




Available online at
 ScienceDirect
www.sciencedirect.com

Elsevier Masson France
 EM|consulte
www.em-consulte.com



CLINICAL RESEARCH

Poor blood pressure control in general practice: In search of explanations

Mauvais contrôle de la pression artérielle chez les patients hypertendus traités et suivis en médecine générale

Robert Nicodème^{a,*}, Artus Albessard^b,
Jacques Amar^{b,c}, Bernard Chamontin^{b,c},
Thierry Lang^b

^a *Département universitaire de médecine générale, faculté de médecine, CHU de Rangueil, 133, route de Narbonne, 31062 Toulouse cedex, France*

^b *Inserm U558, 31000 Toulouse, France*

^c *Service de médecine interne et hypertension artérielle, CHU de Rangueil, Toulouse, France*

Received 17 April 2008; received in revised form 21 February 2009; accepted 24 February 2009
Available online 28 April 2009

KEYWORDS

Arterial hypertension;
General practice;
Blood pressure
measurement;
Guidelines;
Blood pressure
control

Summary

Background. – Arterial hypertension is managed mainly by general practitioners. The blood pressure level of most patients treated in a general practice setting is greater than or equal to 140/90 mmHg.

Aims. – To understand why a blood pressure level greater than or equal to 140/90 mmHg does not lead to a change of treatment.

Methods. – Over a 2-week period, 479 hypertensive patients were included in a cross-sectional study by 27 general practitioners. Consultation data were collected, as were reasons why patients with a blood pressure level greater than or equal to 140/90 mmHg did not have their treatment changed.

Results. – Blood pressure level was greater than or equal to 140/90 mmHg in 58% of patients; treatment was changed in 15% of these individuals. The lack of change in treatment was justified by the physicians as follows: the blood pressure measurements were not considered to be representative (about 30% of cases); the therapeutic result was considered to be satisfactory in the circumstances (about 30% of cases); change was not appropriate given the patient's specific context (the remaining third of cases). The proportion of uncontrolled hypertensive patients whose treatment remained the same was significantly higher among patients with a disease that affected their lifestyle or threatened their life expectancy.

* Corresponding author. Fax: +33 5 62 88 90 84.

E-mail addresses: albessard@ch-montauban.fr, dr.r.nicodeme@wanadoo.fr (R. Nicodème).

MOTS CLÉS

Hypertension artérielle ;
Médecine générale ;
Mesure de la pression artérielle ;
Guides de bonne pratiques ;
Control de la pression artérielle

Conclusion. – The disappointing therapeutic results observed in the management of arterial hypertension do not arise only from poor application of guidelines by general practitioners. Reluctance to rely on blood pressure measurements, a perception that guidelines are revised frequently and are not always clear, and consideration of the general practitioner's activity in the patient's specific context are the main factors involved.

© 2009 Elsevier Masson SAS. All rights reserved.

Résumé

Contexte. – La majorité des hypertendus sont suivis par leurs médecins généralistes et la pression artérielle (PA) de ces patients est souvent supérieure aux recommandations.

Objectifs. – L'objectif de cette étude est de comprendre pourquoi des PA supérieures à 90/140 mmHg ne conduisent pas les praticiens à modifier leurs traitements.

Méthodes. – Pendant deux semaines, 479 patients hypertendus traités ont été inclus par 27 omnipraticiens dans une étude transversale. Les données de consultation ont été collectées ainsi que les raisons de non-modification thérapeutique lorsque les PA des patients dépassaient 90/140 mmHg.

Résultats. – Les PA étaient supérieures aux recommandations pour 58 % des patients et la thérapeutique n'a été changée que pour 15 % d'entre eux. Le statu quo thérapeutique était justifié par les médecins généralistes par une non-représentativité des mesures dans 30 % des cas, par des mesures satisfaisantes compte tenu des circonstances dans 30 % des cas et pour le dernier tiers par le contexte clinique spécifique de leurs patients. Parmi les patients dont le traitement est resté inchangé, ceux qui étaient affectés par une pathologie altérant leur mode de vie ou leur pronostic vital étaient significativement plus nombreux que les autres.

