ADHERENCE TO ANTI-HYPERTENSIVE MEDICATION REGIMENS AMONG PATIENTS ATTENDING THE G.P.H.A. HOSPITAL IN TAKORADI - GHANA.

KNUST

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CERTIFICATION

I hereby declare that this submission is my own work toward the M.Sc. 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 any other degree of the University except where due acknowledgement has been made in the text.

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ABSTRACT

Background: Adherence is the extent to which a person's medication-taking behaviour coincides with the healthcare providers' medical advice. It includes both dosing regularity and timing of intake. Many physicians face the problem of non-adherence among their hypertensive patient population. During the first year of treatment 16 – 50% of patients stop taking their high blood pressure medications. Overall, it is estimated that only about 30 – 50% of patients with hypertension adhere precisely to their hypertension medication regimens. Adherence is important in the treatment of hypertension

Objectives: The objective of this study was to assess the extent of non-adherence to hypertensive medication regimen in G.P.H.A. Hospital, Takoradi. The reasons for non-adherence in the study were also evaluated.

Methods: A prospective study of 150 hypertensive patients on medication for at least 6 months, who reported at the OPD of this hospital, was carried out. The Morisky questionnaire was administered to the patients and reasons for non-adherence sought. Pregnancy related hypertensive patients were excluded in this study.

Results: The study revealed that total adherence to anti-hypertensive medications regimens was 19.3% and partial or medium adherence was 49.3%. Hence the adherence rates (i.e. those who took their medications $\geq$ 75%) to anti-hypertensive medicines in the institution was 68.6% and the non-adherence rate was 31.4%.

The major reasons for non-adherence were forgetfulness (45.4%) by the patient to take medications on time or missed doses and side effects of the medications (20.8%). Finance (10.4% was also a problem for the paying patients who have to make up-front payment to re-fill their medicines.

Conclusion: The prevalence of adherence among hypertensive patients in this health facility was 68.6%. Thus, indicating the need for adherence counselling.

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CHAPTER 1

1.0   LITERATURE REVIEW

1.1   Introduction

The prevalence of hypertension is very high worldwide. It has been on the increase in Ghana over the past years (Pobee, 1994). In 2002, the prevalence rate was estimated at about 35% of Ghanaians in the 40 – 45 years age group, and 40% in those above 55 years of age. The prevalence was approximately 6% in those below 40 years. In this age group, the prevalence was higher in males than females (Buabeng et al 2004). Hypertension has been identified as the most common cause of heart failure, stroke, chronic renal disease and spontaneous sudden deaths in Ghana (Plange Rhule et al 1999.) A major reason for the increasing hypertension prevalence is that many patients in this relatively poor country find it difficult to afford standard hypertension medication (Buabeng et al, 2004).

Many physicians face the problem of nonadherence among their hypertensive patient population. During the first year of treatment 16 – 50% of patients stop taking their high blood pressure medication (Stergachis, 1998). Overall, it is estimated that only about 30% - 50% of patients with hypertension adhere precisely to their hypertension medication regimens. In an effort to improve rates of blood pressure control among underrepresented clinic populations, a four-year study was implemented in a large teaching hospital on the west coast of California. Thirteen hundred and sixty seven African American (75%) and Hispanic American (25%) adults participated in the longitudinal study. In order to assess patient's medicine-taking behaviour, a 9-item scale

was developed and presented to all patients during their medical-treatment programme. Reliability of the measure, as determined by internal consistency, was found to be 0.89. Individuals scoring high on the self-reported measure were significantly more likely to have their blood pressure under control compared to individuals who scored lower. A total of 74% of individual scoring high on the compliance scale had their blood pressure under control compared to 48% of individuals scoring low. (p<. 001)(Morisky et al, 1986). Patient variables which highly correlated with blood pressure control include forgetfulness, lack of understanding, health beliefs, previous history of nonadherence, poor provider/patient communication and lack of social support. Treatment variables included complexity of the regimen and long waiting time.

1.2   **Hypertension and its Classification**:

Hypertension is defined as an elevated systolic blood pressure (SBP), diastolic blood pressure (DBP) or both (Chobanian et al, 2003). A clinical diagnosis of hypertension is based on the mean of two or more properly measured seated blood pressure measurements taken on two or more occasions.

The Seventh Report of the Joint National Committee (JNC 7) on Detection, Evaluation and Treatment of High BP classifies it based on systolic and diastolic values (Table 1.2.1).

Table 1.2.1 Classification of Hypertension (Chobanian et al, 2003)

Classification	SBP (mmHg)	DBP (mmHg)
Normal	<120	<80
Prehypertension	120 -139	80 – 89
Stage 1 Hypertension	140 -159	90 – 99
Stage 2 Hypertension	≥ 160	≥ 100

Hence the JNC 7 classification include normal BP, pre-hypertension, stage 1 hypertension and stage 2 hypertension. The use of qualitative terms (e.g. mild, moderate, high-normal, severe) is no longer recommended.

Etiology: The majority of hypertension patients have essential hypertension (also know as primary hypertension) with no identifiable cause for their disorder. Patients with secondary hypertension have a specific identified cause for elevated BP (Table1.2.2). Although only 5 – 10% of the hypertensive population has secondary hypertension, further diagnostic evaluation should occur if physical or laboratory findings are consistent with a secondary cause. Secondary causes are potentially correctable. Further diagnostic workup should also be considered in patients who do not respond to increasing doses of anti- hypertensive medication or who have a sudden increase in BP or accelerated or malignant hypertension (Chobanian et al, 2003).

Table 1.2.2   Secondary cause of hypertension (Chobanian et al, 2003)

- Chronic kidney Disease

- Chronic steroid Therapy and Cushings Syndrome

- Coarctation of the Aorta

- Drug Induced or Drug related

    - Adrenal Steroids

    - Alcohol in excess

    - Amphetamines / anorexiant (e.g. phentermine, sibutramine)

    - Cocaine and other illicit drugs

    - Cyclosporine and tacrolimus

    - Erythropoetin

    - Liquorice (including some chewing tobacco)

    - Non-steroidal anti-inflammatory drugs / COX-2 inhibitors

    - Oral contraceptives

    - Oral decongestants (e.g. pseudoephedrine)

    - Some over the counter dietary supplements and medicines (e.g. ephedra, bitter orange)

- Pheochromocytoma

- Primary Aldosteronism

- Reno vascular Disease

- Sleep Apnea

- Thyroid or Parathyroid Disease

1.3   Risk Factors for Hypertension

Although elevated blood pressure cannot be linked to a known cause, there are certain risk factors.

Family History: A family history of hypertension, coronary artery disease
(e.g. angina, myocardial infarctions etc) or complications of hypertension such as stroke is perhaps the single most important risk factor for essential hypertension. It is estimated that an individual faces about 45% risk when both of his parents are hypertensive, reducing to about 30% when only one parent is hypertensive (Hawkins *et al*, 1992).

Obesity: This places an excessive load on the heart resulting from increased cardiac output. Obesity is also important because of its high association with biochemical abnormalities such as hyperlipidaemia and diabetes mellitus, both of which may result in hypertension through atherosclerotic changes in blood vessels.

Increasing age: Atherosclerotic and arterosclerotic changes in blood vessels increase with increasing age.

Smoking: The vasoconstrictive effect of nicotine may result in increased total peripheral resistance and hence increase in blood pressure. Cigarette smoking is also injurious to the intima of blood vessels, this initial injury promoting atherosclerotic changes to take place.

Alcohol: Alcohol has vasoconstrictive effects and hence increases in blood pressure. Heavy drinking is related to 40% increased risk of high blood pressure. Middle aged men and women who drink even moderately are likely to experience a 90% greater risk (Burt V.L, 1995).

Diet: Excessive salt intake may result in hypertension because of the ensuing raised cardiac output arising from increased blood volume

. *Lack of exercise:* Sedentary life or an individual whose energy expenditure is far in deficit of intake faces a high risk of developing hypertension.

1.4 Hypertension related-Target Organ Damage:

The ultimate goal of treating hypertension is to reduce associated morbidity and mortality. These hypertension related complications manifest as target-organ damage which include cardiovascular disease and are the primary causes of death in hypertensive patients. Organ systems adversely affected by hypertension include the heart, brain, kidneys, peripheral circulation and eyes.

Heart   Hypertension can affect the heart either indirectly, by promoting atherosclerotic changes or directly, via pressure-related effects. Hypertension can promote cardiovascular disease (CVD) and increase the risk for ischemic events such as angina and myocardial infarction (MI).

Hypertension also promotes the development of left ventricular hypertrophy (LVH), which is a myocardial (cellular) change, not an arterial change. It is commonly believed that LVH is a compensatory mechanism of the heart response to the increase resistance caused by elevated blood pressure. LVH is a strong and independent risk factor for coronary arterial disease (CAD), heart failure (HF) and arrhythmias (Eselin & Carter, 1994). A major cardiac outcome of hypertension is heart failure.

Brain: Hypertension is one of the most frequent causes of cerebrovascular disease (Mac Mahon et al, 1990). Cerebrovascular signs can manifest as transient ischemic attacks, ischemic strokes, multiple cerebral infarcts and hemorrhages. Residual

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functional deficits caused by stroke are among the most devastating forms of target organ damage. A sudden, prolonged increase in systemic BP can also cause hypertensive encephalopathy, which is a hypertensive emergency.

Kidney: Glomerular Filtration Rate (GFR) is used to estimate kidney function. It declines with aging but this rate of decline is greatly accelerated by hypertension. Hypertension is associated with nephrosclerosis, which is caused by increased intraglomerular pressure. It is unknown whether a primary kidney lesion with ischemia causes systemic hypertension or whether systemic hypertension directly causes glomerular capillary damage by increasing intraglomerular pressure. Regardless, chronic kidney disease, whether mild or severe, can progress to kidney failure and the need for dialysis.

Peripheral Arterial Disease: This is another form of atherosclerotic vascular disease that is considered target organ damage. Complications of peripheral arterial disease can include infection and necrosis which in some cases require revascularization procedures or extremity amputation

Eye: Hypertension causes retinopathies that may progress to blindness. In severe cases, papilledema occurs.

1.5   Management of Hypertension

Primary hypertension has no cure but treatment can modify its course

(Merck Manual 1999). It is recommended that every hypertensive patient who also has

other risk factors for coronary heart disease be given prompt and optimum

antihypertensive treatment to minimize their overall risk for heart disease.

1.5.1   Non -Pharmacological Management

This involves life style modifications such as weight reduction, dietary changes, cessation

of smoking and reduction or avoidance of alcohol.

1.5.2   Pharmacological Management of Hypertension

The main goal of treatment of hypertension is to bring hypertension under control quickly

and permanently. This involves the use of antihypertensive drugs when lifestyle

modifications do not normalize blood pressure. These drugs include:

i.   Diuretics

ii.   β – Blockers

iii.   Calcium channel blockers

iv.   Angiotension Converting Enzymes (ACE) inhibitors

v.   Angiotension 11 receptor blockers

vi.   Adrenergic inhibitors

vii.   Alpha one (α1) receptor blockers

viii. Vasodilators.

