

## Cardiovascular Topics

# Blood pressure control at a hospital day clinic — a medical audit

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### Summary

**Aims.** To examine prescribing habits and blood pressure control in a hospital day clinic population receiving calcium channel blockers.

**Setting.** King Edward VIII Hospital day clinic, Durban, KwaZulu-Natal.

**Patients.** 200 consecutive patients receiving a regimen containing calcium channel blockers. 190 patients with evaluable data.

**Method.** Automated non-invasive Dinamap recording) of blood pressure.

**Results.** Only 27% of patients had a blood pressure under 140/90 mm/Hg. Control was unsatisfactory in 53% of patients (blood pressure > 160/95 mmHg), despite the fact that they were attending a hospital-based day clinic. At least 2 agents were used in 93% of patients. Diuretics (62%) and angiotensin-converting enzyme inhibitors (59%) were the most frequently prescribed agents in addition to calcium channel blockers. Subjective side-effects were few and related to vasodilator therapy.

**Conclusion.** The study supports findings worldwide that blood pressure control tends to be poor. Several reasons for poor control were noted. The results raise many important questions regarding management of hypertension.

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With the intention of determining clinicians' prescribing habits in hypertension, we carried out a survey of hypertensive patients attending our hospital outpatient day clinic during October 1993. In a previous survey we had showed poor control of blood pressure in this hospital-based population receiving regimens containing angiotensin-converting enzyme inhibitors.<sup>1</sup> Since angiotensin-converting enzyme inhibitors are known to be less effective in low-renin states, this survey was repeated in a group of patients receiving regimens containing calcium channel blockers, a class of drugs shown to be effective in black patients. Our premise was that control of blood pressure would be better than had been the case in our previous survey. This is a short report on blood pressure control in an outpatient clinic setting using regimens containing calcium channel blockers.

### Material and methods

The survey was conducted in October 1993 over a period of 3 weeks. Two hundred consecutive prescriptions for calcium channel blockers were screened. Demographic data, drug history, indications for use of the agent, and data on side-effects and monitoring habits were obtained from analysis of the outpatient records. The blood pressure recorded

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was that taken by the clinic nurse using a Dinamap recorder; in each case the patient had rested for at least 10 minutes before the recording. This measurement was usually repeated by the attending physician, using a standard mercury sphygmomanometer. For the purposes of this survey the Dinamap reading by the nurse was taken in order to eliminate the effect of white-coat hypertension. Where the readings were grossly disparate, the case data were excluded from analysis.

In each instance the patient had to have received the same medication for at least 2 months before the visit analysed. Outcome was determined as the blood pressure recorded on the day and characterised as: (i) 'effective' (< 140/90 mmHg); (ii) 'borderline' (140/90 - 159/94 mmHg); or (iii) 'ineffective' ( $\geq$  160/95 mmHg).

Ten charts were excluded from the study because of inadequate data collection. The remaining 190 charts analysed form the basis of this report.

## Results

### Demographic data

The 190 patients were aged between 20 and 80 years (median 50 - 59 years) with a male/female ratio of 2:3 and a predominance of blacks (89%). Renal failure was present in 12% of patients, and 25% were diabetic (Table I).

**TABLE I. CLINICAL CHARACTERISTICS (%)**

Age	
Males	40.5
Females	59.5
Race	
Blacks	89
Other	11
Concomitant disease	
Diabetes	25.2
Renal failure	12.0
Heart failure	6.3
Asthma	5.3

### Prescribing habits

The dihydropyridine group was prescribed most frequently, with nifedipine being employed in 73% of patients, followed by isradipine in 21.1% and amlodipine in 3.7%. This study was conducted 2 years ago and does not reflect current prescribing habits at our hospital, where at least another two long-acting agents have since become available for use.

The majority of patients (93%) were receiving additional antihypertensive agents; 49% required two other agents. Of these diuretics were the most frequently prescribed (61.8%), followed by angiotensin-converting enzyme inhibitors (58.8%) and vasodilators (42.3%). Calcium channel blockers were not used as first-line agents but were added to a regimen of diuretics and/or angiotensin-converting enzyme inhibitors when treatment failed to control blood pressure adequately (Table II).

