Clinical Impact of a Pharmaceutical Care Programme Developed in a Family Health Unit: Results of a Pharmacist-Physician Collaboration in the Treatment of Hypertensive Patients

Impacto Clínico de um Programa de Acompanhamento Farmacoterapêutico Implementado numa Unidade de Saúde Familiar: Resultados de uma Colaboração entre Farmacêutico e Médico no Tratamento de Doentes Hipertensos

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Abstract

Introduction: The positive impact of pharmacist-physician collaborative care has been reported in the international literature, although examples of this impact are limited in Portugal. We aim to underline the clinical added value for hypertensive patients that results from pharmacist-physician collaborations.

Methods: A community trial was conducted at a Portuguese family health unit for 19 months. The intervention group was randomly selected from the global records and members of the group received pharmaceutical care in addition to physician care. The comparison group received only physician care. Both groups were comparable at the beginning of the study. In the intervention group, we analysed the hypertensive patients to evaluate the impact of pharmacist-physician collaboration on the patients' blood pressure levels. This evaluation was performed by comparing the obtained blood pressure levels with the levels at baseline and between the groups.

Results: A total of 17 patients with hypertension were enrolled in the pharmaceutical care programme, 12 of whom were female. The mean age was 68.50±3.26 years and, on average, each patient consumed 6.06±0.93 medicinal products. Thirteen patients were uncontrolled. Compared with the baseline, the intervention group achieved mean reductions of 28.85±5.90 mmHg ($p < 0.0005$) and 11.23±2.75 mmHg ($p < 0.005$) in their systolic and diastolic blood pressure, respectively. Considering the comparison group, improvements of 18.63±6.44 mmHg ($p = 0.011$) in systolic blood pressure and 9.03±2.63 mmHg ($p < 0.005$) in diastolic blood pressure were observed.

Conclusion: Pharmacist-physician collaborative care adds clinical value to the typical physician care provided to hypertensive patients within the context of a Portuguese family health unit.

Keywords: Blood Pressure; Family Health; Hypertension; Interprofessional Relations; Pharmaceutical Services; Pharmacists; Physicians; Portugal; Treatment Outcome

Resumo

Introdução: O impacto positivo da colaboração entre farmacêutico-médico para a saúde do doente está bem documentado na literatura internacional. Em Portugal, os exemplos de colaboração são limitados. Com este trabalho pretendemos sublinhar a mais-valia clínica da colaboração farmacêutico-médico em doentes hipertensos.

Métodos: Ensaio comunitário desenvolvido numa unidade de saúde familiar portuguesa, durante 19 meses. O grupo de intervenção, selecionado aleatoriamente do ficheiro global, foi submetido a acompanhamento farmacoterapêutico pelo farmacêutico. O grupo de comparação recebeu apenas os cuidados médicos habituais. Ambos os grupos eram comparáveis à partida. Analisámos os doentes hipertensos para avaliar o impacto da colaboração farmacêutico-médico nos níveis de pressão arterial. A avaliação foi efetuada por comparação com o ponto de partida e entre os dois grupos.

Resultados: Integraram o programa de acompanhamento farmacoterapêutico, 17 hipertensos, 12 do género feminino com idade média de 68,50±3,26 e um consumo médio de medicamentos de 6,06±0,93. Do total, 13 não estavam controlados. Comparando com o início, o grupo de intervenção reduziu, em média, 28,85±5,90 mmHg ($p < 0,0005$) na pressão arterial sistólica e 11,23±2,75 mmHg ($p < 0,005$) na diastólica. Na comparação entre grupos, registou-se uma redução de 18,63±6,44 mmHg ($p = 0,011$) na pressão arterial sistólica e de 9,03±2,63 mmHg ($p < 0,005$) na diastólica.

Conclusão: A colaboração farmacêutico-médico em doentes hipertensos numa unidade de saúde familiar Portuguesa acrescentou mais-valia clínica aos cuidados de saúde habitualmente recebidos pelos doentes.

