Drug Prescribing for Hypertension at Primary Healthcare Facilities in Trinidad

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ABSTRACT

Objective: *To describe the drug prescribing pattern for hypertension at primary healthcare facilities throughout Trinidad.*

Methods: *A descriptive, cross-sectional survey was conducted at 22 primary healthcare facilities across Trinidad using a de novo, pilot-tested questionnaire during June to August 2006.*

Results: *A total of 547 hypertensive patients were recruited into the study. There was a high prevalence of diabetes mellitus (57.6%). Information on the current drug prescribed was available for 442 patients (80.0%) and 26 of these patients (6.1%) were managed without drug intervention. On average, patients were prescribed 1.47 antihypertensive drugs. Angiotensin converting enzyme (ACE) inhibitors, particularly enalapril, were the most commonly prescribed class of antihypertensive drugs in 63.6% of patients. ß-blockers, thiazide diuretics and calcium channel blockers were prescribed in 29.2%, 25.8% and 12.0% of patients respectively.*

Conclusions: *There was significant use of ACE inhibitors, ß-blockers, thiazide diuretics and calcium channel blockers. Angiotensin converting enzyme inhibitors (as monotherapy or in combination with other drug classes) were more likely to be prescribed in diabetic hypertensive patients. Thiazide diuretics were not used as frequently as expected given the evidence which demonstrate similar efficacy with other classes of drugs and associated cost-saving. The observed prescribing pattern in the Trinidad public healthcare setting seems to point to an attempt to conform to recognized international and regional guidelines for the management of hypertension.*

Keywords: Antihypertensive drugs, drug utilization, hypertension, Trinidad

Prescripción de Medicamentos para la Hipertensión en los Centros de Atención Primaria de la Salud en Trinidad

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RESUMEN

Objetivo: *Describir el patrón de prescripción de medicamentos para la hipertensión en los centros de atención primaria de la salud en Trinidad.*

Métodos: *Se llevó a cabo un estudio descriptivo transversal en 22 centros de atención primaria de la salud en Trinidad, aplicando un cuestionario de novo en prueba piloto de junio a agosto de 2006.*

Resultados: *Un total de 547 pacientes hipertensos fueron reclutados para este estudio. Hubo una alta prevalencia de diabetes mellitus (57.6%). La información sobre el medicamento corriente prescrito estuvo disponible para 442 pacientes (80.0%) y 26 de estos pacientes (6.1%) fueron tratados sin la intervención del medicamento. Como promedio, a los pacientes se les prescribieron 1.47 medicamentos antihipertensivos. Los inhibidores de la enzima convertidora de angiotensina (IECA), en particular el enalapril, fueron la clase de medicamentos antihipertensivos más comúnmente prescritos en el 63.6% de los pacientes. Los beta-bloqueadores, los diuréticos tiazídicos, y los bloqueadores de los canales de calcio, fueron prescritos en el 29.2%, 25.8% y 12.0% de los pacientes respectivamente.*

Conclusiones: *Hubo un uso significativo de inhibidores ECA, beta-bloqueadores, diuréticos tiazídicos, y bloqueadores de los canales de calcio. Los inhibidores de la enzima convertidora de angiotensina (en forma de monoterapia o en combinación con otras clases de medicamentos) exhibían una probabilidad*

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mayor de ser prescritos en los casos de pacientes diabéticos hipertensos. Los diuréticos tiazídicos no se usaron con tanta frecuencia como se esperaba, dada las evidencias existentes que demostraban una eficacia similar con otras clases de medicamentos, asociados con un menor costo. El patrón de prescripción observado en el contexto de la salud pública en Trinidad parece apuntar a un intento por ajustarse a las pautas regionales e internacionales reconocidas en relación con el tratamiento de la hipertensión.

