

Assessment of Pharmaceutical Care Interventions in Resolving Drug Therapy Problems in a Group of Hypertensive Patients in Warri, Nigeria

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Website
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Doi:
<https://doi.org/10.21816/ijfmi.v4i2>

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ABSTRACT

Background: Drug Therapy Problems (DTPs) actually or potentially interferes with desired health outcomes. Pharmaceutical Care aims at resolving drug therapy problems.

Objective: The objective of this study was to identify DTPs in hypertensive patients, and to describe the pharmaceutical care interventions used in resolving them.

Methods: This was a non-randomised, single site, prospective study. A total of 65 eligible hypertensive patients were recruited and followed up for six months. Drug Therapy Problems were identified and specific interventions made to resolve them. Relevant descriptive and inferential statistics on data collected were performed.

Results: There were 51 (78.5%) females, and 47 (72.3%) patients aged over 50 years. Most patients (61.5%) had a family history of high blood pressure; 40% of the patients had diabetes as a comorbid condition. Total number of DTPs identified in the patients was 104 and 69% of them were resolved by the end of the study. Inappropriate adherence was the highest occurring DTP (51.5%). While 53.7% of the patients received only patient education to resolve the drug therapy problem identified, 46.3% of them received both patient education and drug-related interventions. Test for association between the type of DTP identified and the outcome of the PC intervention showed that it was statistically significant ($p=0.001$).

Conclusion: Inappropriate adherence to medication was the most occurring DTP. Direct patient education was mostly used in resolving DTPs. Resolution of the DTPs in a group of hypertensive patients in Warri, was closely associated with the outcome of Pharmaceutical care intervention employed.

Keywords: Drug therapy problem, pharmaceutical care, anti-hypertensive drugs, medication use, Nigeria

INTRODUCTION

Drugs are utilised for treatment, prophylaxis or diagnosis of medical conditions. However, apart from side effects, these drugs may have some negative outcomes on patients if not used appropriately. Pharmacists can play an important role in identifying drug therapy problems (DTPs); resolving actual DTPs and preventing potential DTPs through careful pharmaceutical practices.^{1,2}

A Drug Therapy Problem (DTP), also known as a Medication Related Problem, is defined as an undesirable event or risk experienced by a patient, which involves or is suspected to involve drug therapy. Again, the term is used to denote a drug-related event amenable to detection, treatment or prevention, and could prevent or delay patients from achieving desired therapeutic goals. A DTP may be potential (likely to occur) or actual (patient is already experiencing it). An actual DTP is an event that has already occurred in a patient, whereas a potential DTP is an event that is likely to develop if pharmacists do not make any appropriate interventions. Drug therapy problems are significant challenges to health care providers and may affect morbidity, mortality and a patient's quality of life.³

In a review of randomized controlled studies assessing DTPs and health outcomes in the elderly, clinical pharmacy services proved to be beneficial in reducing the occurrence of DTPs.⁴

Pharmaceutical care (PC) involves the process through which a pharmacist cooperates with a patient and other health professionals in designing, implementing, and monitoring a therapeutic plan that will produce specific therapeutic outcomes for the patient. This in turn involves three major functions: identifying potential and actual drug-related problems, resolving actual drug-related problems; and preventing potential drug-related problems. The fundamental goals, processes, and relationships of

pharmaceutical care exist regardless of practice setting. A study showed that pharmaceutical care can improve patient outcome by minimizing drug-related morbidity and mortality.²

The specific responsibilities of a pharmacist include ensuring that the most effective and safest drugs are prescribed to patients and that a patient's drug therapy is convenient enough to be followed as indicated. It is the pharmacist's responsibility to ensure that the patient is able to adhere to medication instruction in order to produce positive outcomes.

