Drug therapy, lifestyle modification and blood pressure control in a primary care facility, south of Johannesburg, South Africa: an audit of hypertension management

Onwukwe SC, MBBS, DipFamMed, DipHIVMan, Registrar
Omole OB, MBBS, DA, MCFP, MMed(Fam Med), Head of Clinical Unit and Principal Specialist
Department of Family Medicine, University of the Witwatersrand, Johannesburg, South Africa
Correspondence to: Olufemi Omole, e-mail: alagbaomole@gmail.com
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Abstract

Background: Hypertension management is suboptimal in many settings. We assessed blood pressure (BP) control according to target, the appropriateness of antihypertensive therapy and the extent of implementing lifestyle modification among hypertensive patients.

Method: This study was an audit involving a retrospective review of medical records of hypertensive patients who were 18 years of age and older (n = 300), attended to by doctors or primary health care nurses at a large community health centre, south of Johannesburg, South Africa. Demographic, anthropometric, clinical and management data were extracted from the files of hypertensive patients who met the inclusion criteria. Data analysis included the use of descriptive statistics, the chi-square test and Fisher's exact test. The main outcome measures were the proportions of patients with controlled BP, who used appropriate antihypertensive drugs and who had documented lifestyle modifications.

Results: Most patients were black (75.7%) and female (68.3%). The mean age was 60 years. The majority of the patients (55.7%) were either overweight or obese. Fifty-seven per cent of the patients (n = 171) had BP control meeting the target. Appropriate choice of antihypertensive drugs was documented in 81.3% of patients (n = 244), while 56.3% had lifestyle modification documented in their records. Significantly more women had their BP controlled to target compared to men (P = 0.0028). Factors significantly associated with good BP control were white race (P = 0.0001) and documentation of adherence to therapy (P = 0.000).

Conclusion: BP control was achieved in the majority of patients and the vast majority was on appropriate drug therapy. White race, female sex and adherence to treatment documented in the medical record were significantly associated with BP controlled to target.

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Introduction

Hypertension is the most common chronic disease and about one billion people globally had hypertension in 2002.[1] It is the leading cause of death worldwide[2] and the second leading cause of death in South Africa,[3] most of these deaths resulting from complications of suboptimal blood pressure (BP) control. The prevalence of hypertension rises with age, and as many as 25% of South African adults were hypertensive in 2003.[4,5]

The current South African hypertension guideline[6] is closely aligned to international hypertension guidelines and was developed to ensure, among other things, that BP is optimally controlled, appropriate lifestyle changes are reinforced and antihypertensive drugs are appropriately selected for the management of hypertension. Despite the effectiveness of antihypertensive drugs and lifestyle changes[7] (weight loss, salt restriction, increased physical activity, limited alcohol intake and healthy diet) in lowering BP, these objectives are not being achieved,[8,9] as shown by, e.g. a multi-facility survey in Cape Town, according to which BP control was achieved in only 33% of hypertensive patients.[9] Poor adherence to guidelines, inappropriate choice of antihypertensives by clinicians and poor adherence to treatment by patients are partly responsible for this lamentable outcome.[10]

A sustained reduction of 5-6 mmHg in diastolic BP has been shown to reduce the incidence of stroke by nearly 40%, coronary events by 15% and heart failure by 50%.[5] Hypertension management therefore requires effective control of BP to target in order for the burden and costs associated with cardiovascular (CV) diseases to be reduced, since the magnitude of BP reduction is a major determinant of the degree of reduction in CV risk.[11]

The quality of care rendered to hypertensive patients can be assessed by determining, among other things, the extent

to which clinicians comply with clinical guidelines and the proportion of patients with controlled BP.

Given the reported suboptimal management of hypertension in other South African settings and the lack of data in our local context, we conducted an audit to assess the extent to which BP was controlled to target, the appropriateness of antihypertensive therapy and the extent to which lifestyle modification was implemented among hypertensive patients in a large community health centre (CHC) south of Johannesburg. This article reports the audit findings, highlighting the clinical and public health implications for hypertension management and CV risk reduction.

