MJMR

EFFECTIVENESS OF ANTI- HYPERTENSIVE DRUGS IN CONTROLLING BLOOD PRESSURE AMONG SRI LANKAN ADULTS DIAGNOSED WITH HYPERTENSION FOLLOWING MEDICAL CHECK-UP: A QUASI-EXPERIMENTAL STUDY

Regidor-111 Dioso[1]*, Mohamed Janoof[2], and Ahamed Lebbe Safrin Jeezan[3]

[1]RN, BSN, MSc, Lecturer, Faculty of Nursing, Lincoln University College, Malaysia
[2]RN, BSN, Nurse Manager, Batticaloa General Hospital, Sri Lanka
[3]RN, Kandy General Hospital, Sri Lanka
**Corresponding Author Email: duke@lincoln.edu.my*

ABSTRACT

This study identified factors that contributed to the effectiveness of antihypertensive drugs and investigated the most effective antihypertensive drug in controlling blood pressure. The purposive sampling technique was used in this quasi-experimental design to enroll study participants. Of the 120 hypertensive patients following consultations at a district hospital of Oluvil, only 100 complied with the experiment. Following medical check-up, it was investigated that hypertension were controlled within 3 months affected by age, and gender. Gender, more probable were women, was primarily identified as a factor (p=0.002657); and age bracket of 30-40 years old was also identified as a factor to had helped control blood pressure (p=0.002107). Hypertensive drugs such as Calcium Channel Blockers (p=0.0008712), Angiotensin Receptor Antagonist (p=0.03983), and Angiotensin Converting Enzymes Inhibitors (p=0.04719) at normal dosages controlled blood pressures among Sri Lankan hypertensive patients.

Key words: Antihypertensive drug, Blood pressure, Hypertension, Pharmacology, Quasi-experimental

INTRODUCTION

Background

World Health Organization (WHO) (2008) says that hypertension (high blood pressure) is one of the leading causes of non communicable diseases in many countries including Sri Lanka. It is predicted that hypertension will become the leading cause of death and disability globally, by 2020 in 18% of the approximated 9.4 million deaths globally (Abegunde *et al*., 2007; WHO, 2008).

One of the first lines of treatments for hypertension is anti-hypertensive drugs (Webb *et al*., 2010). Physical exercise and weight loss is done in addition, if the blood pressure cannot be controlled by drugs alone (Abegunde *et al*. 2007; Chobanion *et al*. 2003).

On account of these issues, we ended up with a question "does anti-hypertensive drugs work effectively in controlling blood pressure among Sri Lankan adults with hypertension following medical check-up?"

Problem statement

According to health ministry sources, it is common to see poorly controlled hypertension and it is estimated that only 1/3 of patients on treatment have their blood pressure well controlled (Chobanion *et al*., 2003; WHO, 2008). That is why there are several anti-hypertensive drugs used in Sri Lanka however only a few are effective in controlling blood pressure.

Objectives

At the end of this study, it is hoped to:

1. Identify factors that can contribute to the effectiveness of antihypertensive drugs.

2. Investigate the most effective antihypertensive drug in controlling blood pressure.

Hypothesis

There is a significant effectiveness of anti-hypertensive drugs in controlling hypertension among Sri Lankan adults following medical check-ups.

Variables

The cause variable is the use of antihypertensive drugs following medical check-ups, while the effect variable is the control of blood pressure among Sri Lankan adults

diagnosed with hypertension. Reviewing literatures are therefore necessary to support the variables set.

Factors Affecting Hypertension

Esposti, *et al*., (2002) said that age (persistence rate increasing proportionately with advancing years), type of drug first prescribed (persistence rate higher with angiotensin II antagonists, progressively lower with ACE-inhibitors, beta-blockers, calcium channel blockers and diuretics), and gender of patient (persistence was better in males) affects hypertension. Similarly, Harper *et al*., (1994) said that age is the prominent factor that affects the blood pressure of a person with hypertension. This study further stated that severity of stroke leads to higher blood pressure as they grow older. Toumilehto *et al*., (1985) on the other hand stated that co-morbidities such as atherosclerosis and cerebrovascular stroke affect hypertension. Several other factors which influence co-morbidities affecting hypertension for instance are smoking, overeating, alcohol intake, and salt intake.