Conclusion. – Les mauvais résultats tensionnels des hypertendus traités et suivis en médecine générale ne sont pas le seul fait d'une mauvaise application des référentiels. La difficulté d'interprétation des chiffres de PA, des recommandations changeantes et souvent peu claires ainsi que la prise en considération du contexte clinique spécifique de leurs patients sont les trois facteurs majoritairement invoqués par les praticiens.

© 2009 Elsevier Masson SAS. Tous droits réservés.

Abbreviations

AHT	arterial hypertension
BP	blood pressure
CI	confidence interval
GP	general practitioner
RIAT	reasons for not intensifying antihypertensive treatment

Background

AHT is a major public health problem and an important risk factor for cerebrovascular accident, coronary disease and heart and kidney failure. Effective treatments exist and management guidelines are disseminated regularly by scientific societies [1]. Nevertheless, various epidemiological studies have shown that BP control is inadequate [2–5]. It is important to understand why the BP level of 70% of hypertensive patients treated in a general practice setting is greater than or equal to 140/90 mmHg—that is, “uncontrolled” by treatment. This observation is not specific to AHT. In the field of lipid-lowering therapies, 74% of patients treated in France did not attain the therapeutic objective [6]. AHT is managed mainly by GPs, who are responsible for 94% of the consultations with diagnosed and treated patients. A 1994 survey on AHT in general practice

showed that 24% of treated hypertensive patients had not attained the 140/90 mmHg cut-off point [3]. In 1999, with the same methodology, this proportion did not exceed 32% of treated hypertensive patients. It would therefore be valuable to seek to understand the disparity that exists between the guidelines of scientific societies, agencies and expert consensus on the one hand, and the practices of GPs on the other [7,8]. Lack of familiarity and scepticism regarding reviews of this decision threshold over time and with regard to the various scientific societies have been stressed, and also the disparity between practices and guidelines. In addition, it is important to take the specific context of general practice into account. For the GP, it is a matter of obtaining a long-term result, of maintaining compliance with the antihypertensive treatment, while dealing or even competing with other health goals, concomitant diseases and, more generally, with specific events in a patient's life.

A change of treatment, in order to lower BP by a few mmHg, means exposure to the risk of new adverse effects, which are likely to alter and disturb treatment compliance. Similarly, BP control is not necessarily the top priority for a patient with another disease, or one who is going through a difficult period in their personal life. The aim of this study was to understand why, despite recognition of the problem, a BP level of at least 140/90 mmHg does not lead to a change of treatment in general medical consultations. In

other words, we wished to find out what lies behind this so-called "clinical inertia" [9].

Methods

Population

In this cross-sectional study, all 52 physicians in the Midi-Pyrénées region of southwestern France who had a resident in training in 2003 were invited to participate. Physicians who declined to participate or who did not have a resident in training were excluded. Each volunteer physician included consecutively, without selection, all hypertensive patients seen in consultation at the surgery, aged 18 years and over and currently receiving pharmacological treatment. Patients with AHT not treated pharmacologically, with AHT diagnosed during the week of the study, who declined to participate or who were not fluent in French were excluded.

Sample size

A reason for noninitiation of treatment change with a 20% frequency should be evaluated with a 95% CI. In a previous survey carried out by the same investigators, 16 physicians recruited 260 hypertensive patients in 1 week, including 240 treated hypertensive patients, of whom 160 had a BP level greater than or equal to 140/90 mmHg, which represented about 15 treated hypertensive patients (10 of whom had high BP levels) per physician per week. On this basis, the 52 supervising GPs in our survey were estimated to be able to include 500 treated hypertensive patients with high BP levels over a period of 2 weeks.

