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Economic Burden of Drug Therapy in Hypertension Management in a Private Teaching Hospital in Nigeria

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Authors' contributions

This work was carried out in collaboration between both authors. Author KAG designed the study, wrote the protocol, collected the data, prepared the manuscript and managed the data analysis for the study. Author IAS supervised the study, vetted the drafted manuscript and made necessary corrections. Both authors read and approved the final manuscript.

Research Article

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ABSTRACT

Background: Information on economic burden of hypertension is needed for relevant decisions and policies due to escalating cost of disease management.
Aims: The study assessed economic burden of pharmacotherapy in hypertension management on the National Health Insurance Scheme (NHIS) of Nigeria and the economies of antihypertensives selection.
Study Design: Cross-sectional study.
Place and Duration of Study: Out-patient-department of a private teaching hospital located in Lagos, Nigeria over four-month duration in 2011.
Methodology: Two hundred and fifty case notes of hypertensive patients were randomly selected. These were assessed for costs of pharmacotherapeutic management of hypertension. Patients' details such as demographic data, drug regimens and funding status were extracted from the case notes. Drugs' prices were obtained from the hospital billing guide. Data presentation was by using descriptive statistics.
Results: Two hundred and eight (83.2%) of the selected case notes met the study criteria. Diuretics were the most economical at an average monthly cost per prescription of NGN858.6 ($5.51) followed by the beta-blockers at NGN1,101.1 ($7.07) while fixed dose combinations were the costliest at NGN10,425.0 ($66.93). Health Maintenance

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Organizations (HMOs) having 104 (50.0%) of the cohort as enrollees incurred most of the cost at NGN446, 325.0 ($2,865.47) followed by NHIS 75 (36.0%) at NGN321, 354.0 ($2,063.14). An average monthly cost of antihypertensives per patient was highest for private patients NGN4, 314.47 ($27.69) and least for NHIS NGN4, 284.72 ($27.50). The national cost implication using the least average monthly antihypertensive cost per patient of NGN4,284 .72 ($27.50) for NHIS implies an average of NGN51,416.64 ($330.10) per annum for each patient and a whooping sum in excess of NGN1.054 trillion (over $6.76billion) for over 20 million affected hypertensive patients in Nigeria.

Conclusion: Cost burden of hypertension management is high, incurred mostly by HMOs and NHIS. Diuretics were the most economical of all prescribed regimens.

Keywords: Pharmacotherapeutic; hypertension; Health Maintenance Organizations (HMOs); National Health Insurance scheme (NHIS); cost of illness.

1. INTRODUCTION

Hypertension is one of the non-communicable diseases once thought of as a disease suffered by the rich but which is currently responsible for high mortality in low-and middle-income countries such as Nigeria [1]. Managing this condition and its resultant complications constitutes a great financial burden on individual patient and the health system of many countries. These costs are borne by the individuals, governments, and the private sector [2]. In addition, many reports abound all over the world including Nigeria, all pointing to high economic costs of managing elevated blood pressure [3,4,5] with emphasis on patients making direct out-of-pocket payment for their prescriptions [6,7].

Nigeria is classified as an economically poor nation [8] with about 70% of the population living below poverty line [9]. Prevalence of hypertension among Nigerians is said to be high [10] and has been put at 38.6% and 41.2% respectively for adult males and females aged ≥25 years [11]. Moreover, given that cost is an important discriminating factor in making informed choices in initiating and maintaining antihypertensive therapy, [12] it is important that hypertensive patients are afforded cost effective therapy while upholding the principles of rational drug use.

However, in a bid to ease the burden of health care finance on her population (while not compromising positive therapeutic outcomes), the Federal Government of Nigeria has come up with a Formal Sector Social Health Insurance Programme. This is a social health security system in which the health care of employees in the formal sector is paid for from funds created by pooling the contributions of employees and employers. This scheme requires that individuals register with National Health Insurance Scheme (NHIS) which is an agency of the government or appoint an NHIS-registered Health Maintenance Organization (HMO) of their choice [13].

Given the above cited scenarios, the objectives of the study were to assess economic burden of pharmacotherapy in hypertension management on the National Health insurance Scheme (NHIS) of Nigeria, Health Maintenance Organizations (HMOs), the individual patients, and the companies as well as the economies of antihypertensives selection.

