Evaluation of drug management of essential hypertension in the University Of Cape Coast Hospital, Ghana.

by

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CERTIFICATION

I hereby declare that this submission is my own work towards the MSc and that, to the best of my knowledge, it contains no material previously published by another person nor material which has been accepted for the award of other degree of the University, except where due acknowledgement has been made in the text.

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Supervisor's Name	Signature	Date
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Head of Department's Name	Signature	Date

ABSTRACT

Hypertension and hypertension-related admissions, complications and death showed an increasing incidence and increasing rate respectively between 2004 and 2006 in the University of Cape Coast Hospital, Ghana, even though in other parts of the world like the America and Canada the management of the disease was under appreciable control. This study sought to compare the drug management of essential

hypertension in the hospital with the 2007 European Society of Hypertension and European Society of Cardiology Guidelines for Arterial Hypertension Management (ESH/ESC guidelines).

Two different tools (structured questionnaires and an observation check list) were used in the observational cross-sectional study carried out between February and July 2008. The first instrument consisted of two separately designed questionnaires directed at seven (7) prescribers and one hundred and twelve (112) confirmed hypertensive subjects who managed hypertension with drugs. The second instrument was an observational check list used to extract information from the clinical notes of seventy-one (71) hypertensive clients. The data collated was analyzed using Statistical Package for the Social Sciences version 12. The outcome of the analysis was then compared with the 2007 ESH/ESC guidelines.

The majority of prescribers defined hypertension as a persistently raised BP beyond 140/90 mmHg for systolic and diastolic values, which was classified into mild, moderate and severe hypertension. Pharmacotherapy was initiated without following through with non-pharmacological management in mild or moderate hypertension as required by the guidelines. 71.4% of the prescribers had BP targets for treating hypertension which fell in line with the guidelines, and therefore employed diuretics, calcium channel blockers (CCBs), β-blockers, angiotensin-converting enzyme inhibitors, angiotensin II receptor blockers, and adrenergic-blocking antihypertensive drugs as medications for both initiation and maintenance (regular) management. CCBs had the highest use rate. In maintenance therapy, whereas monotherapy accounted for 29.6% of prescriptions, combination of two or more different classes of antihypertensive drugs accounted for 69% of prescriptions.

Generally, hypertension management conformed to the 2007 ESH/ESC guidelines[10] except in the diabetic hypertensive.

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LIST OF ABBREVIATIONS

ABA	Adrenergic-blocking antihypertensives
ACE	Angiotensin-converting enzyme
ACEI	Angiotensin-converting enzyme inhibitor
ARB	Angiotensin-II receptor blocker

BHS	British Hypertension Society
BMI	Body Mass Index
BP	Blood pressure
CAA	Centrally-acting antihypertensive drugs
CCB	Calcium channel blocker
CHF	Coronary heart failure
CVD	Cardiovascular disease
CVA	Cardiovascular accident
D	Diuretic
DBP	Diastolic blood pressure
DM	Diabetes mellitus
ESH/ESC	European Society of Hypertension / European Society of Cardiology
ESRD	End-stage renal disease
JNC	Joint National Committee
LVH	Left ventricular hypertrophy
MA	Medical Assistant
MO	Medical Officer

OPD	Out-Patients' Department
PAD	Peripheral artery disease
PVD	Peripheral vascular disease
SBP	Systolic blood pressure
SPSS	Statistical Package for the Social Sciences
V	Vasodilator

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When all Thy mercies, O my God,

My rising soul surveys,

Transported with the view, I'm lost

In wonder, love and praise.

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND

Hypertension is one cardiovascular disease that is not sufficiently prevented and controlled at both hospital and community levels. This has resulted in significant morbidity and mortality. It is reported that blood pressure is under control in less than 20% of patients with hypertension in many countries.[1] The antihypertensive drugs employed in the management of hypertension are current, yet the burden of hypertension management is enormous in Africa[2].

Over the past decade, antihypertensive prescribing patterns in elderly individuals with diabetes have changed in directions consistent with the evolving evidence base in Ontario, Canada.[3] Also, there is evidence that the physician management of hypertension in elderly Canadians became more aggressive between 1994 and 2002. This has resulted in satisfactory control of hypertension and reduction in hypertension-related morbidity and mortality.[4]

International professional bodies on hypertension regularly review hypertension drug management patterns as new drug molecules for hypertension management are discovered in research. The research and associated results often increase the cost of hypertensive medications. There is therefore the call for skillful and prudent administration of these drugs to reduce the burden of the disease, and also offer the advantage of controlling related disorders. Eventually mortality and morbidity will be reduced, and produce an enhanced lifestyle.

Between the years 2004 and 2006, information from the University of Cape Coast Hospital records show an increasing incidence of the disease, and increasing rate of hypertension-related admissions, complications and death. In 2004, 814 cases of hypertension were recorded in the hospital. This figure increased to 995 in 2005. In 2006, a further increase to 1,256 was recorded. In 2004, hypertension accounted for 8.2% and 2.3% of all admissions and deaths respectively. In 2005, 10.5% of admissions were on account of hypertension. 11.8% of admitted hypertensive patients had stroke and 2% died. In 2006 hypertension accounted for 10.2% of the admissions. 13.6% and 4.5% of the hypertension-related admissions had stroke and died respectively.[5] Hypertension management outcomes declined even though the required drugs were available. Averagely, 238 hypertensive patients receive treatment reviews monthly with drugs belonging to one or more of the following classes; calcium channel blockers (CCBs), angiotensin-II receptor blockers (ARBs), angiotensin-converting enzyme inhibitors (ACEIs), vasodilators (V), β-adrenergic blockers (BBs), diuretics and adrenergic blocking antihypertensive (ABAs) drugs.[6]

Evaluating the drug management of hypertension in the hospital could help in making proposals that will streamline treatment protocols in the hospital to conform to national and international standards. Since there is no record of the past performance of the hospital in the management of hypertension, this research can serve as baseline for future assessments. The resulting gaps and updates identified could form a block of recommendations that will improve the care and management of hypertensive subjects in the hospital. With time the policy may be extended to cover the practice in the Central Region, and Ghana.

1.2 ESSENTIAL HYPERTENSION

There is a strong positive and continuous correlation between the blood pressure (BP) and the risk of cardiovascular disease (CVD) -i.e. stroke, myocardial infarction, and heart failure- renal disease, and mortality, even in the normotensive range. This correlation is more robust with systolic than with diastolic BP[7]. There is no specific level of BP where cardiovascular and renal complications start to occur; thus the definition of hypertension is arbitrary but needed for practical reasons in patient assessment and treatment.

Hypertension is frequently defined as the pathological elevation of arterial BP. The diagnosis of hypertension is made when the average of 2 or more diastolic BP measurements on at least 2 subsequent visits is greater or equal to 90 mm Hg or when the average of multiple systolic BP readings on 2 or more subsequent visits is consistently greater or equal to 140 mm Hg. Isolated systolic hypertension is defined as systolic BP greater or equal to 140 mmHg and diastolic BP less than 90 mm Hg. By these definitions, it is estimated that 55 million people in the United States, which is approximately 24% of the adult population, have hypertension or are taking antihypertensive medication. This proportion changes with (1) race, being higher in blacks (32.4%) and lower in whites (23.3%) and Mexican Americans (22.6%); (2) age, because in industrialized countries systolic BP rises throughout life, whereas diastolic BP rises until age 50 to 60 years and thus the greater increase in prevalence of hypertension among the elderly is mainly due to systolic hypertension; (3) geographic patterns, because hypertension is more prevalent in the southeastern United States; (4) gender, because hypertension is more prevalent in men (though menopause tends to abolish this difference); and (5) socioeconomic status, which is an indicator of lifestyle attributes and is inversely related to the prevalence,

morbidity, and mortality rates of hypertension.[7] In Ghana, there is little research and literature published on hypertension and related conditions.

Less than 10 percent of all hypertension is secondary (or malignant), caused by renal disease, adrenal gland disorders, coarctation of the aorta or drug-induced by oral contraceptives, corticosteroids, carbenoxolone, sympathomimetics, tricyclic antidepressants or monoamine oxidase inhibitors. Thus, over 90 percent of hypertension is primary (essential) and represents the upper end of a normal distribution of blood pressure in the population rather than any clearly defined subgroup.

Blood pressure in adults has generally been classified as normal (less than 120/80 mmHg), prehypertension (120-139 mmHg/ 80-89 mmHg), stage one (or mild) hypertension (140-159 mmHg / 90-99 mmHg) and stage two hypertension (greater than 160/100 mmHg).[8] The British Hypertension Society (BHS –IV) guidelines[9] make room for stage three (or severe) hypertension (greater than 180/110mmHg), where stage two (moderate) hypertension ranges from a BP of 160-179mmHg/100-109mmHg. One of the major modifications in recent classification is the introduction of "prehypertension" and the merger of stages 2 and 3 hypertension into one to form the stage 2 hypertension. This modification was because of the new data on lifetime risk of hypertension and the increase in the risk of cardiovascular complications associated with levels of BP previously considered to be normal. The change also reflects the fact that the approach to the management of the stages 2 and 3 is similar.

1.2.1 AETIOLOGY OF ESSENTIAL HYPERTENTION

Although it has frequently been indicated that the causes of essential hypertension are not known, this is only partially true because we have little information on genetic variations or genes that are over expressed or under expressed as well as the intermediary phenotypes that they regulate to cause high BP. A number of factors increase BP, including (1) obesity, (2) insulin resistance, (3) high alcohol intake, (4) high salt intake (in salt-sensitive patients), (5) aging and perhaps (6) sedentary lifestyle, (7) stress, (8) low potassium intake, and (9) low calcium intake. Furthermore, many of these factors are additive, such as obesity and alcohol intake. [7]

It is therefore no longer appropriate to define essential hypertension as "a rise in blood pressure without cause", since a number of causes can be clearly identified in most cases of so-called "essential hypertension". As reviewed in diverse literature, there is clear evidence that changes in lifestyle, including dietary changes that reduce body weight, fat, and alcohol intake and increase potassium and calcium intake, as well as exercise reduce or normalize BP in many patients.[10]

1.2.2 TREATMENT THRESHOLDS AND GOALS

The decision to initiate antihypertensive drug treatment is based on two criteria;

- The level of the systolic and diastolic blood pressure and
- The level of the total cardiovascular risk.[10]

All patients in whom repeated blood pressure measurements show stage 2 hypertension are definite candidates for antihypertensive drug treatment. The primary goal of treatment of the hypertensive patient is to achieve the maximum reduction in the long-term total risk of cardiovascular morbidity and mortality. This

requires treatment of all the reversible risk factors identified, including smoking, dyslipidaemia, abdominal obesity or diabetes, and the appropriate management of associated clinical conditions, as well as treatment of the raised blood pressure.[10]

The BHS-IV guidelines[9] for hypertension treatment emphasizes the need for cardiovascular risk assessment in people with stage 1 (mild hypertension) to guide treatment decisions. Figure 1.1 (below) shows BP thresholds for consideration of drug treatment of hypertension.

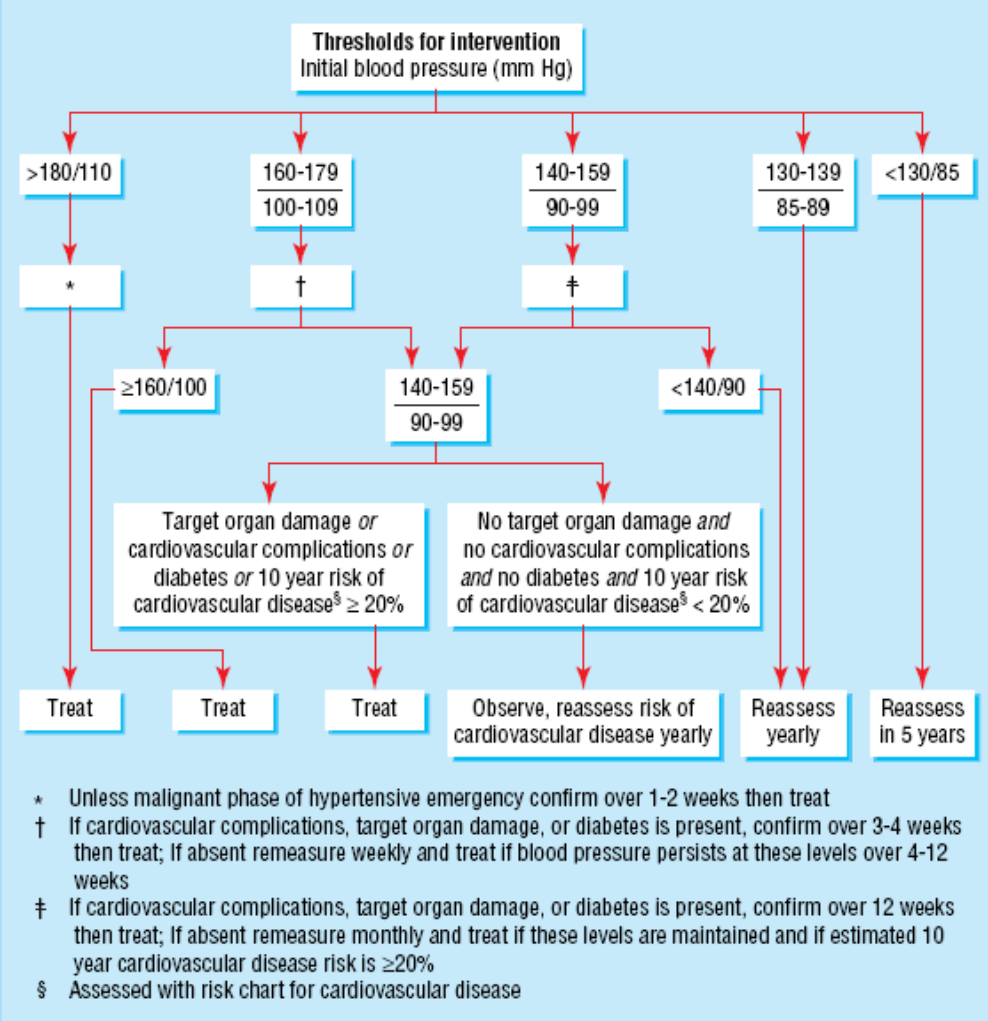

Figure 1.1 BP thresholds for intervention[9].

