Original Article

Evaluating the Role of Clinical Pharmacists in Providing Pharmaceutical Care to Improve Adherence in Hypertensive Patients at a Rural Hospital in Southern Chile: A Pilot Study

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Abstract

Objective: The majority of patients who receive antihypertensive treatment do not achieve adequate blood pressure (BP) outcomes. Adherence to antihypertensive therapy contributes to adequate control of BP and is a substantial reason for therapeutic success. This study aims to evaluate the role of clinical pharmacists in improving patient adherence to pharmacological treatment and in improving BP outcomes. **Methods:** A pre- and postpharmaceutical care interventional study was provided to hypertensive patients in the Cardiovascular Health Program of the Family Health Community Hospital in rural Coelemu, Chile. Patients received pharmaceutical care in three individualized sessions over 6 months. Written educational materials including basic information on high BP were provided to each patient in every session using easy-to-understand language. BP was measured at the beginning and end of each session using an electronic tensiometer, and patients reported their adherence to therapy using indirect, self-reported measures. **Findings:** Over the study period, patients experienced average decreases in systolic and diastolic BP of 7.68 mmHg ($P < 0.001$) and 2.91 mmHg ($P < 0.001$), respectively. Patient adherence to medication, according to self-reported measures, increased from 22% to 60% over the study period. **Conclusion:** Pharmaceutical care, including education about hypertension, healthy lifestyle habits, and adherence, was associated with improved adherence to antihypertensive drug treatment and control of BP in hypertensive patients at a rural hospital in Chile.

Keywords: *Hospital, hypertension, patient compliance, patient outcomes assessment, pharmaceutical service, pharmacist, rural*

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Introduction

Chronic noncommunicable diseases are considered a pandemic due to their high incidence and prevalence. It is estimated that almost 18 million people die annually from cardiovascular diseases (CVDs), making them the leading cause of premature death and disability worldwide. This is true in Chile, where they were responsible for 27% of deaths in 2010.[1]

CVDs include hypertension (HTN), defined as the persistent elevation of blood pressure (BP) above normal limits – defined under Chilean guidelines as systolic BP (SBP) ≥140 mmHg and diastolic BP (DBP) ≥90 mmHg.[2] Despite advances in detection, treatment, and control, HTN remains the main cardiovascular risk factor for death.[3] In this context, a decrease in SBP of only 2 mmHg is associated with a 7% reduction in mortality from ischemic heart disease and a 10% reduction in mortality from stroke.[4]

Adherence to antihypertensive therapy contributes to adequate control of BP and is a substantial reason for therapeutic success.[5,6] Unfortunately, only 34% of

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people who receive antihypertensive treatment achieve adequate BP outcomes.[7] Moreover, only 16.5% of Chilean hypertensive patients have controlled BP, which has both clinical and socioeconomic repercussions, including greater morbidity and mortality, increase in the number of hospital admissions, incapacity for work, and decrease in productivity and social costs, among others.[8] This scenario is directly associated with the silent, life-threatening and slow-progressing characteristic of the disease, where the lack of previous symptoms reduces the compliance rate and contributes to the possibility of poor control.[6]

In addition, the personal commitment of the patient to assume responsibility for their health outcomes is overestimated, as almost a quarter of patients do not correctly understand given medical advice. In this sense, it is essential to incorporate education that provides minimum levels of understanding of treatment to allow the user to acquire self-care skills to improve their own treatment outcomes.[9,10]

It is necessary to consider strategies aimed at improving therapeutic adherence, especially for chronic problems such as HTN, based on the application of practicable methods, such as self-reported tests (Haynes–Sackett test, Batalla Test, and visual analog scale) along with monitoring and health education as alternative supports.[11,12] These strategies for improving understanding to promote the achievement of optimal results can place the pharmacist at a relevant contextual level to assume this shared responsibility.

The aim of this pilot study is to evaluate the role of clinical pharmacists in improving patient adherence to pharmacological treatment and in reducing BP outcomes, with an achievement criterion of a minimum decrease of 2 mmHg, in hypertensive patients treated at a local hospital in the rural community of Coelemu in Southern Chile.

Methods

A pre- and post pharmaceutical[13] care intervention plan was provided to hypertensive patients in the Cardiovascular Health Program of the Family Health Community Hospital in Coelemu, a rural town with 16,000 inhabitants in Southern Chile. The following inclusion criteria were used for this study: diagnosis of HTN, with or without comorbidities; older than 18 years of age; absence of physical difficulties, psychiatric disorders, and psychological limitations; and willingness to participate by providing informed consent. Participating patients received pharmaceutical care in three individualized sessions, each session separated by 36 days on average and lasting approximately 25 min. The study was carried out over 6 months from May to October 2018. Ethical approval was granted by the research committee of the Faculty of Pharmacy of the Universidad de Concepción.