**TABLE II. ANTIHYPERTENSIVE THERAPY (%)**

Monotherapy	7
Multiple drugs	93
1 agent	18.8
> 2 agents	74.2
Classes	
Diuretics	61.6
Angiotensin-converting enzyme inhibitor	58.8
Vasodilator	42.3
Centrally acting agent	20.6
Beta-blocker	15.3
Other	5.3

### Side-effects

Dosages of calcium antagonists were all in the recommended range. Peripheral oedema was the most frequently reported side-effect (7.9%) followed by headache (5.3%). Since most patients (93%) were on other antihypertensive therapy, side-effects could not be attributed directly to calcium antagonists (Table III).

**TABLE III. BLOOD PRESSURE CONTROL AND SIDE-EFFECT PROFILE (%)**

BP control	
Effective	27.2
Borderline	18.0
Not effective (>160/95)	53.3
Not recorded	1.0
Defaulted	0.5
Side-effects	
Peripheral oedema	7.9
Headache	5.3
Palpitations	0.5
Diarrhoea	0.5
Constipation	0.0

### Control of blood pressure

Hypertension was the most common indication for calcium channel blockers in this survey; 87.4% of the scripts were for hypertension alone and 8.4% for hypertension with asso-

**TABLE IV. PERCEIVED CAUSES OF TREATMENT FAILURE (%)**

Concomitant disease	44
NSAID usage	21
Too many tablets	14
Not enough tablets	10
Side-effects	8
Misconception (omitted morning dose)	8
Side-effects	8
Unknown	21
Total	114*

\*There was more than one cause in some patients.  
NSAID = non-steroidal anti-inflammatory drug.

ciated diseases. Blood pressure control was effective in 27% of patients and poor in 53% (Table III). Assessment of compliance could not be measured reliably in our patients because simple misconceptions were among the reasons for non-adherence to therapy (Table IV).

### Monitoring habits

Serum electrolyte levels had been measured during the previous 3 months in 47% of patients. In 49% of these the results had been abnormal.

Angiotensin-converting enzyme inhibitors were the most frequently prescribed agents in diabetics and these drugs were used in 17.4% of patients with renal disease.

### Concomitant therapy

Non-steroidal anti-inflammatory agents were prescribed in 21% of patients. Concomitant disease requiring other medication was present in 64%.

### Discussion

This survey revealed poor control of blood pressure in a group of predominantly black, middle-aged hypertensives attending a hospital-based outpatient clinic. Only a quarter of the patients had adequately controlled blood pressure, despite the use of, on average, two additional hypertensive agents.

Research has consistently shown that only 20 - 30% of known hypertensives achieve good control of blood pressure.<sup>2</sup> It appears that poor control is a major problem facing clinicians worldwide,<sup>3,4</sup> and not only in our own environment.<sup>5,6</sup> After 10 years of follow-up more than a third of patients in the Gothenburg trial<sup>7</sup> failed to achieve goal blood pressure (< 160/95 mmHg), and almost a third suffered cardiovascular complications. More recently, in an extensive international survey involving five European countries and 11 613 treated hypertensives, fewer than 40% had attained the target blood pressure (< 140/90 mmHg) set by the treating physician.<sup>8</sup> In the USA only 21% of patients reach target blood pressure.<sup>9</sup> While drug-related factors and secondary hypertension may be responsible in a small percentage of cases, non-adherence to therapy due to simple misconceptions could often lead to treatment failure. This was indeed the case in several of our patients, making assessment of compliance difficult. Often more than one reason could be found for poor control of blood pressure.

The lower socio-economic class of our patients was responsible for the fact that many were ignorant of the fact that treatment of hypertension has to be lifelong and not just for the duration of any intercurrent illness or period of hospitalisation. Patients often did not understand the information they were given: those coming to the clinic from far away often omitted the early morning dose either because they did not have their morning meal or because they felt they should not take treatment when coming to hospital. Not uncommonly medication for a month was extended to 2

months because of inability to afford the cost of medication. What percentage of patients smoked is not clear, but smoking was common among men.