Data collection

The resident gave each patient who met the inclusion criteria an information sheet and explained the purpose of the study. Patients who agreed to participate then gave oral informed consent. Patient history and details concerning the consultation, BP level and treatment were collected by the resident. At the end of the consultation with the GP, they were asked for the reasons why they had not changed the treatment of a patient whose BP level was greater than or equal to 140/90 mmHg (defined as hypertension not controlled by treatment). The BP level used was the mean of the two measurements taken by the GP. Before the start of the survey, the physicians who volunteered to take part in the study and their residents received training in completion of the questionnaires. A self-administered questionnaire on declared compliance and dietary habits was distributed in the waiting room to patients who had given their consent. All records in which BP measurements were missing were excluded (43 of 522 records, or 8.2%).

Statistical analysis

All data were analysed using STATA 9® software. Qualitative data were compared with the Chi-square test and quantitative variables with Student's test.

Results

Population description

Physicians

Fifty-two physicians were invited to take part in the study and 27 agreed (age range: 38–65 years; mean age: 52; 89% men). The mean number of patients included per physician was 19 (range: 12–30).

Patients

A total of 479 completed questionnaires were available for analysis. The proportion of men was 47% and the mean age \pm 95% CI was 68.4 ± 2.6 years. Our sample was not entirely representative of the population of the region, as the population of the Haute-Garonne administrative area was overrepresented. In 70% of cases, the consultation related to BP control; the remaining 30% of cases were related equally to acute diseases and chronic diseases. The measured and calculated arterial BP level was greater than or equal to 140/90 mmHg in 57.4% of cases. This same proportion of patients was estimated by the physicians as being about 40%. Among the patients included, 22% had a disease that affected their lifestyle and 10% had a disease that threatened their life expectancy. The principal diseases that affected lifestyle were rheumatological (35%), neuropsychiatric (35%) and cancerous (11%). The diseases threatening life expectancy were cancerous in 38% of cases.

Comparison of controlled and uncontrolled hypertensive patients

Systolic and diastolic BP levels were 128.4 ± 1.1 and 75.8 ± 1.0 mmHg, respectively, in controlled hypertensive patients and 150.9 ± 1.7 and 84.8 ± 1.3 mmHg in uncontrolled hypertensive patients (both $p < 0.001$). Time since diagnosis of AHT did not differ between groups. For uncontrolled hypertensive patients, systolic pressure levels were above 140 mmHg in 75% of cases, above 150 mmHg in 50% of cases and 155 mmHg in 25% of cases. Diastolic BP levels were above 90 mmHg in only 25% of cases. Age and sex did not differ between the two groups. Farmers, artisans and workers were more likely to have uncontrolled BP than executive staff, intermediate professions or employees (Table 1). Patients with a disease affecting their lifestyle or threatening their life expectancy were more likely to have poorly controlled BP than those without such diseases ($p = 0.04$).

The prevalence of risk factors (smoking, dyslipidaemia, diabetes, family history of cardiovascular disease) did not differ between the controlled and uncontrolled groups. No differences were observed in the involvement of target organs: left ventricular hypertrophy, proteinuria, serum creatinine, heart failure, coronary disease or peripheral vascular disease.

Treatment change in uncontrolled hypertensive patients

In the group of 275 patients with poorly controlled BP, only 38 (15%) had their treatment changed (out of a total of 261, as data were incomplete for 14 patients). Among uncontrolled patients, the types of treatments, both antihypertensive and non-antihypertensive, as well as the number of treatments

Table 1 Population and AHT control.