Similarly, Fujita *et al*., (1980) did a study between salt and non-salt sensitive patient with hypertension. This study showed that greater increase in blood pressure in salt sensitive patient with sodium loading can be attributed to greater sodium retention, leading in turn to an increase in cardiac output. The persistence of autonomic "drive" in the salt sensitive patient may contribute to increase in blood pressure.

Palatini *et al*. (1994) did a study to assess the reproducibility of ambulatory blood pressure and found that patient reactions to medical environment and changes of body weight seem to account for most of the changes in blood pressure. Therefore, emotions, anxiety and depression triggered by the environment can be factors affecting blood pressure control especially for hypertensive patients.

Antihypertensive Drugs Controlling Blood Pressure

Burnier (2006) revealed that adherence and persistence to therapeutic antihypertensive regimens influence effectiveness of control of blood pressure among hypertensive patients. This study further revealed that achieving optimal outcomes in the treatment of hypertension requires patients to take their medications properly (medication adherence) and also must continuously maintain the intake of medicine throughout the long-term treatment (persistence). However, poor medication-taking behaviour is a main problem among patients with hypertension, and has been identified as one of the main reasons of failure to achieve effective control of blood pressure. In turn, patients with hypertension who have uncontrolled blood pressure as a result of their irregularity in medication-intake behaviour remain at risk for serious morbidity and mortality such as stroke, myocardial infarction, and kidney failure.

On the other hand, Kostis *et al*., (1997) also conducted a study to assess the effectiveness of antihypertensive drug on the occurrence of heart failure in older persons with isolated systolic hypertension. This study found that older persons with isolated systolic hypertension exerted a strong protective effect in preventing heart failure among patients with an 80% risk reduction.

Gueyffier, *et al*., (1997) conducted a research to quantify the average treatment effect of antihypertensive drugs in both genders and to determine whether gender hormones affect antihypertensive drugs to control blood pressure. This study has found that in terms of relative risk, control of blood pressure using antihypertensive drugs did not differ between genders. The absolute risk reduction attributable to treatment seemed to depend on untreated risk. These findings underline the need to predict accurately the untreated hypertensive risk of an individual person in order to rationalize and individualize antihypertensive treatment.

Webb *et al*., (2010) conducted a systematic review and meta-analysis to explain effectiveness of antihypertensive drugs in preventing stroke. Baseline and follow-up data for mean systolic blood pressure (SBP) were extracted from trial reports. Effects of treatment on inter-individual variance in blood pressure (a surrogate for within-individual variability) were related to effects on clinical outcomes. Pooled estimates were derived by use of random-effects meta-analysis. Ultimately they came up with a conclusion that drug-class effects on inter-individual variation in blood pressure can account for differences in effects of antihypertensive drugs on risk of stroke independently of effects on mean SBP.

METHODOLOGY

Research Design

A quasi-experimental study design is more appropriate to

be used for this study.

Sampling

A-120 patients from Oluvil divisional hospitals following medical check-ups were qualified and were primarily enrolled. Purposive sampling eliminated other enrolled participants. Inclusion criteria were adult 20-60 years old and hypertensive patient who are attending to medical clinic at the district hospital of Oluvil, Sri Lanka. More importantly, patients who used only Thiazide Diuretics, Calcium Channel Blockers, Angiotensin Converting Enzymes (ACE) Inhibitors, Angio Receptor Antagonists and Beta Blockers were selected. Patients 19 years old and below were excluded. In addition, a patient who died or transferred from other clinic was also excluded from the study. Of the 120 enrolled participants, only 100 religiously complied with the experiment hence was used in the data analysis.

Data collection

This quasi-experimental study design used procedure manuals with bio-physiologic apparatuses (appendices 1&2) to collect data. Specifically, the blood pressure apparatus uses the mercury based manometer and a regular stethoscope. The checklist in addition to the blood pressure reading consists of age, class of drugs, gender, and frequency of drug intake per day, and month of drug intake.