2. METHODOLOGY

The study was conducted over a four-month period ranging from 1st August – 30th November, 2011 in a private teaching hospital following an approval by the ethical committee of the hospital. The study centre is located in Ikeja, the capital of Lagos State, South West Nigeria. Inclusion criteria required that patients must be on at least an antihypertensive, and must be first diagnosed after 2003, the reason being that a number of hypertension management guidelines came into focus in 2003 [14]. Two hundred and fifty case notes [15] of patients diagnosed with hypertension and attending the Medical Outpatient Clinic of the hospital were randomly selected, out of which only 208 met the inclusion criteria and were subsequently analyzed. The required patients' information such as hospital number, age, gender, occupations, drugs, dosages and patients' drug funding status were extracted from the selected case notes while drugs' prices were obtained from the hospital billing guide.

2.1 Statistical Analysis

Data analysis was carried out using Microsoft excel and Statistical Package for Social Sciences (SPSS) 16.0 for windows. Presentation of data was by using descriptive statistics.

3. RESULTS

Two hundred and eight (83.2%) of the randomly selected case notes belonging to 83 (39.9%) females and 125 (60.1%) males that met the study criteria were evaluated. There is significant association in age group of patients and their mode of occupations (χ^2= 24.77, df: 4, p=0.001). Majority of the patients were within the age ranges of 41-50 and 51-60 respectively. Most of the patients 98 (47.1%) were working with the government while 51 (24.5%) and 25 (12.0%) either worked for private companies or self. Twenty four (11.5%) and 10 (4.8%) of the cohort which constituted the non-working class were either retired or unemployed (Table 1).

Table 1. Age distribution and occupations of patients

Age (years)	N (%)	Occupation	N (%)
21-30	5 (2.4)	Civil servant	98 (47.1)
31-40	34 (16.3)	Self employed	25 (12.0)
41-50	71 (34.1)	Private company	51 (24.5)
51-60	59 (28.4)	Retired	24 (11.5)
>60	39 (18.8)	Unemployed	10 (4.8)

N, number of subjects

Diuretics which were mostly prescribed (33.3%) were found to be the most economical (at an average monthly cost per prescription of NGN858.6, $5.51) of the prescribed antihypertensives though; average monthly dispensed price of indapamide (NGN4200, $26.97) was somewhat on the higher side as compared to other members of the group. This was closely followed by the beta-blockers (NGN1,101.1, $7.07) while fixed dose combinations (containing drugs from different classes) were much more costly than other regimens constituting only 3.1% of the prescription but 16.3% of the total antihypertensive drugs' cost (NGN10,425.0, $66.93). See Table 2 and 3 for details.

Table 2. Pattern of use and costs of antihypertensive drugs prescribed alone or in combinations

Drug	Daily dosing range encountered (mg)	Total number of prescriptions encountered (N)	Total dispensed price for all prescriptions NGN ($)	Monthly dispensed price per drug NGN ($)
Diuretics				
Bendroflumethiazide	5	1	900 (5.78)	900 (5.78)
Hydrochlorothiazide	12.5 – 50	13	8700 (55.86)	669.23 (4.30)
Indapamide	1.5	6	25200 (161.79)	4200 (26.97)
Furosemide	40 – 160	9	16200 (104.01)	1800 (11.56)
Spironolactone	25 – 100	20	18000 (115.56)	900 (5.78)
Amiloride/hydrochlorothiazide	2.5/25 – 5/50	103	61500 (394.84)	597.09(3.83)
Subtotal		152	130500 (837.83)	9066.32 (58.21)
Beta-blockers				
Atenolol	25 – 100	32	19050(122.30)	595.31(3.82)
Carvedilol	3.125 - 6.25	13	25500 (163.71)	1961.54 (12.59)
Propranolol	80 – 160	2	7200 (46.23)	3600 (23.11)
Subtotal		47	51750 (332.24)	6156.85 (39.53)
Calcium channel blockers				
Amlodipine	5 – 10	74	133740 (858.63)	1807.30 (11.60
Nifedipine	20 – 40	51	60000 (385.21)	1176.47(7.55)
Subtotal		125	193740 (1243.84)	2983.77 (19.16)
ACEIs				
Lisinopril	2.5 – 20	60	75000 (481.51)	1250 (8.03)
Ramipril	5 – 10	3	7800 (50.08)	2600 (16.69)
Perindopril	4	2	39000 (250.39)	19500 (125.19)
Subtotal		65	121800 (781.97)	23350 (149.91)
ARBs				
Candesartan	8 – 16	4	51480 (330.51)	12870 (82.63)
Losartan	25 – 100	7	47250 (303.35)	6750 (43.34)
Valsartan	80 – 160	5	44100 (283.13)	8820 (56.63)
Subtotal		16	142830 (916.99)	28440 (182.59)
Vasodilators				
Hydralazine	100	1	6480 (41.60)	6480 (41.60)
Subtotal		1	6480 (41.60)	6480 (41.60)
Alpha receptor blockers				
Prazosin	1 – 2	4	12600 (80.89	3150 (20.22)