In the position statement of the 2007 European Society of Hypertension and European Society of Cardiology (ESH/ESC) Guidelines for Arterial Hypertension Management,[10] the following are some goals of treatment;

- BP should be reduced to at least below 140/90 mmHg (systolic/diastolic), and to lower values.
- Target BP should be at least less than 130/80 mmHg in diabetics and in high or very high risk patients, such as those with associated clinical conditions (stroke. myocardial infarction, renal dysfunction, proteinuria)

1.2.3 PRINCIPLES OF BLOOD PRESSURE PHYSIOLOGY

The human body uses different mechanisms to maintain blood pressure within a certain range. BP is a product of peripheral vascular resistance and cardiac output, and control is exerted by influencing one of these two components. In the body, increase in BP can originate from different sources- the sympathetic nervous system in the form of β- or α-receptor activation; sodium or water retention in the renal system; angiotensin from the rennin-angiotensin system- and from other sources such as endothelial-derived constricting factor.[11] When one of these systems overrides the other, hypertension develops. However, when these are well balanced, homeostasis results in the BP control.

Once hypertension is diagnosed, pharmacologic and non pharmacologic measures are set in motion to control and reduce the BP. In an attempt to reduce the BP, the body triggers a compensatory mechanism that counteracts the pressure control system that has been put in place. Compensatory mechanisms have been designed to maintain perfusion in case of blood loss. They therefore sabotage antihypertensive treatments. For example, when sodium restriction is instituted (by

the administration on a drug, A), the rennin-angiotensin system tends to become activated. Pharmacologically, one strategy for improving control is to block the effect of the compensatory mechanism (with another drug, B). If it is successful, a synergistic effect is achieved, that is , the BP lowering effect caused by both drugs, A and B, is greater than the sum of the reductions observed with either agent as monotherapy.[11] Such two drugs normally come from different classes of antihypertensive agents. Also, the effect they exert may be in addition to or the result of the normal mechanism of action of the medications. For example in vasodilators like hydralazine that causes sodium and water retention, a diuretic would attenuate this compensatory mechanism in addition to exerting its own blood pressure lowering effect. This is synergism and it is beneficial because it allows the use of lower dosages or concentrations of both drugs, reducing the risk of adverse effects while maintaining an appropriate level of BP control.

Where adverse effects or other patient-specific reason makes it impossible to add a second drug that blocks compensatory mechanism, the next rational step is to select a drug that acts by an entirely different mechanism, leading to an additive effect on blood pressure, or to reduce BP to the degree predicted if the reductions of each of the drugs is put together.[11]

1.2.4 DRUG SELECTION AND THERAPY OF HYPERTENSION

Drug therapy is reserved for hypertensive subjects in whom blood pressure cannot be maintained within the normal range by nonpharmacological means. Thus, subjects with systolic and diastolic BP consistently above 140/90mmHg should be considered for therapy. Subjects that have diastolic BPs that are consistently greater than 94 mmHg should be treated and individuals with diastolic pressures between 90

and 94mmHg who have other risk factors (e.g. men older than 55 years, smokers, target organ damage (TOD), diabetes mellitus, hyperlipidaemia or other major risk factors for CVD) should also be treated.[8]

A large number of compounds have been developed over the years for the treatment of hypertension. The most frequently used classes of antihypertensive drugs are diuretics, β-blockers (BBs), calcium channel blockers (CCBs), angiotensin converting enzyme inhibitors (ACEIs) and angiotensin-II receptor blockers (ARBs). They are all similarly effective in reducing blood pressure. Along with alpha-receptor blockers, all these are considered first line therapy for hypertension.[8]

Thiazide diuretics are the least expensive of the first-line drugs and considered appropriate for the treatment of the elderly and in subjects with volume-dependent hypertension. Most black and obese hypertensive subjects belong in the latter group. Thiazides should be avoided in subjects with hyperuricaemia, hyperglycaemia, hyperlipidaemia and hypokalaemia. Hypertensive individuals with left ventricular hypertrophy (LVH) should not be treated with a thiazide diuretic alone, since these drugs have not been shown to reverse hypertrophy, even though BP is reduced. β-blockers should be considered for young hypertensive subjects and those with angina pectoris, a history of myocardial infarction, cardiac arrhythmias, or mitral valve prolapsed.

CCBs should be considered for subjects who cannot tolerate diuretics or β-blockers. In general hypertensive subjects with low rennin levels respond well to CCBs. Thus the elderly and black hypertensive subjects who have underlying bronchospastic pulmonary disease are ideal candidates for receiving one of these

drugs. Patients with LVH and/or a history of cardiac arrhythmias and those with peripheral vascular disease (PVD) can take CCBs safely.

ACEIs and ARBs can be used for initial therapy in patients who cannot tolerate diuretics or β-blockers. These agents are also appropriate for subjects with coronary heart failure (CHF) or diabetes mellitus (DM). They can also be used safely in those with LVH and/or cardiac arrhythmias.

The recommended treatment strategy is to try one medication and increase the dose until the goal BP is achieved. If goal BP is not achieved and the side effects are intolerable or the maximum dose is reached another agent can be added or substituted. An example of adding another agent is that of a diuretic and an ACEI resulting in greatly enhanced hypotensive potency. However, if two antihypertensive agents having similar modes of action are chosen, response will be inadequate because the patient will be on two drugs that have the effect of one. Where two drugs are unable to control the BP adequately, a third agent can be added to the existing regimen.[3]

In choosing the initial first line therapy, issues such as side effects, quality of life, cost and efficacy of drugs in certain subgroups of hypertensive subjects should be considered. Thus, a simplified "stepped-care approach" previously advocated by most investigators, has been replaced by a more individualized approach in which the subject's age, race, concomitant diseases, risk of adverse effects and therapies, lifestyle, and even, possibly, the socioeconomical status are considered. For example, it is known that blacks generally maintain a low rennin state, and therefore tend to perform poorly on ACEIs and ARBs as antihypertensive drugs. Depression and bradycardia may preclude titration of BBs, or a diuretic may be exacerbating gout or hyperglycaemia.

It has been observed that when these agents are used alone, effectiveness is limited to about 30%[8]. Monotherapy controls BP effectively for those patients who are in stage one of hypertension. Most patients in stage 2 (and stage 3, if applicable) will need a combination of two or more antihypertensive drugs. Combinations of antihypertensive agents can yield an efficacy rate of not less than 60%.[12]

As much as health professionals try to control BP in hypertensive subjects with drugs and other recommended approaches, subjects will need to play a part in ensuring success. They need to maintain lifestyle modifications outlined by their prescribers. At all levels of treatment nonpharmacological management should form an integral part[8]. These include exercising, dieting, reduction of stressful conditions, etc. Patients must also adhere to the dosage regimen of the prescribed drugs. Some reasons that account for nonadherence among patients include adverse effects, patient dissatisfaction or patient disinterest.

The presence of secondary hypertension may also contribute to treatment failure. With a case like this, the solution lies in the employment of other procedures other than the use of antihypertensive drugs. Medications may also play vital roles in the worsening of blood pressure controls. Both prescription and over-the-counter medications may account for this. Poor medication choices and combination may also affect BP control.

1.2.5 HYPERTENSION MANAGEMENT IN SPECIAL PATIENT GROUPS

Patient-factors and clinical conditions influence the selection of antihypertensive agents. Such factors and conditions include the age (as in the

elderly), diabetic, pregnant and asthmatic patients. In managing such patient groups, it is important to match the antihypertensive medication to the patient's other disease states to gain the most benefit.[13]

Hypertension and diabetes commonly coexist. They are known to substantially increase the risk of incidence of stroke, coronary heart disease, cardiac failure, peripheral artery disease and cardiovascular morbidity. Aggressive treatment to lower the BP and the regular use of a blocker of the rennin-angiotensin system exert a protective effect from the appearance and progression of renal damage.[10] β-blocker use masks the tachycardia associated with hypoglycaemia such that patients may be unaware that their blood glucose levels are decreasing. In addition, β-blockers can aggravate pre-existing peripheral vascular disease that may be present in the diabetic patient.[13] They are therefore not to be preferred in such patients. Finally, in diabetic hypertensive patients, thiazide diuretics use has been associated with further impairment of glucose tolerance. They should also be avoided.

Due to age-related deterioration of glomerular filtration rate, blood flow, hepatic mass and the coexistence of other diseases, selection of appropriate antihypertensive medication in the elderly can be difficult. Where drug treatment is necessary, it is recommended that low doses of thiazide diuretics be administered whilst monitoring serum potassium levels. Low dose β-blocker use has also been recommended by a number of studies, but not as first-line agent, unless there are associated cardiovascular conditions.[10,13] CCBs have proven to be extremely useful in the elderly in reducing BP with the minimum side effects, without putting too much extra strain on the heart. Peripheral resistance is increased with the decreasing compliance of blood vessels in the elderly, thus vasodilatation of the arterioles by a CCB can produce a significant reduction in BP.[13] ACE inhibitors can be effective,

even though low rennin levels are common in the elderly. Monitoring has to be carried out in the elderly with decreased renal function because of the potential to cause hyperkalaemia.

Hypertension in pregnancy come about either as pre-existing primary hypertension or induced gestational hypertension. In either case, it has associated complications for both the mother and foetus, and therefore it is desirable to control the BP. Methyldopa (a central adrenergic blocking antihypertensive) remain the drug of choice for treating hypertension presenting in pregnancy.[13] Dihydropyridine CCBs and β-blockers (like labetalol) have been used successfully in many studies.[10] ACE inhibitors and ARBs are potentially damaging to the foetus and therefore contraindicated. If hypertension leads to eclampsia, parenteral hydralazine is usually effective, continuing until the mother recovers sufficiently to take oral medications.[13]

1.2.6 REDUCING CVD RISKS WITH STATINS AND ASPIRIN

Some hypertension treatments focus more on the overall CVD risk management. Statin therapy safely reduces risk of coronary heart disease and stroke which are complementary to the benefits of BP control. Therefore statin therapy is recommended for all patients with hypertension and a history of CVD, irrespective of baseline cholesterol values and for people whose CVD risk exceeds 20% over 10 years.[14] Target lipid levels are the same for both primary and secondary prevention. The new ideal targets are to lower total cholesterol by 25% or LDL-cholesterol by 30% or to get total cholesterol and LDL-cholesterol to below 4 mmol/l or 2 mmol/l whichever is the greater. However, pragmatic 'audit' targets of less than 5 mmol/l or 3 mmol/l with the same percentage reductions are recommended as minimal acceptable standards.