1.6   Adherence

Adherence is a term that is often inappropriately used interchangeably with compliance. However, the term adherence is preferred over compliance because it implies an interactive, collaborative relationship between the patient and the care-giver (Nichols-English & Poirier, 2000). Compliance is defined as the extent to which a person's medication-taking behaviour coincides with the healthcare providers' medical advice (Haynes, 1979). The word compliance originated from a practitioner – centered paradigm and implies an authoritarian model that places the patient in a passive role (Felkey, 1995). Adherence includes both dosing regularity and timing of intake, and for some specific patient populations (e.g., for HIV/AIDS patients), selected drug-food interactions. Persistency describes another type of patient behaviour associated with following prescribed medication regimes. Persistency pertains to taking medication as prescribed on a regular basis and not discontinuing pharmacotherapy prematurely. Concordance is an initiative to involve the patient in the treatment process and so improve compliance. It suggests that the patient is involved in treatment planning and implementation (Meichenbaum & Turk, 1987). It also refers to a consultation process between a health care professional and a patient.

1.7   Classification of Adherence

Non-adherence can take many different forms. Patients can fail to fill or refill a prescription, take an incorrect dose, take a medication at the wrong time, forget to take doses, or stop therapy too soon. Non-adherence can also involve taking foods or other medications that will alter bioavailability or alter metabolism rates. Patients can be classified as:

a.	Fully Adherent	-	Those who take adequate amounts of medications in accordance with prescribed regimens.
b.	Partially Adherent	-	Those who take many doses but not regularly enough to control their disease.
c.	Non-adherent	-	Those who take few or no doses.
d.	Over-adherent	-	Involves taking doses too frequently or taking too high of a dose. E.g. Patients taking pain medications.

1.8   Measurement of Medication Adherence

A variety of direct and indirect methods can be used to evaluate or measure medication adherence, ranging from patient self-report to the use of sophisticated electronic medication monitors. The primary measures of adherence can be classified into: subjective, (i.e. patients or others reports); direct (i.e. measurement of drug levels in body fluids) and indirect (e.g. pill counts, prescription refills, electronic monitors or medication use). Each approach to assessing medication adherence has advantages and disadvantages as shown in Table 1.8.1

Table 1.8.1 Advantages and Disadvantages of the Methods of Assessing Adherence

Method	Advantages	Disadvantages
Interviews	Simple and practical	Leads to overestimation
Pill counts	Simple and practical	Patient may discard pills
Plasma Drug levels	Appropriate for certain drugs(e.g. Seizures, blood thinning)	High cost and potential for greater adherence just before visit
Pharmacy Refill records	Accessible	Databases are not always complete
Electronic Monitoring	Accurate and detailed information	High cost and cannot determine if drug was actually ingested

1.8.1   Subjective Measurements:

Asking patients about their adherence has been reported to detect more than 50%

of those with low adherence, with specificity of 87% (Stephenson et al, 1993). One

question to ask patients that has been validated in scientific studies is; "Have you missed

any pills in the past week?" Any indication of having missed pills based on this question

signals a problem with adherence. However, self-report may be misleading or erroneous

because of patient's difficulty recalling the details of doses taken or missed; attempting to

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please the pharmacist; or a combination of these factors. Physicians generally overestimate their patients' adherence rates (Roth & Caron, 1978). Patients self-report is the most practical and widely used. In general, patients can be very accurate in reporting whether they are adhering to their treatment regimens if they are asked simply and directly (Duong et al, 2001).

1.8.2   Direct Measurements

The measurement of drug levels in body fluids (e.g. blood, saliva, urine) involves assessing the presence of a drug or its metabolite using an assay. These are considered to be more reliable measures of adherence than pill counts or subjective measures and are useful for many medications (e.g. .antiepileptic, anticoagulation drugs). However, these measurements are affected by dose and timing e.g. if the patients take the dose just prior to a physician visit, results can be misleadingly high. Furthermore, drugs levels are often not routinely available for most medications and tests can be costly. Individual differences in absorption rates and metabolism of drugs can lead to a wide variation of drug levels among people who are equally adherent or compliant. Drug assays can show that the patient ingested some amount of the drug at some time, but it cannot determine if the patient took the appropriate amount of drug at the proper time as prescribed (Gottlieb, 2000).

1.8.3   Indirect Measurements:

Prescription Refill: Prescription refill records are only a valid source of information about medication adherence when patients use a pharmacy or a pharmacy benefits management programme where monitoring occurs. Pharmacy refill records can be used to measure adherence as well as persistency. A method of measuring adherence based on pharmacy records is determining the number of administered doses for defined period of time reported as a proportion of prescribed doses taken at the prescribed time interval as measured by the period of time. The number of days between refills can also be compared with the number of days over which the prescription was prescribed. Using prescription refill records, medication persistence can be measured by determining the time between initiation and discontinuation of therapy. Refill-based assessments of medication adherence correlate well with other measures of patient adherence (Steiner & Prochazka,1997).

Pill Counting: -   Counting the actual number of unused pills or volume of medication remaining after a given time and subtracting this from the original quantity dispensed also provides an estimate of the quantity of medication presumably used by the patient. This number can be compared with the intended intake, based on the prescribed directions for use and quantity of drug dispensed. These types of medication counts are a simple and practical approach that can be performed by the pharmacist. A limitation of this approach is that the actual patient ingestion is not measured and the schedule of intake is unknown. Also, this approach is subject to patients discarding some of their medications before visit or taking them in a manner other than that prescribed.

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Electronic Monitor: - Electronic monitoring devices have been used to record both frequency and patterns of use that a medication was assumed to have been taken. These devices use microprocessors to record and store events such as the opening and closing of a container, the act of turning off an alarm, patterns of inhaler use, and the tilting of an eyedropper bottle. The Medication Event Monitoring Systems (MEMS) system e.g. consists of a medicine bottle fitted with a cap that contains an electronic circuit, registering the date and time of openings and closing of the bottle. Although there is no certainty about the actual intake of the medication by the patients, this type of approach has been shown to have a superior sensitively compared with other methods (Cramer et al, 1989). An advantage of these devices is that the actual times of events are recorded and can be retrieved and interpreted by the pharmacist and other healthcare professionals. The limitations of these devices are that they do not record the actual ingestion of the drugs and are generally too expensive and cumbersome for routine use.

1.9   Prevalence of non-adherence to medications

Medication non-adherence is a large and complex problem that represents a significant impact on our healthcare system. Hundreds of reports describe rates of non-adherence with medication regimes among patients with various medical conditions. Estimates of patients adherence with a prescribed regimen range from 30% to 80%, varying by medical condition, data source and measures used. Non adherences to long term medication regimens are worse than non-adherence to short term regimens. Most studies tend to converge on a non-adherence rate of 50% for long term pharmacologic therapy and 20-25% for medications prescribed for short periods of time (Claxton et al, 2001).

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Non-adherence varies by the disease being treated (Stergachis et al, 1998). Asymptomatic and chronic conditions, such as hyperlipidemia are associated with higher rates of non-adherence. Several studies recently have shown that patients often stop taking statin therapy, for lowering their cholesterol. Benner, Glynn, Mogun et al (2002) found that only 56% of patients aged 65 or older who were prescribed statins were still taking them 6 months after initiation of therapy and only 35% were taking them 5 years later. Another study, Jackevicius et al (2002); found that only 40% of patients aged 66 or older who had a heart attack or chest pain were still taking their medicines two years later, compared with 36% of those with chronic heart disease and 25% of these who were prescribed the drugs to prevent heart disease.

Adherence is important in the treatment of hypertension. An early study by Haynes et al (1976) showed that adequate control of hypertension was associated with taking at least 80% of a prescribed regimen. The patients' inability to perceive a benefit from the use of antihypertensive therapy removes a powerful stimulus for adherence. Non adherence rates for patients with hypertension are reported to be 50% after 1 year and 85% after 5 years (Garfield et al 2000). Stergachis study of 4086 elderly outpatient Medicaid recipients newly started on anti hypertensive agents from 1982 through 1988 reported an overall adherence rate of only 49%.Only 23% of the patients studied had an adherence level of 80% or higher. Over half of patients with hypertension dropped out of treatment within a year, and only two-thirds of those who remained under care took enough of their medication to control the problem. Patients who do not take enough of their medications to reduce their blood pressure effectively are vulnerable to the long term consequences of hypertension, including an increased risk of acute myocardial

TABLE 1.9.1 Estimated Non-adherence rates and sequelae for selected conditions.

Disease Condition	Rate of Non-adherence	Possible consequencies or sequelae
1. Hypertension	22 –50%	Myocardial infarction and Angina
2. Epilepsy	30 – 50%	Seizures
3. Diabetes	40 – 50%	Loss of control of disease and complication
4. Asthma	20 – 40%	Asthmatic attacks
5. Arthritis	50 – 70%	Disability
6. Depression	50%	Relapse
7. Organ Transplantation	20%	Graft rejection and death
8. Cholesterol Disorders	40 – 50%	Myocardial infarction and angina
9. Congestive Heart Failure	60%	Pulmonary congestion and death
10. Schizophrenia	11 – 57%	Relapse
11. Infections	25 – 50%	Relapse and resistant organisms

(Stergachis, 1998) *U.S. Pharmacist. 1998; (suppl)*

infarction. Poor adherence to drug therapy is considered one of the leading preventable causes of treatment failure and hospital admission for chronic heart failure.

Medication adherence is poor even for conditions where the consequences of non-adherence can lead to adverse outcomes such as in people with epilepsy, asthma, mental illness and people who undergo transplants (Table 1.9.1).

Medication adherence is an important issue in the treatment of epilepsy. Epilepsy patients show up to a 76% rate of non-adherence despite the adverse medical and social consequences of seizures. In a recent study, dose omissions were reported by 71% of 661 respondents to a mailed questionnaire, with 45% of patients reporting a seizure after a missed dose at some time during treatment (Cramer et al, 2002). This study also found that both increases in daily dose frequency (e.g. from 1 to 2 times daily etc.) and taking a large number of tablets or capsules increased the risk of having a seizure after a missed dose.

There is also evidence of problems with non-adherence to asthma medications. Misuse of metered-dose inhalers, and failure to maintain a therapeutic level of medication or to respond appropriately during emergencies, has been linked to asthma-related deaths (Lemanek, 1990). Reported rates of non-adherence to medication regimes for asthma ranged from 17% to 90% in children and adolescents (Baum et al 1986).

Non-adherence rates for drugs used for schizophrenia have been reported to range from 37 to 57% in uncontrolled settings and 11 to 32% in controlled settings. Weiden and Zygmunt (1997) examined the proportion of schizophrenia patients who were non-compliant following discharge from an inpatient service. The rate of outpatients' non-compliance was approximately 50% after 1 year; after 2 years the rate increased to 75%.