Palabras claves: Medicamentos antihipertensivos, utilización de los medicamentos, hipertensión, Trinidad

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INTRODUCTION

Hypertension is a major chronic disease affecting significant portions of the world's population and uncontrolled hypertension leads to severe long-term consequences such as stroke, heart failure, coronary heart disease and end-stage kidney disease. It is also associated with diabetes mellitus and chronic renal failure. Many studies have demonstrated that lifestyle modifications and adherence to appropriate drug treatment are sufficient to maintain blood pressure at optimal levels with dramatic reduction in the risk of long-term cardiovascular and cerebrovascular events. Guidelines are available which recommend evidence-based approaches to the management of hypertension (1, 2).

In Trinidad and Tobago, there is a high incidence of hypertension and hypertension-associated diseases with a consequent heavy burden on the public healthcare system. With a population of just over 1.3 million, ischaemic heart disease is the leading cause of death at 18%, with cerebrovascular disease and hypertensive heart disease ranked as the 4th and 5th leading causes of death at 11% and 4%, respectively (3). With about 40% of its population being of African ancestry, Trinidad and Tobago has a particularly high prevalence of hypertension, similar to that observed in African Americans.

Various drug classes are used in the management of hypertension including diuretics, β-blockers, calcium channel blockers, angiotensin converting enzyme (ACE) inhibitors and angiotensin II receptor blockers. Drugs from all these classes are available to patients accessing the recently introduced Chronic Disease Assistance Programme (CDAP) provided by the Ministry of Health in Trinidad and Tobago. All patients attending public healthcare facilities on the islands are prescribed medicines from a drug list free of charge. In 1998, a drug utilization survey was conducted at primary healthcare facilities throughout the island of Trinidad to determine drug prescribing patterns in hypertension and diabetes mellitus. At that time, thiazides diuretics constituted the largest class of drugs employed, which was in accordance with recognized guidelines, but there was also very high level prescriptions of alpha methyldopa. Angiotensin converting enzyme inhibitors were just beginning to become popular among clinicians at public primary healthcare facilities.

Drug utilization studies from around the globe show wide variations in the use of the various classes of antihypertensive drugs and in many cases are in stark contrast to recommendations by recognized guidelines (4–6). The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure (JNC-7) and the Anithypertensive and Lipid-lowering Treatment to Prevent Heart Attack Trial (ALLHAT) have been published which provide specific recommendations for the management of hypertension, including drug therapy. Likewise, guidelines have been developed by the Caribbean Health Research Council (CHRC) for the regional context in the light of recent global developments (7).

This paper presents the findings of a drug utilization review conducted at public primary healthcare facilities throughout Trinidad to determine drug prescribing patterns in uncomplicated and complicated hypertension.

METHODS AND MATERIALS

A cross-sectional study was conducted and this was approved by the Ethics Committee of the Faculty of Medical Sciences, The University of the West Indies, St Augustine campus.

Permission was also obtained from the respective County Medical Officers of Health (CMOHs) for each county to visit the health centres under their jurisdiction for collection of the required sample size and to view the medical records of patients who agreed to participate. The cross-sectional study was done between June and August 2006.

The study intended to determine the drug prescribing pattern in adult patients diagnosed with hypertension and attending public primary healthcare facilities throughout Trinidad. Persons over 18 years of age, diagnosed with and treated for hypertension and attending the facility for at least three months were eligible to enter the study. There are specific "chronic diseases/lifestyle diseases days" at these facilities where physician consultation is facilitated for such diseases as hypertension, diabetes mellitus, asthma and heart failure.

Cluster sampling was used to randomly select twenty-two public primary healthcare facilities throughout the various counties in Trinidad. Patients were selected from each health centre and researcher-interviewed using a *de novo* pilot tested questionnaire following informed consent. The sample at the individual health facility was chosen using the method of convenience random sampling. Enrolled patients were required to provide demographic data such as ethnicity, religion, marital status, occupation and socio-economic status. Details on hypertensive history, concomitant disease history and drug therapy (and corroborated with patients' records) were also collected.