The practice of dispensing exactly 30 days' treatment may leave a patient without medication in the last day or two before the next clinic visit. Side-effects, documented in 7.9% of our patients, did not lead to total discontinuance of therapy. Multiple drug regimens, often comprising unnecessary drugs, accounted for partial compliance in a very small percentage. Furthermore, little is known about the efficacy of generic formulations of antihypertensive agents. In Nigeria poor control was ascribed in part to use of a racemic mixture of  $\alpha$ -methyldopa; in that study excessive sodium intake and lack of diuretic use also contributed to treatment failure in an undetermined proportion of subjects.<sup>10</sup>

Although calcium antagonists are now widely used to treat hypertension, it has not been easy to achieve therapeutic goals with the first-generation compounds. Despite good blood pressure lowering efficacy these agents are limited by their pharmacokinetic profile, necessitating multiple daily dosing requirements or once-daily formulations. The immediate consequence of multiple dosing is vasodilator-related side-effects, which may reduce patient compliance and negate 24-hour control of blood pressure. Data suggest that 30 - 40% of hypertensive patients are partially compliant; they accept treatment but derive reduced benefit owing to underdosing.<sup>11,12</sup> In this study the majority of patients had to take drugs at least twice a day, and often three times, which in a largely symptomless condition could clearly affect compliance. There were too few patients receiving once-daily medication to allow statistical comparison of this factor alone. It is generally accepted that patient compliance with a particular treatment regimen improves when fewer doses need to be taken.<sup>13,14</sup> In most studies pill counts indicate that compliance with antihypertensive regimens reaches levels of only 50 - 70%. Sackett<sup>15</sup> found that only 47% of 100 patients at a university clinic took more than 95% of their medications. It is estimated that patients need to take at least 80% of their medication before an adequate blood pressure lowering effect is obtained.<sup>16,17</sup> It is likely that suboptimal taking of medication is highly prevalent. As a result, failure to achieve goal blood pressure may prompt the clinician to prescribe more drugs, or a more potent drug with a greater potential for toxicity or side-effects, leading to a further reduction in compliance.

Clearly there are several limitations to an audit of this kind, one being its' rather simplistic nature in using a single measurement to determine control of blood pressure. Although based on one measurement, however, these results would have formed the basis of prescribing choices by the attending clinician on that day. Consideration also needs to be given to the fact that the time of recording in relation to the dose is an important factor in a group of patients who essentially received medication at least twice daily. It would be interesting to know what the level of control was in the small number who received once-daily medication. Another important factor was that many patients in this audit formed part of a highly select group referred for tertiary care. A significant number had other target organ disease in the form of diabetes and renal disease. To what extent these factors

contributed to difficulty in securing control of blood pressure was not determined.

While this study was prompted by hospital management with the aim of investigating prescribing habits and overall costs of newly prescribed agents, it is not possible to draw inferences about the efficacy (or lack thereof) of calcium channel blockers in managing hypertension, especially without knowledge of patient compliance. In 1992 the Pharmacy Department at King Edward VIII Hospital conducted a similar evaluation involving the use of angiotensin-converting enzyme inhibitors. In that study most patients received a fairly high dose of captopril together with a diuretic and often at least one other antihypertensive agent. The findings were similar in that only 21.6% of patients had effective control of blood pressure, while 15.1% were borderline and 60.8% poorly controlled.<sup>18</sup> We believe that in general the sample we analysed reflects blood pressure control in our hospital population of hypertensive patients, regardless of the agents used.

Not only does a perceived lack of blood pressure control lead to disruption of the treatment regimen, but unnecessary diagnostic and treatment procedures, and patient doubts about the efficacy of the medication, serve to add to the overall cost of treatment and compromise compliance. The results of the Hypertension Detection and Follow-up Program are sobering:<sup>19</sup> almost half of newly treated hypertensives will discontinue treatment in the first year because of adverse effects, and only 50% of those who continue will comply and achieve well-controlled blood pressure. The remainder are exposed to the same level of risk as they were before starting treatment.

