Guidelines were noted for other countries such as Spain and Demark, but were not available in English and so were considered beyond the scope of the present analysis.

Example text on dual-arm measurement extracted from some guidelines are shown in Box 1 (for all quotes see Appendix 1). In total, 13 out of 15 guidelines mentioned the need to measure in both arms; however, one South African guideline surprisingly stated ‘all measurements should preferably be taken using the same arm’.⁶ Further, only seven guidelines gave some justification, with only one quantifying the prevalence of substantial arm differences and only one providing a reference to the evidence. No guideline provided a description of appropriate techniques for reliably measuring blood pressure in both arms. Full results are presented in Appendix 1. Table 1 lists the guidelines included with full details in Appendix 2.

DISCUSSION

Most current guidelines advise that blood pressure should be measured in both arms, at least on the initial visit but, for the most part, do not justify why or provide information on the criteria or methods for deciding there is an important difference. Of those that did justify dual-arm measurement, only one

How this fits in

Most guidelines on hypertension state that blood pressure should initially be measured in both arms, but few practitioners actually do this. This study found that published guidelines rarely provided either a justification for dual arm measurement or a description of the appropriate technique. Guideline writers should recognise that the information needs of their target users may include the ‘why’ and ‘how’ as well as the ‘what’.

referenced primary literature to support the claim, and none of the guidelines described a method of taking blood pressure in both arms.

There are some limitations of this review. All the

Box 1. Example statements from selected guidelines.

- ▶ American Heart Association 1980: ‘On the initial examination, one should record the pressure in both arms.’⁷
- ▶ Joint National Committee-3-7: ‘The physical examination should include: an appropriate measurement of BP, with verification in the contralateral arm.’⁸
- ▶ British Hypertension Society-4 (2004): ‘BP should initially be measured in both arms as patients may have large differences between arms.’⁹
- ▶ European Society of Hypertension and European Society of Cardiology practice guidelines 2007: ‘Measure BP in both arms at first visit to detect possible differences due to peripheral vascular disease.’¹⁰
- ▶ Medicines and Healthcare Products Regulatory Agency (2006): ‘BP should initially be measured in both arms ... A difference in BP between the arms can be expected in 20% of patients.’¹¹

BP = blood pressure.

Table 1. Hypertension guidelines’ reference to measuring initial blood pressure in both arms.^a

	1980-1989	1990-1999	2000-2008
Statement made about measuring blood pressure in both arms	JNC-3, JNC-4, AHA, WHO/ISH	BHS-2, BHS-3, JNC-5, JNC-6, WHO/ISH	BHS-4, NICE, MHRA, CKS library, JNC-7, Canadian Hypertension Education programme, JSH, EJCP, ESH, ESH/ESC practice guideline, Heart Foundation of Australia
Justified reason	Nil	Nil	MHRA, ESH, ESH-ESC guideline, BHS-4, ^b CKS guidelines, ^b Heart Foundation of Australia ^b
Reference(s) given	Nil	Nil	ESH
Technique stated	Nil	Nil	Nil

^aSee Appendices for detailed table and references. ^bPartial justification. AHA = American Heart Association; BHS = British Hypertension Society; CKS = Clinical Knowledge Summaries; EJCP = European Journal of Cardiovascular Prevention and Rehabilitation; ESC = European Society of Cardiology; ESH = European Society of Hypertension; JNC = Joint National Committee; MHRA = Medicines and Healthcare Products Regulatory Agency; JSH = Japanese Society of Hypertension; NICE = National Institute for Health and Clinical Excellence; WHO/ISH = World Health Organization/International Society of Hypertension.

Working Party of the British Hypertension Society (BHS) guidelines were found, as were all the guidelines from the Joint National Committee; however, other guidelines may have been missed. In addition, while references cited in each guideline were studied, it is possible that references discussing blood pressure in both arms, justification, and methods could have been missed. Further the BHS referred to extra material (on CD), which may have contained this information.

A recent UK survey showed that most (77%) GPs were aware of the guideline statement to measure blood pressure in both arms, but that only 30% accepted this was worthwhile and less than 13% adhered to it.⁵ Without provision of justification or methods, it would appear current guidelines are likely to be ignored by the majority of GPs. If guidelines justified why they recommended blood pressure measurement in both arms and cited primary literature to support the claim, it is probable that a greater percentage of practitioners would agree with those guidelines. Further, if a practical and simple way of accurately measuring blood pressure in both arms was suggested, more practitioners might adopt the practice and adhere to the guidelines.