Palavras-chave: Assistência Farmacêutica; Farmacêuticos; Hipertensão; Médicos; Portugal; Pressão Sanguínea; Relações Interprofissionais; Resultado do Tratamento; Saúde Familiar

Introduction

Improving patients' health and quality of life is the main objective of all health care professionals. There is an extensive body of international literature reporting significant health improvements when pharmacists and physicians cooperate to improve patients' health, particularly in the case of hypertensive patients.[1-3] Moreover, the costs associated with the ineffectiveness of medication and safety issues are reduced, leading to obvious economic savings for the health care system.[4-6]

Collaborative care between pharmacists and physicians has been encouraged by several international institutions, including the World Health Organization (Declaration of Alma-Ata),[7] the International Federation of Pharmacists[8,9] and the World Medical Association.[10]

In Portugal, although such interprofessional collaboration at the primary health care level is not widespread, there have been some short-term studies on the issue.[11-16]

The literature in this regard highlights several key factors that affect collaborative care, including trust, a clear role specification for each professional and the standard of professional interaction.[17,18]

Pharmaceutical care refers to the pharmacist's contribution to the care of individuals, which is intended to optimise medicine use and improve health outcomes.[19] It is expected that the implementation of a pharmaceutical care programme within a Portuguese primary health care institution would promote a close professional relationship between the pharmacist and the physicians, as well as a clear role specification for these professionals, thereby contributing to additional positive clinical outcomes.

The aim of this report is therefore to underline the clinical added value for hypertensive patients that results from a close collaboration between physicians and a pharmacist in a Portuguese family health unit.

Methods

Between January 2010 and August 2011, a community trial was conducted by a pharmacist at a family health unit in Évora, Portugal. Those patients included in the intervention group were enrolled in a pharmaceutical care programme in addition to receiving typical physician care. The comparison patients only received the typical physician care.

The intervention group were randomly selected from the clinical records of the family health unit (i.e., the

selection was not based on any specific disease). The inclusion criteria were: being aged over 18 years, the availability of telephone contact (due to logistical issues) and the ability to autonomously visit the family health unit. The exclusion criteria were: a cognitive disability diagnosed by a physician (e.g., Alzheimer's disease), being bedridden and having a family relationship with any of the health unit's care professionals.

In the present article, we only report the results of those patients diagnosed by a physician as having arterial hypertension.

The patients randomised to the intervention group (provided they met the inclusion criteria) were invited to participate in the pharmaceutical care programme via telephone contact made by the pharmacist. A maximum of three attempts was made to contact each patient.

Due to the high dispersion of diseases in the patients belonging to the intervention group (selected from the global clinical records), comparison patients were only selected at the end of the study, matching essential characteristics: general practitioner, gender, age group and diagnosed diseases. A list of possible comparison patients with the relevant characteristics was generated for each intervention patient using the physician's software. The respective comparator was the first on the list who exhibited the most matching characteristics.

A family physician – referred to as the facilitator physician – was appointed to follow the entire study and to provide the requested information from the clinical records, since the pharmacist cannot access the physician's records due to ethics issues.

Pharmacist intervention

The pharmaceutical consultations were carried out in a private office (independently from the family physician consultation) and they took place for 4 hours every week over the course of 19 months. The service was provided through a patient-centred strategy using logical and methodological reasoning (based on Dáder's method[20]), as well as specific skills, to detect, prevent and solve negative clinical outcomes.

During the first consultation (60 minutes in duration), the pharmacist recorded the patient's sociodemographic data, personal and family disease history, clinical and pharmacotherapeutic history, lifestyle and allergies. All the health problems were classified according to the ICPC-2 classification scheme.[21] The achievement of therapeutic goals (based on specific guidelines) was assessed through the measurement of health parameters during the consultation or through laboratory tests that were regularly requested by the physician. The patient's frequency of pharmaceutical consultations was defined based on perceived health needs and health problems evolution.