Written educational materials were provided to each patient in every session using easy-to-understand language and including basic information on high BP. These materials also included information on healthy lifestyle habits, medications and their effects, what to do if one or more doses is missed, and what symptoms or signs to pay attention to or seek medical help for. Tailored education was given according to the needs of each patient. A pill organizer was utilized to promote medication adherence. This device facilitates the organization of medication according to a patient's morning, mid-morning, afternoon, and evening doses. A schedule of pharmacological therapy administration was also given to each individual to reinforce administration time and dosage.

BP was measured in every session using an electronic tensiometer. Measurements were made at the beginning and end of each of these sessions. Before taking these measurements, patients were required to have been at rest for at least 5 min and have emptied their bladders. If patients had recently exercised intensively, smoked, and consumed alcohol or coffee, they had to wait 30 min before measurements. The individual average was recorded. Patients were classified according to the Chilean Ministry of Health's current guidelines of HTN in patients older than 15 years of age: SBP (mmHg): optimal: <120; normal: 120–129; normal high: 130–139; Stage 1: 140–159; Stage 2: 160–179; Stage 3: ≥180; and DBP (mmHg): optimal: <80; normal: 80–84; normal high: 85–89; Stage 1: 90–99; Stage 2: 100–109; Stage 3 ≥110.

Measuring adherence to treatment is a complex task, given its multifactorial nature. In this study, we used more than one measure to avoid overestimation and to better estimate the reality of each patient. This research used indirect, self-reported procedures to assess adherence, including the following.

Battle test (disease knowledge test)

This test measures a patient's knowledge about HTN and consists of three simple questions: the first two with a dichotomous response (Yes/No) and the third with an open-ended response. Patients who correctly answered each of the questions, i.e., Yes, Yes and cited the organs affected by elevated BP, were considered a compliant.[14]

Questionnaire

1. Is hypertension a lifelong disease?
2. Can it be controlled with diet and medication?

3. Name two or more organs that are affected by the elevation of blood pressure numbers.

Patient self-reported adherence was assessed with Haynes–Sackett method,[15] which includes an interview between a pharmacist and the patient. First, the pharmacist states that medication adherence could be difficult for different reasons. Next, the patient is asked about their own difficulties taking their medications. "Do you have difficulties taking yours?" If the answer is affirmative, the patient is a noncompliant and the reasons for noncompliance are recorded. If the patient says no, they might not be telling the truth. Then, the pharmacist will insist by asking: "How do you take them? Every day, many days, some days, a few days, or rarely." A final question is asked and what the patient says about the following reflection is collected: "Many people have difficulty in following treatments, why don't you tell me how you are doing?"

Visual analog scale

This test measures an individual patient's perception and estimation of his/her adherence to pharmacological treatment. It corresponds to a graduated scale from 0 to 10, with 10 representing perfect adherence. For this study, a score lower than eight was considered nonadherent.[16]

Statistical analysis was performed using Microsoft Excel (Microsoft corporation, Redmont, WA, USA). Demographic, clinical, and adherence data were examined descriptively and expressed as mean ± standard deviation, frequency, and percentages. To evaluate the effect of the intervention on the outcome measures, BP averages were compared from the first and last session, using a paired *t*-test, in which a value of $P < 0.05$ was considered statistically significant.

Results

Of the 55 patients included, the majority were women (69%). Ages ranged from 34 to 78 years, with 74.5% of patients over 60 years of age. At least one comorbidity was present in 45 (82%) patients, with type 2 diabetes mellitus documented in 30 (55%) patients. The most frequently used medication in addition to the antihypertensive therapy was aspirin at low doses, with 44 (80%) patients using this medication. More details on medication use are summarized in Table 1.

Thirty-eight (76%) patients consumed more than one medication to control their HTN.

All patients were treated with agents acting on the renin–angiotensin system alone or in combination with diuretics; these drugs come in separate pills, a consideration for adherence purposes. Few patients were treated with beta-blockers or calcium channel blockers. Thirteen patients, almost a quarter of all participants, needed three medications to control their BP [Table 2].