Many of the guidelines state how blood pressure should be taken and emphasise the importance of positioning of the arm, for example, the Medicines and Healthcare Products Regulatory Agency (2006) states:

*'Muscle contraction in an unsupported arm can raise diastolic BP [blood pressure] by as much as 10%, while raising the arm above heart level leads to an underestimation by as much as 10 mmHg. The arm should be supported in a horizontal position with the cuff at the level of the heart as denoted by the midsternal level.'*¹¹

With this in mind, taking blood pressure in both arms becomes problematic as, in most consultation rooms, the furniture does not allow both arms to be supported easily. None of the guidelines provide advice on the practicality of measuring blood pressure accurately in both arms in a 10-minute consultation.

GPs appear to be appropriately wary of recommendations unless a justification, together with evidence, is provided. Guideline developers should consider whether users might require additional information to accept and carry out recommendations, and what information this should be.

Competing interests

The authors have stated that there are none

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6. Southern African Hypertension Society Executive Committee 2000. Hypertension clinical guideline 2000. *S Afr Med J* 2001; **91**(2 Pt 2): 163–172.
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8. Chobanian AV, Bakris GL, Black HR, *et al*. The seventh report of the Joint National Committee on prevention, detection, evaluation, and treatment of high blood pressure. *Hypertension* 2003; **42**(6): 1206–1252.
9. 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**(3): 139–185.
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11. Medicines and Healthcare Products Regulatory. *Measuring blood pressure – top 10 tips*. MHRA, 2008. <http://www.mhra.gov.uk/Publications/Postersandleaflets/CON2024207> (accessed 24 Oct 2008).

Appendix 1. Text on dual-arm blood-pressure measurement from major hypertension guidelines.

	Quote	Justified reasons	Referenced	Method stated
UK guidelines				
BHS recommendations on BP measurement 1986	BP should be measured in both arms in all patients with high BP at the initial assessment, <i>and if a reproducible difference of 20 mmHg for systolic pressure and 10mmHg for diastolic pressure simultaneous measurements should be performed</i>	Partial	No	No
BHS-1 1989	–	–	–	–
BHS-2 1993, BHS-3 1999	Not mentioned in text directly but refers to BHS recommendations on BP measurement 1986	–	–	–
BHS-4 2004	BP should initially be measured in both arms as <i>patients may have large differences between arms</i>	Partial	No	No
NICE 2006	Measure blood pressure on both of the patient's arms	No	No	No
MHRA 2006	BP should initially be measured in both arms ... <i>A difference in BP between the arms can be expected in about 20% of patients</i>	Yes	No	No
CKS library, 2007	Initially, measure the BP in both arms, as <i>there can be large differences between arms (greater than 10 mmHg)</i>	Partial	No	No
US and Canadian guidelines				
JNC-1 1977, JNC-2 1980	–	–	–	–
JNC-3 1984, JNC-4 1988, JNC-5 1993, JNC-6 1997, JNC-7 2003	The physical examination should include: an appropriate measurement of BP, with verification in the contralateral arm	No	No	No
AHA 1980	On the initial examination, one should record the pressure in both arms	No	No	No
Canadian hypertension education program 2007 and 2008	BP should be taken in both arms on at least one visit.	No	No	No
New Zealand, Australian and Japanese guidelines				
Heart Foundation of Australia 2008	At the patient's first BP assessment, measure the BP on both arms, thereafter, use the arm with the higher reading	No	No	No
Heart Foundation of Australia 2004	Measure BP on both arms at the first visit, particularly if there is evidence of peripheral vascular disease. A variation of up to 5 mmHg in BP between arms can be acceptable	No	No	No
New Zealand Cardiovascular Guidelines 2005	Not mentioned	–	–	–
JSH 2003	The BP difference between the arms must be evaluated. If a difference of BP between the arms is apparent, the BP should usually be measured with the arm that shows the higher BP	No	No	No
South African Guidelines				
Hypertension Guideline 2003, 2000	All measurements should preferably be taken using the same arm	No	No	No
Hypertension guideline 1995	Not mentioned	–	–	–
International guidelines				
WHO/ISH 1989 WHO/ISH 1999	Measure the blood pressure in both arms on the first visit if there is evidence of peripheral vascular disease	No	No	No
ESH-ESC practice guidelines 2007, ESH-ESC 2003	Measure BP in both arms at first visit to <i>detect possible differences due to peripheral vascular disease</i>	Yes	No	No
ESH 2003	<i>... a recent study has shown significant differences in inter-arm differences for systolic and diastolic blood pressure, leading to the recommendation that bilateral measurement should be made on first consultation ...</i>	Yes	Yes	No
EJCPR 2003	At the initial visit, BP values from both arms should be obtained to <i>detect patients in whom atherosclerotic plaques in subclavian or more central arteries may be responsible for substantial between-arm discrepancies</i>	Yes	No	No

