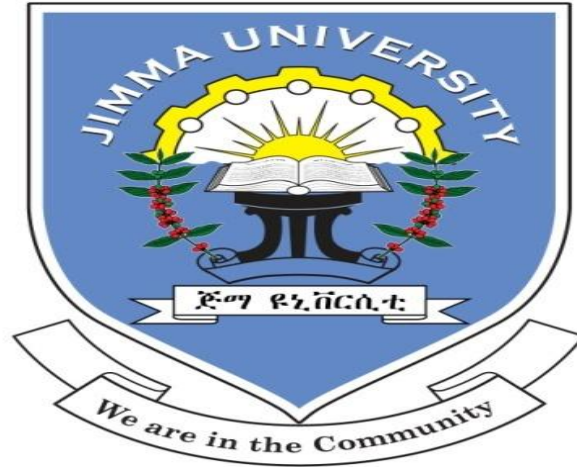


ASSESSMENT OF THE QUALITY OF CARE PROVIDED TO
AMBULATORY HYPERTENSIVE PATIENTS AT DIL CHORA
HOSPITAL DIRE DAWA, EASTERN ETHIOPIA



BY;

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Assessment of the Quality of Care Provided To Ambulatory Hypertensive Patients at
Dil Chora Hospital, Dire Dawa, Eastern Ethiopia

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Abstract

Background; Hypertension is the most important modifiable risk factor for coronary heart disease, stroke, heart failure, and end-stage renal disease. Despite evidence of reduced morbidity and mortality by treating hypertension to specific targets, treatment in many settings is not very successful at achieving blood pressure control and meeting these targets. While access and affordability of therapy certainly play a role, another potential explanation is poor quality of care.

Objective; To assess the quality of care provided to hypertensive patients and determine independent predictors of optimal quality of care at Dil Chora referral hospital, Dire Dawa, Eastern Ethiopia.

Methodology; a hospital based cross sectional retrospective study was conducted to assess the quality of care provided to hypertensive patients at Dil Chora referral hospital. Using a non probability convenience sampling technique 282 hypertensive patients were selected for the study. Data was entered and analyzed using SPSS version 21 for windows. Outcome measurement for each participant was the achievement of the recommended care process, goal blood pressure and experience of the patient with the care service. And outcome measurement for the health care structure was the achievement of each structural indicator.

Result; among 282 participants of the study 168(59.6%) were female and the mean age was 57.56 (± 12.14). The hospital achieved 70.6% of the recommended care structure. On average patients achieved 17.06% (± 8.20) of the recommended care process. Optimal quality of BP control was achieved for 93(33%) of patients. Patients with lower educational status ($B=1.492$, 95% CI, 0.859-2.717), fewer or no history of hospitalization ($B=1.693$, 95%CI, 0.732-2.653), less frequent hospital visit ($B=1.363$, 95%CI, 1.00-1.726) and taking single antihypertensive ($B=-2.419$, 95%CI,-4.171--0.666) and fewer concomitantly used medications ($B=3.571$, 95%CI, 2.779-4.363) are likely to achieve, on average, less recommended care processes. Hypertensive patients with co-morbid diabetes are three times more at risk of sub-optimal BP control (AOR 3.2, (95% CI, 1.23-8.325) than hypertensive patients with no co-morbidity. And patients with male gender ($B=-4.654$ 95% CI, -7.979--1.328), younger age ($B=1.722$ 95% CI, 0.548-2.896), urban residence ($B=11.250$ 95% CI, 4.805-17.695) and with more frequent history of hospitalization ($B=-6.064$ 95% CI, -8.117--4.010) are likely to score, on average, less on their experience of the care service.

Conclusions and recommendation: This study found that the quality of care provided to hypertensive patients in the study hospital was very low. The findings of this study showed that quality of care as measured by achievement of structural standards and patient experience is relatively better and quality of care as measured by level of health care process achievement and level of BP control was very low. Future researches on quality of care for hypertensive patients in other hospitals should also be conducted so that unsought quality gaps during patients routine counseling and clinical evaluations at follow up visits will be identified.

Keywords; Quality of care; Hypertension; Dill Chora Referral Hospital; Ethiopia

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List of Tables

Table 1 Health care process quality indicators and score results by the expert panel	21
Table 2 Health care structure quality indicators and score results by the expert panel	22
Table 3 Background characteristics of hypertensive patients on follow up at Dil Chora hospital April 1, 2014-March 30, 2015 (n=282).....	27
Table 4 Disease related characteristics of hypertensive patients on follow up at Dil Chora hospital April 1, 2014-March 30, 2015 (n=282)	28
Table 5 Medication related characteristics of hypertensive patients on follow up at Dil Chora hospital April 1, 2014-March 30, 2015 (n=282)	29
Table 6 Availability of medical equipments and care formats and achievement of structural standards at Dil Chora hospital, Dire Dawa, April 1, 2014-March 30, 2015	31
Table 7 Months of stock outs and achievement of structural standards Dil Chora hospital, Dire Dawa, April 1, 2014-March 30, 2015	31
Table 8 Distribution of patients based on their eligibility to each health care process indicator and scores for which they were found to be eligible, Dil Chora hospital, Dire Dawa, April 1, 2014-March 30, 2015 (n=282).....	32
Table 9 Linear regression showing association of socio-demographic factor with mean percentage of care process indicators score, Dil Chora hospital, Dire Dawa, April 1, 2014-March 30, 2015 (n=282) 34	
Table 10 Linear regression showing association of disease related variable with mean percentage of care process indicators score Dil Chora hospital, Dire Dawa, April 1, 2014-March 30, 2015 (n=282)	35
Table 11 Linear regression showing association of medication related factors with mean percentage of care process indicators Dil Chora hospital, Dire Dawa, April 1, 2014-March 30, 2015 (n=282)	36

List of Figures

Figure 1 Conceptual framework shoeing factors affecting quality of care.....	12
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Lists of Abbreviations and Acronyms

ACEI	Angiotensine converting enzyme inhibitors
ARB	Angiotensine receptor blockers
AOR	Adjusted odds ratio
ASA	Acetyl salicylic acid
BP	Blood pressure
BUN	Blood urea nitrogen
CBC	Calcium channel blocker
CI	Confidence interval
CV	Cardiovascular
CVD	Cardiovascular disease
CKD	Chronic kidney disease
CLcr	Creatinine clearance
DASH	Dietary Approaches to Stop Hypertension
DBP	Diastolic blood pressure
DM	Diabetes mellitus
DTP	Drug therapy problem
ECG	Echocardiogram
FMOH	Federal Ministry of Health
HC	Health care
HCT	Hydrochlorothiazide
HDL	High density lipoprotein
HIV	Human immunovirus
HTN	Hypertension
JNC	Joint National Committee
LDL	Low density lipoprotein
MMAS-8	Eight item Morisky medication adherence scale
NCD	Non communicable diseases
NICE	National institute for Health and Care Excellence
NORPEQ	Norwegian Patient Experience Questionnaire ()
NSAID	Non steroidal anti-inflammatory drugs
OPD	Outpatient department
RVI	Retroviral infection
SBP	Systolic blood pressure
Scr	Serum creatinine
SPSS	Statistical Package for Social Sciences
TG	Triglycerides
QC	Quality of care
US	United States
WHO	World Health Organization