Method

Design and study setting

This audit involved a retrospective review of medical records and was conducted in the outpatient unit of a large CHC that forms part of a training complex for nurses, medical students and registrars in family medicine and primary health care (PHC). In this facility, three doctors and five PHC nurses provide care to a catchment population of 70 000. While PHC nurses attend to less complicated patients, doctors attend to more complex cases, including those with uncontrolled hypertension.

Criteria, standards and indicators

Quality health care is defined as desirable and achievable health care, and the main purpose of medical auditing is to make certain that the full benefits of medical knowledge are applied effectively to the needs of the patients.[12] In order to assess the quality of care rendered, criteria and standards were set against which the performance of the system under scrutiny was compared. Criteria are measurable or definable items of health care that describe the quality of care and that can be used to assess it, while standards are the levels of care to be achieved for any particular criterion.[13] Indicators are measurable variables related to the standard.[14]

The World Health Organization reports that only half (50%) of hypertensive patients on treatment have their BP controlled to target,[15] and the Trialist collaboration found that less than 10% of the global population that could benefit from the lowering of BP are currently treated effectively.[16] The authors of the current study therefore agreed on the criteria, indicators and standards shown in Table I.

Samples and sampling method

An estimated 3 600 hypertensive patients are managed at the CHC targeted for the study. Assuming a margin of sampling error of 5%, a confidence level of 95% and a response distribution of 50%, a sample size of 300 patients was calculated to be adequate for this audit.[17]

In this CHC, hypertensive patients' files are normally marked with a red sticker. After patients have consulted a clinician and collected their medications, all files are returned to the records registry where they are filed at the end of each working day. Consecutive files of hypertensive patients attended during the day were identified by the red sticker and selected for inclusion in the study at the end of every day. The number of files was cross-checked with the attendance register to ensure that all the files of hypertensive patients attended to were considered. Patients 18 years and older were included. After the record review and extraction of information, patients' files were marked to avoid repeated selection and returned to the registry daily. Selection continued until the required sample size was attained.

Data collection and analysis

Information on patients' details and process of care at the last clinic visit was extracted from patients' files every day, onto an electronic data collection sheet. Information extracted included patients' demographics (age, race, sex and level of education), anthropometric data (height, abdominal/waist circumference and weight), clinical data (presence or absence of comorbid illnesses and BP recording during the last visit), data on antihypertensive therapy (types of drugs, dosages, combinations, duration and documentation of adherence to treatment and documentation of side-effects of medications) and clinical management data (follow-up plans and documentation of lifestyle modification, as detailed in Table I).

Table I: Criteria, indicators and standards for the current audit[6,15,16]

Criteria	Indicators	Standards
Control of BP to target range	BP readings: General low-risk population <140/90 mmHg Diabetic /heart failure ≤130/80 mmHg Chronic renal disease ≤130/80 mmHg	At least 50% of hypertensive patients are controlled to the target BP.
Appropriateness of antihypertensive drug	Class of antihypertensive Recognition of compelling indications for the use of class of drugs	At least 80% of hypertensive patients are on appropriate choice of drug therapy.
Implementation of lifestyle modification	Documentation of advice on lifestyle changes (any of weight loss, increased physical activity, restricted salt intake, limited alcohol intake and healthy diet)	At least 80% of hypertensive patients are on lifestyle modification.

Data was analysed using Epi-Info® version 3.5.1 (Centers for Disease Control and Prevention, Atlanta, Georgia, 2008). Descriptive statistics was done with categorical data presented as percentages, proportions and frequencies, while continuous data were presented as means with their standard deviations. Comparisons between groups for categorical data were carried out using the chi-square test or Fisher's exact test (where there were less than five data cells).[18] For continuous data, the t-test was used. Results were considered statistically significant at P values less than 0.05. Outcome measures were the proportion of patients with BP controlled to target, with appropriate choices of antihypertensive drug(s) and with documented lifestyle modifications. Results were compared with set standards derived from national and international hypertension guidelines (Table I) and inferences made from the system performance.

Ethics

Ethics approval was granted by the University of the Witwatersrand (certificate No. M10514) and permission was obtained from the Director of Sedibeng District Health Services. Patients' files were coded and the names were not recorded.