For each uncontrolled patient, a strategic intervention plan was designed. During the subsequent consultations (each approximately 30 minutes in duration), therapeutic goals and suggested interventions were discussed with and approved by the patient. The pharmacist interventions were adjusted based on the clinical evolution. When related to a healthy lifestyle, medication adherence or correct drug intake, the interventions were directed towards the patients, but when a medical evaluation and the prescription of medicinal products for untreated health problems or changes in the therapeutic scheme already prescribed due to ineffectiveness or safety issues (dosage, drug replacement, new drug) were required, the pharmacist interventions were directed towards the physician (family physician or other).

In general, in addition to the pharmacist's verbal explanation, all the interventions were written down so as to minimise message distortion and allow for traceability. When directed towards the family physician, previous contacts to discuss the case were ensured. Despite the pharmacist having interacted with all the family physicians whenever necessary (i.e., due to negative clinical outcomes in their patients) during the study period, monthly appointments with the facilitator physician were arranged in order to analyse the project's evolution and discuss complex clinical cases. The facilitator physician informed all colleagues about the progress of the study every six months.

The detailed knowledge about the study and its progress, the frequent professional interactions (in the same physical structure, personal contacts) and the clear role specification for the pharmacist in the family health unit were the tools used to build a close and trusting relationship with the physicians.

Among the numerous health problems recorded for all the intervention patients, hypertension was the problem for which the most pharmaceutical interventions were addressed to the physician along with a discussion of each clinical case (close collaborative care between pharmacist and physician). That is why, in the present article, we report only the results for the hypertensive patients by way of an example of collaborative care.

The blood pressure levels of the intervention group were registered in the pharmacist's records. For the comparison patients, the facilitator physician collected similar data from the physician's records.

Main outcome measure

The added value for blood pressure control that resulted from the collaborative care intervention was assessed by comparing the blood pressure levels between the intervention and comparison groups (all hypertensive patients). For the intervention patients, a comparison of the blood pressure levels after follow-up with those at baseline (uncontrolled patients only) was also performed.

Procedures for blood pressure measurement and devices

The patients' blood pressure levels were assessed with a Tensoval Duo Control™ device. After a five-minute rest in the correct position and using the correct cuff size, three measurements were taken in the non-dominant arm and the mean value was recorded. The therapeutic goals and different hypertension grades were based on European guidelines for the management of hypertension.[22,23]

Statistical analysis

The statistical data analysis was performed using a two-tailed Student's t-test for paired comparisons. Significance levels of $p = 0.05$ were used. The continuous variables were expressed as the mean ± the standard error of the mean.

Ethical considerations

The regional health administration and the family health unit's physicians discussed and accepted the project. The National Commission for Data Protection also authorised the collection of the patients' data. All patients who agree to participate in the study signed an informed consent form.

Results

From the initial random list of 400 persons, a total of 39 patients accepted the pharmacist's invitation to participate in the pharmaceutical care programme and signed the informed consent form. Seventeen patients had hypertension and hence were analysed. Fig. 1 illustrates the flow of patient enrolment in the study.

Of the 17 hypertensive patients who were analysed (Table 1), 12 were female. The mean age was 68.50±3.26 years, and the most common educational level was the compulsory 1st to 9th year education (11 patients). Regarding cardiovascular events, a personal history of stroke and myocardial infarction was registered for one and two patients, respectively, while six patients had a family history of stroke. In addition to hypertension, hypercholesterolemia (11 patients), overweightness (11 patients), depression (six patients) and anxiety (five patients) were the most common health problems observed. Only one patient was smoker. On average, each patient had prescribed 6.06±0.93 medicinal products.

Table 1 describes the baseline characteristics of the intervention patients with hypertension and their respective comparators.

According to the blood pressure assessment, 13 intervention patients exhibited uncontrolled levels (blood pressure higher than 140/90 mmHg23). For these patients, 21 pharmacist interventions were performed. The family physicians received nine of them and accepted eight. Additionally, in the case of five pharmacological interventions addressed to the patient (medication adherence and correct drug intake), the situation was previously reported and discussed with the respective family physician.