	Number of patients (%)		p
	Controlled hypertensive patients (N = 204)	Uncontrolled hypertensive patients (N = 275)	
Profession (Insee ^a classification)			
Farmers	2 (1)	11 (4.3)	< 0.05
Artisans, shopkeepers, business owners	7 (3.6)	17 (6.7)	
Executives, higher intellectual professions	10 (5.2)	7 (2.8)	
Intermediate professions	3 (1.6)	2 (0.8)	
Employees	16 (8.3)	11 (4.3)	
Workers	3 (1.6)	15 (5.9)	
Retired	140 (72.2)	175 (68.9)	
No professional activity	13 (6.7)	16 (6.3)	
Missing values	10	21	
Sex			
Men	97 (47.8)	127 (46.7)	ns
Women	106 (52.2)	145 (53.3)	
Missing values	1	3	
Disease affecting lifestyle or life expectancy			
Yes	42 (20.8)	80 (29.2)	< 0.05
Missing values	2	1	

^a Institut national de la statistique et des études économiques.

by prescription were not different whether the treatment was changed or not. The antihypertensive treatment modifications were addition of a drug (37% of cases), change of one of the antihypertensive drugs (18% of cases), increase of posology (26% of cases), suppression of an antihypertensive drug without substitution of the drug to reassess BP level and cardiovascular risk (10% of cases) and addition of non-antihypertensive drugs (9% of cases).

Reasons given by the physicians

Noninitiation of treatment change was justified by the physicians as follows: they did not consider the BP measurements to be representative (about 30% of cases); they

considered the therapeutic result to be satisfactory in the circumstances or the diastolic BP to be adequate without considering systolic BP (about 30% of cases); they gave other reasons in the remaining third of cases (Table 2).

Circumstances of treatment change

Treatment change did not differ by sex or age, nor by history of cardiovascular disorders such as coronary artery disease, congestive heart failure or arteritis of the lower limbs. Treatment was more often changed when the consultation was related to hypertension (16.7%) than when the patient consulted for another reason (6.4%; $p < 0.05$). The proportion of treatment change in uncontrolled hypertensive patients

Table 2 Reasons given by physicians for not changing treatment in uncontrolled hypertensive patients ($\geq 140/90$ mmHg).

Interpretation	Reason given by physician for not changing treatment	No. of patients (%)
BP reading	Today's BP reading does not represent the usual BP level	50 (30.1)
Nonadherence to guidelines	BP level is satisfactory in the circumstances	45 (27.1)
	Diastolic BP level is satisfactory	4 (2.4)
	BP is not the reason for consultation	19 (11.5)
Other reasons related specifically to context of consultation	BP level will improve with present treatment	10 (6)
	BP level will improve with compliance	10 (6)
	Patient reluctant to change treatment	8 (4.8)
	BP level is borderline	7 (4.2)
	BP is not the main problem of this consultation	4 (2.4)
	Treatment change unlikely to improve BP level	3 (1.8)
	Fear of adverse effects if treatment intensified or changed	2 (1.2)
	Earlier attempts at treatment change unsuccessful	2 (1.2)
	Awaiting laboratory result or cardiologist's opinion	2 (1.2)
	Omission (difficult consultation)	0 (0)

increased with the increasing grade of AHT: 10.5%, 24.5% and 29.5%, respectively, for grades I, II and III ($p < 0.05$).

The proportion of uncontrolled hypertensive patients whose treatment remained the same was significantly higher among patients who had a disease that affected their lifestyle or one that threatened their life expectancy.

Patient-declared compliance

Inadequate compliance declared by the patient in the self-reported questionnaire was more frequent in uncontrolled (26.5%) than in controlled hypertensive patients (17.1%) ($p < 0.05$). However, the proportion of treatments changed by the GP in uncontrolled hypertensive patients did not differ according to patient-declared compliance.

Discussion

Three types of factor came to light in this study of why GPs did not change the antihypertensive treatment of their patients who had high BP levels according to accepted guidelines. The first concerned consideration by the GP of the patient's overall health status. We observed in this survey that the physician was less likely to change the treatment of those patients who had a disease that affected their lifestyle or threatened their life expectancy. Similarly, the physicians stated that considerations of long-term compliance, fear of adverse effects, the expectation of achieving results in the long term or consultation for a problem other than AHT were major reasons for not initiating treatment change.