Results

Three hundred files were audited, of which 75.7% (n = 227) belonged to black and 24.3% (n = 73) belonged to white patients. The mean age was 60 years, with only 0.3% (n = 1) less than 30 years and 50% (n = 150) older than 60 years. The mean duration of treatment was 5.6 years. Other patient characteristics are shown in Table II.

The mean systolic and diastolic BPs were 139.8 and 83.2 mmHg respectively. BP control to target was achieved in 57% of patients.

The classes of antihypertensive drugs prescribed for patients are shown in Table II. Angiotensin-converting enzyme (ACE) inhibitors were prescribed for almost equal proportions of black and white patients (72.7% vs. 72.1%). Calcium-channel blockers (CCBs) were prescribed for a greater proportion of black patients compared to white patients (62.6% vs. 31.5%). In contrast, β blockers (BBs) were prescribed for a greater proportion of white patients compared to black patients (8.2% vs. 3.1%).

Clinical comorbidity was documented in 21.3% (n = 64) of patients (Table II). Among patients with diabetes comorbidity, 83.3% (n = 10) had an ACE inhibitor prescribed. While diuretics were used in all patients with heart failure, furosemide was used in 63.9%, spironolactone in 11.1% and hydrochlorothiazide in 25%. Although 99.3% (n = 298) of patients had appropriate dosages of antihypertensive drugs prescribed, appropriate drug combinations was found in 81.3% (n = 244) of patients.

Table II: Patients' demographic and clinical characteristics

Characteristics	% (n)	Mean ± SD
Age (years)		60 +/- 10.7
< 30 years	0.3 (1)	
31-60 years	49.7 (149)	
> 60 years	50.0 (150)	
Sex		
Female	63.8 (205)	
Male	31.7 (95)	
Race		
Black	75.7 (227)	
White	24.3 (73)	
BMI (kg/m²)		
Underweight	3.0 (9)	
Normal weight	41.3 (124)	
Overweight	28.7 (86)	
Obese	27.0 (81)	
Co-morbidity		
Asthma	3.7 (11)	
Cardiac failure	12.0 (36)	
Diabetes mellitus	4.0 (12)	
Ischaemic heart disease	1.7 (5)	
None	78.7 (236)	
BP at last clinic visit		
Systolic		139.8 mmHg ± 18.7
Diastolic		83.2 mmHg ± 12.5
BP control to target		
Controlled	57 (171)	
Uncontrolled	43 (129)	
Use of antihypertensive drugs		
Diuretics	81 (243)	
ACE inhibitors	72.3 (217)	
Calcium-channel blockers	55 (165)	
β blockers	4.3 (13)	

Nearly all patients (99%, n = 297) had regular follow-up reviews, but lifestyle modification was documented in only 56.3% (n = 169) of patients.

Adherence to treatment was documented in 60% (n = 180) of patients. Of these patients, 57.2% (n = 103) were assessed to be adherent. Women were more likely to be adherent to treatment than men (P = 0.0028). Among other factors that influence BP control, white race and documented adherence to treatment were significantly associated with good BP control (P = 0.0001 and P = 0.0000 respectively). Male patients were significantly less likely to have their BP controlled compared to female patients (odds ratio 0.60, 95% confidence interval: 0.37-0.98, P = 0.02; Table III).

Table III: Determinants of BP control

Variable associated with BP control	P value
Drug dosage	0.6759
Sex	0.0028
Race	0.0001
Combination of drugs	0.0668
Documentation of drug adherence	0.0000
Documentation of lifestyle modification	0.3845
BMI	0.3899
Follow-up scheduled	0.6082

System performance for BP control and appropriateness of drug therapy was acceptable (Table IV), but performance for implementation of lifestyle modification was poor and below set standards.

Table IV: Summary of major audit findings compared with set standards

Standards	Major findings
At least 50% of hypertensive patients are controlled to target BP.	57% of hypertensive patients were controlled to target BP.
At least 80% of hypertensive patients are on appropriate choice of drug therapy.	81.3% of hypertensive patients were on appropriate choice of drug therapy.
At least 80% of hypertensive patients are on lifestyle modification.	56.3% of hypertensive patients were on lifestyle modification.