The leading cause of organ rejection and graft failure following transplantation is non-adherence with immunosuppressant medication. Post transplant non-adherence is estimated to be between 5% and 29% by Vasquez et al in 2003. According to a U.S study by Schweizer et al (1990), of kidney transplant recipients, 91% of the recipients who were non-complaint with their medication regimens either lost their graft or died.

There was a recent report on adherence and adverse events associated with antimicrobial prophylaxis among people exposed to B. anthracis related to the bioterrorist attacks. Completion of a full 60-day course of antimicrobial prophylaxis is essential for preventing anthrax. The study was conducted among postal employees who had been offered antimicrobial prophylaxis for 60 days in New Jersey – New York City, and a postal facility in the District of Columbia, 89% of whom used ciprofloxacin. Of the 3428 persons on Ciprofloxacin, 287 (8%) discontinued the medication; 116 (3%) of whom discontinued because of adverse events; 27 (1%) discontinued because of fear of possible adverse events; and 28 (1%) stopped taking the drug because they "did not think it was needed".

1.10   The Effects of Non-adherence on Health Outcomes

Not taking medication correctly can lead to treatment failure, disease progression; drug related morbidity, drug tolerance and drug resistance. There is a growing body of evidence that persons who do not take medications as prescribed for cardiovascular disease suffer adverse health outcomes. The Beta-Blocker Heart Attack Trial reported a 1- year mortality rate of 5.4% in non-adherent patients (i.e. took ≤75% of prescribed medication) compared with 2.2% among those who took 75% or more of their prescribed

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medication (Horowitz et al, 1990). In this study, poor adherers had an increased risk of death whether they were on the *B*-blocker or placebo.

Maronde et al (1989), reported that adherence with hypertensive drug therapy was 18% lower for those who were readmitted to the hospital when compared with those who were not readmitted. In a study of risk factors for first –time events of coronary heart disease (CHD) in persons with hypertension, patients who did not fill their prescriptions regularly enough to be at least 80% compliant as well as those who recently stopped the use of a *B*-blocker, had an increased risk of CHD (Psaty et al, 1990). Other studies have reported association between under use of anti- hypertensive drugs and adverse outcomes. Stergachis et al, 1992, studied persons with peripheral arterial disease and found that continuous users of pentoxifylline (i.e. those who received 80% or more of the recommended dose for a minimum of 120 days) had a 65% reduction in risk of invasive vascular procedures when compared with those who used less than 80% of the recommended dose.

Others have linked non-adherence to an increased risk of admission to an acute care hospital. Col et al, 1990, studied 315 of consecutively admitted elderly persons to an acute care hospital; 28% were drug-related with 11% of these due to non-adherence. Studies have also linked non-adherence to an increase risk of hospital admissions for chronic heart failure (CHF), relapses in schizophrenia and depression.

1.11   The Effects of Non-adherence on Economic Outcomes

An overall estimates of the cost of non – adherence with prescription drugs in the United States has been reported by the National Pharmaceutical Council in 1992, to be as much as $100 billion annually. This estimate includes $50 billion in economic loses from

absenteeism and reduced worker productivity, $25 billion in avoidable hospital admissions, $5 billion in avoidable nursing home admissions and over $ 20 billion from the premature death of working people and extra treatment cost for ambulatory patients. However, such estimates of lost productivity and medical spending should be interpreted with caution because they are not supported by detailed analysis. Non-adherence to medication results in cost largely due to the occurrence and consequent treatment of new or more morbid conditions and possibly due to increased side effect of medication. Poor adherence can lead to inaccurate assessments of treatment effectiveness and thus to inappropriate- and often more costly – adjustment in drug therapy.

The extent and direct cost of hospitalization due to non-adherence was estimated by Sullivan et al in 1990 to be 5.5% of hospital admissions representing approximately $8.5 billion in unnecessary hospital expenditures in 1990. This figure amounted to 1.7% of all healthcare expenditures in the United States during that year. The same study estimated that annual indirect costs exceed $1.5 billion in lost patient earnings and $50 billion in lost productivity.

Other studies have estimated costs outside the hospital setting either by multiplying nonadherence rates with aggregate cost figures on ambulatory care and nursing home care or by multiplying the actual number of clinic visits, physician office visits, nursing home admissions, laboratory tests, and drugs with a cost per unit of these resources.

1.12   Factors Affecting Medication Non-adherence

Many factors affect patient adherence with medication regimes. Pharmacists need to be knowledgeable about the risk factors for non-adherence in order to help identify these issues and assist their patients. While hundreds of factors that can lead to non-adherence have been evaluated by researchers, no single factor has been found to reliably predict patient non-adherence. Studies have however eliminated factors such as level of intelligence, memory, personality traits, age, and level of education as contributing substantially to non-adherence (Stergachis, 1998).

Table 1:12:1 below summarize those factors that have been associated with non-adherence of medications.

Patient and Disease factors: -Inconsistent results have been reported for demographic variables such as age groups, gender, race/ethnicity or educational background. These factors have not been very useful in identifying non-compliant patients. Older age likely influences adherence rates because the elderly are more likely to have other characteristic associated with non-adherence. (e.g. multiple chronic disease, polypharmacy, memory deficits and increased sensitivity to the effects of medications). Certain factors can affect adherence among children and adolescents, including parents not adequately monitoring the intake of their childrens medication, busy schedules, peer pressure, and lack of school involvement. The type of illness, such as chronic diseases with variable presentation of symptoms or without symptoms is also a determinant of adherence problems. When a preventive medication is prescribed or when the medication prescribed for treatment increases the patients' symptoms, non-adherence is more likely.

Table 1.12.1: Risk Factors for Non-adherence

a. **Patient Factors**

- Forgetfulness.

- Lack of belief in the value of the medication.

- Actual and perceived adverse effects of drugs

- Lack of or incomplete understanding or recall.

- Social isolation.

- Perceived lack of efficacy of drug.

- Loss of cognitive, sensory or psychomotor skills associated with older age or disability.

b. **Disease Factors**

- Few symptoms present.

- Perceived seriousness of disease change.

- Chronic conditions.

- Psychiatric diagnosis.

(Stergachis, 1998)

Table 1.12.1: Risk Factors for Non-adherence (cont')

c.   Medication- Related Factors

- Complexity of regimen e.g. frequency of daily doses.

- Number of drugs prescribed.

- Occurrence and severity of adverse effects.

- Unpleasant taste or smell.

- Compatibility of daily activities or lifestyle.

- Safety closure containers.

- Increased duration of treatment.

d.   Healthcare System – Related Factors

- Cost of medication

- Use of multiple pharmacies

- Use of multiple physicians

- Dissatisfaction with their healthcare provider

- Long waiting time or other inconveniences.

(Stergachis, 1998)

For example, nifedipine prescribed for hypertension may induce headache and if patients are not alerted; they may stop taking medication. Artesunate-amodiaquine combination in malaria therapy induces nausea, general malaise, dizziness, e.t.c and when patients are not educated properly they may stop the medication.

Culturally diverse populations can pose special challenges regarding medication adherence. Attitudes and beliefs can affect patients' willingness to begin therapy and to adhere to the regimens.

Medication Regimen Factors: - Complexity of the drug regimen is associated with non-adherence. Complex regimens, with frequent dosings, many medications, and medications taken at odd times increases the likelihood of error and makes adherence more difficult to maintain. Medication adherence is worse when the frequency of daily doses increases (Claxton et al, 2001). In a study of patients who had seizures, those who were required to take only 1 pill a day had an 87% adherence rate, those who were required to take 2 pills a day (i.e.1 pill twice a day) had an 81% adherence rate, those who were required to take 3 pills a day (i.e.1 pill thrice a day) adhered 77% of the time and those who were required to take 4 doses a day showed adherence rates of only 39%.

Health Factors: - The interpersonal skills and accessibility of the healthcare provider are also predictors of non adherence. Using multiple physicians or multiple pharmacies has been associated with a significantly higher risk of hospitalization due to non-adherence. The later can negatively affect adherence as patients lose the opportunity for continuity of pharmacist counselling and coordinated refill reminders. The cost of medications can be a barrier to adherence particularly for the elderly, people with low income and the disabled.

1.13   Strategies to Improve Medication Adherence

Pharmacists can use several methods or strategies to help patients improve their adherence to medication regimens. In general, it takes more than any one type of intervention or strategy to achieve long-term adherence. Multiple interventions, combining educational and behavioral approaches, are more successful in improving adherence, because they address the multiple factors above associated with the problem. Recommendations for helping patients to follow prescribed medical regimens should be based on the best evidence available from randomized controlled trials of adherence interventions. Unfortunately few such studies have been reported. A systematic review of published randomized controlled trials of interventions to assist patients' adherence to prescribed medications reported that only about half of the interventions tested were associated with statistically significant increases in adherence (McDonald et al, 2002). The interventions that were effective for long-term care included combinations of providing more convenient care, information, counselling, reminders, self-monitoring, reinforcement, family therapy, and other forms of additional supervision or attention. Even the most effective interventions had modest effects.

Table 1.13.1: Strategies for Increasing Adherence with Medication Regimens.

A.   Increasing Adherence with Short-term Treatments

- Counselling about the importance of adherence

- Written instructions about taking medicines.

- Reminder packaging (e.g. calendar packs, dosettes)

B.   Increasing Adherence with Long-Term Treatments

- Combinations of the following:

-        Instructions and instructional materials.

-        Simplifying the regimen (e.g. less frequent dosing,

    controlled-released dosage forms)

-        Counselling about the regimen

-        Support group sessions

-        Reminders (manual & computer) for medications and appointment

-        Cuing medications to daily events.

-        Reinforcements and rewards (e.g. explicitly acknowledging

    the patients efforts to adhere).

-        Self-monitoring with regular physician review and re-enforcement.

-        Involving family members and significant others.

(Haynes et al, 2002; McDonald et al, 2002)

Patient Information: - One - on - one verbal interventions between pharmacists and patients with written supplementations are commonly used techniques to improve patient compliance. Providing information about medicines has been demonstrated to be a necessary, albeit insufficient, intervention. The simple transmission of information cannot be considered sufficient in itself, but how the information is received and acted upon is integral with the delivery of the information.

Raising patient information and skill levels can help promote improved adherence. Patients are more likely to adhere to medication regimens when they believe that the medication they are taking is likely to improve health and when they are made an active participant in the decision-making process regarding their medications. However, most busy pharmacists (and physicians) fail to make time for quality interaction with their patients and therefore often fail to consider adherence issues.

Adherence Packaging: - Special packing for certain medications has resulted in improved adherence. Various types of adherence packages, such as those used for contraceptives (oral), have been designed to help patients remember when to take a dose and whether or not a dose was taken. Other applications of adherence packaging in prepackaged ready to dispense systems include blister packs, such as those with certain antimicrobial agents.