Note: Justification has been italicised. AHA = American Heart Association; BHS = British Hypertension Society; BP = blood pressure; CKS = Clinical Knowledge Summaries; EJCPR = European Journal of Cardiovascular Prevention and Rehabilitation; ESC = European Society of Cardiology; ESH = European Society of Hypertension; JNC = Joint National Committee; MHRA = Medicines and Healthcare Products Regulatory Agency; JSH = Japanese Society of Hypertension; NICE = National Institute for Health and Clinical Excellence; WHO/ISH = World Health Organisation/International Society of Hypertension.

Appendix 2. List of guidelines.

British guidelines

- ▶ BHS-4. 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(3)**: 139–185.
- ▶ BHS-3. Ramsay L, Williams B, Johnston G, *et al.* Guidelines for management of hypertension: report of the third working party of the British Hypertension Society. *J Hum Hypertens* 1999; **13(9)**: 569–592.
- ▶ BHS-2. Sever P, Beevers G, Bulpitt C, *et al.* Management guidelines in essential hypertension: report of the second working party of the British Hypertension Society. *BMJ* 1993; **306(6883)**: 983–987.
- ▶ BHS-1. [Anonymous.] Treating mild hypertension. Report of the British Hypertension Society working party. *BMJ* 1989; **298(6675)**: 694–698.
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- ▶ CKS Library. *Hypertension*. 2007. http://www.cks.library.nhs.uk/hypertension/view_whole_guidance (accessed 7 Oct 2008).

US and Canadian guidelines

- ▶ JNC-7. Chobanian AV, Bakris GL, Black HR, *et al.* Seventh report of the Joint National Committee on prevention, detection, evaluation, and treatment of High Blood Pressure. *Hypertension* 2003; **42(6)**: 1206–1252.
- ▶ JNC-6. Anonymous. The sixth report of the Joint National Committee on prevention, detection, evaluation, and treatment of high blood pressure. *Arch Intern Med* 1997; **157(21)**: 2413–2446.
- ▶ JNC-5. Anonymous. The fifth report of the Joint National Committee on detection, evaluation, and treatment of high blood pressure. *Arch Intern Med* 1993; **153(2)**: 154–183.
- ▶ JNC-4. Anonymous. The 1988 report of the Joint National Committee on detection, evaluation, and treatment of high blood pressure. *Arch Intern Med* 1988; **148(5)**: 1023–1038.
- ▶ JNC-3. Anonymous. The 1984 Report of the Joint National Committee on detection, evaluation, and treatment of high blood pressure. *Arch Intern Med* 1984; **144(5)**: 1045–1057.
- ▶ JNC-2. Anonymous. The 1980 report of the Joint National Committee on detection, evaluation, and treatment of high blood pressure. *Arch Intern Med* 1980; **140(10)**: 1280–1285.
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- ▶ Canadian Hypertension Education Programme. *Accurate measurement of blood pressure*. <http://hypertension.ca/chep/recommendations/diagnosis-assessment/accurate-measurement-of-blood-pressure/> (accessed 24 Oct 2008)

Australian, New Zealand and Japanese guidelines

- ▶ The National Heart Foundation of Australia. *New hypertension guidelines*. http://www.heartfoundation.org.au/Professional_Information/Clinical_Practice/Hypertension.htm (accessed 24 Oct 2008).
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... continued

Appendix 2 continued. List of guidelines.

South African guidelines

- ▶ Milne FJ, Pinkney-Atkinson VJ. Hypertension guideline 2003 update. *S Afr Med J* 2004; **94**: 209–226.
- ▶ Southern African Hypertension Society Executive Committee 2000. Hypertension clinical guideline 2000. *S Afr Med J* 2001; **91(2 Pt 2)**: 163–172.
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International guidelines

- ▶ Mancia G, de Backer G, Dominiczak A, *et al.* 2007 Guidelines for the management of arterial hypertension: The task force for the management of arterial hypertension of the European Society of Hypertension (ESH) and of the European Society of Cardiology (ESC). *Eur Heart J* 2007; **28(12)**: 1462–1536.
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