Patients were religiously followed up through phone calls and hand phone messaging services to comply with drug intake and follow up check-ups. Every time the patient comes to the hospital, blood pressures are immediately taken and appointment cards were double checked to see the checklists of drugs if compliance consistently is done.

Thiazide Diuretics, Calcium Channel Blockers, Angiotensin Converting Enzymes (ACE) Inhibitors, Angio Receptor Antagonists and Beta Blockers will be tabulated in 3 months. The months were categorized into blood pressure control using ≤120/80 mm/hg, 120/80 mm/hg, and ≥120/80 mm/hg.

Data analysis

Maan-Whitney U test was used to analyze the data. Probability (p=) sampling was used to investigate on the most probable drug to control hypertension. The p= was set at 0.05 at 95% confidence with 5% margin of error. Standard deviation was also set at 1.00 to investigate the mean probable differences of set of patients going for clinical check-ups. SPSS statistical software was used to analyze the samples.

Ethics

Primarily, permission from the Dean of the Faculty of Nursing and from the Research Management Committee of Lincoln University College was granted.

Secondly, the Ministry of Health, Sri Lanka and the District Hospital of Oluvil (Eastern Province) gave permission to conduct the experiment.

Written consents were acquired from the patients. The ethics of autonomy was respected among subjects used. If subjects will withdraw from the experiment, they are removed without questions.

The benefit of investigating the effectiveness of antihypertensive drugs outweighs the harm of its side effects.

RESULTS AND FINDINGS

Demographic Characteristics

This study identified 82% female hypertensive subjects and the rest were male.

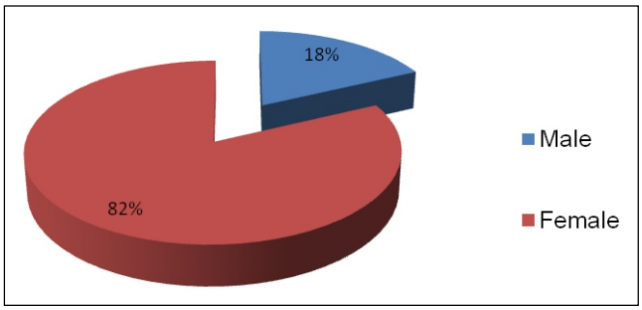

Figure 1: Gender demography

In comparing male and female SBPs, average pressure was 117 mm/Hg higher among females (figure 2).

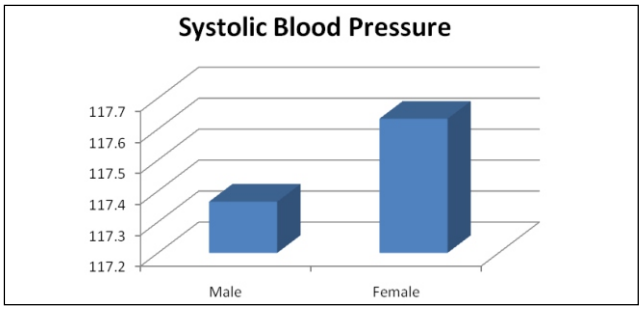

Figure 2: Gender comparison of SBPs

Largest portions of age group in figure 3 are more than 60 years old however this age group responded effectively on antihypertensive drugs having a mean SBP control of 117 mm/hg. The second largest age group is 51 to 60 and 30 to 40 years old achieving a SBP of 117.5 mm/hg. The most probable age group was 30-40 years old responding to antihypertensive drugs achieving a SBP of 119.5 mm/hg.