The second reason was related to BP measurement difficulties and physicians' reluctance to change treatments on the basis of a variable in which they did not have confidence. Indeed, in a third of cases in which they did not change treatment, the physicians declared that the BP measured at the time of consultation was not representative of the usual BP level. If 30% of the patients stated that they owned a BP self-measurement device, no information was recorded in our study to detail whether it was used in the framework of a follow-up by the GP or even if it was used at all.

Thirdly, and lastly, our survey showed a partial lack of adherence to official guidelines. This related essentially to the level of systolic pressure that is considered to be normal or that should be attained with treatment. In about one third of cases, physicians considered that BP was satisfactory in the context of their patients' lives, based on diastolic pressure alone.

Certain limitations of our study should be underlined. The participation rate of the GPs was only 52%, which is hardly surprising in a population for whom research is not a major concern. This was reflected in the 8% of patient records that were excluded because they did not contain the BP readings. This selected physician population is probably not very representative of French GPs. Nevertheless, the results observed among their practice differ little from those observed in previous works. As in earlier studies, BP control was a problem affecting fewer than half of the patients, and control was less satisfactory in certain social categories such as workers, whereas it was maximum in higher socio-economic categories [10].

The range of reasons why the GP did not change treatment despite the readings justifying such a change may be discussed under three headings:

- the need for long-term negotiation with a patient whose overall status is taken into account;
- the lack of confidence in BP measurements;
- a somewhat distant attitude to accepted guidelines.

The same observations were made in the RIAT study of 2621 hypertensive patients, in which several reasons were identified for not intensifying antihypertensive treatment at the end of the consultation despite unsatisfactory measurements. Of the two principal reasons, one concerned the time since the initiation of the current treatment being too short to be able to assess treatment efficacy. The other related to BP measurement, with adequate improvement after the start of treatment or satisfactory self-recordings. But this study provided no information on the attitude of the physicians toward guidelines [11].

In the group of patients with poorly controlled BP (57% of patients), only 15% were prescribed a different treatment. Neither age nor sex was related to treatment change. But the GPs appeared to be attentive to their patients' histories and lifestyles when they changed or intensified hypertensive treatment. During consultations for reasons other than BP monitoring (an acute or other disease), treatment changes were fewer than during consultations motivated by hypertension. The study reflects increased tolerance of high BP measurements in patients with a disease that affects their lifestyle or their life expectancy.

The notion of context encompasses the whole nature of the consultation, whether it is for acute disease or monitoring of chronic diseases, or is related to events in the patient's life. Context is an element likely to modulate the rigour with which the short-term or long-term treatment of hypertension is addressed. The GP must respond to the patient's needs and manage the various problems in order of importance. During consultations for an acute problem, poorly-controlled BP may be considered to be a secondary concern, as in patients who have a disease that affects their lifestyle or their life expectancy. Furthermore, a long-term relationship is a characteristic of general practice. So for nearly 40% of cases in which "BP level will improve with present treatment", the high BP was recorded but was not acted on while "awaiting laboratory result or cardiologist's opinion".

Lastly, BP was not necessarily the main priority of the present consultation, but could be dealt with at a later date. The RIAT study [11] had already emphasized that one of the reasons for nonmodification of treatment was that the current treatment had been initiated too recently for its efficacy to be assessed. This attitude is similar to another reason mentioned—the assumption that BP would improve with compliance.

More surprising was the finding that the proportion of patients with a history of risk factors for cardiovascular diseases, coronary insufficiency or congestive heart failure was not higher among patients with well-controlled BP than among those with poorly-controlled BP, as physicians might be expected to follow these at-risk patients more attentively.

Over the years, successive definitions of AHT and treatment guidelines have been published. Faced with these changes, physicians are aware of official guidelines [5] but appear to follow their own. They consider, for example, that

the “BP level is satisfactory in the circumstances”, or they neglect systolic BP in order to concentrate on diastolic BP.

