Original Article

# Empowering Hypertensive Patients in South Africa to Improve Their Disease Management: A Pharmacist-Led Intervention

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ABSTRACT

**Objective:** Uncontrolled hypertension negatively impacts on mortality. This study aimed to evaluate the impact of a pharmacist-led patient counseling and education model to empower hypertensive patients on chronic medication. **Methods:** This was an operational research project with a quasi-experimental design including an intervention group (55 patients) and a control group (31 patients) of chronic hypertensive patients. The data were collected with interview-administered questionnaires, and were analyzed using SAS® version 9.4. Pharmacist interventions included an educational diary on hypertension management and patient counseling. **Findings:** A 34.7% improvement was observed in patients' understanding of what normal blood pressure (BP) is in the intervention group compared to the control group ($P < 0.001$), whereas a 9.1% improvement was also observed in the intervention group in their knowledge about the fact that systolic BP and diastolic BP are both important in controlling hypertension, with no change in the control group. After the intervention, 40.0% of patients in the intervention group versus 17.9% in the control group had adequate knowledge (≥75% correct answers) about hypertension and its management. Pharmacist interventions were well received by the majority of patients (>90%). **Conclusion:** A pharmacist-led patient counseling and education model can help improve patients' hypertension knowledge and BP control. These should increasingly become routine, aiming to improve chronic disease management.

**KEYWORDS:** *Chronic hypertension, empowerment, patient knowledge, pharmacist intervention, South Africa*

## INTRODUCTION

Prevalence rates of hypertension are generally high among African countries.[1,2] South Africa has one of the highest prevalence rates of hypertension worldwide reaching 77.9% in people aged above 50 years,[1] with high rates generally common among African countries.[1,2] Hypertension is the fastest growing noncommunicable disease (NCD) in South Africa, with hypertension being the major cause of death among patients with NCDs.[3] Overall, hypertension accounts for most deaths due to stroke and heart attack across Africa.[1,2,4]

Primary health-care (PHC) facilities are the foundation of the South African health-care system and where the majority of hypertensive patients are managed; however, there are concerns with blood pressure (BP) control.[5,6] Hypertensive patients should receive counseling and education when visiting PHC facilities, as well as be

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satisfied with their treatment to reduce future morbidity and mortality.[3,7-9]

Written hypertension information leaflets or booklets are effective with improving knowledge about hypertension and subsequent medicine taking,[10,11] with written information serving as a continuous, reliable source about the disease and its treatment.[8,11] Patients should receive such information during counseling, which currently does not always happen in South Africa.[6] Such booklets provide a platform for both pharmacists and patients to develop hypertension care plans, empowering patients to become more personally involved with their treatment.[10,11] This is important in South Africa in view of concerns with BP control,[6,12] and following the implementation of the Central Chronic Medicines Dispensing and Distribution (CCMDD) program to enhance access to medicines for patients in the public system and to aid adherence.[12] Within the CCMDD program, medicines are packaged and distributed free of charge to patients' nearest pick-up point.[12]

Consequently, the main aim of this study was to evaluate the impact of a pharmacist-driven patient counseling and education model in South Africa in PHC facilities to empower hypertensive patients with knowledge. The specific objectives were to determine hypertensive patients' knowledge of their disease and its management, BP control, and self-reported adherence to treatment before and after the implementation of the pharmacist intervention, and subsequently to determine hypertensive patients' satisfaction with pharmacist interventions to inform future initiatives.

## Methods

Operational research project with a quasi-experimental design among patients with hypertension attending PHC facilities in Vhembe District of Limpopo Province.[13] The original design used stratified random sampling to allocate 60 out of 120 facilities to the intervention and control groups. The intention was to initially approach 600 patients based on an estimated 50% drop-out rate following statistical advice. Stratification was undertaken according to the municipality, type, and size to ensure each group was balanced and comparable. However, challenges such as community strikes and riots meant that only 50 PHC facilities eventually took part, 25 in each group.