In identifying DTPs, relevant patient data must be acquired and critical thinking skills applied. All medications must be compared with the patient's medical conditions/complaints to ascertain that every medication is treating a condition and that every condition is being treated with or without a medication. Through cooperation with patients and other health care providers, potential and actual DTPs can be identified through medication reconciliation, medication profile reviews, and these problems can be prevented by monitoring therapeutic plans.⁵

Studies have shown that up to 80% of hypertensive patients may receive inappropriate therapy for their condition, including those with comorbid conditions.^{6,7}

In the UK over-treatment is often due to the process of repeat prescribing; about 75% of all prescribed items are repeats,⁸ that is items issued without the patient seeing the doctor for review. In PC, doctors continue to take ultimate care of patients and pharmacists are responsible for moderating their drug care, in particular by designing, implementing and monitoring a PC plan.

Drug therapy problems arise in the course of treating medical problems and hence compound the problems being treated.⁹ A number of actual DTPs can be resolved

with patient counselling and recommendations to prescribers. Previous studies have shown that behavioural interventions from the pharmacists based on the pharmaceutical care model were capable of reducing DTPs, achieving treatment outcomes and improving quality of life in patients.^{4, 9, 10} The goal of instituting PC services is to reduce increasing levels of drug related morbidity and mortality associated with drug use and to prevent the high financial cost of adverse drug events.¹¹ It has been reported that Pharmacist-led PC services has been contributory to the success in effectively managing diseases such as hypertension and diabetes mellitus (DM), while improving quality of life for such patients.^{12, 13} The aim of this study was to identify Drug Therapy Problems and the frequency of their occurrence in patients receiving anti-hypertensive medications, also to describe the pharmaceutical care interventions used in resolving them.

MATERIALS AND METHODS

Study Design

This was a descriptive, non-randomised, prospective study of drug therapy problems (DTPs) in hypertensive patients. The experimental intervention was a pharmaceutical care (PC) protocol, in which the researchers (the pharmacists) in conjunction with the doctors assigned to the patients, the patients and their care-givers; designed and implemented a PC plan, and monitored patients with hypertension for a period of six (6) months.

Study Setting

This study was carried out in the Medical Outpatient Department of Central Hospital Warri, Delta State, Nigeria. This site was chosen because it is located in the heart of the city; it also has the highest traffic of patients in Warri. The hospital is a Secondary health care facility

which offers comprehensive health care services to the people in the State and its environs.

Sampling technique: A total sample of all patients visiting the OPD in a month within the research period and who fit the inclusion criteria and gave their consent, were recruited for the study.

Patients/participants

Inclusion criteria: Patients who have been diagnosed with hypertension within the previous three months prior to the study date and are on at least one antihypertensive medication; aged 18 years and above, are well oriented, and who gave their consent to be followed up for a period of six months.

Exclusion criteria: Patients who have just been diagnosed of hypertension, patients who did not give their consent; psychiatric patients and pregnant women.

Patients were recruited within a 4 to 6 week period (this was because hospital appointments were every 4 to 6 weeks). Patients were addressed on the purpose and the nature of the study and were asked to give their verbal consent to participate in the study. On that basis, patients were recruited and a pilot study was done.

Data collection

Ethical Consideration

Ethical clearance was obtained from the Ethics Committee of the Hospital before patient recruitment and data collection. Relevant guidelines for maintaining the confidentiality of information were strictly adhered to.

Data collection Instrument

Data collection instrument included: a blood pressure monitor (digital sphygmomanometer) to measure blood

pressure, pharmaceutical care intervention forms to document DTPs and PC interventions.

Data Collection Procedure

Data collection procedures included blood pressure monitoring and patient interviews. This was done by the pharmacist and her research assistant via oral interview, using a comprehensive pharmaceutical care documentation format, which was based on the PC steps.^{9,14} Documentation of the following patient data was done at the first visit: patient's chief complaint and/or doctor's diagnosis, family history, social history, past medical history, past and present medication history. Blood pressure was measured at every visit, and list of DTPs identified.