Adherence Devices: - A number of different device have been designed in an attempt to make adherence with medication regimens easier. Some like Medi-dot and Mediplanner are low technology approaches, while others (i.e. MEMS) are micro-electronically based systems. Pill boxes with clearly marked compartments for each day of the week and time of day (e.g. morning, afternoon, evening) in which doses can be inserted for a one or two

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week period either by the patient or the pharmacist is useful for those who take multiple dosages during the day, such as the elderly and patients with HIV/AIDS.

Refills Reminders: - Refill reminders can help patients follow their medication regimen correctly. They can be manual or automated, either partially or entirely. Media for refill reminders include mailers (i.e. postcards, letters), telephones, e-mail and facsimile. The method should be chosen based on a number of factors, focusing on what will most closely match the patient needs.

Web- Based Approaches: - Consumers use the internet as a means to access information, services, and products, including prescription drugs. The internet offers valuable tools to improve medication adherence. Web-based, home-care monitoring systems can assess medication adherence, health status, quality of life and physiologic parameters. Distance medicine technology enables greater continuity of care by improving access and supporting the coordination of activities by clinicians.

Telemedicine defined as the use of electronic information and communication technologies to provide and support healthcare when distance separates the participants, has been proposed for use in enhancing patient adherence. Technologies included in telemedicine are video conferencing, telephones, computers, the internet, fax, radio and television. Medical devices are being attached to telephone lines to provide remote monitoring of therapy, and call centers are providing medication counselling, prior authorization, refill authorization and monitoring of formulary adherence (Angaran, 1999).

Adherence Contracts: - Patients can be issued a medication adherence "contract" at the initiation of treatment. Contracts may include a simple and clearly written set of instructions that describe the medications; important facts about the medication including side effects and interaction with other medication, and information as to the purpose of the medication and the consequences of not taking it as prescribed. The contract needs to include when and how medication readjustments will occur and when and how prescriptions will be refilled. A schedule of medication intake should also be included - i.e., time contingency or pain contingency instructions plus dose, frequency and length of time the patient is expected to take the medication.

Linking Medication Schedule with Daily Activities: - Linking the act of taking a medication with 'cues' (i.e. routine daily activities) can promote adherence to medication regimen. Forgetfulness is a common reason people do not take their medication as prescribed. Patients should be encouraged to create a routine to help them remember (e.g. place the medication in a place where it will be seen daily such as the dinning table or bathroom).

Altering the Regimen: - While most medication regimens cannot be altered, it may be possible to recommend certain changes to promote medication adherence. In general, adherence rates can be improved by altering such components of the treatment regimen as complexity of treatment, duration of treatment, requirements for lifestyle changes and even the cost of the regimen itself. A systematic review of the association between dosage regimens and medication adherence reported that simpler, less frequent dosing regimens result in better adherence across a variety of therapeutic classes

(Claxton et al 2001). When possible, once a day medications and more user-friendly dosage forms and/or dosage regimens should be used.

Other Strategies: - The development of trust between a patient and his or her pharmacist is essential to the success of the pharmaceutical care process. Without the requisite level of trust, patient adherence to pharmacist recommendations is much less likely. This might not appear problematic at first, given that the annual Gallup poll of consumers views of honesty and ethics among professions has consistently revealed pharmacists to be among the most trusted healthcare professionals (West et al,2002). The study determined that participants used pharmacists' credentials, communication skills, personableness and appearance to form trustworthiness beliefs. Overall, they considered pharmacists to be honest, knowledgeable and caring.

1.14   Problem Statement

Hypertension has been identified as the most common cardiovascular disease in Ghana and causes heart failure, stroke, chronic renal disease and some times spontaneous sudden death (Plange Rhule et al, 1999). Whilst the prevalence of hypertension in the Western countries has decreased during the past decade, that in Black Africans has been reported to be on the increase.

Prescribers uniformly underestimate the problems of non-adherence in their patients (Roth et al, 1978, Brody 1980). If a health care professional is unable to detect non-adherence, it is impossible for him or her to correct the problem. Hence it becomes imperative to measure and evaluate patient adherence reliably. This can be done by self-report, pill counting, and in some cases measuring serum or urine drug levels. Of these, self-report is the most practicable and widely used tool.

In general patients can be accurate in reporting whether they are adhering to their treatment regimen if they are asked simply and directly (Duong et al, 2001). Moreover, regular assessment of patients' adherence by it-self can lead to increase patients adherence to his or her medication regimen.

In view of the consequences of non-adherence to anti-hypertensive medicines and high cost of standard hypertension medication, this study seeks to evaluate the magnitude of non-adherence in the Ghana Ports and Harbours Authority (G.P.H.A.) hospital, Takoradi; and its related patient causes. These can be used to increase awareness among medical officers, prescribers, other health professionals and managers of health care to develop strategies to minimize non-adherence to anti-hypertensive medicines.

1.15   Aim of Study:

To investigate non-adherence to antihypertensive medications regimens in G.P.H.A. hospital, Takoradi.

1.16   Objectives:

a.   To investigate the extent of non-adherence to antihypertensive medication regimens at Ghana Ports and Harbour Authority (G.P.H.A.) Hospital – Takoradi.

b.   To ascertain the reasons for non-adherence in hypertensive patients in G.P.H.A. Hospital – Takoradi.

CHAPTER 2

2.0   MATERIALS AND METHODS

2.1   Study site

The Ghana Ports and Harbours Authority (G.P.H.A.) Hospital in Takoradi was the setting for this study. It is a 50 bed capacity hospital located at the Southern end of the Western Regional Capital and on the Chapel Hill. It is about 200 metres from the European Hospital (also known as Takoradi Hospital). It was established by the G.P.H.A. mainly to take care of the health needs of the workers and their dependants. However, with time the hospital has expanded its catchment to include staff of other organizations and their dependants as well as patients who can afford the services and pay directly (privates patients).Organizations that depend on this facility for their healthcare needs include, Ghana Telecom, Ghana Water Company, State Transport Company, Ghacem, Ltd, Ghana Dock Labour Company, Standard Chartered Bank; all in Sekondi/Takoradi. A total of forty (40) companies/departments have registered with this facility to provide their staff and dependants medical and pharmaceutical services on credit bases.

The average daily outpatients' attendance is between 100-150 patients, with three medical officers at post. The pharmacy department had a pharmacist, houseman pharmacist, three dispensing technicians, a labourer, and service personnel (dispensing technician) at the time of the study.

Services provided at this hospital include: outpatient, admissions, laboratory, minor and major surgeries, ultrasound scanning, pharmaceutical service and ambulance.

2.2 Target population

All adult hypertensive patients attending the facility on out-patient basis were used for the study. These patients should have been diagnosed hypertensive and on medication for not less than six months.

2.3 Study sample and selection

One hundred and fifty hypertensive out patients were sampled for the study. This was made up of 70 females and 80 males. Respondents were selected daily by convenience sampling from the hypertensive patients who went to the pharmacy to fill their prescriptions. Thus patients willing to participate in the study were interviewed and between two to five were sampled daily for the study depending on the turn-up of the hypertension patients for the day. The study took place between 1st November and 31st December, 2005.

Inclusion criteria: Patients presenting with a history of hypertension at OPD of this hospital for at least six months duration and on medication during the said period. Diabetic hypertensives were part of the study provided they were on anti-hypertensive medication.

Exclusion criteria: Pregnancy induced hypertension patients were excluded from the study. Patients diagnosed hypertensive but less than six months duration were also excluded. Also excluded were hypertensive patients on admission.

2.4 Tool development

The data collection tool used was a questionnaire consisting of the Morisky self-reported medication adherence questions relating to medication use and major reasons for non-adherence (Morisky et al, 1986).

The Morisky self-reported medication adherence scale/score is a commonly used adherence screening tool. It is composed of 4 – yes/no questions about past medication use patterns and are thus quick and simple to use during drug history interviews. The questions are presented in table 2.1 below.

Staff of the Pharmacy department of this hospital i.e. Pharmacist and Technicians were involved in the administration of the questionnaires (tables 2.1 and 2.2) developed. The reasons for non-adherence were obtained if any of the 4-item questions were answered in the affirmative.

The tool was pretested on a sample of 10 patients selected from the facility.

Table 2.1: Questionnaire for assessing non – compliance in hypertensive patients

Patient No.	1	2	3	4	5	6
Sex (M/F)						
Age (YRS)						
Sickness Duration						
1. Did you ever forget to take your medication?						
2. Are you careless at times about taking your medication?						
3. When you feel better, do you sometimes stop taking the medication?						
4. Sometimes, when you feel worse, do you stop taking your medication?						
What are your reasons for not being able to take your medications?						
Total Score/ patient						

KEY: Yes = 0; No =1; Questions **1-4** = Morisky's 4-item questionnaire.

Table 2.2: Reasons for Non-adherence in study.

a -- forgetfulness	d -- feeling well
b -- financial	e -- too busy and forgets
c -- feeling sick, side effects	f -- don't believe in the treatment

2.5   Main study

The study was carried out between 1st November and 31stDecember 2005. The questions were administered to 150 patients who consented to participate in the study after the purpose was explained to them (see sample of consent or declaration form in appendix 4).

It is important to consider the rights of respondents in every research. Therefore the rights of respondents during the interviews were well respected. All patients who were interviewed indicated their concern to participate in the study.

Data analysis:

In the Morisky scale, a NO answer was allocated a score of 1, and a YES a score of 0. Thus a patient answering NO to all questions had a maximum score of 4 corresponding to 100% adherence; three NO is equal to 75%; two NO is 50% and one NO is 25% adherence. Patients who answered YES to all the questions score 0% adherence i.e. they are non-adherent. Patients score of 75% or more were considered as adherent and patients with score less than 75% were described as non-adherent.

CHAPTER   3

3.0   RESULTS AND DISCUSSION:

3.1   Level of adherence

Twenty-nine (19.3%) patients fully adhered to their medication. Total adherence

(100%) to anti-hypertensive medication regimens for patients in the study was therefore

low. These patients responded in the entire Morisky questionnaire with "no" answers.

Almost half of the patients in the study (i.e. 74 (49.3%)) had answered affirmatively to

one of the questions. These were considered as being adherent or compliant to their

medication regimen. From Table 3:1, forty (26.7%) patients had answered "yes" to two

questions from the Morisky questionnaire. They are non-adherent to their medications as

well as the five (3.3%) patients who gave "yes" answers to three of the questions asked.

Two (1.3%) patients answered "yes" to all four questions. They are totally non-adherent

(Figure 3.1).

Table 3.1:   Summary of results of Morisky scores to Hypertensive Patients.