Contents

Abstract.....	II
Acknowledgment	III
List of Tables	IV
List of Figures	V
Lists of Abbreviations and Acronyms	VI
1. Introduction	1
1.1. Background	1
1.2. Statement of the problem	5
2. Literature Review.....	8
2.1. Studies on quality measures for hypertensive care	8
2.2. Conceptual framework	12
2.3. Significance of the study	13
3. Objectives	14
3.1. General objective.....	14
3.2. Specific objectives.....	14
4. Methods and Participants.....	15
4.1. Study area and period.....	15
4.2. Study design	15
4.3. Source population.....	15
4.4. Study population	15
4.4.1. Inclusion criteria	15
4.4.2. Exclusion criteria.....	16
4.5. Sample size determination	16
4.6. Sampling technique	17
4.7. Study variables	17
4.7.1. Independent variables	17
Patient related factors	17
4.7.2. Dependent variable	18
4.8. Data collection tools and procedures	18

4.8.1. Data collection tools	18
4.8.2. Data collection procedures	23
4.9 Operational definitions	23
4.10. Data analysis	24
4.11. Ethical consideration	26
4.12. Data disseminations.....	26
5. Result	27
5.1 Socio demographic characteristics of hypertensive patients.....	27
5.2 Disease related characteristic of hypertensive patients.....	28
5.3 Medication related characteristic of hypertensive patients	29
5.4 Quality of the health care Structure.....	30
5.5 Quality of the Health care process	32
5.6 Quality of Treatment outcome	38
5.7 Quality of care based on the Patient experience and satisfaction	43
5.8 Predictors of quality of care	49
5.8.1 Predictors of quality of health care process for hypertensive patients	49
5.8.2 Predictors of quality of treatment outcome	51
5.8.3 Predictors of quality of care based on the patients' perception.....	51
6. Discussion.....	53
7. Conclusion and Recommendation	59
7.1 Conclusion.....	59
7.2 Recommendations	60
References.....	61
Annexes.....	67
Annex I; English version of the questioners	67
Annex II Cheek list for process indicators	74
Annex III Cheek list for structure indicators.....	76
Annex IV Cheek list for treatment outcome	76
Annex V Amharic version of the questioner.....	77
Annex VI Proposed process and structure indicators to be sent to the expert panel for scoring	81
Annex VII consent form.....	85

1. Introduction

1.1. Background

Hypertension is one of the most common worldwide diseases affecting humans. Hypertension is also described as the most important modifiable risk factor for coronary heart disease, stroke, congestive heart failure, and end-stage renal disease (1).

Hypertension is termed the “silent killer” because most patients do not have symptoms. The primary physical finding is elevated BP. The diagnosis of hypertension cannot be made based on one elevated BP measurement. The average of two or more measurements taken during two or more clinical encounters should be used to diagnose hypertension. Thereafter, this BP average can be used to establish a diagnosis, and then classify the stage of hypertension present (2).

Globally cardiovascular disease accounts for approximately 17 million deaths a year, nearly one third of the total deaths (3). Of these, complications of hypertension account for 9.4 million deaths worldwide every year (4). Hypertension is responsible for at least 45% of deaths due to heart disease, and 51% of deaths due to stroke (3).

Not only is hypertension more prevalent in low- and middle-income countries, there are also more people affected because more people live in those countries than in high-income countries. Further, because of weak health systems, the number of people with hypertension who are undiagnosed, untreated and uncontrolled are also higher in low- and middle income countries compared to high-income countries (4).

Traditionally in Africa, communicable diseases and maternal, perinatal and nutritional causes have accounted for the greatest burden of morbidity and mortality. This burden is fast shifting towards chronic non- communicable diseases, and by extension CVDs. This phenomenon is what is being termed as a “double burden of disease”. Whereas high blood pressure was almost non-existent in African societies in the first half of the twentieth century, estimates now show that in some settings in Africa more than 40 percent of adults have hypertension. The prevalence of

hypertension has increased significantly over the past two to three decades. There were approximately 80 million adults with hypertension in Africa South of the Sahara in 2000 and projections based on current epidemiological data suggest that this figure will rise to 150 million by 2025. Further, there is evidence that indicates that related complications of hypertension, and in particular stroke and heart failure are also becoming increasingly more common in this region (5).

It has been suggested that the prevalence of cardiovascular disease and hypertension is increasing rapidly in sub-Saharan Africa (SSA). The current prevalence in many developing countries, particularly in urban societies, is said to be already as high as those seen in developed countries (3,6). SSA is currently battling with communicable diseases such as malaria and HIV, and most governments in the region have limited resources and health budgets. An increasing burden of hypertension in this region is therefore likely to be of grave consequence because very few people will get treated and control is likely to be low. This in turn would result in high morbidity and mortality from potentially preventable complications such as stroke, myocardial infarction, and renal failure (7).

As in any other developing countries, Ethiopia is challenged by the growing magnitude of NCDs which created a double burden on the population and the health system which is already hard hit by communicable diseases. In 2008, the Ethiopian FMOH conducted a situational analysis and revealed that diabetes mellitus, cancer, cardiovascular disease, renal diseases and chronic obstructive pulmonary disease are amongst those with high burden. One study in Addis Ababa “Population based prevalence of high blood pressure among adults in Addis Ababa: uncover a silent epidemic,” which noted that among Ethiopian males and females included in the study, 20% of males and 38% females were overweight; 2% of males and 10% of females were obese; 17% of males and 31% of females had a low level of total physical activity ; and 32% of males and 29% of females had an elevated BP (140/90 mmHg) (8).

Prevention and control of hypertension is complex, and demands multi-stakeholder collaboration, including governments, civil society, academia and the food and beverage industry. In view of the enormous public health benefits of blood pressure control, now is the time for concerted action.

The overall goal of treating hypertension is to reduce hypertension associated morbidity and mortality. This morbidity and mortality is related to target-organ damage (e.g., CV events, heart failure, and kidney disease). Reducing risk remains the primary purpose of hypertension therapy and the specific choice of drug therapy is significantly influenced by evidence demonstrating such risk reduction (2).

Treating patients with hypertension to achieve a desired target BP value is simply a surrogate goal of therapy. Reducing BP to goal does not guarantee that target-organ damage will not occur. However, attaining goal BP values is associated with lower risk of CV disease and target organ damage. Targeting a goal BP value is a tool that clinicians can easily use to evaluate response to therapy and is the primary method used to determine the need for titration and regimen modification (2).

Most patients have a goal BP of less than 140/90 mm Hg for the general prevention of CV events or CV disease (e.g., coronary artery disease) (1-2). However, this goal is lowered to less than 130/80 mm Hg for patients with diabetes and significant chronic kidney disease. Moreover, patients with left ventricular dysfunction (heart failure) have a BP goal of less than 120/80 mm Hg (2).

Public health policy must address hypertension because it is a major cause of disease burden. Interventions must be affordable, sustainable and effective (9). The World Health Organization (WHO) (2009) states that the overall goal is highest possible health for all people, and providing high quality care is one approach for reaching this goal. The Norwegian national action plan on health and social care emphasizes the importance of high-quality care through patient-centered care and the importance of building systems for patients' to take part in the evaluation of quality of care on a regular basis (10).

'Quality of care' is a concept that can be given different meanings, depending on different cultures, whether it is on an individual level or a social level, which aspect we are looking at; process, structure or outcome, whether it is the patients, the relatives, the healthcare personnel,

the administrators or the politicians who define the term and the time at which it is defined (11). It is considered by researchers to be a multidimensional concept (12).