Pharmaceutical care Intervention

Follow up visits were scheduled every four weeks for a period of six months. Patients, who required urgent attention or had more prevailing health challenges, were scheduled for weekly follow up visits. Drug Therapy Problems were categorized as **actual** (presently occurring) or **potential** (would likely occur) after careful investigation. Patients were asked to clearly identify their drug therapy problems. Other factors such as social history, past medical history formed the basis for identifying potential DTPs.

All the information was recorded and updated at each visit and a PC plan to resolve DTPs was documented. Drug therapy interventions were suggested and tailored to the health needs of individual patients; these consisted of: assessment of drug history (current and past medication history, need for drug therapy, compliance with drug therapy), identification, prevention, and resolution of DTPs (actual and potentials), use and storage of medicines (prescription, over-the-counter (OTC), and herbal drugs), and the level and ability for the implementation of adherence-improving strategies.

Patients were also educated on the need for self-monitoring procedures, such as possessing their own sphygmomanometer and monitoring their blood pressure regularly.

Patients were also followed up with telephone calls. For patients who needed urgent attention, appointments were made with their physician to see them promptly for review. Interventions that required dosage adjustment were done by the physician after the patient visits the pharmacists. Interventions/recommendations were made to the medical team through verbal communication and/or written communication. The physicians also met with the patients before or after they met with the pharmacist for patients that required referral.

Data analyses

Data obtained were sorted and entered into Microsoft Excel. Descriptive statistics, were computed for demographic characteristics; patients' medical and medication profile; quantitative distribution of number of encounters per patient, frequency of occurrence of DTPs and quantitative distribution of DTPs resolved and prevented. Descriptive statistics was also used to give a quantitative distribution of forms of pharmaceutical care interventions done, either health education or drug therapy adjustments. Test for association was carried out using Chi Square to determine an association between DTPs identified, and pharmaceutical care intervention outcome.

RESULTS

Out of 104 patients recruited, only 65 were followed up for six months; 38 of them withdrew from the study before the end, and 1 died before the end of the study.

Socio-demographic characteristics of the patients:

Out of the 65 patients, more than half of them (72.3%) were above 50 years of age, with a mean age of 63.3 (SD ± 12.42). We had more females (78.5%). (Table 1)

Table 1: Socio-demographic characteristics of patients that were followed up (n=65)

Variables	Frequency(n)	Percentage (%)
Age (years)		
20 – 35	3	4.6
36 – 50	15	23.1
51 and above	47	72.3
Gender		
Male	14	21.5
Female	51	78.5
Marital status		
Married	51	78.5
Single	1	1.5
Living alone	13	20.0
Total (n)	65	100

Blood pressure of the patients

Blood pressure readings were documented at each visit. Mean systolic and diastolic blood pressures were calculated, at baseline and at end of study. Changes in blood pressure formed the basis for further investigations and follow up. At the end of the study, blood pressure was well controlled in 30 patients as their systolic and diastolic blood pressures were at goal (Table 2b). With a p-value of 0.0287, the post-intervention systolic blood pressure was found to be significantly lower than the blood pressure at baseline, while the post-intervention diastolic blood pressure was not significantly lower than that at baseline (p-value = 0.0559).

Table 2a: Blood Pressure of patients at baseline and end of study (n = 65)

	Baseline Mean \pm Std. Dev.	After 6 months Mean \pm Std. Dev. P-value
Systolic B.P	148.5 \pm 13.5	159.3 \pm 11.8 0.001
Diastolic B.P	89.3 \pm 18.5	87.7 \pm 18.2 0.620

Table 2b: Blood Pressure of patients at baseline and end of study (n = 30)

	Pre-treatment Mean \pm Std. Dev.	Post-treatment Mean \pm Std. Dev. P-value
Systolic B.P	139.4 \pm 22.55	128.8 \pm 12.86 0.0287
Diastolic B.P	84.3 \pm 11.78	80.8 \pm 9.98 0.0559