Morisky Score		0	1	2	3	4	Total
Hypertensive patients (frequency)	Male	2	2	23	40	13	80
	Female	0	3	17	34	16	70
Total No. of Patients		2	5	40	74	29	150
Total percentage frequency (%)		1.3	3.3	26.7	49.3	19.3	99.9
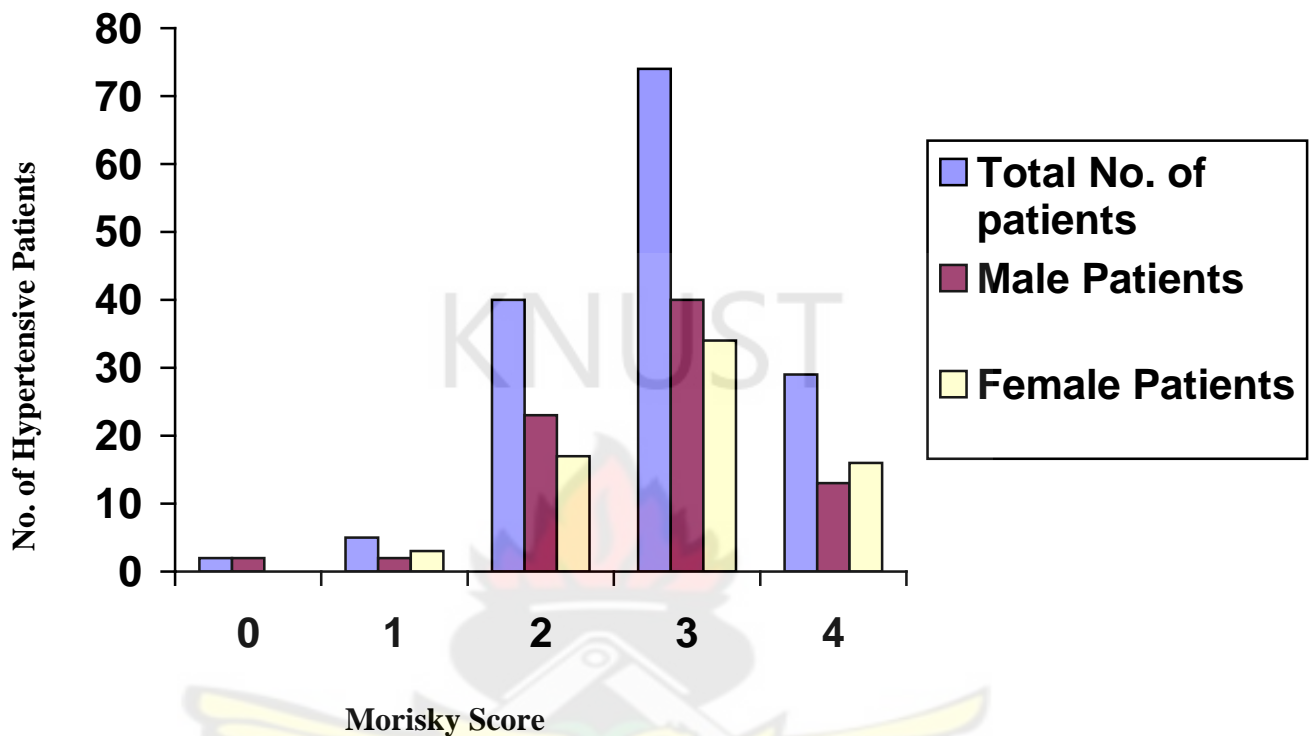
Figure: 3.1: Morisky's Score to hypertensive patients by sex

Adherence is an important issue in the treatment of hypertension. An early study shows that adequate control of hypertension was associated with taking at least 80% of the prescribed regimen (Haynes et al, 1976). The patient's inability to perceive a benefit from the use of anti-hypertensive therapy removes a powerful stimulus for adherence. Patients who do not take enough of their medication to reduce their blood pressure effectively are vulnerable to the long-term consequences of hypertension including an increased risk of acute myocardial infarction.

Poor adherence to medication therapy is considered one of the leading preventable causes of treatment failures and hospital admissions for chronic heart failure

(Vinson et al, 1990, Tsuyuki et al 2001, Michalsen et al 1998). In this study 47 (31.3%) patients showed poor adherence to their medication regimen and 103 (68.7%) had good score for adherence. These forty-seven patients (Table 3.1) were not taking their medication correctly which can lead to treatment failure, disease progression, drug related morbidity and drug tolerance. There is a growing body of evidence that such patients who do not take medications as prescribed for cardiovascular disease suffer adverse health outcomes. Hence about 31% of the study population is at a risk of developing these complications. The Beta-Blocker Heart Attack Trial reported a one year mortality rate of 5.4% in non adherent patients (i.e. those who took ≤ 75% of prescribed medication) compared with 2.2% among this who took 75% or more of their prescribed medication (Horowitz et al 1990). In the said study, poor adherence had an increased risk of death whether they were on the Beta- Blocker or placebo. In 1989, Maronde et al, reported that adherence with anti-hypertensive therapy was 18% lower for those who were readmitted to the hospital when compared to those who were not readmitted.

The problem of poor adherence to medical treatment is a well recognized problem in medical literature. This makes non-adherence to medications one of the largest and most expensive disease categories. Moreover, patient non-adherence is not limited to medication alone. It can also take many other forms, which include the failure to keep appointments, to follow recommended dietary or other life style changes, and to follow other aspect of treatment or recommended preventive health practices. Adherence is greatly enhanced when health care providers work in partnership with the patient. Patients need to be properly educated about their disease and the need for medication.

For example, some patients believe that medications can do more harm than good. Patients may also have fears about taking medications, deny that they have a chronic condition or have poor understanding of why they need daily medication. Sometimes, just the reminder of being sick is a burden that can prevent compliance. Counseling, education, or just simply listening to patients, answering their questions and in the long run getting them to understand their conditions and what their medication is, is the goal of many clinical interventions.

Age Distribution. Table 3.2 indicates the age distribution of patients interviewed. 102 (68%) patients were below sixty years old and 48 (32%) were between sixty and seventy-nine years. The reason for this could be that, because the patients are mostly workers from companies and the retirement age in Ghana is sixty (60) years. From figure 3.2, the mean age group was 50 – 59 years. Table 3.3 indicates that patients below 50 years and between 60 to 69 years had significantly better adherences than those from 50 – 59 years and 70 years and above. Generally, at 70 years and above patients tend to forget their medication taking regimen and this adversely affects adherence.

Table 3.2: Age Distributions of Hypertensive patients

Age (yrs) group	30 - 39	40 - 49	50 - 59	60 - 69	70 - 79
No. of patients (frequency)	11	38	53	40	8
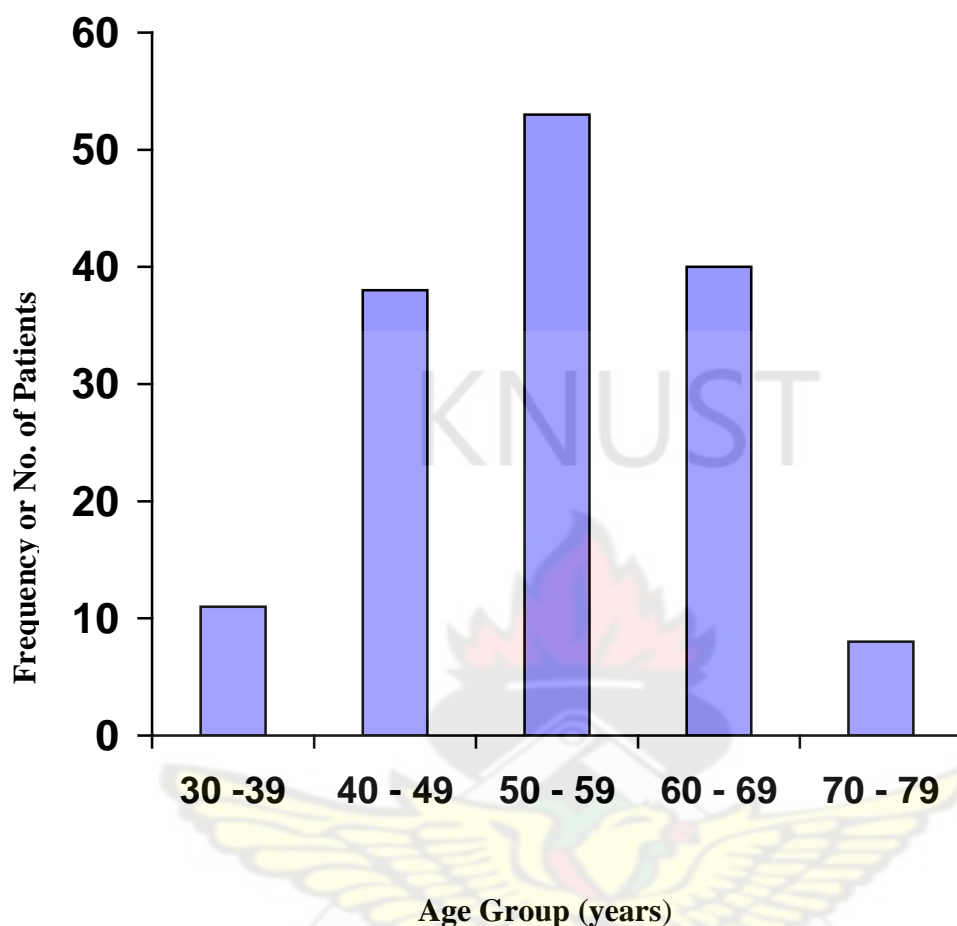
Figure 3.2: Age Distributions of Hypertensive Patients

Sex and Adherence. The sex distribution in the study was eighty (80) males to seventy (70) females. From the study as in Table 3.3, it shows that more females i.e.50 (71.4%) are adherent to anti-hypertensive medicines than their male i.e. 53 (66.3%) counterparts even though more males were included in the study. It is also shown in table 3.1 that no female patient scored zero adherence for her medication taking regimen but two male patients scored zero. As shown in figure 3.3, the females adhered better to their hypertension medication in all the age groupings except for 50 – 59 and the 40 – 49 years