The advice concerning the use of low-dose aspirin for primary and secondary prevention of CVD is to use 75 mg daily if the patient is over 50 years old with blood pressure controlled to less than 150/90 mmHg and either: target organ damage, diabetes mellitus, or 10-year risk of cardiovascular disease of less than 20%.[14]

1.2.7 PREVIOUS EVALUATIONS OF HYPERTENSION MANAGEMENT

It is estimated that the awareness of hypertension among Americans has improved from a level of 51% between 1976 and 1980 to 70% in 1999 to 2000. The percentage of patients with hypertension receiving treatment has increased from 31% to 59% in the same period, and the percentage of persons with high BP controlled to below 140/90 mmHg has increased from 10% to 34%. Between 1960 and 1991, median systolic blood pressure (SBP) for individuals aged 60-74 declined by approximately 16 mmHg. These changes have been associated with highly favourable trends in the morbidity and mortality attributed to hypertension. Since 1972, age adjusted death rates from stroke and coronary heart disease have declined by approximately 60% and 50% respectively. In the past decade better treatment of hypertension has been associated with considerable reduction in the hospital case-fatality rate for heart failure.[8] This information suggests that there have been substantial improvements. However, these improvements have not been extended to the total population. Two-thirds of hypertensive patients are not being controlled to BP levels less than 140/90 mmHg. Furthermore the decline rates in CHD-and stroke-associated deaths have slowed in the past decade. In addition the prevalence and hospitalization rates of heart failure, wherein the majority of patients have hypertension prior to developing heart failure, have continued to increase. Moreover

there is an increase in the end-stage renal disease (ESRD) by primary diagnosis. Hypertension is second only to diabetes as the most common antecedent for this condition.[8] In a recent study of men receiving care at a Veteran Affairs Hospital, 60.4% of subjects were receiving multiple antihypertensive medications. Nevertheless only 28% of these same patients had reached goal pressure levels.[15]

1.3 THE UNIVERSITY HOSPITAL, CAPE COAST

The university hospital, owned by the University of Cape Coast and established in 1963, caters for the health needs of the university community. With time the scope of the hospital increased to include meeting health needs of the communities outside the university community. It has therefore become one of the fourteen healthcare facilities in Cape Coast.

The hospital has a 40-bed capacity that takes care of both in-patients and outpatients. The catchment area of the hospital is seven communities, with a total population of about 30,000. This makes about 35% of the total population in the Cape Coast Metropolis. The average literacy rate is 57.1%.[16]

The hospital is a district level health care facility with an average of five (5) medical officers and assistants on duty every week day. Complicated health issues are determined and referred for specialist attention and management at higher centres of healthcare. The facility is located in an academic environment with clientele ranging from the illiterate to the highly intellectual. This facility also thrives on the research outcome of professionals who work in the hospital, feeds on the feedback from the researches and attempts to improve its service to the catchment

communities. By virtue of its catchment area and the professionals at post, the activities can easily be extrapolated to reflect the quality of health services in the Central Region of Ghana.

Even though the study could be carried out elsewhere in the central region, this institution was chosen for convenience. Again the possible sample for research available in the university offers diversity that cannot be obtained anywhere in the central region. Finally, the hospital has been noted to have professionals who have practiced healthcare at the same place for a long time. The turnover of workers in this institution is low. Therefore the results of sustained treatment pattern over the years can easily be ascertained.

1.4 STUDY OBJECTIVES

This research has the following objectives;

- Identify the targets of drug treatment of essential hypertension in the hospital
- Identify the various classes of drugs employed in the management of essential hypertension in the hospital
- Compare the general drug management trends of hypertension in the hospital with the 2007 European Society of Hypertension (ESH) and the European Society of Cardiology (ESC) Guidelines for the Management of Arterial Hypertension.[10]

CHAPTER TWO

METHODOLOGY AND RESULTS

2.1 TYPE OF STUDY

A cross-sectional study was generally employed. A retrospective search was also carried out to find out how hypertensive subjects started with pharmacotherapy. The tools used were qualitative and quantitative.

Two different instruments (structured questionnaires and an observation check list) were used in this study; the first instrument was made of two designed questionnaires to find out how medical officers and assistants (prescribers) in the hospital understood and managed hypertensive subjects. The second questionnaire was directed at the diagnosed hypertensive subjects. This questionnaire sought to find out how clients managed the condition together with the prescribers.

The second instrument was an observation check list targeted at the clinical notes/records (cards and folders) of hypertensive clients. The information obtained in the card/folder was to confirm the responses to the questionnaire completed by the prescribers.

2.2 TIME FRAME

The study started on February 11, 2008 and ended on July 30, 2008. It began with the administration of questionnaire to hypertensive subjects and prescribers. In July, 2008 folders were sampled and the required information extracted and tabulated.

2.3 STUDY VARIABLES

The main study variable was the classes of antihypertensive agents. Other variables included the BP (measured in mmHg), disease conditions presenting as complications or co-morbidities to hypertension, age, weight and height. The only measured variables were the weight and height which were used to calculate the body mass index (BMI) of subjects. Whilst completing the questionnaire, the subjects provided the some information regarding BPs, and the names of the hypertensive drugs that were being taken.

2.4 STUDY POPULATION

Prescribers who worked at the hospital were chosen to be part of the study population. The old and newly diagnosed hypertensive patients (subjects) also formed part of the study population. The subjects should have been managing hypertension with drugs.

2.5 DEVELOPMENT OF QUESTIONNAIRE

Two sets of questionnaires were developed; one for prescribers (Questionnaire One) and the other for hypertensive subjects (Questionnaire Two). Questionnaire One was first drafted and piloted among medical officers who worked at the Baiden-Ghartey Memorial Hospital and Tantri Clinic in Cape Coast. The responses to the draft-questionnaire were carefully studied, evaluated and modified. The modified questionnaire was re-piloted among medical officers at the Central Regional Hospital, Cape Coast. It was modified again after the second piloting to obtain the final one shown in Appendix I (page 54).

Questionnaire Two was drafted and piloted among ten (10) subjects who sought care at the Central Regional Hospital, Cape Coast. The completed copies of the questionnaire were evaluated, modified and re-administered to another set of ten (10) subjects from the Cape Coast Municipal Hospital. The responses to the questionnaire were studied and modified to produce the final questionnaire, shown in Appendix II (page 60).

2.6 SAMPLING, ADMINISTRATION OF QUESTIONNAIRE AND DATA COLLECTION

2.6.1 QUESTIONNAIRE ONE

Eight (8) copies of the questionnaire for prescribers were distributed. Seven (7) questionnaires were completed. The results of the SPSS version 12 data analysis are shown in figures 2.2 to 2.20, and tables 2.1 and 2.2 (Pages 22-33).

2.6.2 QUESTIONNAIRE TWO

One hundred and twenty (120) copies of the questionnaire were distributed to the subjects. A systematic random sampling method was applied in the selection of subjects: The first of the subjects that accessed the pharmacy for medications within every span of 30 minutes from 10 am to 1pm was selected to complete the questionnaire. Where he/she declined to complete, the next available subject was picked. In cases where subjects were not able to read and understand the questionnaire, the research assistant interpreted using standardized local terminologies and assisted the subject to complete it. Where the subject could read

and understand, the research assistant allowed him to complete the questionnaire on his or her own. An average of six questionnaires was completed daily. Whilst completing the questionnaire, the weight and height of subjects were measured. A total of 112 questionnaires were completed by the selected subjects. The results of the analysis are shown in figures 2.2 to 2.20, and tables 2.1 and 2.2 (Pages 22-33).

2.6.3 SUBJECTS' FOLDERS

214 Out Patient Department (OPD) numbers of eligible subjects were listed and numbered. Numbers which were multiples of 3 were chosen. The cards/folders of the selected OPD numbers were then traced at the Records Unit of the hospital. Where tracing of the card/folder was not successful, the next traceable one was selected. The information below was extracted from them;

I. Sex of subject
II. Age of subject on the first record of high BP
III. Length of observatory period after first high blood pressure (BP) record before drug treatment began
IV. Class of antihypertensive drugs used on commencing drug management of hypertension
V. Average BP values within the last 3 months after commencing drug management
VI. Classes of antihypertensive drugs currently used to manage the condition
VII. Rate of change of antihypertensive drugs in a year
VIII. Identification and recording of co-morbidities, complications and risk factors and

IX. History of referral.

The results of the analysis have been shown in figures 2.2 to 2.20, and tables 2.1 and 2.2 (Pages 22-33).

2.7 RESULTS

2.7.1 DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

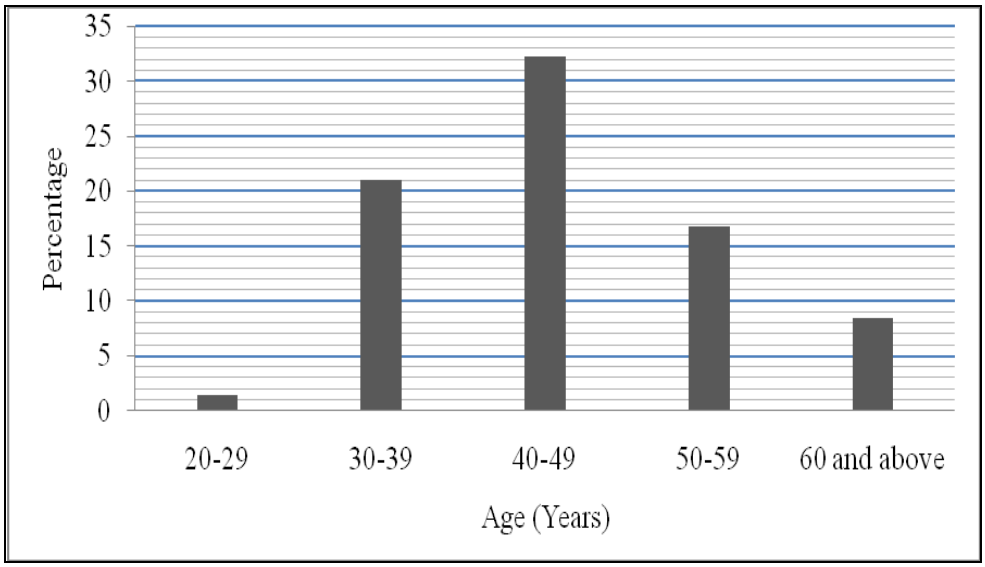

Figure 2.1- Age distribution of subjects at onset of hypertensive condition.

32.2 % of those who suffered from hypertension were aged 40 to 49.

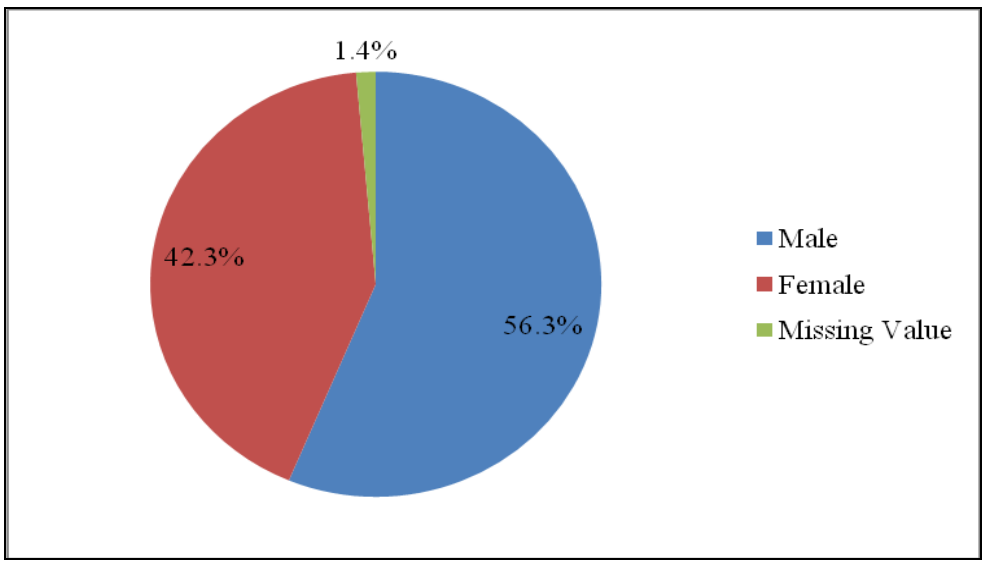

Figure 2.2- Sex distribution of subjects.

56.3% of those who suffered from hypertension were males.

2.7.2 DEFINITION, CLASSIFICATION AND MANAGEMENT TARGETS

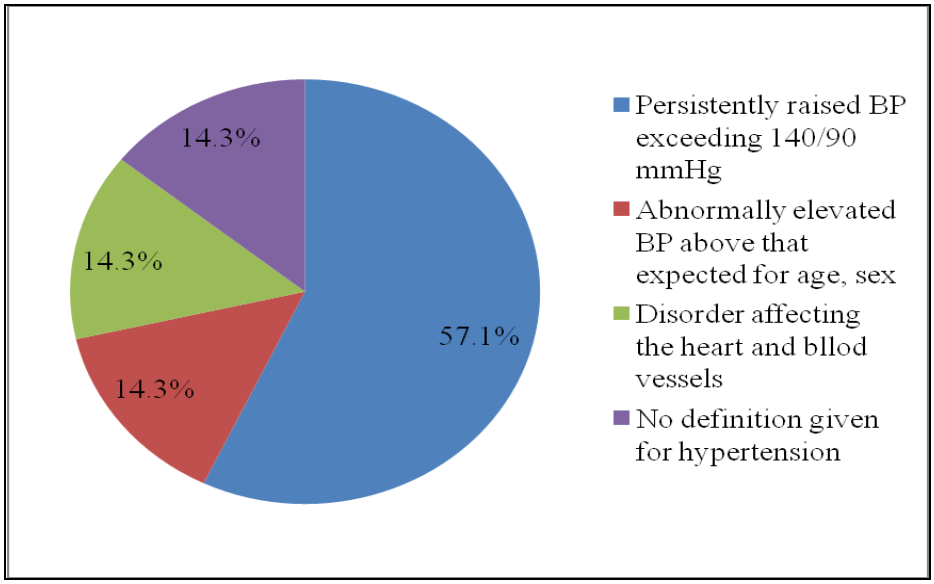

Figure 2.3- Prescribers' definition of hypertension (n=7).