For Successful control of blood pressure an organization should have a clear directions, functional infrastructures and commitment. According to the NICE quality standards for hypertension, services should be commissioned from and coordinated across all relevant agencies encompassing the hypertension care pathway. A person-centered approach to provision of services is fundamental in delivering high-quality care to adults with hypertension (6).

Measuring performance of blood pressure control allows an organization to document how well care is currently provided and lay the foundation for improvement. Hypertension Control quality measures designed to evaluate the effectiveness of the care and management of patients diagnosed with hypertension is vital for measuring performance of care services (1).

Despite evidence of reduced morbidity and mortality by treating hypertension to specific targets, treatment in many settings is not very successful at achieving blood pressure control and meeting these targets. While access and affordability of therapy certainly play a role, another potential explanation is poor quality of essential care (QC).

1.2. Statement of the problem

Premature death, disability, personal and family disruption, loss of income, and healthcare expenditure due to hypertension, take a toll on families, communities and national finances. In low- and middle-income countries many people do not seek treatment for hypertension because it is prohibitively expensive. Households often then spend a substantial share of their income on hospitalization and care following complications of hypertension, including heart attack, stroke and kidney failure. Families face catastrophic health expenditure and spending on health care, which is often long term in the case of hypertension complications, pushing tens of millions of people into poverty (13).

Over the period 2011-2025, the cumulative lost output in low- and middle-income countries associated with non-communicable diseases is projected to be US\$ 7.28 trillion (14). The annual loss of approximately US\$ 500 billion due to major non-communicable diseases amounts to approximately 4% of gross domestic product for low- and middle- income countries. Cardiovascular disease including hypertension accounts for nearly half of the cost (15).

Even in countries where health services are accessible and affordable, governments are finding it increasingly difficult to respond to the ever-growing health needs of their populations and the increasing costs of health services. Preventing complications of hypertension is a critical element of containing health-care costs. All countries can do more to improve health outcomes of patients with hypertension by strengthening prevention, increasing coverage of health services, and by reducing the suffering associated with high levels of out-of-pocket payment for health services (16-18).

Although cost-effective interventions are available for addressing hypertension, there are major gaps in application, particularly in resource-constrained settings. It is essential to quickly identify ways to address these gaps including through operational research; the enormous benefits of blood pressure control for public health make a compelling case for action (19).

Hypertension has significant morbidity and mortality and is associated with adverse outcomes such as coronary artery disease, congestive cardiac failure, stroke and renal disease. This

imposes more financial constraints on the health system, which is already burdened by the HIV pandemic. Based on the available evidence, the current US guidelines, published in the Seventh report of the Joint National Committee on prevention, detection, evaluation and treatment of high blood pressure (JNC 7), recommend maintaining blood pressure at less than 140/90 mmHg for most patients and less than 130/85 mmHg for patients with diabetes mellitus and renal disease (20).

There is evidence that treatment to specific targets can reduce morbidity and mortality (20-21). A reduction of 5–6 mmHg in diastolic blood pressure (DBP) has been shown to reduce the incidence of stroke by 40%, coronary events by 15% and heart failure by 50%. Non-pharmacological measures as well as medication can contribute to blood pressure reduction. For example, the Dietary Approaches to Stop Hypertension (DASH) low sodium diet reduces the systolic blood pressure (SBP) by 2–8 mmHg and weight reduction of 10 kg can contribute to a reduction of 5–20 mmHg (20).

Despite this evidence, treatment in many settings is not very successful at achieving blood pressure control and meeting these targets. The majority of patients' Blood pressures remain uncontrolled in all societies. In developing countries the high prevalence of hypertension and poor hypertension control are important factors in the rising epidemic of cardiovascular disease. The hypertension treatment received by many patients often does not conform to treatment recommendations. This suggests that improving quality of care for hypertensive patients could lead to substantial reductions in morbidity and mortality (16).

It is likely that the control of blood pressure and quality of care in Ethiopia is also problematic, although few studies exist to verify this. Health institution-based data compiled by the Federal Ministry of Health of Ethiopia (FMOH) indicate the leading causes of outpatient visits, admissions and deaths, although these data fail to cover all health facilities or regions of the country, hypertension is emerging in the list of causes of hospital deaths in recent years. Owing to the lack of diagnostic skills and facilities to detect ischaemic heart disease, cerebrovascular disease, and other chronic diseases at peripheral health institutions in the country, and the

associated poor recording and reporting system, the emergence of hypertension as a cause of hospital death may represent the “tip of the iceberg” (23).

Excellence in care is what those in need of healthcare services wish for, and it is also the main goal for those providing the care. Health care structure, process, treatment outcome and patient satisfaction are important indicators of health care quality. To take into account the multidimensional reality of a hospital, and the patient in the hospital, more studies need to use multivariate analysis to catch this complex reality, so that results can be used in quality improvement work. However, there are theoretical and methodological difficulties in measuring quality of care and the conditions associated with the concepts. Theoretically based research is limited, and there is still no agreement about what this concept encompass and how it is related to the complex reality of patient care.

Not only earlier studies regarding quality of hypertensive care are limited in number but they also measure only some of the quality measures, usually focusing on the care process and outcome. Health care structure, patients’ experiences with the care service in hospital should also be considered important elements in quality improvement work in hospitals, and should be seen as indicators of quality of healthcare. There is also a need for more mixed methods, because the combination of qualitative and quantitative studies may give a more complete picture of quality of health care. Thus this study is designed to evaluate the quality of hypertensive care provided at Dill Chora hospital from different angles including the health care structure, process, treatment outcome and the patient experience.

2. Literature Review

2.1. Studies on quality measures for hypertensive care

Studies on quality of the health care structure

A study conducted in Moshupa District, Botswana on Quality improvement cycle found that none of the structural standards were met in the base line audit. During the re-audit after six months of quality improvement work, 66.67% of target standards were met (24).

In November 2010, ICAP conducted a situational analysis of NCD care in Ethiopia's Oromiya Region in partnership with the Oromiya Regional Health Bureau. Using a convenience sample of 33 hospitals, ICAP utilized a short, standardized survey tool to explore the availability of chronic disease services for three conditions: diabetes, hypertension, and epilepsy (8).

The median number of adult hypertensive patients enrolled in care at these hospitals was 197 for HTN (range 14-1935). The study findings show that few hospitals have designated clinics for NCD services, and most see NCD patients on an ad hoc basis along with other OPD patients. Only 21% of facilities have a designated HTN clinic (usually an assigned day in which patients came to OPD) (8).

Very few (3%) hospitals have appointment systems for NCD patients, i.e., an appointment book or other systematic way in which to determine when patients are expected and whether they miss appointments. None of the hospitals have defaulter tracking systems or other outreach for NCD patients who miss appointments. In addition, very few (3%) of hospitals have charting tools or forms to support continuity care for HTN (e.g., flow sheets, standard formats, checklists). In addition, none have provider support tools for HTN and epilepsy. Only one hospital has SOP for HTN; each provider acts independently, and only one hospital has any monitoring and evaluation system in place for chronic diseases other than HIV (8).

Studies on quality of the health care process

A study that assessed QC in 12 U.S. communities found out that, of 1,953 hypertensive patients, only 57% received optimal care and 42% had controlled hypertension. Patients who had received optimal care were more likely to have their BP under control at the end of the study (45% vs. 35%, $p = .0006$). Patients were more likely to receive optimal care if they were over age 50 (76% vs. 63%, $p < .0001$), had diabetes (77% vs. 71%, $p = .0038$), coronary artery disease (87% vs. 69%, $p < .0001$), or hyperlipidemia (80% vs. 68%, $p < .0001$), and did not smoke (73% vs. 66%, $p = .0005$). This study had concluded that higher QC for hypertensive patients is associated with better BP control (30).