Table 3.3: Adherence of Patients by Age and Sex

Sex	Male Patients (n = 80)		Female Patients (n = 70)	
Age group (years)	No. of patients in study	Patients with adherence ≥ 75%	No. of patients in study	Patients with adherence ≥ 75%
30 – 39	5	3	6	6
40 – 49	15	12	23	16
50 – 59	35	25	18	10
60 – 69	22	13	18	14
70 – 79	3	0	5	4
Total	80	53	70	50
%tage of patients with adherence ≥75%	-	66.3 %	-	71.4 %

groupings. For instance, in the age group70 – 79 years; the three men in this group never

adhered to their medication up to 75%, whilst their female counterpart had four women

with ≥ 75% adherence out of five in the group. From the figure 3.3, it shows that

adherence at old age i.e. above sixty years, is better for women than men. From the study,

good adherent was 52% for men as against 78% for women (Table 3.3) at old age.
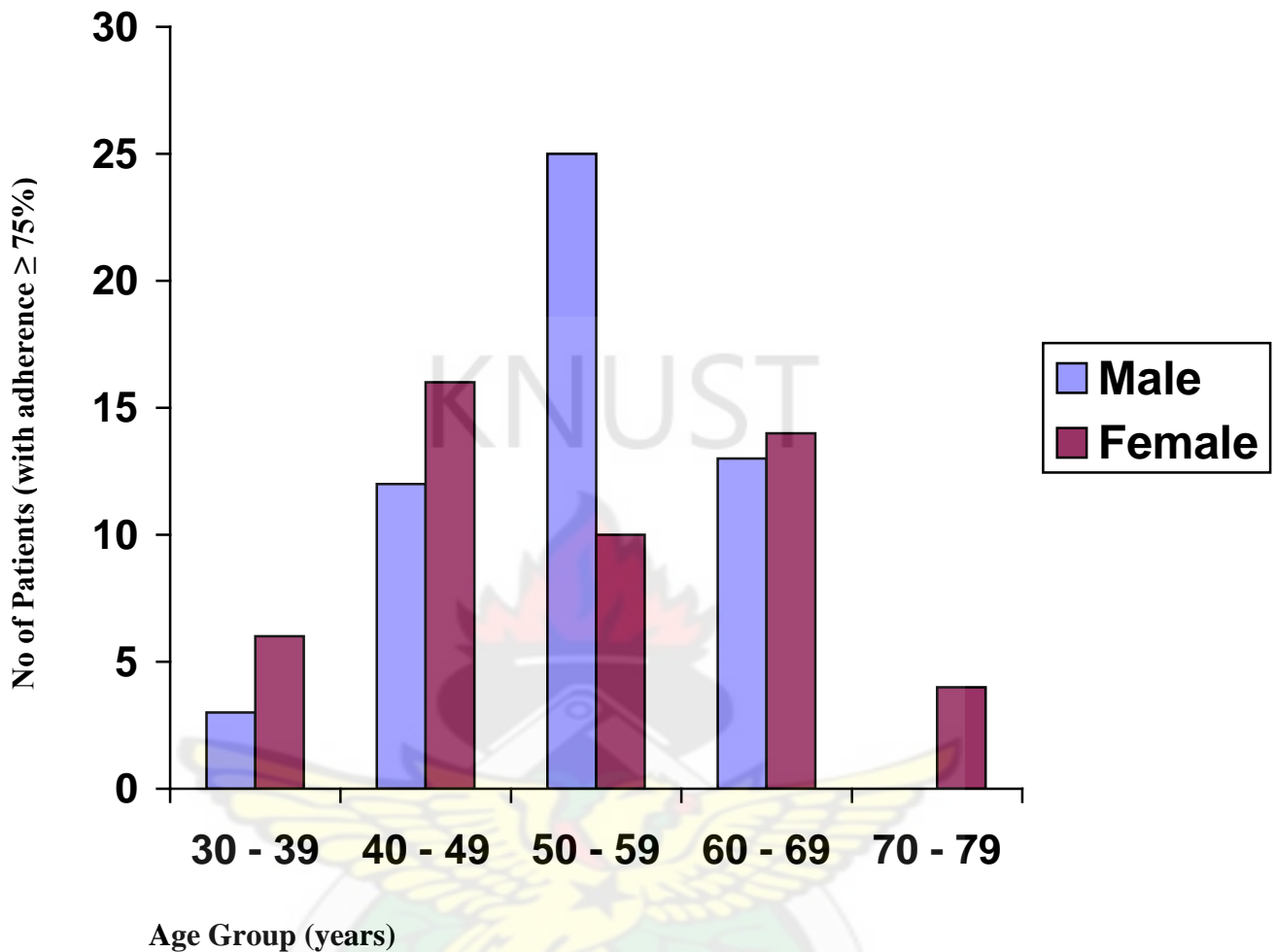
Figure 3.3: Adherence of Patients by Age and Sex

All the females in the age group 30 – 39 years adhered to their medication regimens. It is important to note here that young population adherent to medication will inevitably reduce complications of their disease at old age leading to reduced health and economic burden on both the individual and country as a whole.

Duration of Sickness. More than half of the patients (53%) disease conditions were between one and three years old. It is an indication that most hypertensive patients do not leave long with their disease condition, most probably due to development of

disease complications resulting from non-adherence of medications. It is also probable that the hypertensive patients could have been retired and have relocated or changed a health facility. All the patients studied started their medications over a year ago even though the inclusion criteria was six months and over on medication.

Table 3.4: Duration of Hypertension and Adherence of patients.

Duration of sickness (Hypertension) (yrs)	1 - 3	4 - 6	7 - 9	10 – 12
No. of patients (frequency)	80	55	11	4
No. of patients with ≥ 75% adherence	56	39	6	2

In this study, adherence was better when the duration of the sickness was less than six years old after which it markedly reduced. 95 patients out of 135 (i.e. 70%) had good adherence for their medication when their disease condition was less than six years. However, after six years of disease duration the adherence reduced to about 50%.
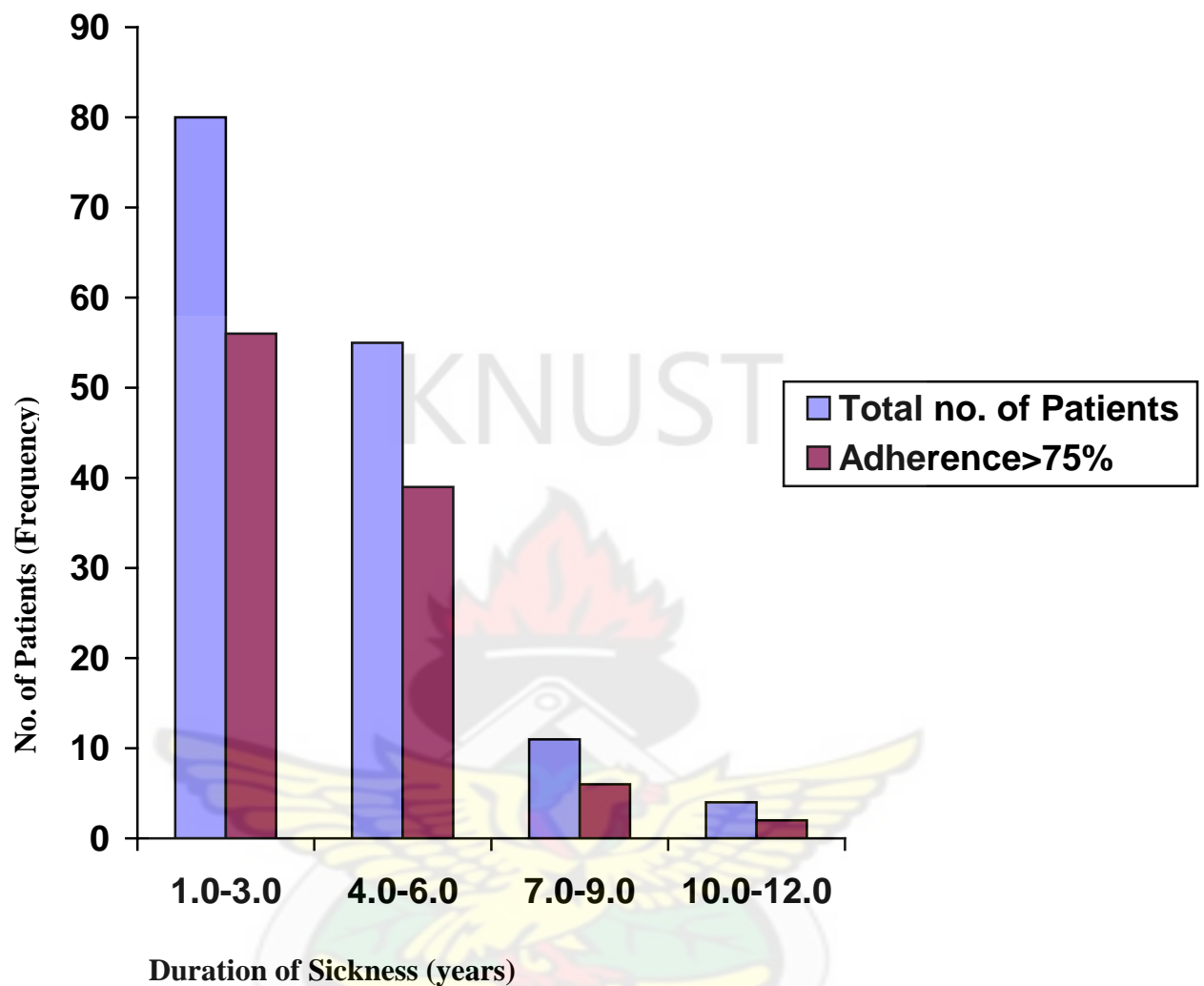
Figure3.4: Duration of Hypertension and Adherence

From figure 3.4 it is clearly noticed that the number of hypertensive patients decreases with increasing duration of their disease condition. The reduction in numbers could be attributed to deaths, relocation after retirement, and change of health facility or even trying other alternative medicines e.g. traditional or herbal. The duration of sickness on figure 3.4 were entered as whole numbers (years) for simple data analysis i.e. 3.4 years will be taken as 3.0 yeas but 3.5years will be entered as 4.0 years.

3.2   Reasons for non-adherence

Many factors affect non-adherence with medication regimens. These can be grouped into patients factors, disease factors, medication related factors, and health care systems related factors. In this study, the patient's factors were used to evaluate the non-adherence.

From the results shown in Table 3:5, the main reason why respondents did not comply with their medication is forgetfulness; with a total frequency of 83 (45.4%). Most of the patients in the study are workers of companies and are very busy, leading to forgetfulness. Since this is one of the major reasons for non-adherence in these respondents, patients should be encouraged to adopt systems and methods for remembering to take their medicines such as the use of alarm clocks. They can also enlist the help of friends and families for support.

From Table 3:5 and Figure 3:5 about 20.8% of the patient did not take their medications / or miss doses because of the side effect of the drugs especially calcium channel blocker, angiotension converting enzyme inhibitors and diuretics. Severe headaches and diarrhoea were associated with the calcium channel blockers whilst persistent cough and numbness or heaviness were some of the side effects encountered by respondents taking the angiotension converting enzyme inhibitors. There is therefore the need for pharmacists to counsel patients on common side effects that may be encountered, including how to avoid them and what to do when they occur. The counseling environment should be relaxed and none threatening so that patients should therefore not be afraid to ask about potential side effects and what to do when they occur. The patients should be informed that most of the above mentioned side effects are just

transient and will disappear with continuous use of the medicine. If side effects occur

persistently, the health care providers must be informed.