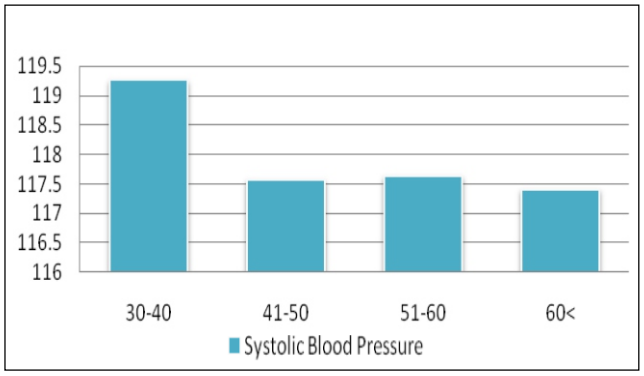

Figure 3: SBPs on age group

Marital status as depicted in figure 3 responded effectively on the antihypertensive regimens having the married subjects to achieve a SBP of 117.7 mm/hg. The widowed on the other hand achieved a SBP of 117.62 mm/hg after the antihypertensive therapeutic regimen was given. There were no unmarried patients in this study.

Figure 4: Systolic Pressure vs Marital Status

Age is the most probable factor (p=0.002657) to achieve effectiveness of antihypertensive drugs in controlling SBP. Gender is the second probable factor (p=0.002107). Marital status (figure 4) is not a significant factor for antihypertensive drugs to control blood pressure (p=0.2011).

Table 1. Factors affecting effectiveness of antihypertensive drugs

Factors	Mean	Std. Deviation	Probability
Age	3.24	0 .806	**0.002657**
Gender	10.09	3.232	**0.002107**
Marital status	1.001	3.79	**0.2011**

Table 2 showed that the different drugs used by adult Sri Lankans diagnosed with hypertension identified to control blood pressure. The average systolic blood pressure for the patients who use Calcium channel blockers at normal dose controlled SBPs from 117.491mm/Hg to 117.633 mm/Hg as compared to other antihypertensive drugs.

Thiazide diuretics 25 milligrams (mgs) are less probable in its effectiveness (p=0.257), while 12.5 and 50 mgs is not effective at all (p=0.000). Beta Blockers at normal dose (Atenolol 50 mg bd, Propranolol 20mg bd) also had less effectiveness (p=0.3673) while at low dose (Atenolol 25 mg bd, Propranolol 10mg bd) had lesser probability in its effectiveness (p=0.7579); and high dose (Atenolol 100 mg bd, Propranolol 40mg bd) is not effective at all (p=0.000). On the contrary, ACE Inhibitors at normal dose (Captopril 25mg tds, Enalapril 5mg bd) has better effectiveness (p=0.04719) as compared with its low dose (Captopril 12.5mg tds, Enalapril 2.5mg bd) (p=0.4930) and high dose (Captopril 50mg tds, Enalapril 10mg bd) (p=0.9202). Angiotensin Receptor Antagonists at normal dose (Losartan K 50mg bd) also has better effectiveness (p=0.03983) on controlling blood pressure as compared with its low dose (Losartan K 25mg bd) (p=0.08001) and with its high dose (Losartan K 100mg bd) (p=0.9202). Lastly, Calcium Channel Blockers at normal dose (Nifedipine 20mg bd, Amlodipine 5mg bd, Verapamil 40mg tds, Diltiazam 60mg noct) is more effective (p= 0.0008712) as compared with its low dose (Nifedipine 20mg daily, Amlodipine 2.5mg bd, Verapamil 20mg tds, Diltiazam 30mg noct) (p=0.000) and at its high dose (Nifedipine 40mg bd, Amlodipine 10mg bd, Verapamil 60mg tds, Diltiazam 60mg bd) (p=0.6367).

