Aetiology

Review: ambulatory blood pressure monitoring predicts clinical outcomes

Appel LJ, Robinson KA, Guallar E, et al. *Utility of blood pressure monitoring outside of the clinic setting. Evidence Report/Technology Assessment no 63. AHRQ publication no 03-E004* Rockville, MD: Agency for Healthcare Research and Quality, Nov 2002. <http://www.ahrq.gov/clinic/bpmonitw.htm>

QUESTION: Does blood pressure (BP), either self measured (SMBP) or measured by ambulatory monitoring (AMBP) outside a clinical setting, predict clinical outcomes?*

Data sources

Studies were identified by searching 3 electronic databases and hand searching journals, reference lists, and conference proceedings.

Study selection

Longitudinal studies fully published in English were selected if they reported on AMBP or SMBP in ≥ 50 patients.

Data extraction

Data were extracted on study design and setting, method of BP measurement, time and place of BP measurement, and outcomes

Main results

1 prospective cohort study tested the association between SMBP and total and cardiovascular disease (CVD) deaths at 6.6 years (n=1728) and between SMBP and fatal and non-fatal stroke at 4.4 years (n=1256) (table).

10 prospective cohort studies assessed the relation between AMBP and clinical outcomes (table). Follow up ranged from 1–6.4 years.

Conclusions

In 10 prospective studies, ≥ 1 dimension of blood pressure measured by ambulatory monitoring predicts clinical outcomes. Only 1 study has tested the association between self measured blood pressure and clinical outcomes.

* The report addressed other questions not reported in this abstract.

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Associations between blood pressure measurements and clinical outcomes*

Type of blood pressure measurement	Clinical outcome	Number of studies†	Relative risk range
Systolic SMBP	CVD death	1 of 1	1.02
	All deaths	1 of 1	1.01
	Stroke	1 of 1	3.12‡
Daytime systolic AMBP	CVD death	1 of 3	1.3
	CVD death/morbidity	3 of 4	1.19–6.42
	Stroke	2 of 2	1.41–1.51
	All deaths	0 of 2	Not significant
Night-time systolic AMBP	CVD death	2 of 3	1.41–1.42
	CVD death/morbidity	2 of 2	1.31–1.34
	Stroke	2 of 2	1.30–1.34
	All deaths	1 of 2	1.24
24 hour systolic AMBP	CVD death	1 of 3	1.34
	CVD death/morbidity	4 of 4	1.03–1.28
	Stroke	2 of 2	1.47 and 1.47
	All deaths	1 of 2	1.23
Daytime diastolic AMBP	CVD death	0 of 1	Not significant
	CVD death/morbidity	1 of 3	2.46
	Stroke	1 of 1	1.31
	All deaths	0 of 1	Not significant
Night-time diastolic AMBP	CVD death	0 of 1	Not significant
	CVD death/morbidity	1 of 2	1.67
	Stroke	1 of 1	1.24
	All deaths	0 of 1	Not significant
24 hour diastolic AMBP	CVD death	0 of 1	Not significant
	CVD death/morbidity	1 of 2	1.71
24 hour diastolic AMBP	All deaths	0 of 1	Not significant

*AMBP = ambulatory monitoring blood pressure; CVD = cardiovascular; SMBP = self measured blood pressure.

†Number of studies showing a significant association (p<0.05).

‡Association between highest quintile of SMBP and increased risk of stroke.

COMMENTARY

Until this review by Appel *et al*, clinicians did not know what to make of ABP because evidence on prognosis had not been consolidated. ABP is a non-invasive automated technique measuring BP at intervals usually over a 24 hour period. ABP can identify absolute BP, white coat hypertension (WCH), non-dipping (night-time BP <10% lower than daytime BP), and reverse dipping (night-time BP higher than daytime BP). Most people are nocturnal dippers. Their systolic BP (SBP) and diastolic BP (DBP) drop about 10–20% compared with average daytime levels.

Appel *et al* have structured this 235 page evidence-based report to answer key questions on the management of this epidemic of hypertension affecting 25% of the US population. Higher ABP levels and patterns in cross-sectional studies were confirmed to be positively associated with BP related target organ damage. In prospective ABP studies, higher sustained BP and non-dipping or reverse dipping patterns were positively associated with increased risk of CVD events, highly so for secondary hypertension as in end stage renal disease and type 2 diabetes.

ABP is useful for diagnosing WCH, comprising approximately 20% of hypertensive patients. WCH predicts a reduced CVD risk compared with sustained hypertension.¹ The question of whether risk in WCH is equivalent to risk in normotension, or whether to withhold drug therapy, cannot be answered by Appel *et al* because of insufficient reported data. For SMBP, although half of reviewed studies confirmed an association of its use with reduced BP, no conclusion could be made between its use and reduced CVD outcome, again because of insufficient published data.

Health funders in the US are now incorporating these data in decision making by using ABP to directly estimate a patient's cardiovascular risk when WCH or various types of dipping are suspected.² Clinical management of hypertension as routinely practised may be changing.

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1 Pickering TG, Coats A, Mallion JM, et al. *Blood Press Monit* 1999;4:333–41.

2 Verdecchia P, O'Brien E, Pickering T, et al. *Am J Hypertens* 2003;16:87–91.