According to the Botswana study, in the baseline audit none of the target process standards were met. And after six months during the re-audit, only five out of 11 process target process standards were achieved. Statistically-significant improvement in performance ($p < 0.05$) was shown in 10 criteria although the target standard was not always met (24).

Another study that was conducted in Jimma zone south east Ethiopia to assess the quality of care provided for people with non-communicable chronic disease including hypertension found out that quality of care provided to these patients was very low. Six hundred seventy four medical records were reviewed. Recommended care components were actually provided to patients in 38.5% (95%CI: 37.5%, 39.5%) of times on which patients were eligible, among patients with hypertension. After case mix adjustment, it was found that 45.9% (95%CI: 45.4%, 46.5%) of recommended components of care was actually provided to patients. This was 45.1% (95%CI: 44.4%, 45.8%) in the hospital and 30.5% (95%CI: 29.7%, 31.3%) in the health centers (25).

Studies on quality of treatment outcome

A study that assessed QC in U.S.A found out that, of 1,953 hypertensive patients, only 42% had controlled hypertension (30). In the Botswana study none of the target outcome standards were met in the baseline audit. But after intervention to improve quality of hypertensive care one out of two outcome target standards were achieved. In the re-audit, the target of achieving blood pressure control ($< 140/90$) in 70% of patients was achieved (24). A study conducted on determinants of care and control among peri-urban black south Africans find out that Mean BP

(mm Hg) was 151/99 for men, 142/88 for women with BP controlled (,140/90 mm Hg) among 33% of men, 44% of women. In regression models of select socioeconomic, lifestyle risk and HTN care variables, significant predictors of lower SBP and DBP or BP control included: fewer antihypertensive medications, better compliance to HTN recommendations, younger age, female, higher education level and not using alcohol excessively (31).

In the Jimma zone study optimal level of disease control was achieved only for 40(38.5%) of patients (25). A hospital-based cross-sectional survey conducted in south west Ethiopia also showed that the overall control rate was 15.5% (26).

Studies on quality of care based on the patient experience

Results from care quality studies showed that the overall view of patients' perceptions of quality of care mostly was good (27), and patient satisfaction was high (28). However, studies have suggested that patient satisfaction scores present a limited and optimistic picture, since questions about specific aspects of patients' experiences showed that inpatients who rated the satisfaction as 'Excellent' at the same time reported several problems (28). One study addressing the paradoxes of patient satisfaction with hospital care found that poor patient experiences with aspects of care did not correlate with low patient satisfaction scores. In fact, the overall patient satisfaction was rated high (29).

Some studies have reported that women rate their satisfaction with quality of care higher than men (34, 35), while others have reported that women have significantly poorer scores than men (27). Further, one study have found that sex is unrelated to patients' perception of quality of care (36). Wilde Larsson, Larsson and Starrin (1999) found no difference between men and women regarding actual care episodes, but women tended to give different care aspects higher subjective importance than men (37).

Studies showed that age is related to patient satisfaction. Older patients tend to rate their experiences and satisfaction with quality of care higher than younger patients (27, 38, 39). Education has been identified as having a significant impact on patients' perception of quality of care. High scores on quality of care are often associated with lower levels of education (27, 40).

However, one study showed that educational status improved satisfaction with quality of care (39).

Studies found that health status was related to the patients' perception of quality of care, and patients in better health tend to rate quality of care higher than patients in poorer health (27, 28). Patients who rated their physical health better, are more likely to rate their perception of quality of care higher than patients with poorer physical condition (41).