Table 2. Antihypertensive drugs

Group of drugs	<120/80 1st mo	120/80 1st mo	>120/80 1st mo	<120/80 2nd mo	120/80 2nd mo	>120/80 2nd mo	< 120/80 3rd mo	120/80 3rd mo	> 120/80 3rd mo	Mean	Standard deviation	Probability
Tthiazide diuretics Normal Dose (HCT 25 mg mane)	3	2	0	2	2	1	3	2	0	1.67	1.0540926	0.257
Thiazide diuretics Low Dose (HCT12.5 mg mane)	0	0	0	0	0	0	0	0	0	0	0	0.00
Thiazide diuretics High Dose (HCT 50 mg mane)	0	0	0	0	0	0	0	0	0	0	0	0.00
Beta Blockers Normal Dose (Atenolol 50 mg bd, Propranolol 20mg bd)	2	2	0	3	1	0	2	2	0	1.33	1.0540925	0.3637
Beta Blockers Low Dose (Atenolol 25 mg bd, Propranolol 10mg bd)	0	1	1	0	1	1	1	0	1	0.67	0.4714045	0.7579
Beta Blockers High Dose (Atenolol 100 mg bd, Propranolol 40mg bd)	0	0	0	0	0	0	0	0	0	0	0	0.00
ACE inhibitors Normal Dose (Captopril 25mg tds, Enalapril 5mg bd)	3	4	1	2	3	3	3	4	1	2.67	1.00	0.04719
ACE inhibitors Low Dose (Captopril 12.5mg tds, Enalapril 2.5mg bd)	0	2	1	2	0	1	2	0	1	1.00	0.8164965	0.4930
ACE inhibitors High Dose (Captopril 50mg tds, Enalapril 10mg bd)	0	1	0	0	1	0	1	0	0	0.33	0.4714045	0.9202
Angiotensin receptor Antagonists Normal Dose (Losartan K 50mg bd)	13	14	1	19	6	3	15	10	3	9.33	5.9814528	0.03983
Angiotensin receptor antagonists Low Dose (Losartan K 25mg bd)	8	7	1	10	4	2	12	3	1	5.33	3.8297084	0.08001
Angiotensin receptor antagonists High Dose (Losartan K 100mg bd)	0	0	1	0	1	0	0	1	0	0.33	0.4714045	0.9202

Cal. Channel Blockers Normal Dose (Nifedipine 20mg bd,Amlodipine 5mg bd, Verapamil 40mg tds, Diltiazam 60mg noct)	8	15	7	11	7	12	14	8	8	10	2.9059326	0.0008712
Cal. Channel Blockers Low Dose (Nifedipine 20mg daily, Amlodipine 2.5mg bd, Verapamil 20mg tds, Diltiazam 30mg noct)	0	0	0	0	0	0	0	0	0	0	0	0.00
Cal. Channel Blockers High Dose (Nifedipine 40mg bd,Amlodipine 10mg bd, Verapamil 60mg tds, Diltiazam 60mg bd)	0	2	0	0	1	1	0	2	0	0.67	0.8164965	0.6367

However, it is interesting to find that according to the analysis of co-variance result (table 3), R^2 using F-test, the age (t=0.371), gender (t=0.388) and marital status (t=0.51) are significant only on enhancing the effectiveness of antihypertensive drugs.

Table 3: Influencing Factors using T-test

Factors	Unstandardized Coefficients		Standardized Coefficients	T-test	Sig.	Correlations	
	Beta	Std. Error	Beta			Zero - order	Partial
(Constant)	112.473	3.992	0.000	28.172	0.000		
Gender	0.364	0.983	0.040	0.371	0.712	0.055	0.038
Age	0.784	2.020	0.042	0.388	0.699	0.021	0.040
Marital Status	0.623	1.223	0.054	0.510	0.611	0.064	0.052

DISCUSSION

Many factors may contribute to poor medication-taking behaviour which includes the complexities of dosage regimens among Sri Lankans with greatest therapy-related influence. The main aim in the development of strategy was to improve outcomes for Sri Lankans with hypertension, to facilitate good medication-taking behaviour through simplified dosing and tolerability, along with the development of programs to detect poor medication adherence and to support long-term medication persistence in daily practice. Barbagallo *et al*., (2000) revealed that there is a dependency in the adherance of antihypertensive drugs affected by marital status, age, and gender.

Discussing about marital status, Sri Lankans who are married are busy with work since they need to make a living to support their family. Likewise, the intake of antihypertensive drugs may not be consistently adhered to. Or on the contrary, it may be more significant for the others since family maybe a factor to

support them by frequent reminder to adhere to drug treatment regimens.

With regards to gender as a factor, Sri Lankan males in the eastern province are more into farming and fishing as their occupation. This may be a reason for fewer adherences to drug treatment regimen since the knowledge on the effectiveness of such drugs are less. Or on the contrary, it is more likely adhered to by female Sri Lankans who are more motivated to achieve a faster recovery from their hypertensive crisis.