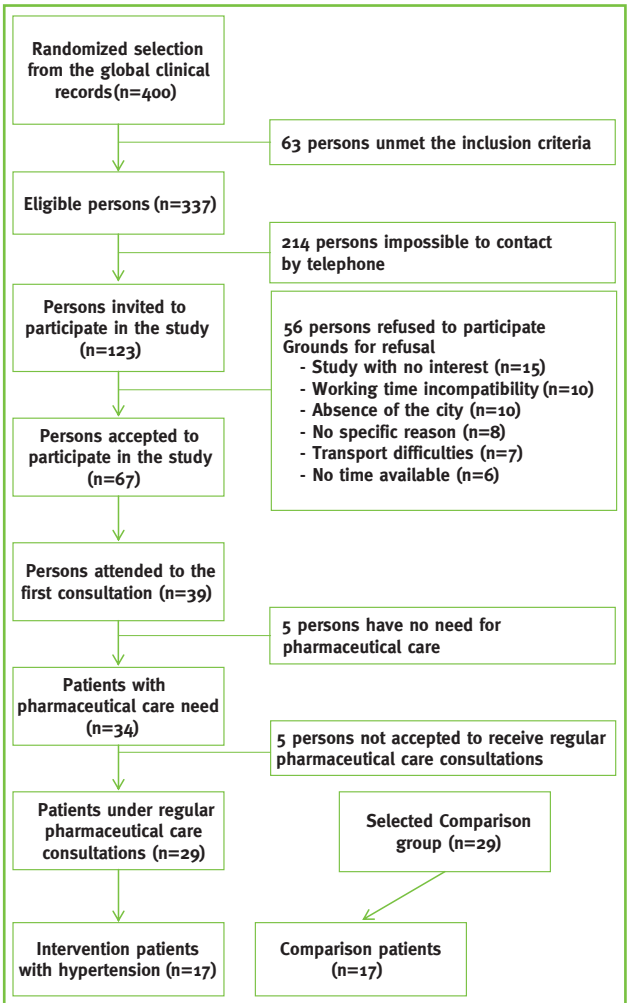

Figure 1. Flow of patient enrolement in the study.

Table 1. Baseline characteristics of the intervention and comparison groups

Baseline characteristics	Intervention group	Comparison group	*P* value
n	17	17	-
Gender			
Male	5	5	-
Female	12	12	-
Mean age	68.50±3.26	65.96±2.61	0.053
Educational level			
Compulsory education 1st-9th years	11	n.a.	-
Upper secondary education	3	n.a.	-
Higher education	3	n.a.	-
Tobacco use	1	2	-
Cardiovascular events			
Stroke	1	2	-
Myocardial infarction	2	1	-
Family history of cardiovascular events			
Stroke	6	0	-
Myocardial infarction	-	-	-
Most prevalent diseases			
Hypertension	17	17	-
Hypercholesterolemia	11	13	-
Overweightness	11	11	-
Depression	6	6	-
Anxiety	5	3	-
Number of medicinal products	6.06±0.93	6.20±1.14	0.847
Number of health problems	6.44±0.70	5.47±0.87	0.429
Mean blood pressure levels	150.25±6.16	149.80±3.93	0.956

n.a. – Not available from clinical records.

The pharmacist interventions intended to control the patients' blood pressure levels are presented in Table 2. Compared with the baseline (only hypertensive uncontrolled patients, n = 13), statistically significant improvements were achieved in the blood pressure levels after follow-up. Mean reductions of 28.85±5.90 mmHg (from 157.46±5.29 to 128.62±3.34 mmHg; $p < 0.0005$) in the systolic blood pressure and 11.23±2.75 mmHg (from 87.08±4.52 to 75.85±3.9 mmHg; $p < 0.005$) in the diastolic blood pressure were observed. The pharmacist-physician team controlled 11 of the 13 initially uncontrolled patients, thereby achieving the respective therapeutic goals. Regarding the stages of hypertension, of the seven patients with grade 1 hypertension at baseline, five improved to exhibit blood pressure levels lower than 140 mmHg after follow-up, while two remained unchanged. All the patients with grade 2 and grade 3 hypertension (four and two patients, respectively) at baseline achieved their therapeutic goals after follow-up.