Discussion

This audit found that BP was controlled to target in the majority (57%) of patients, and as far as the authors are aware, most South African studies have reported BP control in between 24.5% and 44% of patients.[8,9,19-21] International reports including the United States National Health and Nutrition Examination Survey (2001–2002)[22,23] reported BP control in 53.1% of hypertensive patients, while an Irish survey[24] found BP control in 48.6% of PHC patients. Achieving BP control in 57% of patients in a less resourced PHC setting suggests that PHC has the potential to play a pivotal role in the control of CV diseases in South Africa, since hypertension is the largest contributor to CV diseases.[5] This achievement has the potential to translate into large-scale benefits at the population level, because a sustained reduction of 5-6 mmHg in diastolic BP reduces stroke by nearly 40%, coronary events by 15% and heart failure by 50%.[5]

In conformity with the literature,[25] women in the current study were significantly more likely to have their BP controlled than men (P = 0.02; Table III). This is most likely explained by women's better treatment adherence compared to men (P = 0.003) and the overall better utilisation of health care services compared to men.[4,26] These behaviour patterns mean that women are more motivated to take responsibility for their health than men in South Africa. Health care providers need to be aware of this fact and invest more effort in motivating male patients to change their behaviour in an effort to improve their BP control. This is crucial in the management of hypertension, where a significant degree of patient involvement and self-motivation are needed for successful outcomes.

Black patients have been reported to have a more severe form of hypertension and are less likely to achieve BP control.[27] Belonging to the white race in this audit was significantly associated with good BP control compared to black patients (P = 0.0001). Poorer adherence to treatment, a general lower level of education and a weaker patient-clinician engagement compared to white patients may account for this observation.[28] These disparities have to be borne in mind during the management of black hypertensive patients, and efforts should be made to ensure that both patient education and BP control are intensified to limit complications.

Weight loss, increased physical activity, salt restriction, limited alcohol intake and healthy diet, which are defined as lifestyle changes, have been shown to decrease BP.[7,10,29] However, only 56.3% of patients had lifestyle modification recorded despite 99% having had follow-up reviews. Opportunities provided by follow-up visits should be used to implement and reinforce lifestyle and behavioural changes, strategies that have been shown to lower BP.[7] In this audit, 55.7% of patients had a BMI greater than 25 kg/m^2, way above the rate of 29.8% reported for being overweight in the 2003 South African Demographic and Health Survey.[4] Abdominal and waist circumferences were not documented, despite lifestyle modification being documented in 56.3% of patients. Obesity and increased abdominal circumference are common in South Africa[30,31] and are strongly associated with hypertension and CV diseases. Since both obesity and increased abdominal circumference are amenable to lifestyle changes,[7,31,32] health care providers should utilise the opportunity offered by follow-up reviews to engage their patients in weight loss and exercise. Where available, other team members such as clinical psychologists and health promoters should be utilised to encourage a healthy lifestyle among patients.

The levels of education and socio-economic status of patients were not documented in this audit, and it was therefore not possible to explore the relationship between BP control and these latter two variables. Nonetheless, studies indicate that higher levels of education and socio-economic status are significant predictors of better health outcomes, including BP control.[25,26,33,34]

Screening for comorbidity was rarely done, as this was documented in only 21.3% of patients. This omission has serious clinical implications since identification of comorbidity is an important task in risk stratification, which in turn is crucial for individualising the management of the

hypertensive patient. Such individualised management includes determining the BP threshold at which treatment is commenced, selecting the appropriate antihypertensive drug(s) for a particular patient and providing adjunct treatments that may be necessary for CV risk reduction in that patient.[6,10] Active screening for complications and comorbidities should be the norm in PHC, as early interventions reverse or slow down the progression of complications.[35] The absence of symptoms should not deter clinicians from screening for comorbidities because comorbidities are usually silent, as shown in a Cape Town study according to which 25% of men and 6% of women had silent renal disease.[19] Setting up prompts may assist in reminding clinicians to screen for comorbidities and complications at intervals stipulated by guidelines.