Statistical Package for the Social Sciences (SPSS) Version 16.0 was used for data input and analysis. χ^2 analyses were performed to determine statistically significant associations between hypertensive patients (with and without diabetes mellitus), age, gender, duration of disease and choice of drug therapy. A level of significance α of 0.05 was used (α = 0.05).

RESULTS

Most of the patients enrolled in the study were female (71.1%), of Asian Indian descent (54.1%) with an average age of 62 ± 11.1 years. Most patients were being treated for both hypertension and diabetes mellitus (315 out of 547, 57.6%) and reported being diagnosed with these conditions on average of 10 years, (Table 1). Of the 547 hypertensive patients recruited, complete accessible drug records (from patient file or current prescription) were available for 442 patients (80.8% of the sample). Twenty-six out of 442 patients (6.1%) were not currently being prescribed drugs for hypertension, although 18 out of these 26 patients (69.2%) were also diabetic and would have had lower blood pressure goals (Table 2). At primary healthcare facilities, patients were prescribed on average 1.47 antihypertensive drugs, with just 174 out of 442 patients (39.4%) being on two or more antihypertensive drugs. Significantly less patients with concomitant hypertension and diabetes mellitus were prescribed two or more antihypertensive drugs compared with patients with hypertension alone (30.4% *vs* 51.0%, $p < 0.05$).

Angiotensin converting enzyme inhibitors were the most commonly used class of antihypertensive drugs and were prescribed in 281 patients (63.6%), followed by ß-blockers (29.2%), diuretics (25.8%) and calcium channel blockers [12.0%] (Table 3). Enalapril was the ACE inhibitor of choice

Table 1: Demographic details of study sample

	All HTN patients (n = 547)	HTN with DM (n = 315)
Male	158 (28.9%)	95 (30.2%)
Female	389 (71.1%)	220 (69.8%)
Age (yrs ± SD)	62.7 ± 11.1	62.4 ± 10.4
Ethnicity		
African	200 (36.6%)	95 (30.2%)
Asian Indian	296 (54.1%)	193 (61.3%)
Mixed	38 (6.9%)	19 (6.0%)
Other/not stated	13 (2.3%)	8 (2.5%)
Self-reported duration of disease		
Hypertension (yrs ± SD)	10.0 ± 10.0	–
Diabetes mellitus (yrs ± SD)	–	10.5 ± 9.0

HTN = hypertension; DM = diabetes mellitus

Table 2: Antihypertensive drug therapy in patients with complete accessible drug records (n = 442)

Antihypertensive drug intervention	All HTN patients n (%)	HTN alone n (%)	HTN with DM n (%)
No drug therapy	26 (5.9)	8 (4.2)	18 (7.2)
Monotherapy	242 (54.8)	86 (44.8)	156 (62.4)
Dual drug therapy	121 (27.3)	62 (32.3)	59 (23.6)
Triple drug therapy	45 (10.2)	30 (15.6)	15 (6.0)
Quadruple drug therapy	8 (1.8)	6 (3.1)	2 (0.8)
Total	**442**	**192**	**250**

HTN = hypertension; DM = diabetes mellitus

Table 3: Prescribed antihypertensive drugs in Trinidad (n = 442)