2.2. Conceptual framework

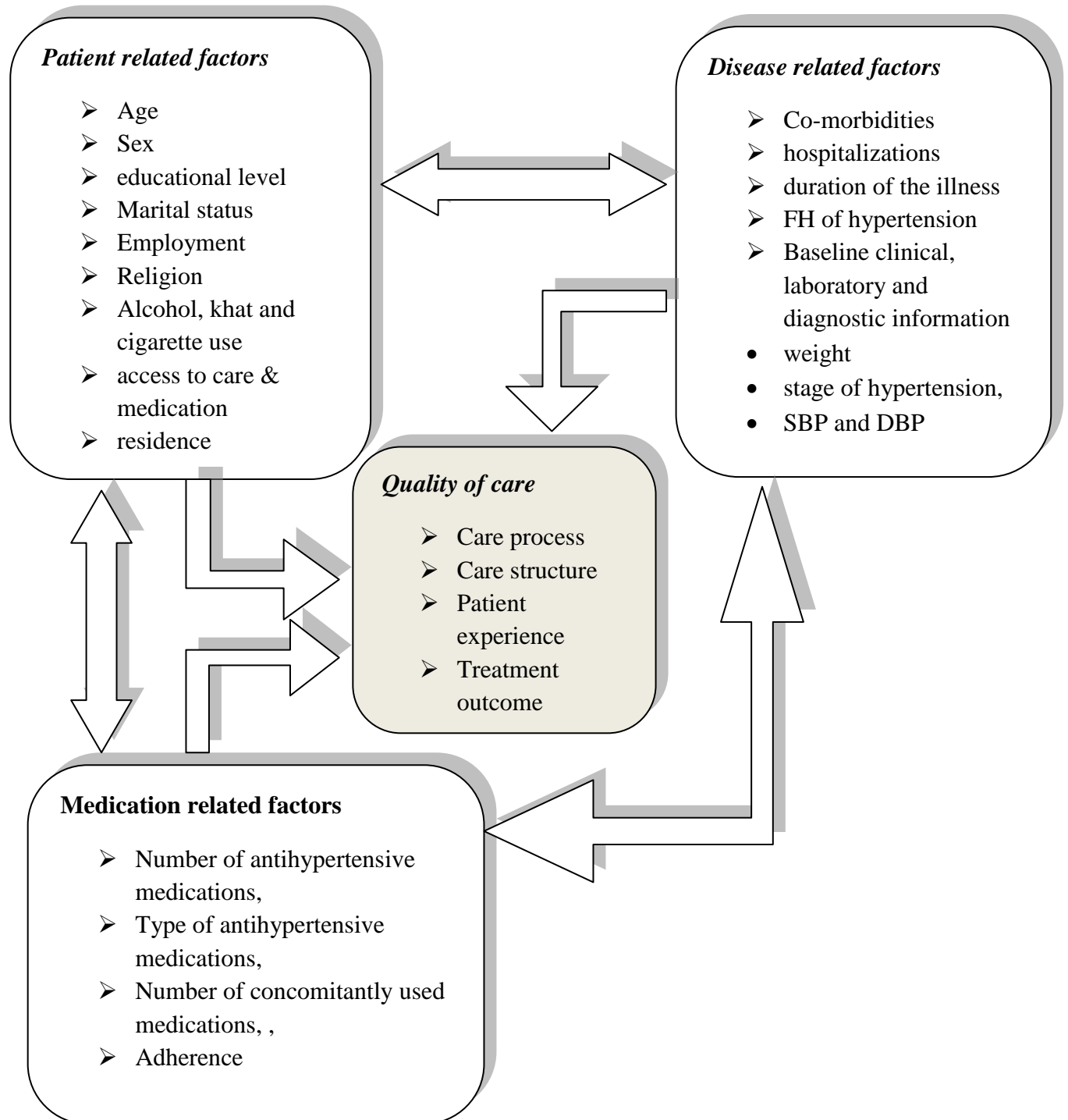


Figure 1 Conceptual framework shoeing factors affecting quality of care

2.3. Significance of the study

The aim of this study is to assess the quality of care provided to hypertensive patients. The findings from the study will serve as an input for policy makers in targeting specific intervention areas to improve the quality of care in hypertension as well as other cardiovascular diseases. Planners and programmers at different levels of health service and other government institutions can employ the information generated by the study to plan and implement effective hypertension treatment and care programs. In addition, understanding the quality of clinical care provided in these setting will also help decision makers in the health sector to identify priority areas for quality improvement that need to be addressed in line with efforts for the expansion of the services. Moreover, the results will alert health professionals at hypertension treatment and care units to make emphasis on unsought quality gaps during their patient's routine counseling and clinical evaluations at follow up visits. Finally, the insurmountable benefit goes to hypertensive patients in that the study enables patients to be entertained by the best of their treatment outcomes and improve their quality of life by creating awareness on the quality gaps that are detrimental to their therapy.

3. Objectives

3.1. General objective

- ✓ To assess the quality of care provided to ambulatory hypertensive patients at Dill Chora hospital, Dire Dawa, Eastern Ethiopia.

3.2. Specific objectives

1. To determine the hospitals achievements on care structure quality indicators for hypertensive patients.
2. To determine individual and overall achievements on the care process indicators for hypertensive patients.
3. To determine individual and overall achievements of goal blood pressure for hypertensive patients.
4. To determine individual and overall scores of hypertensive patients on their experience of the care service.
5. To determine the independent predictors of sub-optimal quality of care measures

4. Methods and Participants

4.1. Study area and period

The study was conducted in Dire Dawa city located in the eastern part of the country. Dire Dawa is one of the federal city administrations following Addis Ababa.

Dil Chora hospital is the only referral hospital in the city. It has been giving health care service to the people of Dire Dawa and the surrounding areas including Djibouti since 1951 E.C. The hospital provides inpatient, outpatient, emergency, surgical, gynecologic, obstetric, orthopedic, ophthalmologic services. The hospital has chronic care units for HIV, hypertensive, diabetic, epileptic patients and other chronic diseases. Each chronic care unit involves two nurses and one physician.

The study period was from April 1, 2014 to March 30, 2015 in which the quality of care provided to ambulatory hypertensive patients within one year of the hospital's service was assessed.

4.2. Study design

A hospital based cross sectional retrospective study design was used to assess the quality of care provided to hypertensive patients in Dire Dawa Dill Chora hospital ambulatory care unit.

4.3. Source population

All hypertensive patients on treatment and regular follow-up at Dil Chora hospital

4.4. Study population

All adult hypertensive patients aged 18 years and above, who visit the hospital with a documented diagnosis of hypertension over at least a one year period and who fulfills the inclusion criteria.

4.4.1. Inclusion criteria

- Patients who had at least one visit before April 1, 2014 with a documented diagnosis of hypertension.

4.4.2. Exclusion criteria

- Women who have been diagnosed with elevated blood pressure while they are pregnant.
- People who have been lost to follow-up (who didn't show up for two or more appointments with in the period of one year)
- Patients initially diagnosed with hypertension and start treatment outside of the hospital.
- Patients whose medical records have been lost.
- Patients who are not willing to participate in the study.

4.5. Sample size determination

A size of 384 patients is obtained using a minimum sample size calculation and a formula for single population proportion. The sample size is calculated on the assumption Level of confidence taken to be 95%, 5% margin of error, and P to be 0.5

$$n = \frac{\left(Z_{1-\alpha/2}\right)^2 P(1-P)}{d^2} \quad (42)$$

- Parameters in the formula
 - n is minimum sample size
 - P is estimate of the prevalence rate for the population and is taken to be 0.5
 - d is the margin of sampling error tolerated
 - $Z_{1-\alpha/2}$ is the standard normal variable at $(1-\alpha)$ % confidence level and α is taken to be 5%

Then
$$n = \frac{(1.96)^2 (0.5*0.5)}{(0.05)^2} = 384$$

By using population correction formula:-

$$n = \frac{noN}{no + N}$$

Where, N= 763(total numbers of hypertensive patients)

$$n = \frac{384 \times 763}{384 + 763} = 256$$

10% of non-response rate = 26 so, the total sample size = 282

4.6. Sampling technique

In this research a non-probability, convenience sampling technique was used. Patients were enrolled consecutively to the study based on their order of arrival at the hypertensive care unit. All eligible patients who were willing to participate in the study were scrutinized until the planned sample size is obtained. They were invited to participate in the study in consecutive order and their records were reviewed after their written consents were obtained. For those who had repeated clinic visits during the data collection period, data collected during their first visits was considered.

4.7. Study variables

4.7.1. Independent variables

Patient related factors

- Age
- Sex
- Occupation
- Residence
- Access to care and medication
- Educational status
- Marital status
- Religion
- Alcohol, khat and cigarette use
- Family history of DM and hypertension
- Regular exercise
- Regular Salt reduction in diet

Disease related factors

- Co morbidities
- History of hospitalizations since the diagnosis of hypertension
- Duration since the diagnosis of hypertension
- Baseline stage of hypertension
- Baseline SBP and DBP

Medication related factors

- Number of antihypertensive medications
- Initial and current antihypertensive medications used
- Concomitantly used medications
- Adherence to antihypertensive medications

4.7.2. Dependent variable

There were three outcome variables in this study

- Quality of health care process for hypertensive patients
- Quality of care based on the patient's perception
- Quality of treatment outcome

4.8. Data collection tools and procedures

4.8.1. Data collection tools

Four separate data collection tools to evaluate the quality of care provided to ambulatory hypertensive patients were used. These tools were used to evaluate the health care structure for hypertension, health care process for hypertension, the patient's experience and finally a non-structured Questionnaire to gather information on patient, disease and medication related factors and the treatment out come as well.

Tools to measure patient satisfaction

Quality of care was from the 1950's evaluated by asking physicians and nurses what they thought was important to the patient when hospitalized and what they thought the patient felt about the care received (43-47). As early as 1967, Raphael asked whether healthcare personnel had knowledge of the patients' thoughts and views (48). Later studies showed that the aspects of care that physicians and nurses found to be important were not at all important to patients. Similarly, other aspects that were important to patients were not at all regarded as important by physicians and nurses (45-47). Physicians and nurses were also less satisfied with the care the patients received than the patients themselves (49), and fewer personnel thought that the patients were satisfied than was actually the case (50). Along with a strengthening of patients' rights in the healthcare system and a turning towards consumerism and patient-centered care, questionnaires were developed to ask the patients how they experienced quality of care and how satisfied they were with the care they received (37, 51).

Some instruments have been developed to measure specific aspects or to be used within specific contexts such as neurosurgical care (52), patients' staffing perceptions and patient care (53), patient satisfaction with hospital performance (54), patient satisfaction with hospital care and nursing care (55), and patient satisfaction in hospital from admission to discharge (56). Other instruments have been developed to conduct more general surveys of quality of care. Examples of such instruments are the Picker Institute Questionnaire (28), the Norwegian Patient Experience Questionnaire (NORPEQ) (57).