Table 3.5:   Reasons for non-adherence to anti-hypertensive medications

Reasons	Frequency	Percentage Frequency
a. Forgetfulness	83	45.4
b. Financial	19	10.4
c. Feeling sick, side effects	38	20.9
d. Feeling well	29	15.8
e. Too busy and forgets	14	7.6
f. Don't believe in the treatment	0	0
TOTAL	183	100.0

NB: Some patients had more than one reason for non-adherence
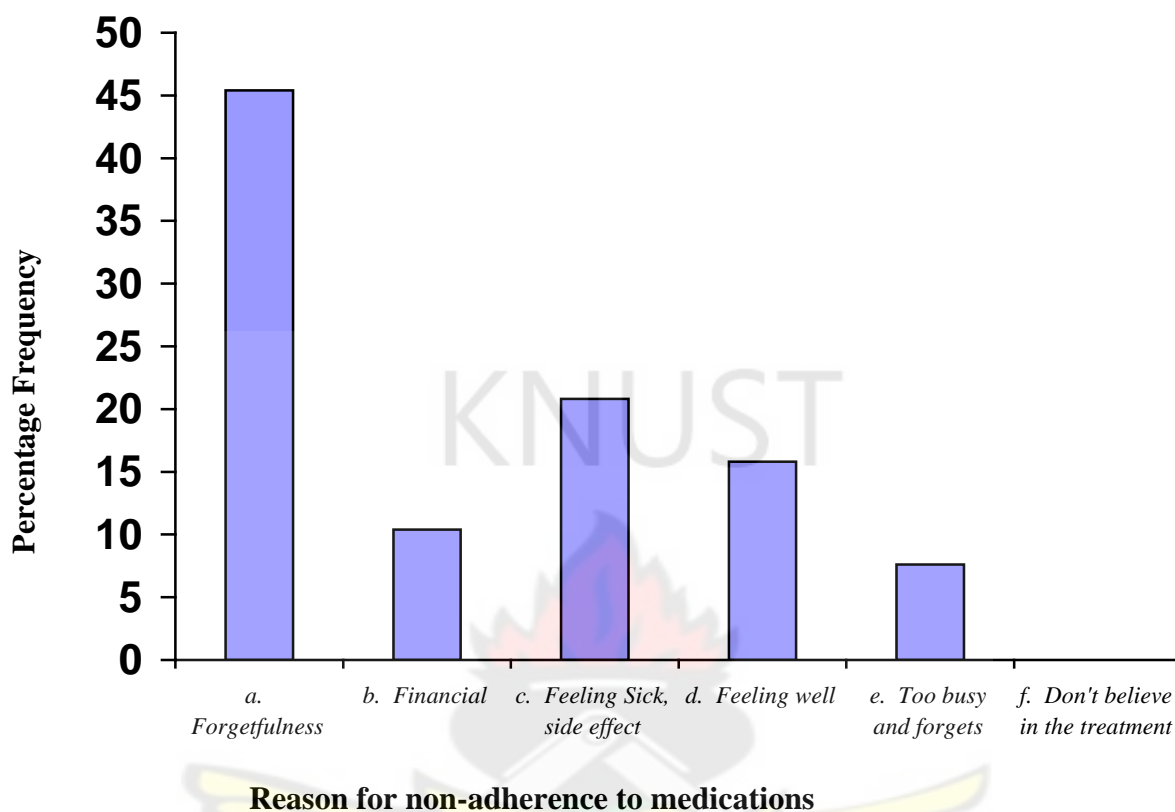
Figure 3.5: Reasons for non-adherence to anti-hypertensives

Another reason why respondents did not comply with their medication is affordability. 19 (10.4%) of the patients had problem of financing their refills and this contributed to their non-adherence. Financial access has been deemed as one of the important barriers to health and a major cause of non-adherence to hypertension medication in Ghana (Buabeng et al, 2004). This is more so when patients have to pay upfront for medication. Doctors should consider the financial status of their patients in prescribing anti-hypertensive medicines to enable affordability e.g. generic prescribing should be encouraged. Prices of antihypertensive medicines should be subsidized by the

government. This is why the National Health Insurance Scheme (N.H.I.S.), being introduce should be encouraged and supported by all to make access to health service and medicines affordable to the populace. Pharmacists in health institutions should ensure that wherever possible all medicines prescribed are within the recommended list for re-imbursement by the N.H.I.S. and patients must always be encouraged to register with the N.H.I.S.

About 15.8% of the patients had no cause to take their medications regularly since they were feeling very well. There is the need for clinicians to explain the implications of starting long term therapy (i.e. that medication may be a life long commitment). They should emphasize the importance of prescribed dosage regimens and life style changes.

From table 3:3; 7.6% of the reasons for non-adherence were attributed to too busy work schedules and hence patients forget to report for reviews on schedule as well as remember to take their medications on schedule. There is the need for launching a comprehensive approach involving health care providers, patients and the general public especially with the aim of educating patients on the need to take their medicines regularly and in the manner prescribed. It is however relieving to know that all the patients involved in the study believed in having treatment for their ailment (hypertension)

CHAPTER 4

4.0   CONCLUSIONS AND RECOMMENDATIONS

4.1   Conclusions:

- Excellent adherence rate for anti-hypertension medication was low (19%), but over all good adherence rate was 68%. The non-adherence rate was about one-third (31.3%) of the hypertensive patients.

- Female hypertensive patient in the study were more adherent to their medication regimens than their male counterparts.

- Forgetfulness (45%) and feeling sick/ side effect (21%) are the major causes of patient non-adherence to their anti-hypertensive medication regimens in the institution.

4.2   Significance of the Study:

The result of this study is of value to health care providers, the general public, pharmacists, the ministry of health or Ghana health service, and administrators. The findings will be communicated to all stakeholders or interested parties at organized workshops or seminars.

Patients' adherence to anti- hypertensive medications would therefore be improved significantly and this will prevent treatment failures encountered in therapy due to non-adherence. As a result there would be much savings on the medicines budget both from the patient as an individual and the government as a whole since hospital admissions and cost of treatment will be reduced.

4.3   *Limitations:*

As a result of financial and time constraints, this study was limited to the GPHA hospital in the Sekondi /Takoradi metropolis. It could not be extended to other hospitals in other parts of the Western Region of Ghana. The Morisky score method used in the study is inexpensive and easy but can lead to overestimation of the results, because they are self- reports by the patients which can be misleading.

The institution chosen for the study as well as the sample size of 150 patients limits the generalization of the findings. Further studies with larger number of institutions and sample size should test the conclusions.

4.4   Recommendations:

Patients' adherence with anti-hypertensive medication was estimated as 68% in the study and non-adherence was 32%. This has several implications to the health delivery system and pharmacy practice in the country. The following recommendations are intended to assist health institutions to offer better medication counseling and to design better strategies for optimal adherence rates.

- The pharmacists, dispensing technicians/technologies should be adequately trained and resourced to offer proper counseling to hypertensive patients on their medication and disease conditions.

- Pharmaceutical care protocols and guidelines for anti-hypertensive medication counseling must be developed and implemented.

- The attitude of pharmacists and pharmacy staff towards professional responsibilities must be re-oriented to provide patient centered services.

- Effective communication and counseling techniques for pharmacists and pharmacy staff should be developed through regular in-service training.

- Local pharmaceutical companies should be assisted and encouraged to produce affordable, quality and effective anti-hypertensive medicines in Ghana.

- Pharmacists must be available and accessible to hypertensive patients at all times. This can develop cordial relationship with the patient and facilitate frank exchange of information leading to improved adherence.

- Pharmacists must spearhead the responsibility of counseling all hypertensive patients in their institutions rather than leaving that to the other pharmacy staff.

- Clinicians and other prescribers must educate their first time diagnosed hypertensive patients about their disease conditions and the importance of adherence to treatment programmes.

- Health care professionals should assist hypertensive patients develop systems that will remind them to take their medications.

- There should be total collaboration between all the health professionals in the institution to promote patient education and medication counseling.

- The designers of health institutions must consider the inclusion of counseling rooms for the pharmacy department instead of pinhole windows.

REFERENCES

.American Society of Health-System Pharmacists. ASHP Guidelines on Pharmacist-
Conducted Patient Education and Counselling. *Am J Health Syst Pharm. 1997;*
54: 431 – 434.

Angaran DM, (1999) Telemedicine and telepharmacy: current status and future
implications. *Am J Health Syst Pharm*. **56:** 1405 – 1426.

Baum D, Creer TL (1986) Medication compliance in children with asthma.
J Asthma. **23**: 49 – 59

Benner JS, Glynn RJ, Mogun H, et al(2002) Long-term persistence in use of statin
therapy in elderly patients. *JAMA*. **288**: 455 – 461.

Brody DS An analysis of patient recall of their therapeutic regimens.
1980*; J Chronic Dis.* **33**:57-63.

Buabeng K. O., Matowe L., Plange-Rhule J. (2004) Unaffordable drug prices: A major
cause of non-compliance with hypertension medication in Ghana.
J Pharm Phamaceut Sc. **7(3**): 350 – 352.

Burt V. L. (1995) Trends in the prevalence, awareness, treatment and control of
hypertension in the adult population. Data from the Health Examination Surveys,
1990 – 1991. Hypertension. **26:** 60 – 69.

Chobanian AV, Bakris GL, Black HR (2003)   The Seventh Report of the Joint National
Committee on Prevention, Detection, Evaluation and Treatment of High Blood
Pressure.

Claxton AJ, Cramer J, Pierce C. A systematic review of the association between dose

    regimens and medications compliance. *Clin Therapeutics. 2001*; **23:** 1296 – 1310.

Col N, Fanale JE, Kronholm P. The role of medication noncompliance and adverse drug

    reactions in hospitalization of the elderly. *Arch Intern Med.1990;* **150**: 841-845

Cramer JA, Glassman M, Rienzi V. The relationship between poor medication

    compliance and seizures. *Epilepsy Behav.2002;* **3:** 338 – 342.

Cramer JA, Mattson RH, Prevey ML, Scheyer RD, Ouellette VL. How often is

    medication taken as prescribed? A novel assessment technique. *JAMA. 1989;*

    261: 3273 – 3277.

Duong M, Piroth L, Grappin M, et al. Evaluation of the Patients on antiretroviral

    regimens. *HIV Clin T rials.2001;* **2:** 128 – 135.

Eselin JA, Carter BL. Hypertension and Left Ventricular Hypertrophy: is drug therapy

    beneficial? *Pharmacotherapy 1994*.

Felkey BG. Adherence screening and monitoring. *Am Pharm.* **NS35:**42 – 51.

Garfield FB, Caro JJ. Achieving patient buy-in and long term compliance with

    antihypertensive treatment. *Dis Manage Health Outcomes.2000*; **7:** 13 – 20.

Gottlieb H. Medication non-adherence: finding solutions to a costly medical problem.

    Drug Benefit Trends. 2000; **12**:57 – 62.

Hawkins D.W., Bussey H. I., Prisant L. M. (1992) Hypertension in Dipiro et al's

    Pharmacotherapy. A Pathophysiologic Approach. Elsevier, N. Y. 139 – 143.

Haynes RB Determinants of compliance: the diseases and the mechanics of treatment. In:

    Haynes RB, Taylor DW, Sacket DL, eds. Compliance in Healthcare. *Baltmore.*

    Md: The John Hopkins University Press; 1979: 49 – 62

Haynes RB, McDonald H, Garg AX, Montague P. Interventions for helping patients to

follow prescriptions for medications. *Cochrane Database Syst Rev. 2002;*

(2) CD 000011.

Haynes RB, Sackett DL, Gibson ES. Improvement of medication compliance in

uncontrolled hypertension. *Lancet. 1976*; **1**: 1265 – 1268.