57.1% prescribers defined hypertension as persistently raised BP exceeding 140/90 mmHg.

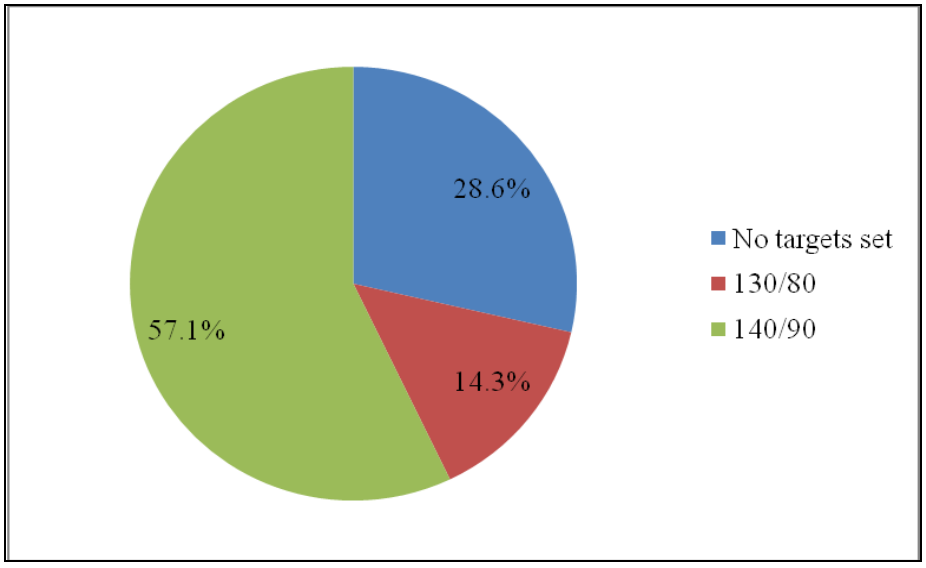

Figure 2.4 Prescribers' BP targets for hypertension management (n=7).

57.1% of prescribers targeted 140/90mmHg BP in managing hypertension

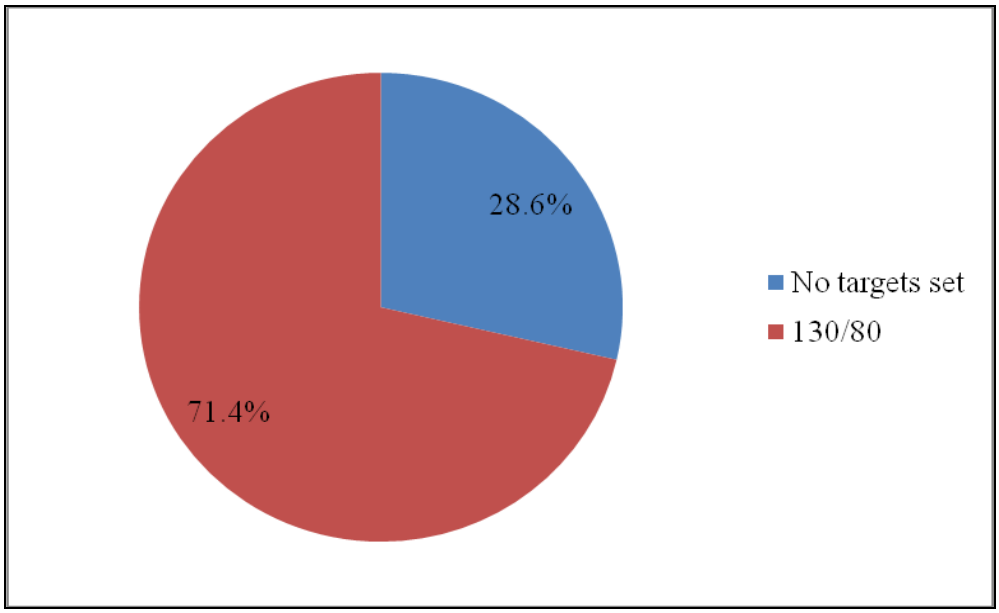

Figure 2.5 Prescribers' BP targets for hypertension management in diabetics (n=7).

71.4% of prescribers targeted 130/80mmHg BP in managing diabetic hypertensive patients.

2.7.3 DRUG MANAGEMENT OF ESSENTIAL HYPERTENSION

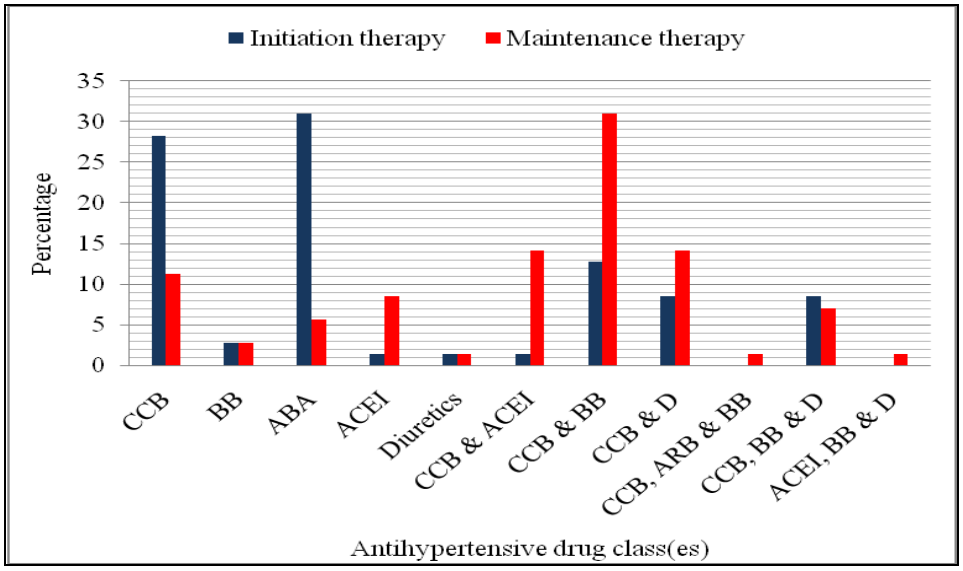

Figure 2.6- Proportions of antihypertensive drug class(es) used for initiation and maintenance therapy(n=71).

CCBs were the most employed antihypertensive drugs.

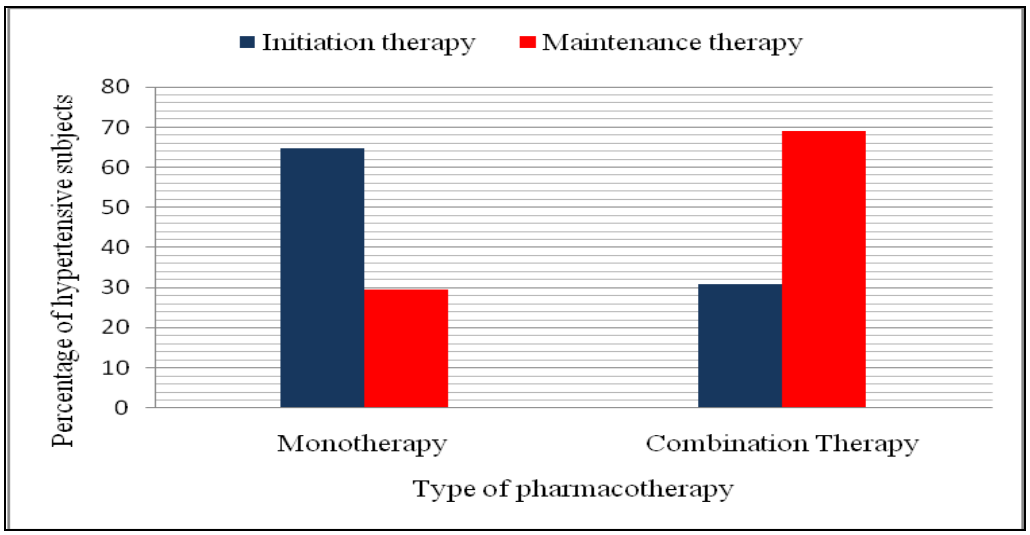

Figure 2.7- Pharmacotherapeutic approach in hypertension management (n=71).

More than two-thirds of subjects needed a combination of two or more classes of antihypertensive agents to manage hypertension.

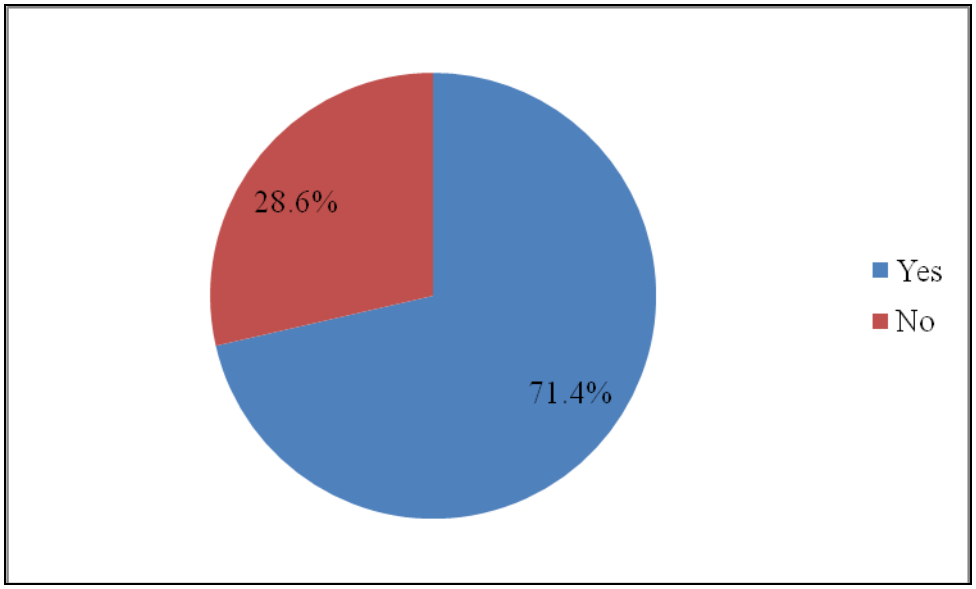

Figure 2.8- Cholesterol lowering agents used in CVD risk management.

71.4% of prescribers employed cholesterol lowering agents in managing CVD risk.

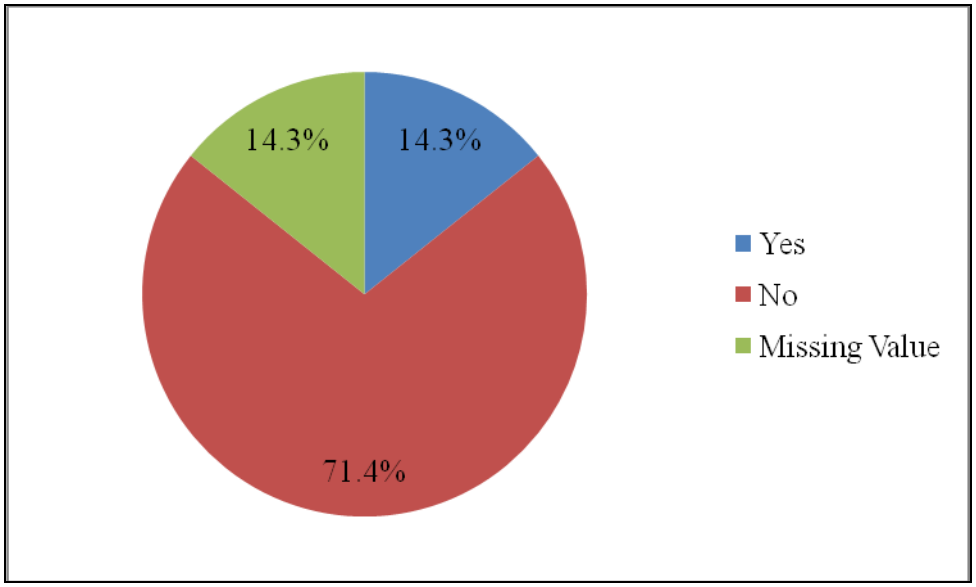

Figure 2.9- Low dose aspirin used in CVD risk management.

71.4% of prescribers employed low dose aspirin in managing CVD risk.