Drug therapy profile

Total number of drugs prescribed in majority of the patients was 5- 9 (72.3%). Number of anti-hypertensive drugs per prescription varied, with 50.8% of the patients having 3 to 5 different anti-hypertensive drugs in each prescription. Each prescription had antihypertensive drugs from one or more of the following classes:

- Thiazides (e.g Hydrochlorothiazide)
- Angiotensin converting enzyme inhibitors (Lisinopril)
- Angiotensin II receptor blockers (Valsartan)
- Calcium channel blockers (Amlodipine and Nifedipine)
- Alpha blockers (Prazosin)

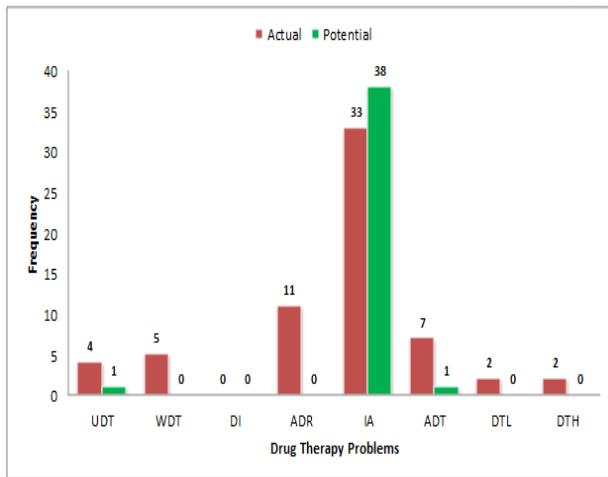
The use of more drugs could be attributed to comorbidities associated with hypertensive patients. Patient diagnosis indicated that 40.0% of the patients had hypertension and diabetes mellitus, while 43.1% of them had hypertension with other health conditions such as asthma, depression, malaria and rheumatoid arthritis.

Pharmaceutical care intervention

All 65 patients received one form of pharmaceutical care intervention or the other. Patients received either health related education only, drug therapy modifications only, or both. Fifty-four per cent of the patients received health related education only, while 46.3% of the group received both health related and drug therapy intervention.

Profile of Drug Therapy Problems (DTPs):

Inappropriate adherence to drugs occurred 33 (51.5%) times, followed by adverse drug reaction observed 11 times. A total of 64 actual DTPs were identified while 40 potential DTPs were also identified. (Fig 1)



KEY: UDT: Unnecessary drug therapy, WDT: Wrong drug therapy, ADR: Adverse drug reaction, DI: Drug interaction, IA: Inappropriate adherence, ADT: Additional drug therapy, DTL: Dosage too low and DTH: Dosage too high.

Figure1: Drug Therapy Problems

Drug Therapy Problems resolved/prevented

A total of 20 potential DTPs were prevented, and 52 actual DTPs were resolved at the end of the study. Actual DTPs were DTPs already existing and identified at baseline, while potential DTPs were those identified in the period of the study which could be prevented.

A Summary of potential DTPs prevented and actual DTPs resolved as at the end of the study is given in Table 3.

Table 3: Percentage of potential DTPs prevented and actual DTPs resolved

DTPs	Potential n(%)	Prevented n(%)	Actual n(%)	Prevented n(%)
Unnecessary Drug therapy (e.g. duplicate therapy)	1 (2.5)	0 (0)	7 (10.9)	5 (7.8)
Wrong drug (including dosage form)	0 (0)	0 (0)	5 (7.8)	5 (7.8)
Dosage too low	0 (0)	0 (0)	3 (4.7)	1 (1.6)
Dosage too high	0 (0)	0 (0)	2 (3.1)	2 (3.1)
Adverse drug reaction	1(2.5)	1(2.5)	10 (15.6)	8 (12.5)
Drug interaction	0 (0)	0 (0)	0 (0)	0 (0)
Inappropriate adherence	32(80)	15(37.5)	30 (46.9)	26 (40.7)
Additional Drug therapy	6 (15)	4 (10)	7 (10.9)	5 (7.8)
Total	40 (100)	20 (50)	64 (100)	52(81.3)