The data were collected on the scheduled clinic return-date over 6 months by trained pharmacists, with a 4-month interval for each patient between baseline and post-intervention visits. Randomization was used to select up to 15 hypertensive patients per facility, based on the availability and willingness of patients who met the inclusion criteria on the day of data collection, which was principally adults on chronic antihypertensive treatment for more than 6 months and without organ damage. The first random patient was approached, enrolled if willing, and when completed, the next available patient was approached. This process continued resulting in 253 patients being eventually enrolled in the study: 138 in the intervention group and 115 in the control group.

Patients in both groups received usual care and were requested to collect their medicines monthly. The intervention group was exposed to a pharmacist intervention at enrollment with the control group introduced to the intervention at the end. The pharmacist intervention included a hypertension information diary for daily use, with 15–30 minutes of patient counseling and education about hypertension and its management, and the correct use of the diary. The diary also had space for patients to record their BP, lifestyle changes, and any adverse effects. The counseling was performed on the first visit immediately after the questionnaire was administered.

A structured questionnaire was developed based on previously published studies,[14-16] translated into local languages, and piloted among 22 hypertensive patients from another district in the Province with a similar socioeconomic status as the study facilities. This assisted in simplifying the language used, helping to avoid different interpretations. Training of all data collectors and cross-checking of entered data took place to ensure the validity and reliability of the data.

The validity of the results was supported by the study design in which the control group was exposed to the same conditions as the intervention group, except for the patient counseling and education model (intervention). Demographic data included educational status with patients with formal education (completed at least primary school and up to secondary school and tertiary education) being classified as educated.[17]

Patients' knowledge of hypertension and its management, self-reported adherence, and lifestyle habits were assessed for both groups. Patients' knowledge testing questions were classified into four groups including (1) understanding and knowledge of hypertension, (2) knowledge on BP measurement and readings, (3) knowledge about medication and lifestyle, and (4) knowledge of the dangers of uncontrolled high BP. Adequate knowledge about hypertension was considered as 75% of answers provided correctly.[18] Patients rated their adherence to treatment using six predefined categorized responses, i.e., excellent, very good, good, fair, poor, and very poor, which have been previously used in adherence studies.[9,19] Previous studies had revealed that participants felt more comfortable and confident with words compared to numbers for rating adherence, and a 30-day recall performed better compared to a 3-day or 7-day recall.[19,20]

Patients' BP as taken by the nurse at the facility on the day of data collection was recorded from their clinic record card. BP recordings between enrollment and study end were collected retrospectively. At the study end, patients with uncontrolled BP were counseled on medication adherence and referred to the medical practitioner to assess their treatment regimen and discuss future care.

Data were captured electronically on Microsoft Excel™. Responses to open-ended questions were typed up manually and grouped into categories. Data were analyzed using SAS®2018 (SAS Institute Inc, Carey, North Caroline, USA) version 9.4. Baseline characteristics between the intervention group and the control group were compared using the Fisher's exact test. Positive changes in hypertension management knowledge from baseline to the final post-intervention visit in the intervention and control groups were determined using the same test. A two-sided $P \leq 0.05$ indicated statistical significance.

The primary outcome was the proportion of patients with adequate knowledge of the management of hypertension after the pharmacist intervention. The secondary outcomes included (i) positive changes for individual variables from baseline to post-intervention, (ii) decrease in systolic and diastolic BP, (iii) proportion of patients with controlled BP, and (iv) the proportion of patients being satisfied with the pharmacist intervention. The pharmacist intervention was considered acceptable if there was at least 80% agreement or satisfaction among all respondents.

Ethical clearance for the study was obtained from the Medunsa Research Ethics Committee of the University of Limpopo, currently Sefako Makgatho Health Sciences University (MRECH 27/2014: PG). Permission to conduct the study was obtained from the Limpopo Department of Health and the Vhembe District Executive Manager. All patients provided written informed consent to participate.

## Results

Losses to follow-up resulted in a final sample of 55 patients in the intervention group and 31 in the control group. These differences reflect that only patients with baseline and post-intervention data were included in the analysis.