Guidelines succeed guidelines and cut-off points follow cut-off points, whereas the link between AHT and risk remains constant. Guidelines are complex to read and do not take account of the balance to be sought between desirable clinical aims and the patient’s wishes. Lastly, to succeed in lowering the last few mmHg and attaining the target means adding a new treatment with risks that are not less than those of the first treatment [12]. In another chronic disease, diabetes, GPs are also involved closely with guidelines.

Physicians know the guidelines, but stress that they have to be adjusted to the individual nature of each patient. This necessity does not account entirely for the departure from the guidelines, however. Lack of adherence to recommendations was underlined with regard to bovine spongiform encephalopathy, by the fact that only 44% of GPs who advised their patients to change their dietary habits did so themselves in their own homes [13]. In our present study, treated, uncontrolled, hypertensive patients had mainly pure grade 1 systolic hypertension, as was observed in other studies of practices relating to hypertensive patients in primary prevention [14].

This finding is not confined to the general practice setting; a survey in secondary prevention in coronary patients with hypertension showed that 32.5–38.8% achieved BP goals and that 50% of uncontrolled hypertensive patients had mild hypertension [2]. Given the age range of patients recruited in this study, the difficulty of controlling systolic BP is not surprising. But the predictive value of systolic BP over the age of 55 years should be stressed. The conciliatory attitude of GPs to systolic BP has already been underlined [15]. In the general practice setting, increased awareness of the importance of systolic BP management should be one of the aims of continuing medical education. A prerequisite is to restore the confidence of practitioners in BP measurement, as lack of confidence accounted for 30% of the explanations for maintenance of a treatment which was a priori ineffective.

These findings are in line with the fact that the “white coat effect” accounts for a nonnegligible proportion of resistance to treatment: 20% of uncontrolled AHT may be related to this effect [16], particularly in elderly patients [17]. This reluctance was confirmed by the study of Godwin et al. [18], which showed that only 69% of patients found to have uncontrolled hypertension in the family physician’s office did in fact have uncontrolled hypertension on 24-hour ambulatory monitoring. On the other hand, GPs do have confidence in BP self-measurement. Moreover, self-measurement has been found to have better prognostic accuracy than office-measurement of treated AHT [19]. The 2005 guidelines issued by the French Haute Autorité de santé have extended the indications for self-measurement. A priority for improving AHT management could be to clarify the interpretation of office BP measurements.

Whether these results can be valid in other health contexts needs to be confirmed. However, poor BP control, so-called “clinical inertia” and lack of confidence in BP measurement have been reported in various countries [5,11].

Our findings suggest that the disappointing therapeutic results observed in AHT management in the general popula-

tion and in general practice, and clinical inertia, do not arise only from poor application of guidelines by GPs. Three principal factors help us to understand this situation: reluctance to rely on BP measurements which show marked variability; a perception of guidelines being revised frequently, liable to change and not always clear; and consideration of the GP’s activity in the patient’s specific context. Evaluation of various interventions to improve AHT control in primary care have shown that there are no obvious solutions [20], although ambulatory measurement, use of feedback to inform the physician of the true state of control in his or her population of treated patients, or of reminder systems as suggested by Pickering [5], open interesting perspectives for the future.

Funding

This study was supported by the “Haute Autorité de santé”, the French Health Authority.

Acknowledgments

The authors wish to thank Drs Y. Abiteboul, S. Ané, M. Bismuth, S. Bismuth, P. Boyer, T. Brillac, B. Bros, C. Chevalier Duflo, J.-P. Denayrolles, T. Elbaz, B. Escourrou, J.-F. Fajolles, M. Harroch, E. Haudry, P. Jourdan, M. Lorrain, J.-J. Mestas, P. Mesthe, P. Mignot, C. Nicolas, D. Pernin, J.-C. Poutrain, B. Rico, C. Sournac, A. Stillmunkes, M. Vidal, and A. Villeneuve, without whom this study would not have been possible. This study was supported through contract no. 0419048 with the Agence nationale d’accréditation et d’évaluation en santé (now the Haute Autorité de santé).