Drug class/Generic drug name	All HTN patients n (%)	HTN alone n (%)	HTN with DM n (%)
ACE inhibitors (ACEI)			
Enalapril	247	95	152
Lisinopril	30	15	15
Fosinopril	2	1	1
Captopril	2	2	0
Total	**281 (63.6)**	**113 (58.9)**	**168 (67.2)**
β-blockers (BB)			
Atenolol	117	61	56
Propranolol	9	4	5
Bisoprolol	3	1	2
Total	**129 (29.2)**	**65 (33.9)**	**64 (25.6)**
Diuretics			
Thiazide (bendrofluazide)	89	50	39
Furosemide	25	16	9
Total	**114 (25.8)**	**66 (34.4)**	**48 (19.2)**
Calcium channel blockers (CCB)			
Nifedipine	45	22	23
Amlodipine	5	0	5
Verapamil	3	1	2
Total	**53 (12.0)**	**23 (12.0)**	**30 (12.0)**
α-blockers			
Terazosin	1	1	0
Doxasosin	2	0	2
Total	**3 (0.7)**	**1 (0.5)**	**2 (0.8)**
Angiotensin receptor blockers (ARB)			
Valsartan	9	5	4
Presartan	1	0	1
Total	**10 (2.3)**	**5 (2.6)**	**5 (2.0)**
Other drugs			
Methyldopa	23	16	7
Reserpine	4	2	2
Total	**27 (6.1)**	**18 (9.4)**	**9 (3.6)**

HTN = hypertension; DM = diabetes mellilus; ACE = Angiotensin converting enzyme

in the Trinidad primary healthcare setting, either as monotherapy or polypharmacy. Diuretics were employed more frequently in uncomplicated hypertension (34.4%) than in hypertensive diabetic patients (19.2%), $p < 0.05$. Angiotensin receptor blockers, α-blockers, methyldopa and reserpine were less frequently prescribed in less than 10% of the sample.

Angiotensin converting enzyme inhibitors were utilized more frequently as monotherapy in hypertensive diabetic patients (70.5%) than in uncomplicated hypertension (55.8%), $p < 0.05$; whereas diuretics were more likely prescribed in uncomplicated hypertensives (12.8%) than in diabetic hypertensives (3.2%), $p < 0.05$ (Table 4).

Table 4: Monotherapy in HTN patients, with and without concomitant DM

Drug class	All HTN patients n (%)	HTN alone n (%)	HTN with DM n (%)
ACE inhibitors	158 (65.3)	48 (55.8)	110 (70.5)*
β-blockers	39 (16.1)	15 (17.4)	24 (15.4)
Calcium channel blockers	14 (5.8)	5 (5.8)	9 (5.7)
Diuretics	16 (6.6)	11 (12.8)	5 (3.2)*
Angiotensin receptor blockers	5 (2.1)	1 (1.2)	4 (2.6)
Methyldopa and reserpine	10 (4.1)	6 (7.0)	4 (2.6)
Total	**242 (100)**	**86**	**156**

* $p < 0.05$

HTN = hypertension; DM = diabetes mellitus

Although multiple drug therapy was utilized less in diabetic hypertensive patients, ACE inhibitors combined with either ß-blockers or diuretics were prescribed to a greater extent in this group than in uncomplicated hypertension, $p < 0.05$ (Table 5). Likewise, triple therapy with ACE inhibitors, ß-blockers and diuretics was greater in the diabetic hypertensive group than in uncomplicated hypertension, $p < 0.05$.

In patients with concomitant diabetes mellitus, metformin was commonly prescribed in 203 out of 250 patients (81.3%). The sulphonylureas, gliclazide and glibenclamide were prescribed to a lesser extent in 35.6% and 21.6% of the patients, respectively. Insulin was prescribed in 45 diabetic hypertensive patients (18.0%); however, only 22 of these patients were also prescribed ACE inhibitors.

Cardioprotective prophylactic aspirin (81 mg) was prescribed in 190 out of 442 (43.0%) patients. Other frequently prescribed drugs in the sample included simvastatin, isordil and glyceryl trinitrate (GTN).