Table 1 shows that females predominated with no differences in baseline characteristics between the groups. Comorbidities were present in 33.3% of the control group and 49.1% among intervention patients, of which diabetes was most common. Other comorbidities included shortness of breath, ulcers, heart problems, and arthritis.

Before the intervention, approximately 90% of the patients in both groups did not have adequate knowledge about hypertension management. This changed with 40.0% of the patients in the intervention group and 17.9% in the control group having sufficient knowledge, although this was not statistically significant.

Table 2 shows the positive changes for each knowledge question and self-reported adherence from baseline to post-intervention visits for both groups. Although a number of positive changes were observed after the pharmacist intervention, the only statistically significant ($P < 0.001$) improvement in the intervention group was in the understanding of normal BP.

More of the patients in the intervention group (19.5%) than in the control group (10.7%) who had uncontrolled BP at baseline had controlled BP post-intervention. However, this did not reach statistical significance.

**Table 1: Comparison of baseline characteristics between the intervention group and the control group**

| Patient characteristics | Intervention group (*n*=55) | Control group (*n*=31) | *P** |
|---|---|---|---|
| Gender, *n* (%) | | | 0.337 |
| Female | 49 (89.1) | 25 (80.7) | |
| Male | 6 (10.9) | 6 (19.4) | |
| Age (years) | | | |
| Mean±SD | 62.1±11.2 | 65.9±12.0 | 0.145 |
| Median (Q1-Q3) | 63 (53-67) | 65 (59-76) | - |
| Marital status, *n* (%) | | | 0.755 |
| Married | 27 (49.1) | 18 (58.1) | |
| Divorced | 3 (5.5) | 0 | |
| Never married | 9 (16.4) | 4 (12.9) | |
| Separated | 1 (1.8) | 0 | |
| Widowed | 15 (27.2) | 9 (29.0) | |
| Education†, *n* (%) | | | 1.000 |
| Educated | 23 (41.8) | 13 (41.9) | |
| Uneducated | 32 (58.2) | 18 (58.1) | |
| Comorbidities, *n* (%) | | | 0.178 |
| Comorbidity | 27 (49.1) | 10 (33.3) | |
| No comorbidity | 28 (50.9) | 20 (66.7) | |
| Diabetes as comorbidity | 16 (29.6) | 5 (16.7) | 0.292 |
| Duration of treatment (years), *n* (%) | | | 0.801 |
| 1-5 | 14 (25.4) | 9 (29.1) | |
| >5 | 41 (74.6) | 22 (70.9) | |
| BP, mean±SD | | | |
| Systolic BP | 138.6±21.8 | 138.7±21.6 | 0.990 |
| Diastolic BP | 78.9±9.6 | 82.6±11.1 | 0.118 |
| Weight and BMI, mean±SD | | | |
| Weight (kg) | 76.7±14.5 | 76.6±14.2 | 0.962 |
| BMI | 30.9±6.8 (*n*=32) | 30±4.8 (*n*=10) | 0.673 |

*Fisher's exact test; †Completed at least primary education. SD=Standard deviation, Q1=Quartile 1, Q3=Quartile 3, BMI=Body mass index, BP=Blood pressure

The majority (≥89.8%) of the patients in the intervention group expressed their satisfaction with various aspects of the counseling by pharmacists [Figure 1].

Most (97.7%) patients found the dairies easy to use, motivated them to change their lifestyle, and become more health wise. Similarly, 90.9% stated that the study aided them to remember their medicines and clinic appointments. Overall, 90% of the patients who were exposed to the diary expressed their satisfaction with its content and use. Only a minority found them time-consuming (43.2%). Family members also supported patients in helping them to improve their BP control. This included helping those patients who found it difficult to read themselves from the diaries, further assisted by trust in the information provided in the diary, which was typically shared with family members and friends. Some patients however preferred face-to-face counseling sessions with the pharmacist instead of an information booklet, which needs to be factored into any future program.