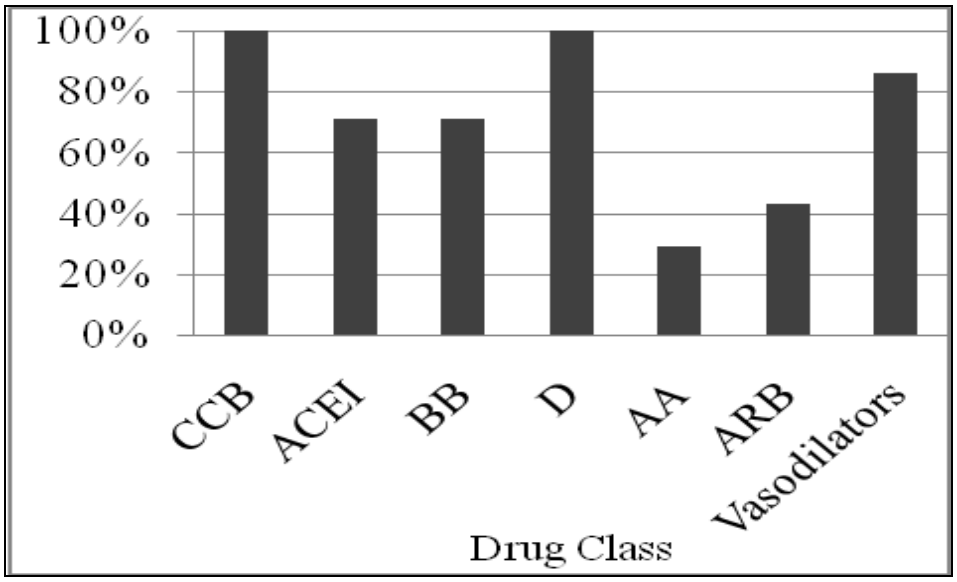

Figure 2.10- Drugs considered useful by prescribers for hypertension management (n=7).

All prescribers found CCBs and diuretics useful in hypertension management.

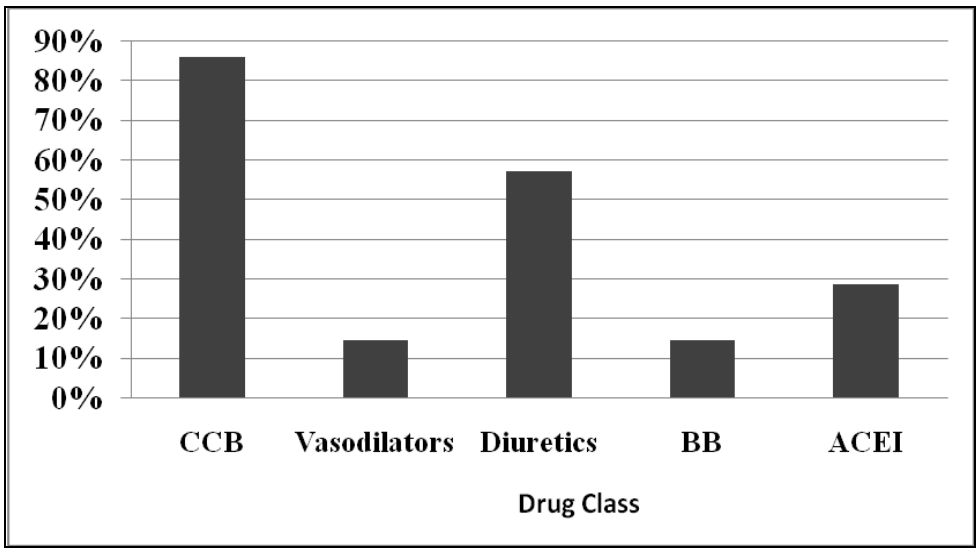

Figure 2.11- Prescribers' preferred drugs for first line management of hypertension (n=7).

The majority of prescribers preferred CCBs and diuretics as first line hypertensive drugs

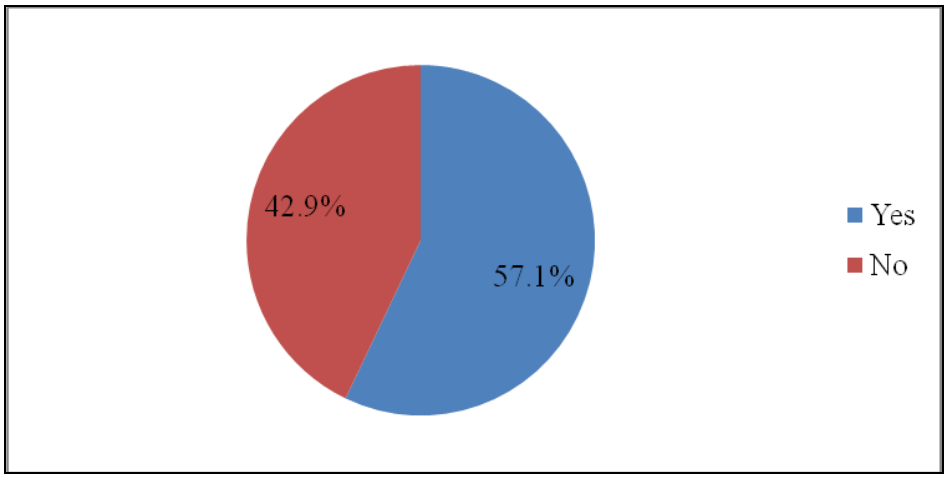

Figure 2.12- Prescribers' preference of combination therapy in the initiation of hypertension management.

57.1% of prescribers preferred the use of combination therapy to initiate drug management of hypertension.

Table 2.1 Prescribers' reasons for use of antihypertensive drug therapy in treating hypertension.

DESCRIPTION	REASON FOR USE
Combination therapy	CCB, Vasodilator, BB used to lower pulmonary BP
	First line therapy failure
	To manage other symptoms
	Signs of end organ damage
	Vasodilator and pulse rate lowering effect needed simultaneously
	It had a better outcome than in monotherapy.
Monotherapy	To avoid drug interaction
	Monotherapy has always been effective

2.7.3.1 MANAGEMENT OF SPECIAL HYPERTENSIVE CASES

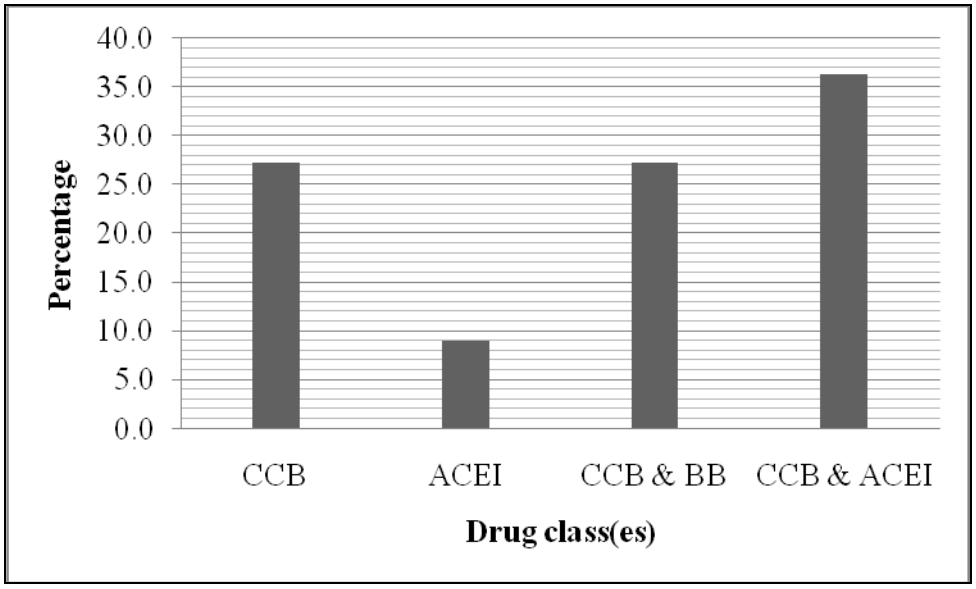

Figure 2.13- Antihypertensive drug use in diabetics (n=11).

45.5% of diabetic hypertensive subjects used an ACEI.

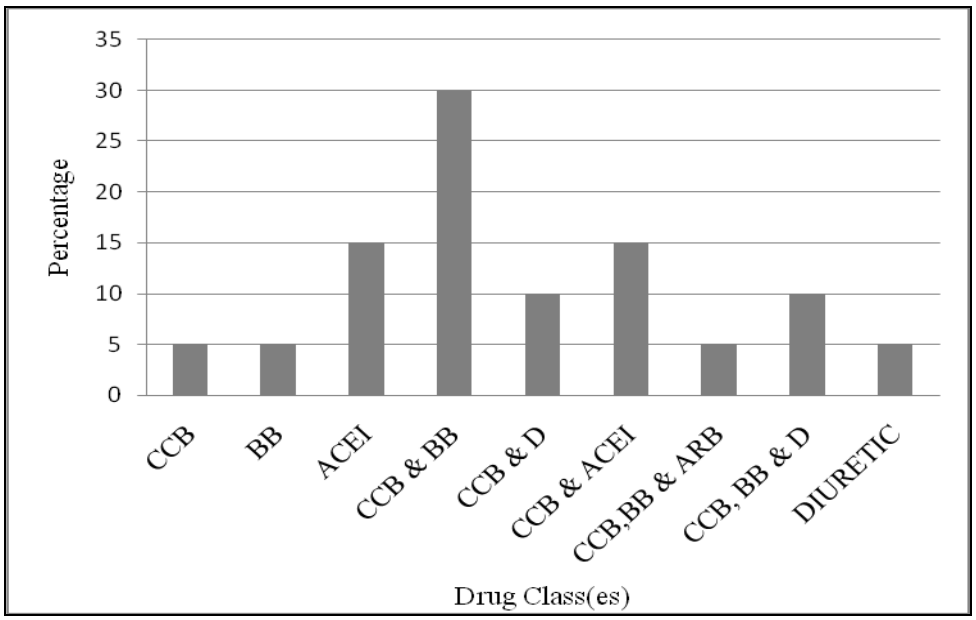

Figure 2.14- Antihypertensive drug use in the aged (n=20).

75% of aged subjects used CCBs to manage hypertension

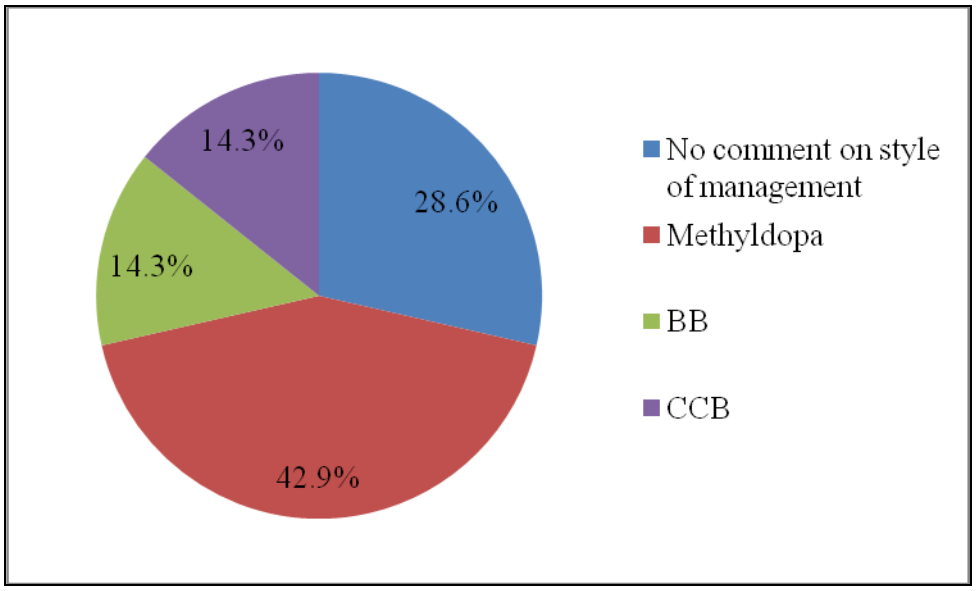

Figure 2.15 Prescribers' proposed drug management of hypertension in pregnancy (n=7).

42.9% of prescribers employed methyldopa in the management of hypertension in pregnancy.