Lastly, Age 30-40 years old is the most significant factor affecting the adherence to antihypertensive drugs. However, it is still probable among ageing Sri Lankans (≥41 years old) to be also motivated in achieving the full effectiveness of the drugs.

CONCLUSION

Following medical check-up, it was investigated that hypertension can be controlled within 3 months affected by age, gender and marital status. Further investigation in controlling hypertension showed that Calcium Channel Blockers at normal dose specifically using Nifedipine 20 mgs twice a day, Amiodarone 5 mgs twice a day, Verapamil 40 mgs thrice a day and Diltiazem 30 mgs before sleeping were highly probable (p=0.0008712). Angiotensin receptor antagonists at normal dose specifically using Losartan Potassium 50 mgs twice a day was also significant (p=0.03983). Normal dosages of ACE inhibitors specifically Captopril 25 mgs thrice a day, and Enalapril 5 mgs twice a day were also significant (p=0.04719).

There is significant effectiveness of anti-hypertensive drugs used in the eastern province of Sri Lanka in controlling hypertension among adults. However, factors such as age, gender and marital status were identified to have contributed in controlling adult hypertension. Result showed that there were more women (82%) who had hypertension than men (18%). Investigations showed that the age bracket 41-50 years was also showed that antihypertensive drugs helped in controlling hypertension.

RECOMMENDATION

Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure (2003) revealed that regular exercise and healthy nutrition should be included in the health education among the ageing and the married population in Sri Lanka. The DASH (Dietary Approaches to Stop Hypertension) eating plan is particularly recommended if blood pressure is high or if a person is at risk for high blood pressure. The DASH is a combination diet that is low in fat and rich in fruits and vegetables which is less likely to be practiced by Sri Lankans in the eastern province. It is low in cholesterol and saturated fat, high in dietary fiber, potassium, calcium and magnesium and moderately high in protein which is recommended to those who is less likely to adhere consistently to antihypertensive drug treatment.

REFERENCES

Abegunde, D. O., Mathers, C. D., Adam, T., Urtegone, M. & Strong, K. (2007). The burden and costs of chronic diseases in low- income and middle income countries. *Lancet.* 370(9603), pp 1929-1938.

Barbagallo, M. & Barbagallo Sangiorgi, G.(2000). Efficacy and tolerability of lercanidipine in monotherapy in elderly patients with isolated systolic hypertension. *Aging (Milano)*, 12(5), pp 375-9.

Burnier, M. (2006). Medication Adherence and Persistence as the Cornerstone of Effective Antihypertensive Therapy. *American Journal of Hypertension,* 19(11), pp 1190-1196.

Chobanion, A. V., Bakris, G. L., Black, H. R., Cushman, W. C., Green, L. A., Izzo, J. L. Jr, Jones, D. W., Masterson, B. J., Oparil, S., Wright, J. T. Jr, Roccella, E. J.; Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. National Heart, Lung, and Blood Institute; National High Blood Pressure Education Program Coordinating Committee (2003). Seventh report of the joint national committee on prevention, detection, evaluation, and treatment of high blood pressure. *Hypertension,* 42(6), pp 1206-1252.

Esposti, D. E., Sturani, A., Martino, M., Falasca, P., Novi, M. V., Baio, G., Buda, S. & Volpe, M. (2002). Long-term persistence with antihypertensive drugs in new patients. *Journal of Human Hypertension,* 16(6), pp 1206-1252

Fujita, T., Henry, L. W., Bartter, C. F., Lake,, R. & Delea, S. C. (1980). Factors Influencing Blood Pressure in Salt-sensitive Patients with Hypertension. *The American Journal of Medicine,* 69(3), pp 334-344.

Gueyffier, F., Boutitie, F., Boissel, J. P., Pocock, S., Coope, J., Cutler, J., Ekbom, T., Fagard, R., Friedman, L., Perry,

M., Prineas, R. & Schron, E. (1997). Effect of Antihypertensive Drug Treatment on Cardiovascular Outcomes in Women and Men: A Meta-Analysis of Individual Patient Data from Randomizd, e Controlled Trials. *Annals of Internal Medicine,* 126(10), pp 761-767.