## Discussion

It was encouraging to see pharmacist-led interventions being well received, similar to Dawes *et al*. in which a patient booklet was well received.[10] Some patients subsequently requested that this pharmacist-led

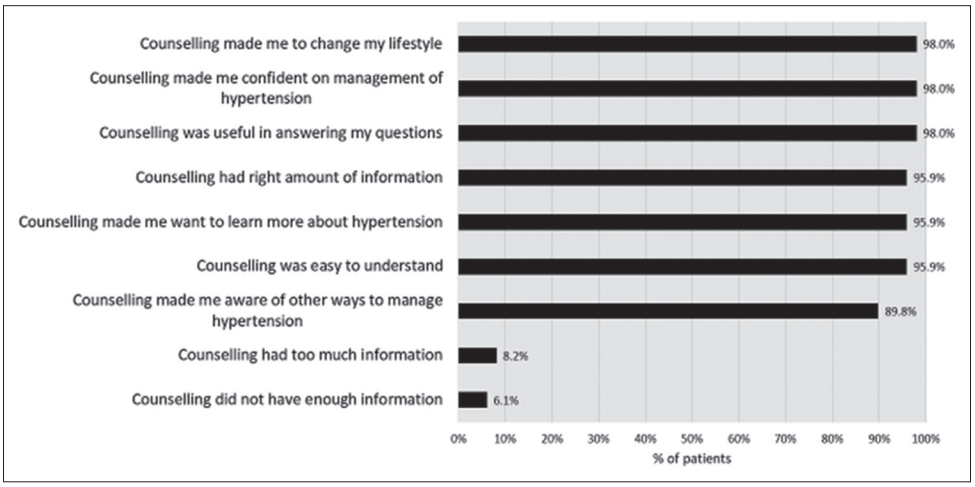


**Figure 1:** Patient satisfaction with pharmacist counseling and education (intervention group)

**Table 2: Positive changes in hypertension management knowledge from baseline to the final post-intervention visit in intervention and control groups**

| Statement | Positive changes from baseline to post-intervention | | | |
|---|---|---|---|---|
| | Intervention group | | Control group | |
| | Number/sample size | Percentage | Number/sample size | Percentage |
| Understanding and knowledge of hypertension | | | | |
| Definition of hypertension | 20/49 | 40.8 | 14/29 | 48.3 |
| Normal BP | 17/49 | 34.7 | 0/25 | 0.0* |
| Causes of high BP | 13/53 | 24.5 | 6/28 | 21.4 |
| Benefits of taking medicines for high BP correctly | 9/45 | 20.0 | 4/27 | 14.8 |
| Knowledge of BP measurement and readings | | | | |
| Importance of BP numbers | 5/55 | 9.1 | 0/29 | 0.0 |
| Meaning of the reported BP numbers | 6/55 | 10.9 | 1/28 | 3.57 |
| BP readings written down on paper | 13/55 | 23.6 | 3/29 | 10.3 |
| Knowledge about medication and lifestyle | | | | |
| Taking hypertension medicines as prescribed is necessary and important | 0/55 | 0.0 | 0/31 | 0.0 |
| Exercise is important to control high BP | 1/49 | 2.0 | 0/27 | 0.0 |
| Smoking is dangerous to hypertensive patients | 2/49 | 4.1 | 1/29 | 3.5 |
| Alcohol is dangerous to hypertensive patients | 2/50 | 4.0 | 2/29 | 6.9 |
| Can do something to lower high BP | 16/53 | 30.2 | 9/30 | 30.0 |
| Knowledge about hypertension complications and its dangers | | | | |
| Dangers of uncontrolled high BP | 6/55 | 10.9 | 2/28 | 7.1 |
| Self-reported medication adherence | 6/55 | 10.9 | 12/31 | 38.7# |

*Significant improvement in the study group, #Significant improvement in the control group. BP=Blood pressure