Horowitz RI Viscoli CM, Berkman L, et al. Treatment adherence and risk of death after a

myocardial infraction. *Lancet. 1990;* **336**: 542 – 545.

Jackevicius CA, Mamdani M, Tu JV. Adherence with statin therapy in elderly patients

with and without acute coronary syndromes. *JAMA. 2002;* **288**: 462 – 467.

K/DOQ1.   Clinical practice guidelines for chronic kidney disease: evaluation,

classification and stratification. Kidney Disease outcome Quality Initiative. *Am.*

J. Kidney Disease 2002; **39** (Suppl 1): 51-266.

Koda-Kimble Mary Anne, Lloyd Yee Young et al. Applied Therapeutics: The clinical

use of drugs :(2004); 14: 1 – 8.

 Lemanek K. Adherence issues in the medical management of asthma. *J. Pediatric Psych.*

1990; **15**: 437 – 458.

Mac Mahon S. et al. Blood Pressure, Stroke and Coronary heart diseases. Part I:

Prolonged differences in blood pressure: Prospective observational studies

corrected for the regression dilution bias. *Lancet 1990;* **335** (8692):765-74.

Maronde RF Chan LS, Larson FG, et al. Underutilization of antihypertensive drugs and

associated hospitalization. *Med Care. 1989*; **27**: 1159 – 1166.

McDonald HP, Garg AX, Haynes RB. Interventions to enhance patient adherence to

medication prescriptions: scientific review. *JAMA. 2002;* **288**: 2868 – 2879.

Meichenbaum D, Turk DC (1987). Facilitating Treatment Adherence. A Practitioner's
Guidebook. NY: Plenum Press; 1987; **20.**

Merck Manual. **17th** Edition. (1999). 1629-35.

Michalsen A, Konig G, Thimme W. Preventable causative factors leading to hospital
admission with decompensated heart failure. *Heart. 1998*; **80**:437-41

Morisky DE, Green LW, Levine DM. Concurrent and predictive validity of a self-
reported measure of medication adherence. *Med Care. 1986;* **24**: 67 – 74.

Nichols – English G, Poirier S. Optimizing adherence to pharmaceutical care plans. *J Am
Pharm. Assn. 2000*; **40:** 475 – 485

Non-compliance with medication Regimens. An Economic Tragedy. Emerging Issues in
Pharmaceutical Cost Containing. Washington, DC*: National Pharmaceutical
Council; 1992:* 1 – 16.

Plange-Rhule J., Phillips R., Acheampong J.W. (1999). Hypertension in renal failure in
Ghana1. *J Hum Hypert.* **3:**37 – 40

Pobee O.M.J. (1994) National high blood pressure education programe working group
report on hypertension and diseases in Ghana. 23: 145.

Psaty BM, Koepsell TD, Wagner EH. The relative risk of incident coronary heart disease
associated with recently stopping the use of beta-blockers. *JAMA.1990*;
263:1653-1657.

Roth HP, Caron HS. Accuracy of doctor's estimates and patients' statements on
adherence to a drug regimen. *Clin Phaarmacol Ther. 1978;* 361 – 370.

Schweizer RT, Rovelli M, Palmeri D. Noncompliance in organ transplant recipients.
Transplantation. 1990; **49**: 374 – 377.

Steiner JF, Prochazka AV. The assessment of refill compliance using pharmacy records: methods, validity, and applications *J Clin Epidemiol. 1997*; **50**: 105 – 116.

Stephenson BJ, Rowe BH, Haynes RB, et al. Is this patient taking the treatment as prescribed? *JAMA. 1993;* **269:** 2779 – 2981.

Stergachis A IMPACT: Improving Patients Compliance with Medication Regimens. *US Pharmacist. 1998; (Suppl):* 1 – 16.

Stergachis A, Sheingold S, Revicki DA, Psaty BM, Luce BR. Medical care and cost outcomes following pentoxifylline treatment for peripheral arterial disease. *Arch Intern Med. 1992;* **152**: 1220 – 1224.

Sullivan SD, Kreiling DH, Hazlet TH. Noncomplaince with medication regimens and subsequent hospitalizations: a literature analysis and cost of hospitalization estimate. *J Res Pharm Economics. 1990;* **2**: 19 – 33.

Tsuyuki RT, McKelvie RS, Arnold JMO. Acute precipitants of congestive heart failure exacerbations. *Arch Int Med. 2001*; **161**:2337-2342.

Vasquez EM, Tanzi M, Benedetti E. Medication noncompliance after kidney transplantation. *Am J Health Syst Pharm. 2003*; **60**: 266 – 69.

Vinson JM, Rich MW, Sperry JC, Shah AS, McNamara T. Early readmission of elderly patients with congestive heart failure. *J Am Geriatr Soc. 1990;* **38**:1290-1295.

West DS, Wilkin NE, John P. Bentley JP. Understanding how patients form beliefs about pharmacists' trustworthiness using a model of belief processing. *J Am Pharm Assoc. 2002;* **42:** 594 – 601.

Weiden PJ, Zygmunt A. Medication noncompliance in Schizophrenia: part 1, assessment. *J Prac Psych Behav Health. 1997*, 106 – 110.

APPENDICES

Appendix 1

Questionnaire for assessing non – compliance in hypertensive patients

Patient No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Sex (M/F)															
Age (YRS)															
Sickness Duration															
1. Did you ever forget to take your medication?															
2. Are you careless at times about taking your medication?															
3. When you feel better, do you sometimes stop taking the medication?															
4. Sometimes, when you feel worse, do you stop taking your medication?															
What are your reasons for not being able to take your medications?															
Total Score/ patient.															

Key: Y = Yes = O   **N** = No = 1   **Questions 1-4 = Morisky's 4-item questionnaire.**

Appendix 2

Reasons for Non – adherence

(a) - forgetfulness

(b) - financial

(c) - feeling sick, side effects

(d) - feeling well

(e) - too busy and forgets

(f) - Don't believe in the treatment.
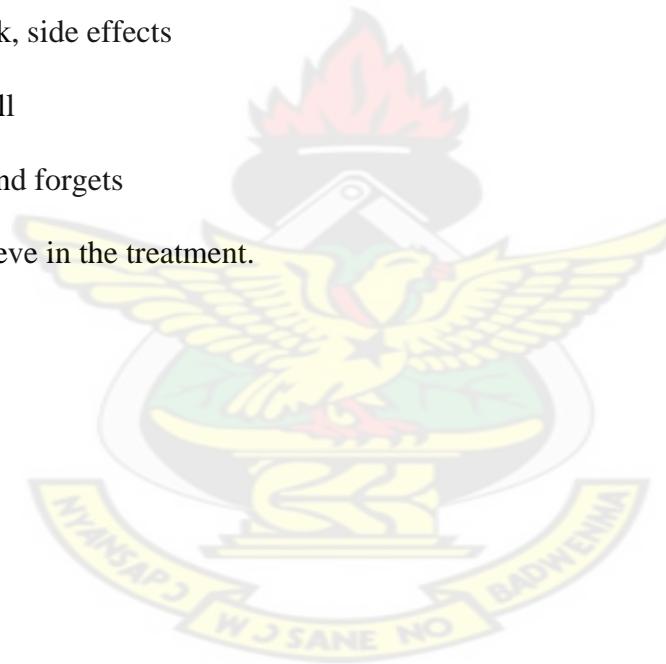
Appendix 3

Morisky scores for Hypertensive Patients in the Study.

Patient No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Sex (F/M)	M	F	M	F	M	M	M	M	F	F	M	M	M	F	F
Age (yrs)	46	35	56	47	44	60	54	56	56	42	60	52	45	38	39
Morisky Score	4	3	3	2	4	4	2	4	4	3	3	3	2	4	4

Patient No.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Sex (F/M)	M	F	F	F	M	M	M	F	M	F	F	M	F	M	M
Age (yrs)	50	52	50	48	62	55	42	48	38	65	51	48	45	44	59
Morisky Score	3	4	4	3	2	3	3	2	4	4	2	3	3	3	3

Patient No.	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Sex (F/M)	F	F	M	M	M	M	F	M	F	F	M	F	F	M	M
Age (yrs)	48	72	63	66	39	54	62	45	41	49	51	50	60	60	59
Morisky Score	3	3	4	2	4	3	3	3	3	3	3	3	4	2	2

Morisky Scores for Hypertensive Patient in the study

Patient No.	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Sex (F/M)	F	F	M	M	M	M	F	M	M	M	F	F	F	F	F
Age (yrs)	60	67	40	39	60	55	39	60	50	48	48	45	67	60	49
Morisky Score	3	3	4	3	4	3	4	3	3	4	4	3	4	4	4

Patient No.	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
Sex (F/M)	F	F	M	F	F	M	F	F	F	M	M	M	M	F	M
Age (yrs)	72	69	50	43	48	49	51	52	60	60	51	60	70	42	45
Morisky Score	3	2	4	2	2	4	2	3	3	3	4	3	2	2	3

Patient No.	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
Sex (F/M)	M	M	F	F	M	F	F	M	M	M	F	M	M	F	F
Age (yrs)	62	38	45	49	60	72	58	53	52	55	56	71	53	54	51
Morisky Score	2	2	3	3	2	2	2	2	3	2	2	1	0	3	1

Morisky scores for Hypertensive Patients in the   Study.

Patient No.	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105
Sex (F/M)	F	F	F	F	M	M	M	M	M	M	F	F	M	F	M
Age (yrs)	48	50	70	62	61	49	55	56	48	49	49	48	52	63	61
Morisky Score	3	3	3	3	3	3	3	1	3	2	3	3	2	3	3

Patient No.	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120
Sex (F/M)	F	M	F	M	F	M	M	F	F	M	F	M	F	F	M
Age (yrs)	60	50	32	51	60	60	55	63	50	50	56	53	38	48	63
Morisky Score	3	2	3	3	1	3	3	2	2	2	1	3	2	2	0

Patient No.	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135
Sex (F/M)	F	M	M	M	F	F	M	F	M	F	F	M	F	M	M
Age (yrs)	51	61	62	58	58	60	60	70	66	68	49	50	65	58	59
Morisky Score	4	2	3	3	2	3	2	3	3	4	4	2	2	3	3

Morisky scores for Hypertensive Patients in the   Study.

Patient No.	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150
Sex (F/M)	M	M	M	F	M	M	F	M	M	F	F	F	M	M	M
Age (yrs)	48	52	39	49	50	60	52	55	53	60	49	58	59	62	70
Morisky Score	2	3	2	3	3	3	3	3	3	4	3	3	3	2	2

Note: F = Female, M = Male.

Appendix 4

Consent / Declaration form to Participate in study

I, Mr./Mrs./Rev./Alh……………………………………..do hereby agree to participate in the on-going study on medication adherence after the contents and purpose have been explained to me in simple terms. I understand that the answers I give will not be used against me in the facility where I seek for medical attention. I therefore declare that my answers are a true reflection of my medication taking.

Signature / Right Thumbprint.