The findings of this survey raise important questions regarding hypertension management. The newer, more physiological, longer-acting agents available incur greater costs, although, it is hoped, along with improvement in blood pressure control and quality of life. There is, however, a dire need for well-designed cost-effectiveness analyses in the clinic setting to confirm this, and there is as great a need for intensive patient education and health worker interaction in the management of the hypertensive patient to ensure that therapeutic goals are achieved. Such a need can only be addressed by an effective education programme<sup>20</sup> instituted by a health team. Without this, and even with the most modern and effective treatment, we have little hope of achieving

a significant decline in cardiovascular mortality and renal failure in our population.

## References

1. Naidoo DP, Gray AL, Reddy P, *et al.* A potential role for a quality assurance approach in the management of hypertension. *S Afr Med J* 1996; **86**: Cardiovascular suppl 5, C262-C264.
2. Sackett DL, Haynes B, Taylor DW. The problem of compliance with antihypertensive regimens. *Drugs* 1983; **25**: suppl 2, 12.
3. Dunbar-Jacob, Dwyer K, Dunning EJ. Compliance with antihypertensive regimen: a review of the research in the 1980's. *Ann Behav Med* 1991; **13**: 31-39.
4. Sharkness CM, Snow DA. The patient's view of hypertension and compliance. *Am J Prev Med* 1992; **8**: 141-146.
5. Seedat YK. Race, environment and blood pressure. The South African experience. *J Hypertens* 1983; **1**: 7-12.
6. Saunders LD, Irwig LM, Wilson TD. Hypertension management and patient compliance at a Soweto polyclinic. *S Afr Med J* 1982; **61**: 147-151.
7. Samuelsson O, Wilhelmson L, Andersson OK, Pennert K, Berglund G. Cardiovascular morbidity in relation to a change in blood pressure and serum cholesterol levels in treated hypertension: results from the primary prevention trial in Gothenburg. *JAMA* 1987; **258**: 1768-1776.
8. Taylor Nelson. Healthcare: Copyright Cardiometer 1992.
9. Fifth Report on the Joint National Committee: Detection, evaluation and treatment of high blood pressure (JNCV). *Arch Intern Med* 1993; **153**: 154-183.
10. Ogunyemi O. Reasons for failure of antihypertensive treatment. *BMJ* 1983; **286**: 1956-1957.
11. Rudd P, Ahmed S, Zachary V, Barton C, Bonduelle D. Issues in patient compliance: The search for therapeutic sufficiency. *Cardiology* 1992; **80**: suppl 1, 2-10.
12. Haynes RB. Management of patient compliance in the treatment of hypertension: Report of the NHBLI working group. *Hypertension* 1982; **4**: 415-423.
13. Eisen SA, Miller DK, Woodward RS, Spitznagel E, Przyeck TR. The effect of prescribed daily dose frequency on patient medication compliance. *Arch Intern Med* 1990; **150**: 1881-1884.
14. Deglovet P, Menard J, Vu HA, *et al.* Factors predictive of attendance at clinic and blood pressure control in hypertensive patients. *BMJ* 1983; **287**: 88-93.
15. Sackett DL. The hypertensive patient. Compliance with therapy. *Can Med Assoc J* 1989; **139**: 545-549.
16. Luscher TF, Vetter H, Siegenthaler W, Vetter W. Compliance in hypertension: facts and concepts. *J Hypertens* 1985; 3-9.
17. Haynes RB, Taylor DW, Sackett DL, Gibson ES, Bernholtz CD, Muckerjee J. Can simple measurements detect patient non-compliance? *Hypertension* 1980; **2**: 757-764.
18. Gray A. Drug use evaluation: angiotensin converting enzyme inhibitors. Paper presented at the ICI Research Day, October 1992 (unpublished).
19. Hypertension, Detection and Follow-up Program Co-operative Group. Five-year findings of the hypertension detection and follow up program. *JAMA* 1979; **242**: 2562-2577.
20. Hill MN. Strategies for patient education. *Clin Exp Hypertens [A]* 1989; **11**: 1187-1201.