The choice and combination of antihypertensive drugs were appropriate in 81.3% of patients while drug dosages were correct in 99.3% of patients. These results have important implications for BP control, especially in patients with comorbid illnesses. For example, all the patients with documented evidence of cardiac failure were started on diuretics. However, spironolactone was used less frequently despite evidence that it significantly improves outcomes in cardiac failure.[36] In addition to their use in heart failure, diuretics, either alone or in combination with an ACE inhibitor, have been shown to reduce the incidence of stroke in several trials.[37,38] In the current study, over 80% of all the patients with diabetes were started on an ACE inhibitor. CV risk associated with hypertension is amplified by diabetes,[38] and early initiation of an ACE inhibitor and control of BP to less than 130/80 mmHg slow down the onset and progression of microvascular complications.[39-43]

Thiazide diuretic was the most frequently used antihypertensive in line with recommendations that it be used as first-line drug treatment among black patients[6,10] in whom hypertension has been linked to sodium metabolism abnormalities.[8,32] However, the Baragwanath Hypertension Ambulatory Monitoring Study showed that a CCB in the form of nifedipine was superior to thiazide diuretics as monotherapy among black South Africans.[44] In fact, a second agent was necessary for adequate BP control in most patients initially started on thiazide monotherapy. The clinical implication of this is that though sodium metabolism abnormalities are the overriding aberration among black patients, most will require a second antihypertensive drug in addition to an initial thiazide diuretic.

ACE inhibitors were used more in white patients compared to blacks, rightly so because renin-angiotensin overactivity is the predominant underlying pathology in white hypertensive patients. The high efficacy of ACE inhibitors, especially when combined with diuretics, in preventing major CV events has also been shown by studies such as the HOPE[45] and ASCOT studies.[46]

Since the majority of the patients in this audit were black, it was not surprising that BBs were the least used antihypertensive. BBs are ineffective in the black South African population, and the increased risk of new onset type 2 diabetes, as shown in the ASCOT study,[46] limits their use in this patient group, except where there are compelling indications against these limitations.

Apart from female sex and white race, the documentation of adherence to treatment was the other factor found to be significantly associated with BP control (P = 0.000; Table III). This finding indicates that although the choice of antihypertensive drug is important in ensuring BP control, activities that improve patients' understanding of their conditions and those that increase their participation in their own care are crucial for good outcomes. Patient education and adherence counselling should therefore be provided during clinic visits in PHC. Steps that promote adherence such as using a daily dose regimen, prescribing long-acting agents, using drugs with a low side-effect profile and reducing the number of pills taken per day should be encouraged.[5,25] While it is important to consider differences in class actions, it is detrimental to neglect treatment adherence, as the antihypertensive likely to provide clinical benefit is the one that the patient swallows consistently.

This audit was a review of patients' records and was therefore prone to information bias. Sampling consecutive patient files has the potential for selection bias, which may limit the generalisation of the findings to the entire hypertensive population in the CHC. The use of a single BP reading and not BP readings over time might have increased the risk of misclassifications of BP control. Despite these potential limitations, this audit provides an estimate of the quality of hypertension management at this CHC, and the findings provide bases for quality improvement processes and further studies on hypertension management in PHC.

In conclusion, BP control was achieved in the majority of patients and the choices of antihypertensives were appropriate in a vast majority. Regrettably, follow-up visits were not maximally utilised to promote lifestyle changes, which is clinically effective and doable within the consultation. Recognising the influence of race, sex and treatment adherence on the processes and outcomes of hypertension management is crucial in improving the care of hypertensive patients.

Improving the quality of medical records, conducting CV risk stratification, promoting lifestyle changes and providing adherence counselling during clinical encounters can improve hypertension management. Although drug therapy was appropriate in the majority of patients, ongoing training of PHC clinicians in evidence-based hypertension guidelines can sustain or improve on this high level of performance, ensuring that advancements in hypertension management are translated into clinical benefits for the individual patient.

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Declarations

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