Harper, G., Castleden , C. M. & Potter, F. J. (1994). Factors affecting changes in blood pressure after acute stroke. *American Heart Association,* 25(9), pp 1726-1729.

Kostis J. B., M., Davis, B. R., Cutler, J., Grimm, R. H. Jr, Berge, K. G., Cohen, J. D., Lacy, C,R., Perry, H. M. Jr, Blaufox, M. D., Wassertheil-Smoller, S., Black, H. R., Schron, E., Berkson, D. M., Curb, J.D,, Smith, W. M., McDonald, R., Applegate WB. (1997). Prevention of Heart Failure by Antihypertensive Drug Treatment in Older Persons With Isolated Systolic Hypertension. *Journal of the American Medical Association,* 278(3), pp 212-216.

Palatini, P., Mormino, P., Canali, C., Santonastaso, M., Zanata, G. & Pessina, A. C. (1994). Factors affecting ambulatory blood pressure reproducibility. Results of the HARVEST Trial. Hypertension and Ambulatory Recording Venetia Study. *American Heart Association,* 23(2), pp 211-216.

Toumilehto, J., Nissinnen, A., Woulf, E., Gebores, J., Piha, T. & Puska, P. (1985). Effectiveness of Treatment with Antihypertensive Drugs and Trends in Mortality from Stroke in the Community. *British Madical Journal,* 291(6499), pp 857-861.

Webb, A. J., Fischer, U., Mehta, Z. & Rothwell, P. M. (2010). Effects of Antihypertensive-drug Class on Interindividual Variation in Blood Pressure and Risk of Stroke: A Systematic Review and Meta-analysis. *The Lancent,* 375(9718), pp 906-915.

World Health Organization (2008). The World Health Report 2008 - primary Health Care. Retrieved at [March 2017]. Available at: http://www.who.int/whr/2008/en/

Appendix 1: Procedure manual

Monitoring Blood Pressure

DISTRICT HOSPITAL - OLUVIL

Drug name: dosage: frequency: series:

Patient No:

Age:

Marital status:

Date:

Gender:

Equipment:

1. A double nose stethoscope
2. An appropriately sized adult blood pressure cuff
3. A blood pressure measurement instrument such as an aneroid or mercury column sphygmomanometer or an automated device with a manual inflate mode

No	Procedure	√
1	Identification of patient and check contraindication of the site	
2	Gather equipment	
3	Acquire written and informed consent	
4	Prepare the patient: Make sure the patient is relaxed	
5	Positioning of patient: supine, seated, standing.	
6	Remove excess clothing	
7	Choose the proper BP cuff size	
8	Place the BP cuff on the patient's arm correctly	
9	Palpate/locate the brachial artery and position the BP cuff	
10	Wrap the BP cuff snugly around the arm.	
11	Position the stethoscope: (place the bell of the stethoscope over the brachial artery)	
12	Inflate the BP cuff slowly: (inflated enough to stop blood flow)	

Appendix 1 continuation: Procedure manual: Record Blood Pressure		
13	Slowly Deflate the BP cuff(: the pressure should fall at 2 - 3 mmHg per second) and watch the mercurial fluctuation at eye level	
14	Listen for the Systolic Reading: (The first occurrence of rhythmic sounds)	
15	Listen for the Diastolic Reading (Continue to listen till the sounds fade.)	
16	Record the reading SBP_____ DBP _____	
17	Redo the procedure on different site if it is deemed necessary to do again	

Appendix 2: Procedure manual
Home (oral) medications instructions

DISTRICT HOSPITAL - OLUVIL

Drug name: dosage: frequency: series:		
Employee No:		
Age:		
Marital status:		
Date:		
Gender:		
No	**Procedure**	√
1	Ask for the dosage, route and frequency of the drug in the checklist	
2	Checks all of the medication expiration	
3	Instruct to take appropriate dose	
4	Instruct to take medicine on time	
5	Instruct to take sufficient fluids to swallow medication	
6	Ask again to repeat the instructions	
7	Reconfirm how to use the checklist	