A comparison of the clinical achievements for the hypertensive patients between the intervention group and their comparators (all hypertensive patients, whether their blood pressure was controlled or not, n = 17) showed that collaborative care contributed to statistically significant mean reductions in both systolic and diastolic blood pressure ($p < 0.005$ and $p = 0.043$, respectively). On average, the patients who received additional pharmaceutical care showed reductions in their systolic blood pressure of 22.94±6.17 mmHg (from 150.25±6.16 to 127.31±3.14 mmHg) and reductions in their diastolic blood pressure of 7.56±3.41 mmHg (from 82.31±4.63 to 74.75±3.26 mmHg). The comparison patients (those who did not receive pharmaceutical care) showed a mean reduction in their systolic blood pressure of 4.31±4.46 mmHg (from 149.80±3.93 to 145.49±5.59 mmHg), which was not statistically significance ($p = 0.349$), and an average increase in their diastolic blood pressure of 1.47±2.82 mmHg, which was again not statistically significance ($p = 0.608$). The difference between the groups showed that the added value of the pharmacist-physician collaboration in the treatment of hypertension was significant, since this collaboration resulted in reductions of 18.63±6.44 mmHg ($p = 0.011$) in the systolic blood pressure and 9.03±2.63 mmHg ($p < 0.005$) in the diastolic blood pressure.

Table 3 shows the evolution of the blood pressure levels between the intervention group and the comparison group.

The therapeutic goals were achieved for 11 of the 13 initially uncontrolled patients under pharmaceutical care and for eight of the 13 patients in the comparison group.

Table 2 - Pharmacist interventions made in blood pressure levels (n = 13)

Pharmacist interventions	#	%
Pharmacological		
Drug replacement	3	14.3
Correct drug intake	3	14.3
Medical prescription for untreated hypertension	2	9.5
Addition of a new drug to therapeutic scheme	2	9.5
Medication adherence	2	9.5
Change in the time of drug intake	1	4.8
Dosage increase	1	4.8
Subtotal	14	66.7
Non-pharmacological		
Salt intake reduction	6	28.6
Physical activity	1	4.8
Subtotal	7	33.3
TOTAL	21	100.0

Table 3. Evolution of the blood pressure levels Mean values, differences and respective statistical significance at the beginning of the study and after follow-up for the intervention (IG) and comparison (CG) groups.

Blood pressure	Initial (mmHg)	Final (mmHg)	Final-initial (mmHg)	*P* value
Systolic				
Intervention group (n=17)	150.25±6.16	127.31±3.14	-22.94±6.17	‹0,005
Comparison group (n=17)	149.80±3.93	145.49±5.59	-4.31±4.46	0.349
Difference (IG vs CG)	-	-	-18.63±6.44	0.011
Diastolic				
Intervention group (n=17)	82.31±4.63	74.75±3.26	-7.56±3.41	0.043
Comparison group (n=17)	81.38±2.85	82.86±3.23	+1.47±2.82	0.608
Difference (IG vs CG)	-	-	-9.03±2.63	‹0.005

Discussion

Our results underline the positive impact of pharmacist-physician collaboration in the treatment of hypertensive patients, which has previously been shown in the international literature.[1-3,24,25] At the national level, this contribution may encourage community pharmacists and physicians to collaborate in health care teams. It also suggests the need for the permanent inclusion of pharmacists in family health units in order to ensure that the benefits for patients are maintained.[26]

The relatively small number of patients involved in the study limits the conclusions that can be derived from the results. This small number of patients was mainly due to the low rate of patient acceptance (Fig. 1) of a new and previously unknown service provided by a pharmacist, since pharmacists are not usually involved in family health units.