The NORPEQ (57) is related to the patients' experiences while in hospital. It includes eight questions identified as indicators of quality of care for adult somatic inpatients in the Nordic countries (58). The eight-item questionnaire comprises six items concerning experiences with health personnel including: whether the doctors were understandable, doctors' and nurses' professional skills, nursing care, whether the doctors and nurses were interested in the patient's problems, and information relating to tests. . Six of these NORPEQ items sum to produce an overall scale from 0 to 100, where 100 is the best possible experience of care. Two additional

items ask about general satisfaction and incorrect treatment. All items use five-point descriptive scales with the response categories “not at all”, “to a small extent”, “to a moderate extent”, “to a large extent”, and “to a very large extent”. Construct validity assesses the extent to which a questionnaire measures what is intended through comparisons with variables that following empirical and theoretical considerations have expected associations with patient experiences (60). Accordingly, the patient experience measured with the six NORPEQ items were tested for association with the two additional items that asked about general satisfaction and incorrect treatment.

In this research quality of care was also seen from the patient’s perspective, and patient experience was viewed as a measure of quality of care. The quality of care from the patient’s perspective will be measured using the NORPEQ questioner.

Development of process and structure quality indicators

The structure and process indicators for hypertensive quality of care were developed by reviewing the scientific literature and clinical practice guidelines pertaining to hypertensive care. The indicators that represent clinical processes across the spectrum of hypertensive care were developed based closely on JNC-VII and the NICE quality standards for hypertension. And the indicators that represented the health care structure for hypertensive care are developed based on a study conducted in Moshupa District, Botswana on Quality improvement cycle and NICE quality standards for hypertension. The process quality indicators include diagnostic, treatment and follow up process. The quality indicators for health care structure include diagnostic instruments, medical supplies, antihypertensive medications and care formats.

An expert panel of one physician and two clinical pharmacists reviewed the indicators and supporting evidence. They rated each indicator's feasibility and validity using a 5-point Likert scale (59). Indicators with median validity and feasibility score of two and less were accepted. Accordingly, from 25 health care process quality indicators presented for the expert panels all of the indicators were approved for validity and feasibility (table 1). From 19 health care structure quality indicators 17 were approved as well (table 2).

Table 1 Health care process quality indicators and score results by the expert panel

No	Process indicators	Experts score						Median	
		1 st		2 nd		3 rd		V	F
		V	F	V	F	V	F		
1	Systolic and diastolic blood pressure should be measured on patients otherwise presenting for care at each visit.	1	1	1	1	1	1	1	1
2	Examination of the fundi at each visit.	1	1	1	1	1	5	1	1
3	Examination of heart at each visit.	1	1	1	1	1	2	1	1
4	Examination of abdomen for bruits at each visit.	1	1	1	1	1	1	1	1
5	Examination of peripheral arterial pulses at each visit.	2	2	1	1	1	1	1	1
6	Examination of neurologic system at each visit.	1	1	1	1	1	1	1	1
7	A calculation of body mass index (BMI) yearly.	1	1	1	1	1	1	1	1
8	Urinalysis yearly.	1	1	1	1	1	1	1	1
9	Blood glucose test yearly	1	1	1	1	1	1	1	1
10	Serum potassium test yearly	2	2	1	4	1	1	1	2
11	Serum creatinine test yearly	1	1	1	1	1	1	1	1
12	Serum LDL test yearly	1	1	1	3	1	1	1	1
13	Serum HDL test yearly	1	1	1	3	1	1	1	1
14	Serum triglyceride test yearly	1	1	1	3	1	1	1	1
15	An ECG examination once yearly	1	1	1	1	1	1	1	1
16	Urinary albumin excretion should be quantified and monitored on an annual basis in high-risk groups, such as those with diabetes or renal disease.	1	1	1	3	1	1	1	1
17	All people with hypertension (stages 1 and 2) should be treated.	1	1	1	1	1	1	1	1
18	First-line treatment for patients with pre-hypertension is lifestyle modification. The medical record should indicate counseling for at least 1 of the following interventions prior to initiating pharmacotherapy: - weight reduction if obese; - increased physical activity if sedentary; or- low sodium diet.	1	1	1	1	1	1	1	1
19	Treatment for Stage 1 and Stages 2 hypertension should include lifestyle modification. The medical record should indicate counseling for at least 1 of the following interventions: - weight reduction if obese; - increased physical activity if sedentary; or- low sodium diet.	4	4	1	1	1	1	1	1
20	Patients whose BP goal is not achieved should return for follow up and adjustment of medications at monthly intervals until the BP goal is reached	2	2	1	1	1	1	1	1
21	Patients with target organ damage, DM or CAD should be offered pharmacotherapy for the co-morbid illness.	1	1	1	1	1	1	1	1

22	Patients with target organ damage, DM or CAD and stage 1 & 2 hypertension should be offered antihypertensive medication.	2	2	1	1	1	1	1	1
23	Newly diagnosed Stage 1 and 2 patients should be evaluated by the provider within 1 months of their initial visit.	4	4	1	1	1	1	1	1
24	Newly diagnosed patients with hypertensive crises should be evaluated by the provider within 2 weeks of their initial visit.	1	1	1	1	1	1	1	1
25	Hypertensive patients with consistent average SBP > 140 or DBP > 90 over 6 months should have one of the following interventions recorded in the medical record: Change in dose or regimen of antihypertensive agents; or repeated education regarding lifestyle modifications.	1	1	1	1	1	1	1	1

V-validity, F-feasibility

Table 2 Health care structure quality indicators and score results by the expert panel

No	Structure indicators	Experts score						Median	
		1 st		2 nd		3 rd		V	F
		V	F	V	F	V	F		
1	Sphygmomanometer (blood pressure machine)	1	1	1	1	1	1	1	1
2	Blood pressure cuff	small,	1	1	1	1	1	1	1
		Medium	1	1	1	1	1	5	1
		Large	1	1	1	1	1	1	1
3	Weighing scale	1	1	1	1	1	1	1	1
4	Height scale	2	2	1	1	1	1	1	1
5	Specimen tubes for blood tests	2	2	1	1	1	1	1	1
6	An ECG machine	1	1	1	1	1	1	1	1
7	Specimen bottles for urine	2	2	1	1	1	1	1	1
8	Investigation request forms (laboratory and ECG)	2	2	1	1	1	1	1	1
9	Prescription forms	2	2	1	1	1	1	1	1
10	Appointment book	2	2	1	1	1	1	1	1
11	Patient Appointment card	1	1	1	1	1	1	1	1
12	Patient allergy card	1	1	1	3	1	5	1	3
13	Diuretics	1	1	1	1	1	1	1	1
14	ACE inhibitors	1	1	1	1	1	1	1	1
15	ARB	2	2	1	3	1	5	1	3
16	Calcium channel blockers	2	2	1	1	1	1	1	1
17	Cardio selective B-blockers	2	2	1	1	1	1	1	1

V-validity, F-feasibility, ECG-electrocardiogram

4.8.2. Data collection procedures

Prior to the actual data collection, validity of the form was pre-tested at the ambulatory hypertensive care unit at Dill Chora hospital and subsequent modifications were done.

Patients were enrolled consecutively to the study based on their order of arrival at the hypertensive care unit for their usual review during the data collection period. The medical record folders was then put aside and retrospective data were collected from the patient's file using a data collection tool in order to evaluate the care process and treatment outcome. Then the patients were interviewed using none structured questioner to collect information on the patient, disease and medication related factors and to evaluate their experience. This was done by two BSc nurses in charge at the chronic care unit and one Pharmacist. To evaluate the health care structure one pharmacist was assigned and the availability of diagnostic equipments, formats and antihypertensive medications was evaluated by observation throughout the data collection period and by reviewing recording documents in the hospital's medical and none medical store.