Table 1: Demographic and clinical characteristics of participants included in the pharmaceutical care program

Variables	Characteristics	Number of patients (%)
Gender	Female	38 (69)
	Male	17 (31)
Age (Mean±SD)		65.20±9.30
Number of patients by range	34-42	1 (2)
	43-51	4 (7)
	52-60	9 (16)
	61-69	21 (38)
	70-78	20 (36)
Comorbidity	No	10 (18)
	T2DM	17 (31)
	Dyslipidemia	15 (27)
	T2DM + dyslipidemia	13 (24)
Other medications	Metformin 850 mg	30 (55)
	Glibenclamide 5 mg	8 (15)
	NPH insulin	2 (4)
	Atorvastatin 20 mg	28 (51)
	Aspirin 100 mg	44 (80)

T2DM=Type 2 diabetes mellitus, NPH=Neutral protamine Hagedorn, SD=Standard deviation

The results of the Battle test (disease knowledge assessment) are shown in Table 3. In the first session, 39 (71%) patients did not know about organs affected by HTN. In later sessions, there was an increase in knowledge and adherence, defined by correctly answering the three questions of the Battle test, with 46 (84%) patients adherent at the third session compared to 16 (30%) at the first session.

For the responses to the Haynes–Sackett test shown at the beginning of this study, the main reason for nonadherence was difficulty of administering medication, indicated by 43 (78%) patients, followed by forgetfulness, indicated by 41 (75%) patients. These tendencies improved by the last session, in which they were indicated by 22 (40%) and 20 (36%) of patients, respectively. At the beginning of the study, 43 (78%) patients were found to be nonadherent to their therapy, defined by answering at least one of the questions incorrectly. By the end of the study, the number of nonadherent patients fell to 22 (40%).

The average patient self-evaluated adherence score on the visual analog scale increased by 1.9 points: from 5.7 at the first session to 7.6 at the final session. At baseline, 71% of patients were considered nonadherent, defined by a score of lower than 8. By the final session,

Table 2: Antihypertensive treatments of participating patients

Medications and dosage per day	Classification and name	Number of patients, *n* (%)
Enalapril 20 mg	ACE inhibitors	32 (58)
Losartan 50 mg	Angiotensin II antagonist	23 (42)
Hydrochlorothiazide 50 mg	Thiazides	21 (38)
Furosemide 40 mg	Sulfonamides	17 (31)
Nifedipine retard 20 mg	Calcium channel blockers	11 (20)
Amlodipino 10 mg	Calcium channel blockers	1 (2)
Atenolol 50 mg	Beta blocking agent	1 (2)
Monotherapy	Enalapril	10 (18)
	Losartan	7 (13)
	Total	17 (31)
Two-drug therapy	Enalapril + hydrochlorothiazide	15 (27)
	Losartan + hydrochlorothiazide	6 (11)
	Losartan + furosemide	4 (7)
	Total	25 (45)
Triple therapy	Enalapril + furosemide + nifedipine retard	7 (13)
	Losartan + furosemide + nifedipine retard	4 (7)
	Losartan + furosemide + amlodipine	1 (2)
	Losartan + furosemide + atenolol	1 (2)
	Total	13 (24)

ACE inhibitors=Angiotensin-converting enzyme inhibitors

Table 3: Summary of patient responses to the Battle questionnaire

Question	Patients (%)					
	Session# 1		Session# 2		Session# 3	
	Yes	No	Yes	No	Yes	No
1	28 (51)	27 (49)	44 (80)	11 (20)	55 (100)	0 (0)
2	36 (65)	19 (35)	39 (71)	16 (29)	46 (84)	9 (16)
3	16 (29)	39 (71)	34 (62)	21 (38)	48 (87)	7 (13)
Classified as adherent	16 (29)	39 (71)	34 (62)	21 (38)	46 (84)	9 (16)

Classified as adherent in Session #1 versus Session #3, *P* value = 0.001

the percentage of nonadherent patients had decreased to 26%.

BP outcomes improved over the course of the study. The average SBP at the first session was 144 ± 11 mmHg, compared to 136 ± 11 mmHg at the final session ($P < 0.001$). The average DBP at the first session was 87 ± 9 mmHg, compared to 84 ± 6 mmHg at the final session. On average, SBP and DBP decreased by 8 mmHg and 3 mmHg ($P < 0.001$), respectively, over the course of the study.