2.7.3.2 OTHER FINDINGS OF SIGNIFICANCE

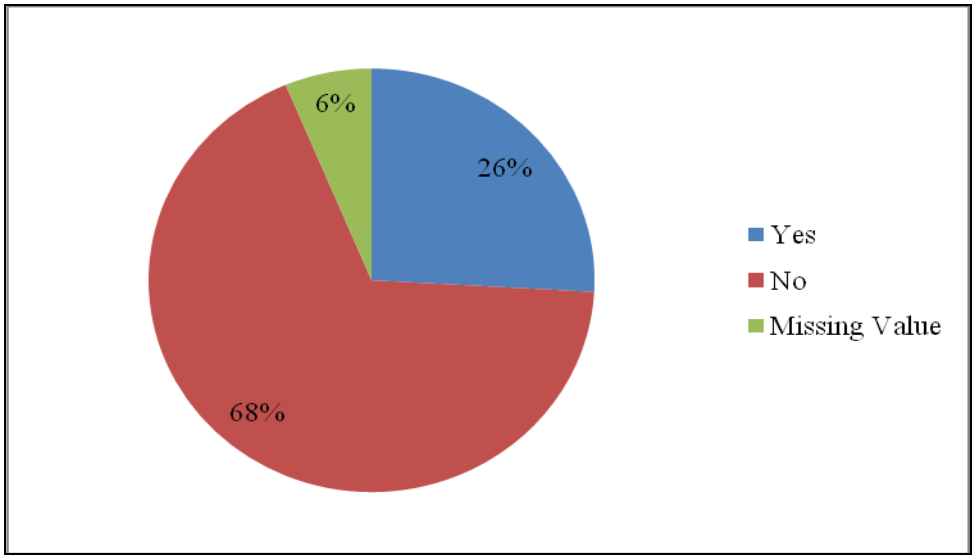

Figure 2.16- Subjects' request for a change of medications (n=112).

26% of subjects requested for a change in medications.

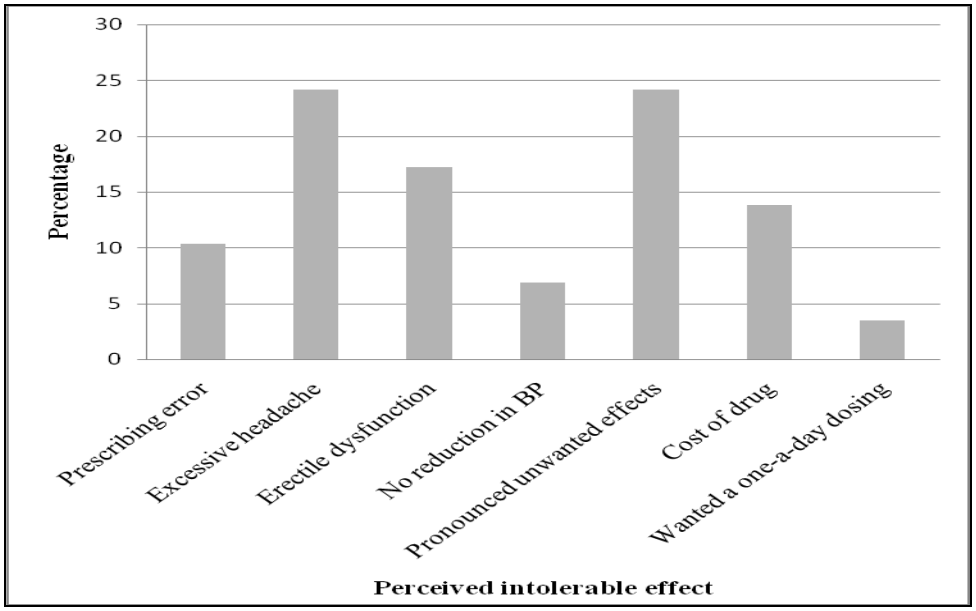

Figure 2.17- Subjects' perceived drug intolerable effects (n=29).

Excessive headache was one of the perceived antihypertensive drug intolerable effects.

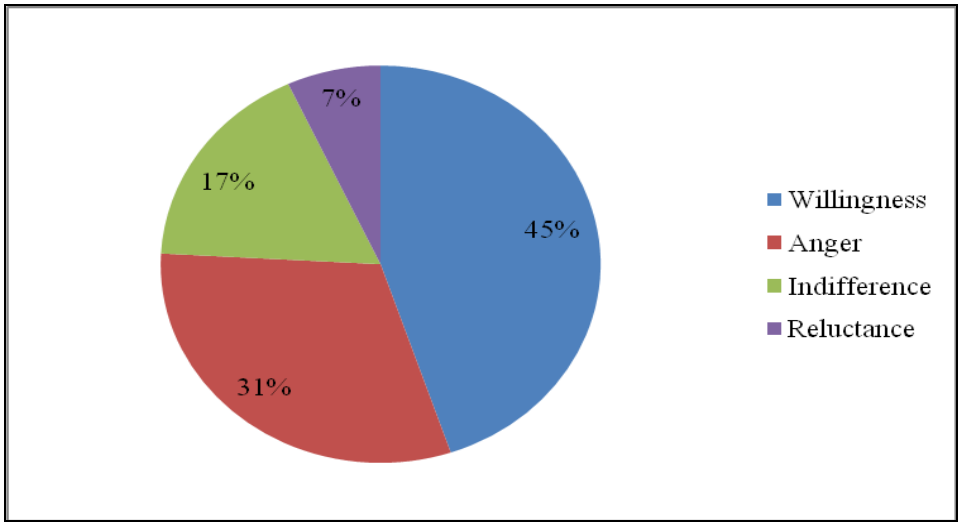

Figure 2.18- Subjects' perceived attitude of prescribers to requests for a change in medications (n=29).

31% of prescribers got angry over subjects' requests for antihypertensive drug change.

Table 2.2- Some antihypertensive drugs employed by prescribers in the management of some associated conditions.

Condition	**Recommended therapy**
Cardiac disease	Administer a beta blocker
Bronchial asthma	Administer an ACE-I
Malignant hypertension	Administer Hydralazine
Heart failure	Administer an ACE- inhibitor
LVH	Give an ARB
DM	Give an ACE- Inhibitor
Pheochromocytoma	Give a B-blocker
Renal failure	Give an ACE-Inhibitor
Thyrotoxicosis	Beta-blocker administration
Pregnancy	Administer methyldopa
Cushing's syndrome	Give an ARB

2.7.4 GENERAL MANAGEMENT GUIDELINES

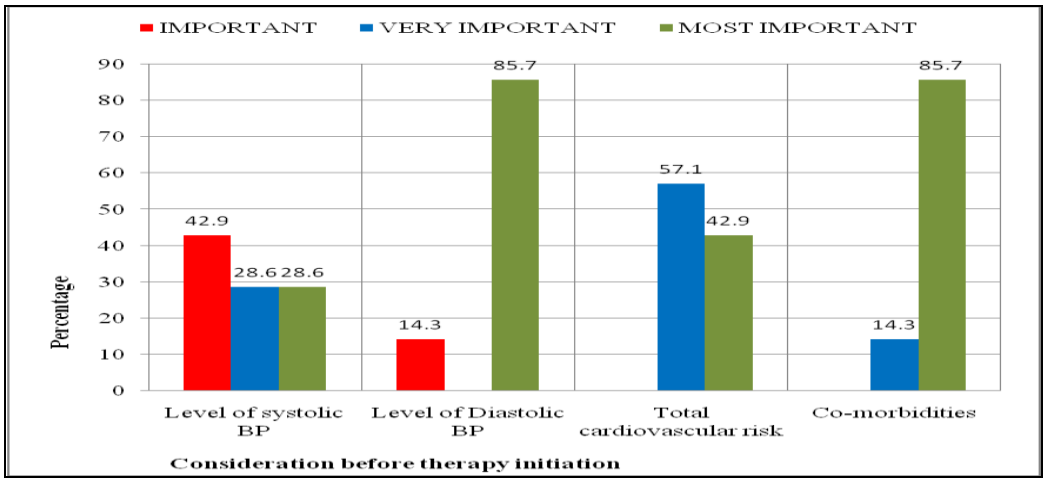

Figure 2.19- Prescribers' considerations before initiating antihypertensive drug therapy (n=7).

28.6% of prescribers considered the level of SBP as one most important parameter in determining the initiation of pharmacotherapy in hypertension management.

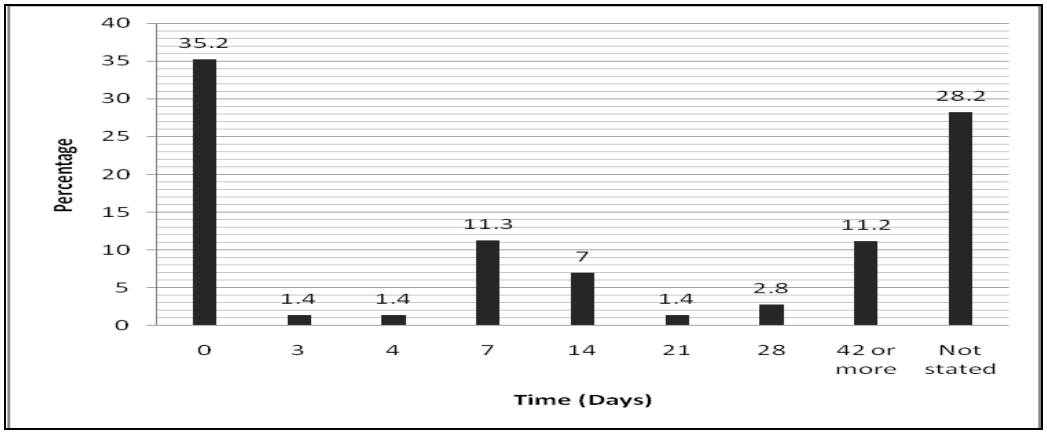

Figure 2.20- Period for monitoring subjects' BP before starting pharmacotherapy (n=71)

35.2% of subjects promptly began hypertension pharmacotherapy when initial elevation of BP was first detected.

CHAPTER THREE

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

3.1 DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

From the folders of subjects, 32.2 % of those who suffered from hypertension were diagnosed at age 40 to 49, 21% at 30 to 39 and 16.8% at 50 to 59 years (figure 2.1). This together represents 70% of the respondents and confirms that aging increases BP.[7] It also gives a clue as to when prescribers may screen individuals for high BP because most hypertension cases have no presenting symptoms. Female: male ratio was 1:1.3 (Figure 2.2). This confirms that the prevalence of hypertension is skewed towards males, and the male sex is a risk factor in hypertension.[7]

3.2 DEFINITION, CLASSIFICATION AND MANAGEMENT TARGETS

The majority (57.1%) of prescribers agreed that hypertension was persistently raised BP of 140/90 mmHg (Figure 2.3). The ESH/ESC guidelines for hypertension treatment makes provision for use of BP cut-off values to simplify diagnostic and treatment approaches of hypertension in daily practice. All respondents agreed to the classification of hypertension as mild, moderate and severe on one side, and primary/essential and secondary/symptomatic hypertension on the other hand. The BHS-IV guidelines[9] classified hypertension as Grade 1 (140-159 mmHg systolic and/ or 90-99 mmHg diastolic), Grade 2 (160-179 mmHg systolic and/or 100-109mmHg diastolic) and Grade 3 (>180 mmHg systolic and/or > 110 mmHg diastolic). These classifications are observed as being synonymous to the mild, moderate and severe

classifications used in the responses above. In the 2007 ESH/ESC guidelines however, Grade 2 and grade 3 hypertension have been combined as Grade 2, starting from SBP > 160 mmHg and/or diastolic blood pressure (DBP) > 100 mmHg.[10] It is therefore expected that prescribers will update the practice in the hospital to conform to the ESH/ESC recommendation because it is simpler.

71.4% of the prescribers had BP targets for treating hypertension. 14.3% had a target of 130/80 mmHg, whereas 57.1% had a target of 140/90mmHg. 28.6% of the prescribers did not indicate what target they worked with (Figure 2.4). 71.4% of respondents had 130/80 mmHg as upper limit for the BP measurements of hypertensive diabetics (Figure 2.5). These are in line with those given by the 2007 guidelines in all hypertensive subjects with no compelling condition and in diabetics[10]. The goal for individuals with prehypertension and no other compelling indication is to lower the BP to normal levels with lifestyle changes, and prevent the progressive rise in BP using recommended lifestyle modifications. However, individuals with prehypertension who have diabetes or kidney disease should be considered candidates for appropriate drug therapy if a trial lifestyle modification fails to reduce the BP to 130/80 mmHg or less.[8]

3.3 DRUG MANAGEMENT OF ESSENTIAL HYPERTENSION

3.3.1 INITIATING ANTIHYPERTENSIVE TREATMENT

The prescribers indicated that the following were some considerations that influenced pharmacotherapy initiation in hypertension (Figure2.19);

- 85.7% of respondents considered as most important the level of diastolic BP and presence of co-morbidities before initiating antihypertensive treatment
- 42.9% of respondents considered as most important the total cardiovascular risk before initiating antihypertensive treatment.
- 28.6% respondents indicated level of systolic BP as most important in considerations that influence the commencement of hypertension treatment with drugs.