Table 2 Continues ……

Subtotal		4	12600 (80.89)	3150 (20.22)
Centrally acting agent				
Methyldopa	500 – 3000	32	87000 (558.55)	2718.75 (17.46)
Subtotal		32	87000 (558.55)	2718.75 (17.46)
Fixed dose combination				
Atenolol/Chlortalidone	50/12.5 – 100/25	3	9300 (59.71)	3100 (19.90)
Lisinopril/hydrochlorothiazide	20/12.5	2	23400 (150.23)	11700 (75.12)
Candesartan/hydrochlorothiazide	8/6.25 – 16/12.5	3	39000 (250.39)	13000 (83.46)
Valsartan/hydrochlorothiazide	80/12.5–160/12.5	6	74250 (476.70)	12375 (79.45)
Subtotal		14	145950 (937.02)	28475 (182.81)
Grand total		456	892650 (5730.93)	

$1 = NGN155.76 ($ = US Dollar, NGN = Nigerian Naira). Source: Central Bank of Nigeria [16], ARB = Angiotensin receptor blockers, ACEIs= Angiotensin converting enzyme inhibitors

Table 3. Costs of antihypertensive drugs prescribed per month

Drug class	Total cost NGN ($)	% of total drug cost	Number of prescriptions encountered	% of prescriptions (n=456)	Average cost per prescription NGN ($)
Diuretics	130,500 (837.83)	14.6	152	33.3	858.6 (5.51)
Beta blockers	51,750 (332.24)	5.8	47	10.3	1,101.1 (7.07)
Calcium channel blockers	193,740 (1243.84)	21.7	125	27.4	1,549.9 (9.95)
ACEIs	121,800 (781.97)	13.7	65	14.3	1,873.9 (12.03)
ARBs	142,830 (916.99)	16.0	16	3.5	8,926.9 (57.31)
Alpha blockers	12,600 (80.89)	1.4	4	0.9	3,150.0 (20.22)
Vasodilators	6,480 (41.60)	0.7	1	0.2	6,480.0 (41.60)
CAA	87,000 (558.55)	9.8	32	7.0	2,718.8 (17.46)
Fixed dose combinations[¥] (from different classes)	145,950 (937.02)	16.3	14	3.1	10,425.0 (66.93)
Total cost (NGN)	892650 (5730.93)				

[¥]*Components of combinations from different drug classes (i.e., Atenolol/Chlorthalidone, Lisinopril/Hydrochlorothiazide, Candesartan/Hydrochlorothiazide, Valsartan/Hydrochlorothiazide)*

An average cost of NGN892,650 ($5,730.93) was estimated for the total antihypertensive drugs prescribed per month with calcium channel blockers contributing the highest cost of 21.7% (NGN193,740, $1243.84). Highest average cost per prescription was obtained for fixed dose combination (NGN10,425.0, $66.93) followed by ARBs (NGN8,926.9, $57.31) and vasodilators NGN6,480.0 ($41.60). Vasodialators were also the least prescribed (Table 3).

Half of the studied patients, 104 (50.0%) were enrollees of HMOs while 75 (36.0%) subscribed to the services of the NHIS of Nigerian government. However, 17 (8.2%) of the patients had their bill settled by their companies and 12 (5.8%) constituted private patients, making direct out-of-pocket payment for drugs. Incidentally, HMOs incurred most (50.0%) of the cost (NGN446,325.0, $2,865.47) of antihypertensives prescribed in the study. Average monthly costs of antihypertensives per patient based on sources of drug fund was highest for private patients (NGN4,314.47, $27.69) followed by companies (NGN4,305.72, $27.64). The least average monthly cost was by NHIS (NGN4,284.72, $27.50) followed by HMOs (NGN4291.58, $27.55). See Table 4.

The national cost implication using the least average monthly antihypertensive cost per patient of NGN4,284 .72 ($27.50) for NHIS implies an average of NGN51,416.64 ($330.10) per annum for each patient and a whooping sum in excess of NGN1.054 trillion (over $6.76billion) for over 20 million affected hypertensive patients in Nigeria.