Discussion

At baseline, a high percentage of patients presented BP outside the ranges suggested by the Chilean Ministry of Health. Because of pharmaceutical intervention, at the end of the study, about 60% of patients had BPs in the "normal" and "high-normal" categories. These results match those of another national report that studied the influence of demographic and behavioral variables on adherence.[17] However, it differs markedly with figures obtained by the National Health Survey of 2010 that showed that only 17% of the Chilean population of hypertensive patients had controlled BP.[18] The World Health Organization warns that in many countries, despite antihypertensive pharmacological schemes, only 25% of hypertensive patients have controlled BP.[5] Uncontrolled HTN exposes patients to an elevated risk of cardiovascular and cerebrovascular morbidity and mortality, due to the linear correlation proven in several studies.[19,20]

The importance of BP control is validated by several trials that have shown differences in only 2–3 mmHg in SBP and 1–2 mmHg in DBP to be sufficient to cause significant changes in health outcomes.[21] In this regard, it has been found that an average reduction of 10–12 mmHg in SBP and of 5–6 mmHg in DSP is accompanied by a 40% reduction in cerebrovascular accidents, a 15% reduction in myocardial infarctions, and a 33% decrease in cardiovascular mortality.[2] On the other hand, each increase of 20 mmHg in SBP and of 10 mmHg in DBP in figures of 115/75 mmHg doubles the risk of death due to cardiovascular disease.[22] Therefore, while the decrease found in the study may seem small numerically, the difference was statistically significant and is clinically substantial if sustained.

The improvements in BP control observed in this study may be attributable to the implemented pharmaceutical interventions, in which clinical pharmacists provided education orally and in writing to each patient in each of the three sessions, aimed at promoting adherence to

prescribed treatments and increasing patient knowledge about their pathology, antihypertensive medications, and nonpharmacological measures. It is evident that the concept of pharmaceutical education should not be limited to the transmission of information, but extended to include the delivery of tools that motivate patients to actively participate in managing their therapy. The constant and progressive feedback given to the patients by clinical pharmacists in this study helped patients more effectively understand the importance of maintaining or achieving BP control.

By the end of our study, three-fifths of patients were found to be adherent. This relatively high rate of adherence contrasts with that of other publications.[18] This improvement may have been due to the patients' positive beliefs and guaranteed access to their medications, as well as to the use of the pillbox and the pharmacotherapy sheet and instruments that incorporate the patient in the adherence process and emphasize that adaptation of therapy need not interfere with quality of life, but complement a patient's usual routine. Misuse and confusion with other family members' drugs was avoided through the use of the pillbox.

Although it is difficult to define a consensus standard of what constitutes adequate adherence, studies consider that rates above 80% are acceptable.[12] Nevertheless, it is important to consider that there is little evidence that this limit is relevant, as it is a dynamic phenomenon that cannot be characterized by a single number. In effect, the World Health Organization notes that the average rate of adherence to antihypertensive pharmacotherapy is around 50%–70%, which supports the results of the measurement methods used in this study.[20,23]

Given that the risk of nonadherence is constant, following medical indications does not guarantee desired clinical outcomes. This situation remains a great challenge in primary care, especially in at-risk populations, for whom the impact of better control could be substantial. Thus, the Chilean Ministry of Health included control of high BP in its strategic objectives for the 2011–2020 decade, with a commitment to increase the proportion of people with controlled BP by 50%, a percentage that was surpassed in this study.[2,18,24]

A limitation of this study is that it was conducted over a relatively short time frame, so it may not be possible to evaluate the whole impact of the pharmacist's interventions, making it difficult to demonstrate a sustained significant reduction in BP outcomes. This study also did not include education for other patients' coexisting conditions, which may have impacted clinical outcomes. Finally, while this exploratory study of 55 patients suggests that a pharmacist intervention plan may have had a positive effect on patient outcomes, education, and adherence, a more robust study design and larger sample size are needed to confirm the impact of this intervention.

The findings of this study highlight the low degree of patient adherence, knowledge, and baseline control of HTN, and how difficult it can be for hypertensive patients to achieve therapeutic goals. Therefore, continuous monitoring of adherence in patients is needed. The main objective of this study was met in terms of improving adherence to antihypertensive drug treatment and in decreasing BP. These findings support the role that a clinical pharmacist can assume in promoting therapeutic adherence.

Authors' Contribution

All authors contributed to the design, data collection, study logistics, and analysis. Pola Fernández and Lorenzo Villa conducted the statistical analysis. Pia Cordova, Felipe Morales, and Lorenzo Villa prepared the manuscript. All authors participated in the editing, reviewing, and approval of the final version of the manuscript.

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Conflicts of interest

There are no conflicts of interest.

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