Even though the considerations above were valid, they were not complete to effectively offer a better control of the disease condition. For example only 28.6% of prescribers gave the weightiest consideration (most important) to systolic BP for pharmacotherapy initiation. Authorities explain that most patients will reach the DBP goal once the SBP goal is achieved. They therefore emphasize greater attention to the SBP as a major risk factor for cardiovascular diseases (CVDs). However, DBP is a more potent cardiovascular risk factor (which the majority of prescribers acknowledged) than SBP in those under 50 years old.[8]

In figure 2.20, 35.2% of subjects began drug treatment of hypertension the first day they were found to have high BP. 56.3% of all those who were taking antihypertensive drugs started taking them within two weeks of recording a high BP. Only 14% of subjects started their antihypertensive drugs four (4) weeks after their first hospital record of high BP. Whenever an initial elevation in BP is first detected, it should be verified with a minimum of three readings over at least 4 weeks before instituting drug therapy. This confirmation phase may be bypassed and drug therapy promptly instituted if target organ symptoms and/or severe hypertension

(above180/110 mmHg) are present. [10] It is therefore implied that the 35.2% of subjects that began drug therapy on the first day might have been diagnosed with stage two (or three) hypertension with or without TOD, cardiovascular complication, diabetes or a 10 year risk of CVD greater than 20%. This is possible, as in many Ghanaian communities, sick people report to the hospital when they are at the point of death, or after failing on non-orthodox medicine.

10% of subjects that requested for a change in medication reported that prescribers had instituted antihypertensive drugs therapy for them when they did not meet the criteria for starting pharmacotherapy at the time (Figure 2.17). Some interventions have been made regularly in the hospital where pharmacists, on counseling subjects, observed that their BP rise was temporary. The BP normalized after a few days to a couple of weeks without taking the antihypertensive drugs that had already been prescribed.[17] It can be concluded in part that some subjects had not received adequate attention and treatment. This could be a point for further study.

Twenty-nine (29) of the subjects requested prescribers for a change in the medication they suspected was causing intolerable effects (figure 2.16). The prescribers who received such requests responded with attitudes that could put off the patient, and subsequently contribute to nonadherence to the hypertensive medications. 53% of patients indicated that doctors who received such requests met them with anger, indifference or reluctance (Figure 2.18). The choice of medications for the management of hypertension rested mainly on prescribers. Patients, by virtue of the Patients' Charter[18], need to be respected as partners in deciding their health care plans.

Some of the factors that contribute to poorly controlled BP are poor prescriber habits, poor attitudes towards patients and inappropriate protocols. These in turn contribute to poorly controlled BP. The subjects were inadequately empowered with information and choice to manage the BP. This results in difficult BP management and increased unwanted effects. Figure 2.17 shows some concerns subjects had with their drugs, which some prescribers lost the opportunity to empower subjects appropriately to overcome the problems associated with hypertension management. Work needs to be done to enhance prescriber-subject co-operation in managing hypertension.

3.3.2 CALCIUM CHANNEL BLOCKERS (CCB)

CCBs appeared as the most used of all antihypertensive drugs in the hospital. 59.3% and 80.3% of subjects used CCBs in initiation and maintenance (continued use) therapy respectively (figure 2.6). CCBs usage as monotherapy accounted for 28.2% and 11.3% of initiation and maintenance therapy respectively. In combination therapy, their use rate was 31% for initiation and 69% for maintenance therapy. Also, among prescribers 100% considered CCBs useful in hypertension management (figure 2.10), and 87.5% preferred CCBs as their first line management agent (figure 2.11). CCBs also were combined with other classes of antihypertensives to achieve synergistic or additive BP control.

CCBs lower the BP by inhibiting the entry of calcium into the vascular smooth muscle cells. The African race, the elderly and liberal salt users often show

preferential responses to CCBs. Up to 30% stage one and two subjects are controlled by monotherapy. [19]

It was also observed that the use of calcium channel blockers among hypertensive subjects was higher in drug maintenance therapy than in the pharmacotherapy initiation stage. Subjects who started treatment of hypertension using other classes of antihypertensive drugs ceased using them along the line (for example, users of adrenergic blocking antihypertensives [ABAs]) and continued the treatment with CCBs as monotherapy or in combination with other classes of antihypertensive drugs.

3.3.3 ADRENERGIC BLOCKING ANTIHYPERTENSIVES (ABA)

Prescribers' response to the questionnaire suggested that use of adrenergic agents was scanty and limited to cases involving pregnancy. However from subjects' folders, an extensive user pattern was observed. In subjects' folders for instance the use rate was 31% for initiating pharmacotherapy and 5.6% for maintenance treatment (figure 2.6,).

Generally, the number of subjects using ABAs reduced with time. The size of subjects that used CCBs on the other hand increased from 59% in initiation to 80% in maintenance. This suggests that some adrenergic agents used to initiate pharmacotherapy were switched to others like CCBs, in maintenance therapy. It was also observed that most subjects who used these agents were the older generation of subjects that were diagnosed with hypertension before or around the 1980s, and pregnant subjects (figure 2.15). Even though ABAs have been mentioned to be

efficacious among subjects, they have limited recognition in the 2007 ESH/ESC guidelines[10]. The British Hypertension Society guidelines for the Management of Hypertension (2004) and the American Heart Association Journal of Hypertension (2008) were silent on the use of ABAs. This suggests the use of this class of agents for management of hypertension in subjects with no compelling condition have been discontinued.

3.3.4 β-BLOCKERS

β-blockers reduce BP by suppressing rennin release and by reducing cardiac output. Depression of central and peripheral adrenergic outflow may be additional mechanisms. An average of 44% of subjects uses β–blockers as their choice antihypertensive with less than 3% taking them as monotherapy. β-blockers could be one of the significantly patronized class of antihypertensive agents in the university hospital. They were mostly used in combination with other classes of antihypertensive drugs to effect additive or synergistic control of BP. Some of the combinations observed above included β–blocker combinations with diuretics only, or CCBs only, or with CCBS and ARBs, or with CCBs and diuretics, or with ACEI and diuretics, or CCBs and diuretics, or ARBs, diuretics and CCBs.

From the subjects' folders, 24% of subjects initiated treatment with a β-blocker. Only 2.8% of the subjects were found to have started treatment with a β-blocker only. It was observed that β-blockers were not popular for initiation of hypertensive treatment especially in monotherapy. The distrust in β-blockers could be attributable to the fact that generally, β-blockers control the BP poorly in blacks.[10]

Only 14.3% of prescribers indicated that if they had to initiate hypertensive treatment with drugs, they preferred β-blockers (figure 2.11). Despite the fact stated above the level of use of this group of antihypertensive is significant with the majority of users combining it with other classes of antihypertensive drugs for additive and synergistic effect. 71.4% of the medical officers and assistants who completed the questionnaire confirmed their usefulness in maintenance therapy (figure 2.10).

Some of the β-blockers employed in the hospital included atenolol, propranolol and carvedilol. Some prescribers mentioned using β-blockers in special cardiac diseases like angina pectoris, post myocardial infarction, heart failure (carvedilol) and tachyarrhythmia. Their use in the treatment of thyrotoxicosis and pheochromocytoma was also noted (Table 2.1).

3.3.5 DIURETICS

As an antihypertensive agent, diuretics were mostly used in combination with other antihypertensive agents as in fixed dose combination or in separate tablets and strengths. Figure 2.6 shows that 18.4% of subjects started hypertension drug treatment with a diuretic, either as monotherapy or in combination therapy. 1.4% of subjects began with a diuretic only. In the maintenance treatment however, 23.9% of the subjects took diuretics.

Generally, it was observed from this research that 95% of those who used diuretics did so in combination with other classes of antihypertensive drugs. Some of the diuretics commonly used include hydrochlorthiazide, bendroflumethiazide and furosemide. Diuretics potentiate the action of all other antihypertensive agents.[19]

Some of the combinations observed with the diuretics were with β-blockers, CCBs, ARBs, ACEIs, ACEI and CCBs, and ACEIs and BBs. It is also known to be very effective especially in the black race.

3.3.6 ANGIOTENSIN-CONVERTING ENZYME INHIBITORS (ACEIs)

ACEI use in the hospital was very low. As observed in figure 2.6, it was among the least prescribed drug for initiation of monotherapy among subjects. In maintenance therapy however, it was among the top three drugs. The use rate as monotherapy in maintenance therapy was 8.5%. Generally, 24% of hypertensive subjects use ACEI to control their BP both in monotherapy and in combination therapy. Some of the common combinations noted were between ACEI and CCBs, then with CCBs plus a diuretic. These combinations are known to have additive effects on blood pressure lowering. When employed as monotherapy, ACEI effectively control up to 60% of subjects with mild to moderate hypertension. Response rates are however lower in the African race.[20]

3.3.7 ANGIOTENSIN-II RECEPTOR BLOCKERS (ARBs)

ARBs are known to lower blood pressure by blocking the constrictor effect of angiotensin II on vascular smooth muscle. The clinical efficacy and side effects of these agents are similar to ACEI but they do not induce cough. Therefore most subjects who had good control of BP with ACEIs but could not tolerate the adverse effects of cough and angiodema could find ARBs as suitable substitutes. Usage

pattern was only about 1.4% of hypertensive subjects. All subjects who took ARBs used it in combination with CCBs, and BBs (figure 2.6).

3.3.8 MONOTHERAPY VERSUS COMBINATION THERARY

64.8% and 31% of subjects employed monotherapy and combination therapy respectively to initiate hypertension management. In maintenance therapy, however, monotherapy accounted for 29.6% whereas combination therapy accounted for 69% (figure 2.7). More than two-thirds of hypertensive individuals cannot be controlled on one drug and will require two or more hypertensive agents selected from different classes.[12, 20] For example in the ALLHAT studies, 60% of those whose BP was controlled to less than 140/90 mmHg received two or more agents, and only 30% overall were controlled on one drug.

57.1% of prescribers preferred initiating pharmacotherapy with a combination of 2 or more antihypertensive agents from different classes (figure 2.12). However, observation from the folders indicated that only 31% of patients actually initiated therapy with the combination antihypertensive agents. Some prescribers are therefore not practicing what they proposed.

Combinations involving CCBs and BBs accounted for 44.9% of the total combination drug therapy for maintenance therapy. The combinations have been shown in several studies to be additive in hypotensive effect.[22,23,24] The CCB decreases peripheral vascular resistance and subsequently slightly increases cardiac output in some subjects activating the sympathetic nervous system along with the rennin angiotensin system. The β-blocker in addition to causing its own blood

pressure-lowering effect may attenuate this compensatory mechanism by blocking sympathetic effect. They appear to be very well tolerated hence the extensive use of such a combination in the hospital. This combination is recommended by the 2007 ESH/ESC guidelines[10].

CCB and ACEI combinations account for 20.4% of the total combination therapies of hypertension drugs for maintenance therapy. These combinations produce a synergistic effect on BP control.[25] They are recommended by the 2007 ESH/ESC guidelines.[10]

CCBs and diuretics were also prescribed together as antihypertensive agents. Their use rate was 20.4% of the total combinations for maintenance therapy. A review of this combination concluded that it was not effective and could cause potentially harmful side effects.[26] This combination is not recommended by the 2007 ESH/ESC guidelines[10].

Three or more different groups of antihypertensive agents were also employed by subjects. A combination involving CCBs, BBs, and diuretics was noted. The second multidrug combination involved CCBs, β-blockers and ARBs. Another one worth mentioning is that involving ACEI, BB and diuretics. Their use pattern together was 14.2% of the total combination therapy. The ESH/ESC guidelines[10] suggest that subjects requiring more than two medications should have a diuretic incorporated into their regimen. This was observed to be rational as the diuretics are noted to be generally additive or synergistic with many other antihypertensive medications.[19, 27]

It was observed from the trend in the hospital, that those who required more than two different antihypertensive agents in combination satisfy this theory, except the combination involving CCBs, ARBs and BBs. The combination CCBs and ARBs produces a synergistic effect on BP control.[27] Both classes of drugs are known to have direct blood pressure-lowering effects and compensatory mechanism attenuation effects on each other. In addition to its vasodilatory effects, the CCB has acute and chronic natriuretic and diuretic effects, which activate the rennin-angiotensin system. The ARBs block this effect and also inhibit any compensatory stimulation of the sympathetic nervous system, such as reflex tarchycardia.[28] As CCBs and BBs produce additive effect, their combination with an ARB, as above is expected to be efficacious.

57.1% of prescribers acknowledged treating hypertension with more than one antihypertensive agent (Figure 2.12). Some gave the reasons for the above as follows (Table 2.1);

- Vasodilator and pulse rate lowering effect needed simultaneously,
- Signs of end organ deterioration or damage,
- Management of other symptoms apart from hypertension and
- A better outcome than in monotherapy.