**Table 3: Changes in mean systolic and diastolic blood pressure from baseline to post-intervention for the intervention and control groups**

| | Mean blood pressure; mmHg (SD) | | | |
|---|---|---|---|---|
| | *n* | Intervention group | *n* | Control group |
| Mean systolic BP | | | | |
| Baseline | 52 | 138.6 (21.8) | 31 | 138 (21.6) |
| Post-intervention | 55 | 135.7 (22.0) | 28 | 138.4 (20.1) |
| Change: Baseline to post-intervention* | 40 | −4.6 | 28 | 0.75 |
| *P* | | 0.122 | | 0.869 |
| Mean diastolic BP | | | | |
| Baseline | 52 | 78.9 (9.6) | 31 | 82.6 (11.1) |
| Post-intervention | 55 | 76.6 (11.3) | 28 | 79.1 (12.9) |
| Change: Baseline to post-intervention* | 40 | −2.5 | 28 | −1.46 |
| *P* | 40 | 0.272 | 28 | 0.496 |
| Intervention group versus control group* | | | | |
| *P* | 40 | 0.584 | 28 | 0.379 |

*Change was calculated only in patients with baseline and post-intervention data. SD=Standard deviation, BP=Blood pressure

intervention should be routinely implemented in PHC facilities throughout South Africa to assist with reducing BP. The strengthening of patient–pharmacist relationships could help improve satisfaction with healthcare services generally and treatment outcomes in the future.

There was also an indication that written information can improve patients' knowledge of hypertension with patients sharing their information with family and friends. Furthermore, those experiencing reading difficulties were assisted by family members. These factors should be considered as South Africa instigates measures to improve adherence to medicines in patients with NCDs including the CCMDD program.[12]

The greater change in patients' knowledge of what hypertension is in the control group may be due to patient curiosity after being asked what hypertension is during enrollment versus the knowledge provided to the intervention group. In addition, this knowledge was only offered once in the intervention group at the start, and forgetfulness could be an issue in the intervention group.[11]

However, to balance this, there was a significant improvement in patients' knowledge of what is normal BP in the intervention group [Table 2], similar to other studies.[10,11,21] A positive change in the intervention group in knowing that both systolic and diastolic BP readings are important for controlling hypertension is encouraging, as this is likely to improve patients' involvement in the management of their disease.[22]

A positive change was also seen in BP control, with a greater reduction in the intervention group [Table 3]; however, this did not reach statistical significance. This may be due to high dropout rates as significant changes have been seen in BP control in patients with hypertension after pharmacist interventions in other studies.[21]

A negative finding was that self-reported medication adherence significantly improved in the control group compared to the intervention group [Table 2]. This may be due to improved relationships between patients and pharmacists resulting in honest answers in the intervention group.[23] Consequently, low adherence in the intervention group may be a better representation of actual practice,[23,24] with previous studies showing that knowledge is the most significant factor in medication adherence among hypertensive patients.[25]

With improved medicines accessibility through the CCMDD program in South Africa,[12] it will be essential to strengthen patients' involvement in their treatment. Such programs should also include potential ways of addressing illiteracy among patients where this is a concern to help complete hypertension diaries.

The main limitation was the high drop-out rate due to the inaccessibility of some of the facilities. Cross-contamination between the intervention and control groups cannot be excluded. We have also not been able to compare our findings with others as we are unaware of studies that have jointly assessed the combination of patient diaries and counseling. Despite these limitations, we believe our findings give a basis for improving the future care of hypertensive patients in PHC facilities in South Africa.

Encouragingly, patients in PHC facilities in South Africa were highly satisfied with the pharmacist intervention, laying a strong foundation for improving collaboration in the future. Consequently, it is recommended that this intervention model be further developed and tested, with a greater focus on lifestyle changes and clinical outcomes. Pharmacists should also help routinely instigate and review patient diaries to help improve future control of BP.

## Authors' Contribution

Enos M. Rampamba, Johanna C. Meyer, and Elvera A. Helberg devised the concept for the study, developed the questionnaire, and educated the pharmacists taking part. Enos M. Rampamba and Johanna C. Meyer undertook the initial analysis. Enos M. Rampamba, Johanna C. Meyer, and Brian Godman undertook the first draft of the paper, with all authors involved in the subsequent revisions.

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### Conflicts of interest

There are no conflicts of interest.

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