4.9 Operational definitions

Optimal quality of care structure; If the hospital achieved all the recommended care structures

Optimal quality of care process; If the patient achieved all the recommended care he/she found to be eligible

High quality of care process; If the overall recommended care process achieved was above or consistent with previous studies that had concluded low quality of care process

Low quality of care process; If the overall recommended care process achieved was below or consistent with previous studies that had concluded low quality of care process

Optimal quality of BP control; If the patient goal BP was achieved based on JNC VII, after calculating the average of the last three BP readings

High quality of care based on the patient experience; If the overall NORPEQ score was above or consistent with previous studies, which concluded higher quality of care based on the patient experience.

Low quality of care based on the patient experience; If the overall NORPEQ score was below or consistent with previous studies, which concluded lower quality of care based on the patient experience.

Non adherence; adherence was determined by MMAS-8 version translated for this study. The patients were considered non adherent when they had a score equal or greater than 1 on the MMAs-8.

Paying; a person who accesses care and medication through out of pocket payment.

Co-morbidity; co-existence of additional disease condition in hypertensive patients.

Exercise; physical activity categorized according to the number of episodes of exercise undertaken per week. A person who reports regular aerobic exercise of at least 30 min for every ≥ 3 times per week was considered physically active.

Smoker; a person who smokes at least one piece of cigarette daily.

Alcohol drinker; a person having up to two drinks daily.

Traditional medicine user; a person who use herbal preparation as maintenance of health as well as prevention improvement or treatment for hypertension.

Coffee user; a person who drinks at least one cup of coffee daily.

Reduce salt use; a person who use less amount of salt in their regular diet than they use previously.

4.10. Data analysis

All completed data collection forms were examined for completeness, consistency and clarity during data management, storage, and analysis. The data was coded, entered, and cleaned by the principal investigator before analysis. Data were entered and analyzed using SPSS for windows version 21. Data exploration was carried out to check for any inconsistencies, coding error, out of range, and missing values and appropriate measures were made. The 95% CI was used to show the accuracy of data analysis. P value ≤ 0.05 was considered as statistically significant.

The first outcome measurement for each participant was the achievements of each process indicator for which they are found to be eligible with a binary (yes/no) score. The percentage of indicators achieved from which an individual was found to be eligible was calculated to determine individual achievement and was used as a dependent variable for this particular measure of quality of care. And to determine the overall achievement, the mean amount and percentage of indicators achieved the sample population was calculated. Associations between indicator achievement and patient, disease and medication related factors were evaluated using linear regression model. Associations between indicator achievement, treatment outcome and patient experience were evaluated using logistic regression models and linear regression model. Predictors of hypertensive care process indicator achievement were determined using multiple linear regression model.

The second outcome measurement for each participant was the achievement of goal blood pressure with a binary (yes/no) scores. To determine the quality of blood pressure control, average of the last three BP readings within the study period was calculated for each study subject and designated as optimal and sub-optimal quality of treatment outcome based on the JNC VII standards. Associations between optimal quality of treatment outcome and patient, disease and medication related factors were evaluated using logistic regression model. The relationship between quality of treatment outcome and quality of care based on the patient experience and quality of the care process were evaluated using logistic regression model. Predictors of sub-optimal quality of BP control were determined using multi-variable regression model.

The third outcome measurement for each participant was quality of care based on the patient experience with the care service. To determine the individual NORPEQ score six of the NORPEQ items were summed to produce an overall scale from 0 to 100 for each study subject And the mean of NORPEC score from all study subjects were calculated to determine the overall quality of care based on the patient experience. The test of validity was conducted to determine the validity of the NORPEQ questioner to measure the health care experience for this particular study population using Pearson correlation test. Associations between quality of care based on the patient experience and patient, disease and medication related factors were evaluated using

linear regression model. Relationship between quality of care based on the patient experience with quality of the care process and quality of treatment outcome were evaluated using linear regression and logistic regression models respectively. Predictors of quality of care based on the patient experience were determined using multiple linear regression model.

4.11. Ethical consideration

The proposal was submitted to the Office of Institutional Review Board (IRB) of Jimma University, college of health science. Following the approval by IRB, an official letter of cooperation was obtained from the college of health science. As the study was conducted through review of medical records and interviewing the patients, there was no harm to individual patients. The patient's informed consent was obtained before the interview and review of the medical records. Extraction of data from medical records was done by trained staff working in the chronic care unit at Dill Chora hospital in order to preserve confidentiality. There was no any personal identifier included in the data collection form. The data obtained was not be accessed by a third person, except the principal investigator, and will be kept confidential.

4.12. Data disseminations

The result of the study will be disseminated to Jimma University College of Health science, pharmacy department and medical science, Dill Chora referral hospital and other concerned and interested organizations. Finally, attempts will be made to publish the research in local or international journals.

5. Result

5.1 Socio demographic characteristics of hypertensive patients

From a total of 763 hypertensive patients on follow-up at Dil Chora hospital 282 patients were selected for the study. Among 282 participants of the study 168(59.6%) were female and 114(40.4%) were male. The age distribution was in range (25-94) with a mean of 57.56 (± 12.14). Two hundred sixty nine (95.4%) of participants were residents of the city of Dire Dawa while 13(4.6%) of them are from the surrounding rural areas [Table 3].

Table 3 Background characteristics of hypertensive patients on follow up at Dil Chora hospital April 1, 2014-March 30, 2015 (n=282)

Variables	n(%)
Sex	
Female	168(59.6)
Male	114(40.4)
Occupation	
Retired	69(24.5)
Farmer	5(1.8)
Trader	28(9.9)
Employed	47(16.7)
Prisoner	1(0.4)
Unemployed	132(46.8)
Residence	
City	269(95.4)
Outside City	13(4.6)
Marital Status	
Married	212(75.2)
Single	33(11.7)
Divorced	3(1.1)
Widow	34(12.1)
Religion	
Muslim	62(22.0)
Orthodox	212(75.2)
Protestant	8(2.8)
Cigarette Use*	
Yes	12(4.3)
No	270(95.7)
Alcohol Use*	
Yes	23(8.2)
No	259(91.8)
Khat Use*	
Yes	43(15.2)
No	239(84.8)

...table continued

Exercise*	
Yes	32(11.3)
No	250(88.7)
Coffee Use*	
Yes	175(62.1)
No	107(37.9)
Salt Reduction*	
Yes	161(57.1)
No	121(42.9)

5.2 Disease related characteristic of hypertensive patients

Among 282 hypertensive patients 169(59.9%) of patients do not have co morbid illnesses and 92(32.6%) of patients have a co morbid diabetic illness which represent the largest number of cases with co morbidity. Other co morbidities such as ischemic heart disease, stroke, heart failure, chronic kidney disease and retroviral infection were also found among the study participants [table 4]. The duration since diagnosis was in range of (1-17) with a mean of 4.06 (± 2.96). The systolic blood pressure and diastolic blood pressure during the initial diagnosis was in range of [130-220 mmHg] and [80-140 mmHg] respectively. The mean initial SBP and DBP was found to be 166.13[± 14.18] and 96.9[± 8.92] respectively.