Evaluation of pharmaceutical care interventions

The result of the Chi Square (table 7), at p = 0.001, df =1, shows that there was a statistically significant association between the type of drug therapy problems identified

(whether actual or potential) and the outcome of the PC intervention done (whether resolved or prevented). Table 4

Table 4: Association between the numbers of Drug Therapy Problems resolved/prevented and Pharmaceutical Care Intervention

	Resolved/Prevented		Total
	Yes	No	
Actual	52	12	64
Potential	20	20	40
Total	72	32	104

$\chi^2 = 11.285, df = 1, p = 0.001 (p < 0.05)$

Number of encounters per patient

Table 5 shows that majority (83.3%) of the patients had less than four encounters with the research pharmacist. Number of encounters was determined by patient’s blood pressure at goal and DTPs resolved.

Table 5: Number of Encounters with Patients

No. of Encounter with Patient	Frequency	Percentage (%)
1 - 3 times	60	83.3%
4 - 6 times	11	15.3%
7 – Above	1	1.4%

DISCUSSION

The study lasted for six months, similar to the duration of another study done in Portugal,¹⁵ indicating that 6 months intervention was enough to develop noticeable outcomes

in pharmaceutical care. About half of the population sample had their blood pressure well controlled by the end of the study; however, this was a slightly lower proportion of patients compared to other studies where PC was done for hypertensive patients.^{10, 15} This may be attributable to the high prevalence of inappropriate adherence observed in this study. The two major areas of intervention were patient education and drug therapy (adjustment in dosage regimen) similar to another study.¹⁶

Several studies have shown that involvement of pharmacists in the management of hypertensive patients improved treatment outcomes.^{15, 17, 18, 19, 20} This study provided evidence for the benefits of a patient-focused role of the pharmacist in identifying and resolving drug-related problems in the patient population studied. The main DTP encountered in patients receiving antihypertensive medications was inappropriate adherence, followed by adverse drug reaction. Another study showed similar findings where patient non-adherence topped the list, followed by adverse drug reaction.²¹ Similarly, in a sample of elderly patients who received pharmaceutical care in their homes for one-year, non-adherence to drug therapy was the most common DTP identified.²² The reasons for patients’ non-adherence to drug therapy were poor understanding of the disease and/or treatment, lifestyle issues and treatment anxiety. These were then considered and addressed during the pharmaceutical care intervention.

Of the 104 DTPs identified during the study, a mean of 2.6 were actual DTPs and 0.5 potential DTPs. This is similar to a study in Brazil where 92 DTPs were identified, 21 patients showed a mean of 2.6 actual DTP and 0.5 potential DTP.²³ However, percentage DTP resolved and prevented were relatively lower in this study than observed in other studies.¹⁵

Implications of the findings: Health educational interventions, consisting of counseling, lifestyle

modifications, and encouragement of patient to participate actively in the proposed drug therapy, are beneficial in achieving treatment outcomes in hypertensive patients.²⁴

The collaboration between the pharmacist and the clinician also was essential to resolving and/or preventing DTPs in this study. Similar studies showed positive results of interventions that lead to the resolution and prevention of DTPs, reduction of treatment costs, and overall satisfaction with pharmaceutical care program.^{25,26,27, 28}

Conclusion

At the end of the study, the major DTPs evident were inappropriate adherence and adverse drug reaction. Patient education and drug-focused interventions were required to resolve actual DTPs and prevent potential DTPs.

The study provided evidence for the pharmaceutical care role of pharmacists in chronic disease management. There is however need for further research on the actual cause of inappropriate adherence among this group of patients.

Despite the limitations, this study represents a novel form of practice in hospital pharmacies within Delta state in particular, and Nigeria as a whole, where pharmaceutical care is still scarcely practiced.

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