Table 5: Details of combinations involving two or more drugs in HTN patients, with and without concomitant DM

Drug combinations	All HTN patients n (%)	HTN alone n (%)	HTN with DM n (%)
DUAL THERAPY			
ACE inhibitor and β-blocker	39 (22.4)	19 (19.4)	20 (26.3)*
ACE inhibitor and diuretic	38 (21.8)	18 (18.4)	20 (26.3)*
ACE inhibitor and CCB	9 (5.1)	4 (4.1)	5 (6.6)
β-blocker and diuretics	11 (6.3)	6 (6.1)	5 (6.6)
β-blocker and CCB	5 (2.8)	2 (2.0)	3 (3.9)
Diuretic and CCB	6 (3.5)	4 (4.1)	2 (2.7)
Diuretic and methyldopa or reserpine	5 (2.8)	4 (4.1)	1 (1.3)
Other dual therapies	8 (4.5)	5 (5.1)	3 (3.9)
Total Dual Therapy	**121 (69.5)**	**62 (63.3)**	**59 (77.6)**
TRIPLE THERAPY			
ACE inhibitor and β-blocker and thiazide	20 (11.5)	15 (15.3)	5 (6.6)*
ACE inhibitor and β-blocker and CCB	6 (3.4)	2 (2.0)	4 (5.2)
β-blocker and CCB and diuretic	6 (3.4)	4 (4.1)	2 (2.6)
β-blocker and Diuretic and methyldopa or reserpine	5 (2.9)	4 (4.1)	1 (1.3)
Other triple therapies	8 (4.6)	5 (5.1)	3 (4.0)
Total Triple Therapy	**45 (25.9)**	**30 (30.6)**	**15 (19.7)**
QUADRUPLE THERAPY			
ACE and β-blocker and CCB and diuretic	3 (1.7)	2 (2.0)	1 (1.3)
ACE and β-blocker and CCB and centrally acting	2 (1.1)	2 (2.0)	0 (0.0)
β-blocker and CCB and diuretic and α-blocker	1 (0.6)	0 (0.0)	1 (1.3)
β-blocker and CCB and diuretic and methyldopa or reserpine	2 (1.1)	2 (2.0)	0 (0.0)
Total quadruple therapy	**8 (4.6)**	**6 (6.1)**	**2 (2.6)**
Total	**174**	**98**	**76**

$p < 0.05$

HTN = hypertension; DM = diabetes mellitus; ACE = angiotensin converting enzyme; CCB = calcium channel blocker

DISCUSSION

This study highlighted the significant number (57.2%) of patients being treated for both hypertension and diabetes. This survey was conducted over a 3-month "window" period, and it is possible that since that time the prescribing pattern may have changed. Among the drug classes with significant use, ACE inhibitors (67.1%), β-blockers (26.6%) and calcium channel blockers (14.3%) were the most commonly employed. There was a high prevalence of hypertensive diabetic patients in our sample and the increased utilization of ACE inhibitors is in accordance with JNC-7 guidelines which recommend its use for renoprotection in this patient group (8).

Both diuretics and alpha methyldopa were prescribed less frequently in 26.2% and 6.1% of patients, respectively. Use of multiple drug combinations for hypertension disease control was also high at 37.4%.

Our findings are similar to that observed in the Department of Veterans affairs, United States of America (USA) where there was increased use of ACE inhibitors (range: 28.9% to 38.3%), β-blockers (range: 19.9% to 28.6%), thiazide diuretics (range: 11.2% to 16.5%), calcium channel blockers (range: 20.1% to 28.1%) and angiotensin receptor blockers [range: 1.5% to 5.5%] (9). By 2002, the cross-sectional broadly representative NHANES study in the USA also showed that diuretics, calcium channel blockers, β-blockers and ACE inhibitors were commonly prescribed at a rate of 28.7%, 20.3%, 19.8% and 23.8%, respectively (10).

Another recently published study in the USA showed similar shifts in the prescribing patterns of antihypertensive drugs in uncomplicated disease from 1993 to 2004: diuretics (increase from 34% to 50%), calcium channel blockers (decrease from 44% to 29% in 2000), ACE inhibitors (36% to 35%, unchanged), β-blockers (increase from 24% to 33%), and angiotensin receptor blockers [1% when they entered the market in 1995 and increased to 23%] (11). In the present study, patients were on average prescribed 1.9 antihypertensive drugs.