Table 4. Proportion of costs incurred per month based on patient's drug funding status

Source of drug fund	N (%)	Dispensed price of drug per month NGN ($)	Proportion of total cost (%)	Average cost per patient NGN ($)
HMOs	104 (50.0)	446,325.0 (2865.47)	50.0	4,291.58 (27.55)
NHIS	75 (36.0)	321,354.0 (2063.14)	36.0	4,284.72 (27.50)
Companies	17 (8.2)	73,197.3 (469.94)	8.2	4,305.72 (27.64)
Private patients	12 (5.8)	51,773.7 (332.39)	5.8	4,314.47 (27.69)

4. DISCUSSION

This study revealed that pharmacotherapeutic management of hypertension is capital intensive as already pointed out in several studies within and outside Nigeria [3,4,5]. This becomes more evident when the average monthly costs of antihypertensives incurred by studied patients are compared with the monthly minimum wage of NGN18,000 ($115.56) in Nigeria [17]. HMOs and NHIS were found to be responsible for offsetting much of the estimated medication costs. A national antihypertensives cost in excess of NGN1.054 trillion (over $6.76billion) for a conservative 20 million hypertension prevalence (less than 15.0%) in Nigeria is huge and demand concerted efforts to minimize incident rate and ensuring cost effective choice of regimen at all time for optimal therapeutic outcomes. However, similar antihypertensive drugs are expected to be at lower costs in public heath institutions that are less/not profit oriented unlike private hospitals.

Financing healthcare needs especially as related to drug management of non-communicable conditions such as elevated blood pressure requires the availability of steady source of fund [1,18], which has led to much of extensive research and well informed policies by most countries towards containing issues bordering on cost of managing such conditions [7]. The

overarching objective of such is to relieve the patients of the burden of direct out-of-pocket payment for medications [13] as evident in this study where much of the cost of prescribed antihypertensives was borne by the HMOs and NHIS. This is in sharp contrast to previous report elsewhere in Nigeria were virtually all the studied patients shouldered the cost burden of antihypertensive drugs prescribed [6]. This present shift of cost burden can be confidently attributed to increase in number, as well as marketing activities of the HMOs, [19] coupled with aggressive creation of awareness of benefits of health insurance by the Federal Government of Nigeria using NHIS as a medium of dissemination of health care finance services. Higher average monthly cost per patient obtained for private patients also pointed to the fact that insurance policy is a better alternative as compared to out-of-pocket expenses.

Enrolling with the HMOs or the NHIS affords the patients the opportunity of paying for their health care services at a later date, often by means of deduction of pre-determined amounts from their salaries. This benefit amongst other attracted more patients to the cover of HMOs and NHIS as seen in our study. However, this is not without some discrepancies [20,21] necessitating some private companies and individual patients to prefer managing their own medication costs as also observed in this study.

Consistent with many reports, [22,23] diuretics were found to be most economical of all the prescribed antihypertensives, though unnecessary prescription of the slightly expensive member(s) of the group should be avoided. This is to ease cost of medication utilization on patients, their companies, HMOs and NHIS in order to encourage adherence to therapy as well as optimize outcomes of drug intervention.

Increase awareness of benefits of health insurance policies should be embarked upon to ensure that every citizen of the country is under insurance cover while increasing the pool funds. Cost effectiveness/minimization analysis of the various drug regimens to be conducted at regular interval for overall improvement in quality of healthcare delivery. Generic prescribing as well as competitive bidding in drug supply should be mandated for efficiency. Strategies should be put in place for healthcare professionals to be monitored and regulated to avoid unethical practices of extravagant prescribing among other probable sharp practices. Unscrupulous marketing activities by “pharmaceutical companies’ representatives” should be discouraged as these characteristically lead to unnecessary drugs being forced on patients often at high costs. In addition, continuous feedback mechanisms from the consumers (patients) of health insurance scheme should be established and factored into policy improvement and decision making.

Limitations of the study include the fact that only drug cost component was evaluated while other associated costs were left unaccounted for. Also, the studied center is a private health institution servicing affluent clients, as such, patients reaction to cost of medications may not reflect that obtainable in other populations that frequent highly subsidized government owned hospitals. In addition, only one center was used for the study; hence, the results must be generalized cautiously.

5. CONCLUSION

The study revealed that monetary cost of pharmacotherapeutic management of elevated blood pressure is high and that the HMOs and NHIS bore much of the cost of the antihypertensive drugs prescribed for the patients studied. Diuretics and beta-blockers were the most economical of all the antihypertensive drugs.

CONSENT

Not applicable.

ETHICAL APPROVAL

Approval granted by the ethical committee of the hospital.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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