References

- [1] 2003 European Society of Hypertension–European Society of Cardiology guidelines for the management of arterial hypertension. *J Hypertens* 2003;21:1011–53.
- [2] Amar J, Chamontin B, Genes N, et al. Why is hypertension so frequently uncontrolled in secondary prevention? *J Hypertens* 2003;21:1199–205.
- [3] Chamontin B, Poggi L, Lang T, et al. Prevalence, treatment, and control of hypertension in the French population: data from a survey on high blood pressure in general practice, 1994. *Am J Hypertens* 1998;11:759–62.
- [4] Lang T, de Gaudemaris R, Chatellier G, et al. Prevalence and therapeutic control of hypertension in 30,000 subjects in the workplace. *Hypertension* 2001;38:449–54.
- [5] Pickering TG. Therapeutic inertia and the Medicare crisis. *J Clin Hypertens (Greenwich)* 2006;8:667–70.
- [6] Van Ganse E, Souchet T, Laforest L, et al. Ineffectiveness of lipid-lowering therapy in primary care. *Br J Clin Pharmacol* 2005;59:456–63.
- [7] Clinical reality of coronary prevention guidelines: a comparison of EUROASPIRE I and II in nine countries. EUROASPIRE I and II Group. *European Action on Secondary Prevention by Intervention to Reduce Events. Lancet* 2001;357:995–1001.
- [8] Hagemester J, Schneider CA, Barabas S, et al. Hypertension guidelines and their limitations: the impact of physicians’ compliance as evaluated by guideline awareness. *J Hypertens* 2001;19:2079–86.

- [9] Phillips LS, Branch WT, Cook CB, et al. Clinical inertia. *Ann Intern Med* 2001;135:825–34.
- [10] de Gaudemaris R, Lang T, Chatellier G, et al. Socioeconomic inequalities in hypertension prevalence and care: the IHPAF study. *Hypertension* 2002;39:1119–25.
- [11] Ferrari P, Hess L, Pechere-Bertschi A, et al. Reasons for not intensifying antihypertensive treatment (RIAT): a primary care antihypertensive intervention study. *J Hypertens* 2004;22:1221–9.
- [12] Campbell NC, Murchie P. Treating hypertension with guidelines in general practice. *BMJ* 2004;329:523–4.
- [13] Raude J, Fischler C, Lukasiewicz E, et al. GPs and the social amplification of BSE-related risk: an empirical study. *Health Risk Soc* 2004;6:173–85.
- [14] Amar J, Vaur L, Perret M, et al. Hypertension in high-risk patients: beware of the underuse of effective combination therapy (results of the PRATIK study). *J Hypertens* 2002;20:779–84.
- [15] Oliveria SA, Lapuerta P, McCarthy BD, et al. Physician-related barriers to the effective management of uncontrolled hypertension. *Arch Intern Med* 2002;162:413–20.
- [16] Oikawa T, Obara T, Ohkubo T, et al. Characteristics of resistant hypertension determined by self-measured blood pressure at home and office blood pressure measurements: the J-HOME study. *J Hypertens* 2006;24:1737–43.
- [17] Mancia G, Facchetti R, Bombelli M, et al. Long-term risk of mortality associated with selective and combined elevation in office, home, and ambulatory blood pressure. *Hypertension* 2006;47:846–53.
- [18] Godwin M, Delva D, Seguin R, et al. Relationship between blood pressure measurements recorded on patients' charts in family physicians' offices and subsequent 24 hour ambulatory blood pressure monitoring. *BMC Cardiovasc Disord* 2004;4:2.
- [19] Bobrie G, Chatellier G, Genes N, et al. Cardiovascular prognosis of "masked hypertension" detected by blood pressure self-measurement in elderly treated hypertensive patients. *JAMA* 2004;291:1342–9.
- [20] Fahey T, Schroeder K, Ebrahim S. Educational and organizational interventions used to improve the management of hypertension in primary care: a systematic review. *Br J Gen Pract* 2005;55:875–82.