The blood pressure improvements observed in our study (18.63±6.44 mmHg in systolic blood pressure and 9.03±2.63 mmHg in diastolic blood pressure) were higher than those observed in several prior studies (reductions of between 6 and 9 mmHg in systolic blood pressure and between 1 and 5 mmHg in diastolic blood pressure for patients in receipt of a pharmacist intervention in addition to typical physician care have been reported[2,3,15,27,28]). Apart from the sample size, several other factors may have contributed to these differences. For instance, different follow-up periods and different kinds of pharmaceutical services (not all of them consistent with pharmaceutical care as defined in this article) were used in other studies. The frequency of the pharmaceutical consultations in the present study may also have affected the results. In our study, each hypertensive patient was followed, on average, for 12.9 months (51.5 weeks) and received 11.6 pharmaceutical consultations, that is, one consultation every four weeks. In previous studies, the interval between consultations was higher, at between five and 12 weeks.[2,3,15,28] It is plausible that the higher frequency of pharmaceutical consultations in our study allowed for more frequent reinforcement of the interventions, resulting in greater reductions in patients' blood pressure levels. Indeed, in a study in which a similar service was implemented and the pharmaceutical appointments were also monthly, the authors achieved a systolic blood pressure reduction of 18 mmHg.[14]

The implementation of a pharmaceutical care service within a family health unit brings professionals into physical proximity and thereby facilitates their interactions. The mutual respect between the physicians and the pharmacist, the positive results and the frequent interactions may have improved the pharmacist-physician collaboration and, hence, accounted for the higher rate of acceptance of the interventions referred to the physician (eight out of nine).

An increase of about 30% ($p < 0.005$) in the hypertension control of patients who received pharmacist-physician

collaborative care was observed in this study, which suggests that this collaboration has the potential to improve patients' health. This result is similar to the findings of a study conducted in 2008 by Carter *et al* in which the patients also showed improvements in blood pressure control: 89.1% of patients in the intervention group were controlled *versus* 52.9% in the control group.[3] Other studies have reported lower values of blood pressure control, ranging between 15% and 18% .[2,29]

The added value of pharmacist-physician collaborative care for cardiovascular risk reduction

Considering a linear relationship between cardiovascular risk and blood pressure levels, Houle *et al*30 estimated that for every 5.7 mmHg reduction in systolic blood pressure, the overall absolute risk of stroke and myocardial infarction will decrease by 2.4% and 2%, respectively. Based on this estimation, and considering the reduction of 18.63 mmHg ($p = 0.011$) in systolic blood pressure that was achieved in this study, the overall absolute risk of stroke and myocardial infarction in patients under collaborative care will decrease by approximately 7.8% and 6.5%, respectively.

Based on the interventions performed to control patients' blood pressure levels, as well as the clinical outcomes achieved (a reduction of 18.63 mmHg in systolic blood pressure), the mean added value of a pharmacist intervention for hypertensive patients was estimated. On average, 1.62 pharmacist interventions were performed per uncontrolled patient. According to the mean reduction achieved in the systolic blood pressure, one pharmacist intervention corresponded to a reduction of 11.5 mmHg in the systolic blood pressure. Applying the data from Houle *et al* study, 30 on average, one pharmacist intervention provided to hypertensive patients could correspond to a 4.8% reduction in the overall absolute risk of stroke and a 4% reduction in the overall risk of myocardial infarction.

Conclusion

Within the context of a Portuguese family health unit, a close pharmacist-physician collaboration adds significant clinical value to the typical care provided for hypertensive patients. The mean additional reductions in blood pressure observed in the uncontrolled patients may decrease the risk of future cardiovascular disease.

Conflicts of interest

The authors have no conflicts of interest to declare.

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Protection of human and animal subjects

The authors declare that the procedures followed were in accordance with the regulations of the relevant clinical research ethics committee and with those of the Code of Ethics of the World Medical Association (Declaration of Helsinki).

Confidentiality of data

The authors declare that they have followed the protocols of their work center on the publication of data from patients.

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