42.9% of respondents indicated monotherapy as the approach of choice in initiating drug therapy in the hypertensive. They gave the following reasons;

- That monotherapy has always been effective and did not see the need to add a second drug
- To avoid drug-drug interaction as much as possible

3.3.9 THERAPEUTIC APPROACH IN SPECIAL CONDITIONS

3.3.9.1 DIABETES MELLITUS

The coexistence of hypertension and diabetes mellitus substantially increases the risk of developing renal damage and other end-organ damage. These further increase the incidence of stroke, coronary heart disease, cardiac heart failure, peripheral artery disease and cardiovascular morbidity. Aggressive treatment to lower the BP and using a blocker of the rennin-angiotensin system exerts a protective effect from the appearance and progression of renal damage. A blocker of the rennin-angiotensin system therefore should be a regular component of combination treatment and the one preferred when monotherapy is sufficient in diabetic hypertensive subjects.[10] This was not observed as the practice in the hospital. Rather, hypertensive diabetic individuals used CCBs, ACEIs, and BBs. A minority (45.4%) of eleven subjects employed an ACEI as a regular component of their treatment (figure 2.13).

27.3% of diabetic subjects were on combined CCBs and BBs. BBs are documented to favour increase in weight, have adverse effects on lipid metabolism and increase the incidence of diabetes mellitus.[10] BBs are therefore not to be preferred in diabetics.

3.3.9.2 AGED

In the elderly, preferred drugs include diuretics and CCBs, even though drug treatment could be initiated with diuretics, CCBs, BBs, ARBs and ACEI in line with

the general guidelines.[10] 20 subjects were 60years and above. CCB use in aged hypertension management was 75% (figure 2.14). The majority of elderly subjects use CCBs, confirming that the management of hypertension among the elderly was appropriate. However diuretic use was only 25%, which was in combination with a CCB, BB or both.

3.3.9.3 PREGNANCY

Three (3) groups of agents were chosen by responders to be appropriate for the management of hypertension in pregnancy; they include CCBs, methyldopa, and BBs. 14.3% of prescribers proposed the use of CCBs in managing the condition; half of them will use CCBs as first line, whereas the other half of responders will use this class of drugs only after methyldopa has failed (figure 2.15). In all, 42.9% indicated that they were comfortable with the use of methyldopa. 14.3% of prescribers indicated BB as the choice antihypertensive in pregnancy. The drugs of choice for the management of hypertension in pregnancy have been specified as labetalol (BB), nifedipine (CCB) in the 2007 ESH/ESC guidelines, and methyldopa in both the 2007 ESH/ESC guidelines and the Standard Treatment Guidelines of Ghana.[10, 29] These fall in line with the choices of the prescribers in the management of hypertension in pregnancy.

3.4 CONCLUSION

Most prescribers at the hospital defined hypertension as a phenomenon of a persistently raised BP beyond 140/90 mm Hg for systolic and diastolic values. The target for managing hypertension with no other compelling condition was 140/90mmHg BP. In subjects with co-morbidities, complications or target-organ damage, a BP of 130/80 mmHg was the upper limit.

The hospital uses the following classes of drugs to manage hypertension;

- diuretics,
- calcium channel blockers,
- β-blockers,
- ACE-inhibitors,
- angiotensin II receptor blockers,
- and adrenergic-blocking antihypertensive drugs

Generally, drug use pattern showed that in initiation, monotherapy accounted for 64.8% whilst combination therapy accounted for 31%. The classes with the highest rate of use in monotherapy are CCBs (59.3%) and adrenergic antihypertensive drugs (31%). In maintenance treatment, monotherapy accounted for 29.6% of prescriptions, whilst combination of two or more different classes of antihypertensive drugs accounted for 69%. CCBs had the highest use rate (80.3%) in both mono-and combination maintenance therapies. Combinations involving CCBs and BBs had the highest share of maintenance (31%) and of all combination (44.9%) therapies. The following combination therapies used were recognized by the 2007

European Society of Hypertension (ESH) and the European Society of Cardiology (ESC) Guidelines for the Management of Arterial Hypertension;

- CCBs and ACEIs
- CCBs and BBs and
- All combinations involving more than 2 classes of drugs with a diuretic.

The management of hypertension generally, and specifically in the aged and in pregnancy was in line with the 2007 ESH/ESC guidelines[10]. However, the approach of prescribers in managing diabetic subjects was arbitrary and therefore did not satisfy the recommendations by the 2007 ESH/ESC guidelines for managing diabetic subjects.

3.5 RECOMMENDATIONS

This study is the first in the Central Region of Ghana particularly in the university hospital. In order to fairly and progressively assess future performance of the hospital, it is recommended that the hospital institutes a clinical care management team. This team will among others, be responsible for drawing protocols for the management of disease conditions like hypertension. Even though there were guidelines for the management of hypertension, they appeared remote as they were designed with the developed world in focus. Professionals in this hospital need to build guidelines tailored to meet hypertension management needs in the community.

Further research could be done on the following;

- The perceived routine recommendation of prescribers for patients to start drug management of hypertension when diagnosis-confirmation protocols have not been followed through

- Subjects employing adrenergic antihypertensive drugs switch to the use of CCBs with time and
- The extent of hypertension treatment target achievement in the hospital.

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APPENDIX I

QUESTIONNAIRE FOR THE MEDICAL OFFICER /ASSISTANT

This questionnaire is an academic exercise to help understand the health professionals' impression in the management of hypertension. We request that in answering the questions you will be as candid as practicable. Even though your identity is valuable, it is not necessary to disclose it on this sheet and it is intended that your responses will be kept as confidential as possible.

Every effort you put into this to help complete this work is appreciated.

1. Sex ( )Male ( ) Female
2. Age…….
3. Profession……Specialty……
   ……
4. Briefly state what hypertension is.

……
……

5. Which of these classifications of hypertension have you been identifying with?
   [ ]
   Primary/Essential Hypertension and Secondary/Symptomatic Hypertension
   [ ] Mild, moderate, and severe hypertension
   [ ] Any other,
   (Please state)
   …….
   [ ] All of the above
   [ ] None of the
   above .
6. Tick [√] the non pharmacological methods (listed below) you have been employing in managing hypertension.

   [ ]Counselling on smoking cessation, [ ] Counselling on weight reduction, [ ] Counselling on reduction of excessive alcohol consumption, [ ] Counselling on physical exercise, [ ] Counselling on reduction in salt intake, [ ] increase in fruit and vegetable consumption. [ ] reduction in saturated and total fat intake, [ ] bed rest [ ] any other, (please state)
   ……
7. Tick [√] the pharmacological methods (listed below) you have been employing in managing hypertension?
   [ ] Antihypertensive drugs [ ] Cholesterol lowering agents
   [ ] Antiplatelet drugs [ ] any other (Please state)……

8. What approximate percentage of your hypertensive clients take drugs to manage hypertension.

   [ ] < 40% [ ] 41%-60% [ ] 61%-80% [ ] 81%-95% [ ]>95% [ ] Don't know

9. In initiating drug therapy in hypertension it is necessary to consider the points below;

   (Please indicate by circling the level of importance)

DESCRIPTION	**LEVEL OF IMPORTANCE (LEAST 1-MOST IMPORTANT 5)**				
The Level of systolic blood pressure	1	2	3	4	5
The Period within which client's blood pressure has remained raised above normal level	1	2	3	4	5
The diastolic blood pressure	1	2	3	4	5
The total cardiovascular risk level	1	2	3	4	5
None of the above	1	2	3	4	5
Any other (please state)……..	1	2	3	4	5

10. What blood pressure targets/goals have you set in managing hypertension involving
    Normal hypertensive adults…….?
    Diabetic hypertensive adults ……..?
11. Kindly tick [√] below the classes of antihypertensive you consider useful in hypertension management.

A. [ ] Calcium Channel Blockers (CCB)
B. [ ] Angiotensin Converting Enzyme Inhibitors (ACE-I)
C. [ ] ß-adrenergic neurone blockers (BB)
D. [ ] Diuretics (D)
E. [ ] α-adrenergic neurone blockers(AB)
F. [ ] Centrally-acting antihypertensive(CAA)
G. [ ] Angiotensin II Receptor Blockers (ARB)
H. [ ] Vasodilators (V)
I. [ ] Others (please state)
……
…….

12. Which of the above (11) have you been considering appropriate for first line drug management of hypertension?

    ……
    ……
    ……
    ……

13. Please tick [√] your usual approach in the next line of action when the first line has failed. [ ] Counsel on lifestyle changes, [ ] Increase drug dose until maximum permissible dose is attained, [ ] Add a second or third antihypertensive agent, keeping the doses as low as possible, [ ] Change drugs administered all together [ ] any other (please state) ……
14. Have you ever initiated drug therapy with more than one antihypertensive agent?

    [ ] Yes [ ] No
15. What was the reason and results of that action (14)?
    ……
    ……
    ……
    ……
    ……
    ……
    …….
16. What approximate percentage of your clients used combination therapy in managing hypertension?

    [ ] < 20% [ ] 21%-40% [ ] 41%-60% [ ] 61%-80% [ ]>80% [ ] Don't Know
17. List some co-morbidities you have identified and treated as you managed hypertension in susceptible clients?
    ……,
    ……,
    ……,……,
    ……, ……,
18. Kindly indicate your 1st, 2nd, 3rd, and if applicable 4th line of treatment of hypertension with the under listed co-morbidities. Please state the classes of antihypertensive drugs used in the various conditions (Abbreviations for the classes may be used, as in the footnote).

CO-MORBIDITY	**1ST LINE**	**2ND LINE**	**3RD LINE**	**4TH LINE**
Ischaemic Heart Disease				
Heart Failure				
Diabetes Mellitus				
Chronic Kidney Disease				
Cerebrovascular Disease				
Left Ventricular Hypertrophy				
Peripheral Arterial Disease				
Special conditions Like…				
…Pregnant women				
…Older subjects				
…obesity				
…Children and adolescents				
Others ……				

19.

Are there other special cases or conditions you consider using some particular/special drugs? [ ] Yes [ ] No

20. Kindly state/List these conditions and the corresponding drugs.

……
……
……
……
……

21. Apart from their antihypertensive action, what other benefits do you identify with some of the antihypertensive drugs?

……
……
……
……
……

22. What potential unfavourable effects are associated with some antihypertensive drugs, for which reason they require cautious use?

……
……
……
……

23. Kindly tick if any of these factors affect/influence your choice of drug for hypertensive client.

[ ] Previous experience of subjects
[ ] Cost of drug
[ ] Cardiovascular risk profile of individual subject

[ ] Presence of target organ disease clinical significance
[ ] Coexisting disorders
[ ] Drug-drug interactions
[ ] Duration of action
[ ] Any other (please state)……..

24. Kindly state the target blood pressure levels in managing hypertension with specific co-morbidities.

……
……
……
……
……
…

25. What percentage of the blood pressure targets are achieved

……

26. How long have you been scheduling clients for review of management plan?

……
……..

27. How often do clients express satisfaction with drug management of their disease?

[ ] Never [ ] Rarely [ ] Often [ ] Very Often

28. How often do they request for a change in prescription?

[ ] Never [ ] Rarely [ ] Often [ ] Very Often

29. How have you been managing resistant hypertension?

……
……
……
……

30. Please state any atypical problems you have been encountering in managing hypertension.

……
……
……
……

31. Which of these problems (question 30) remains unsolved?

……
……

……
……

32. How often have you been referring hypertensive clients for further management at higher institutions?

[ ] Never [ ] Rarely [ ] Often [ ] Very Often

33. Please state the title and year of any national or international guidelines for hypertension that you know of.

……
……
……
……
……
……

APPENDIX II

SUBJECT'S QUESTIONNAIRE

This questionnaire is an academic exercise to help understand the health professionals' impression in the management of hypertension. We request that in answering the questions you will be as candid as practicable. Even though your identity is valuable, it is not necessary to disclose it on this sheet and it is intended that your responses will be kept as confidential as possible.

Every effort you put into this to help complete this work is appreciated.

1. Age …… Sex [ ] Male [ ] Female
2. Community

   ……..
3. Weight (to be measured by researcher)

   ……
4. Height (to be measured by researcher)

   ……
5. For how long have you been on hypertension medication?

   ……
6. How often do you take hypertension medication in a day?

   [ ] Once a day, [ ] Twice a day [ ] Thrice a day [ ] once every other day
7. How often do you miss doses of medications that you take?

   [ ] Never do I miss [ ] Rarely [ ] Often [ ] Very often.
8. What do you do when you remember having missed a/ some dose(s)?

   [ ] Take a dose immediately [ ] Wait to take the next day's dose. [ ] Nothing
9. Kindly list the drugs you take to manage hypertension and related conditions.

   ……

   ……
10. How beneficial has the medication been to you? Please state briefly

    ……

    ……..……

    ……

    ……

11. What don't you like about the drugs you are taking?

……

……

……

……

12. Have you ever requested that your doctor changes the drug you are taking?

[ ] Yes [ ] No

13. If yes, why?

……

……

……

……..

14. How did the doctor react?

……

……

……

……

15. State some of the special problems you have ever had in taking hypertensive drugs.

.....

.....

.....

.....

16. What is your usual BP value or readings as you take your medications?

..... [ ] I don't know.

17. Overall, are you satisfied with the management of your health condition?

[ ] Not satisfied [ ] Satisfied [ ] Very satisfied