Although the trend of antihypertensive drug prescribing in Trinidad indicates an attempt by local health authorities to adopt recommendations from recognized guidelines, similar to those seen in some USA studies, there are stark differences in comparison to other major developing countries. Although a study in Nigeria showed high use of diuretics, there was also high use of alpha methyldopa (12). In India, there is very low use of both diuretics and ACE inhibitors (13).

Following the ALLHAT and JNC-7 report, thiazide diuretics were recommended as first-line treatment in newly diagnosed uncomplicated hypertension or as part of polypharmacy of hypertension with co-morbidities. These publications indicate that thiazide diuretics are just as effective as other drug classes in uncomplicated hypertension, have additional benefit in the prevention of cardiovascular events and are very cost-effective (14). The ALLHAT study also showed that they were the most efficacious antihypertensive drug class in Blacks, while potentiating the action of other classes of antihypertensive drugs (15). A recent study examining the effect of government policy in Norway for mandatory prescription of thiazides in uncomplicated hypertension showed no significant change in achieving treatment targets and demonstrated potential savings (16).

Despite the evidence, it was interesting to note the less frequent use of thiazide diuretics in our Black population. In our patient sample, just about one in four patients was prescribed thiazide diuretics, with slightly more uncomplicated hypertensive patients being prescribed this class. Although a recent USA study showed a significant increase in prescription of thiazides following the publication of the ALLHAT study (17), many other studies still demonstrate the under-utilization of thiazides, especially in uncomplicated hypertension which corroborated with the findings of our study (18–21).

A recent survey of clinicians in the USA demonstrated that there is a persistent perception that thiazides are not as effective as β-blockers and are less tolerable than the newer classes of antihypertensive drugs (22). Also, reports of increased rates of diabetes with thiazides and β-blockers may explain the continued prescription and reliance on expensive drugs despite the numerous trials that indicate otherwise (23).

Angiotensin converting enzyme inhibitors were by far the most popular drugs, particularly enalapril, in our sample population, with no significant difference in its preference between uncomplicated and hypertensive diabetic patients. A few studies have demonstrated that ACE inhibitors (as monotherapy) possess a statistically significant protective association with respect to mortality after controlling for age and cardiovascular status (24, 25) which may explain its increasing utilization across the globe. In our sample, clinicians in Trinidad seem to be adhering more strictly to the guidelines than their counterparts in Pennsylvania in the USA in 2002, where just about 50% of elderly diabetic hypertensive patients were being prescribed drugs from this class (26).

There were a number of limitations of the study which includes its cross-sectional nature. This survey was conducted over a 3-month "window" period, and it is possible that since that time the prescribing pattern might have changed. The study was not designed to assess whether patients were controlled for either hypertension or diabetes mellitus, or whether treatment targets were being met. Patient charts were not examined to determine severity of disease and to assess whether appropriate therapy was administered to control disease. We did not examine patients' drug history to determine whether appropriate changes and/or adjustments to drug therapy were made to adequately control disease. We did not record laboratory results, such as serum creatinine or albuminuria, which could have given insight into disease progression. These laboratory results would have dictated the appropriate use of the antihypertensive drugs, such as ACE inhibitors. Although patients were asked about their adherence to drug treatment, we expected these responses to be highly subjective as many reports show the wide disparity between self-reported and actual adherence (which could only be determined by objective measures).

CONCLUSION

The survey highlighted the current utilization of drugs in hypertensive patients accessing the services of the public health sector in Trinidad. The results indicate that current prescribing patterns are in keeping with the recommendations of JNC-7 and CHRC guidelines. A further evaluation of drug utilization for hypertension should be done to determine their adequate blood pressure control in patients with an audit to assess the impact of drug therapy on disease outcome and strategies to improve patient adherence to drug treatment.

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