Table 4 Disease related characteristics of hypertensive patients on follow up at Dil Chora hospital April 1, 2014-March 30, 2015 (n=282)

Variables	n(%)
FH of hypertension	
Yes	61(21.6)
No	221(78.4)
Co-morbidities	
None	169(59.9)
DM	92(32.6)
CAD	1(0.4)
Stroke	9(3.2)
HF	6(2.1)
CKD	2(0.7)
RVI	3(1.1)
Hospitalization since diagnosis	
None	200(70.9)
Once	66(23.4)
Twice	10(3.5)
Three times	5(1.8)
Four times	1(0.4)

5.3 Medication related characteristic of hypertensive patients

The mean amount of initial antihypertensive medication the patients' received was 1.23(\pm 0.45) in rang of (1-3) medications. Majority of patients 221(78.4%) received a single agent as an initial treatment while 57(20.2%) of them started with dual therapy and only 4(1.4%) of them received triple agents. Currently 113(40.1%) of patients are on a single agent therapy while 140(49.6%) and 29(10.3%) of them are on dual and triple therapy respectively. The mean amount of current antihypertensive agents was 1.7(\pm 0.65) in rang of (1-3) agents. And 35(12.4%) of patients admitted that they were occasionally using traditional medication (Moringa leaf) [table 5].

Table 5 Medication related characteristics of hypertensive patients on follow up at Dil Chora hospital April 1, 2014-March 30, 2015 (n=282)

Variables	n (%)
Access To Medication	
Paying	125(44.3)
Free	157(55.7)
Adherence	
Adherent	115(40.8)
Non Adherent	167(59.2)
Hydrochlorothiazide	
Initial	146(51.8)
Current	202(71.6)
Enalapril	
Initial	68(24.1)
Current	143(50.7)
Captopril	
Initial	0
Current	1(4)
Nefidipine	
Initial	114(40.4)
Current	92(32.6)
Atenolol	
Initial	16(5.7)
Current	41(14.5)
Methyldopa	
Initial	3(1.1)
Current	1(4)

5.4 Quality of the health care Structure

The hospital has a dedicated unit for NCD follow up and management. In these room hypertensive patients, diabetic patients, patients with CAD, HF, CKD, and non-CAD receive their care and treatment based on their appointment schedules. There was no specific dedicated day for different type of diseases, so patients were accommodated based on their arrival to the care unit.

The staff in the care unit was composed of one general medical practitioner and two nurses. Throughout the observation period, all of the staffs were observed to wear white gowns and arrive at 2:00 in the morning and 8:00 in the afternoon and leave at 6:00s in the morning and at 11:00 in the afternoon. The unit operates from Monday to Friday. Though the patients appointment is made not to fall on the weekends and holly days, those who arrive on such a day for any medical reason will be served at the emergency unit.

Though the hospital met most of the structural standards, some of the basic care structural requirements were not met. Including crucial medications used in the management of hypertension like hydrochlorothiazide which was not available for six months in the study period of one year. Small and medium blood pressure cuffs were not available at all throughout the year(table 4, 5).

In addition to a well functional paper formats, the hospital has a modern health management information system which has been observed to be actively operational during the data collection period. The hospital's health management information system had a black box (an instrument which keeps the patients and the hospital information in case of disasters situations that can damage computers and network). This system also produces annual and monthly reports of different sorts.

The patients care information was recorded digitally as well as on paper. All of the study participants have their own appointment card and the next appointment is written and explained to the patients by the physician himself.

The performance level on the quality of health care structure indicators for Dil Chora hospital was found to be 70.6% [table 6, 7].

Table 6 Availability of medical equipments and care formats and achievement of structural standards at Dil Chora hospital, Dire Dawa, April 1, 2014-March 30, 2015

Structural standards		Finding	Standard achieved
There is at least one aneroid sphygmomanometer (blood pressure machine)		Available and functional	Yes
There is at least one blood pressure cuff	small,	Not available	No
	Medium	Not available	No
	Large	Available and functional	Yes
There is at least one weighing scale		Available and functional	Yes
There is at least one height scale		Available and functional	Yes
Specimen tubes for blood tests		Available and functional	Yes
There is at least one ECG machine		Available and functional	Yes
specimen bottles for urine		Available and functional	Yes
Investigation request forms		Available and functional	Yes
Prescription forms		Available and functional	Yes
Appointment book		Available and functional	Yes
Patient Appointment card		Available and functional	Yes

Table 7 Months of stock outs and achievement of structural standards Dil Chora hospital, Dire Dawa, April 1, 2014-March 30, 2015

Medication	Months of stock out	Standard achieved
Hydrochlorothiazide	6	No
Enalapril	1	No
Captopril	10	No
Nefidipine	0	Yes
Atenolol	0	Yes

5.5 Quality of the Health care process

Hypertensive patients included in this study were found to be eligible for health care process indicators in range of (18-25) with a mean eligibility of 20.21(\pm 1.78). And among these indicators for which they were found to be eligible they had scored a mean number of 3.6(\pm 1.67) indicators in range of (2-13) indicators.

Indicator 18 takes a minimum number of eligible patients in which none of the study participants were found to be eligible and indicators 1-15,17,19 received the maximum with 282(100%) of patients found to be eligible. The maximum score with 282(100%) patients was recorded for indicator 1 and 17. The minimum 0(0%) score was recorded for indicator 2-7, 18 and 24 (table 6).

The mean percentage of health care process indicators achieved from which the study participants were found to be eligible was 17.06% (\pm 8.20) in range of 9.09%-57.14%. None of the patients received optimal quality of hypertensive care process (table 8).

Table 8 Distribution of patients based on their eligibility to each health care process indicator and scores for which they were found to be eligible, Dil Chora hospital, Dire Dawa, April 1, 2014-March 30, 2015 (n=282)

No	Process standards	Eligible N (%)	Scored N (%)
1	Systolic and diastolic blood pressure should be measured on patients otherwise presenting for care at each visit.	282(100)	282(100)
2	Physical examination: Examination of the fundi at each visit.	282(100)	0(0)
3	Examination of heart at each visit.	282(100)	0(0)
4	Examination of abdomen for bruits at each visit.	282(100)	0(0)
5	Examination of peripheral arterial pulses at each visit.	282(100)	0(0)
6	Examination of neurologic system at each visit.	282(100)	0(0)
7	A calculation of body mass index (BMI) yearly.	282(100)	0(0)
8	Urinalysis yearly.	282(100)	9(3.2)
9	Blood glucose test yearly	282(100)	93(33)
10	Serum potassium test yearly	282(100)	8(2.8)
11	Serum creatinine test yearly	282(100)	18(6.4)
12	Serum LDL test yearly	282(100)	5(1.8)

	Table continued	
13	Serum HDL test yearly	282(100)	5(1.8)
14	Serum triglyceride test yearly	282(100)	5(1.8)
15	An ECG examination once yearly	282(100)	5(1.8)
16	Urinary albumin excretion should be quantified and monitored on an annual basis in high-risk groups, such as those with diabetes or renal disease.	94(33.33)	0(0)
17	All people with hypertension (stages 1 and 2) should be treated.	282(100)	282(100)
18	First-line treatment for patients with pre-hypertension is lifestyle modification. The medical record should indicate counseling for at least 1 of the following interventions prior to initiating pharmacotherapy: - weight reduction if obese; - increased physical activity if sedentary; or- low sodium diet.	0(0)	0(0)
19	Treatment for Stage 1 and Stages 2 hypertension should include lifestyle modification. The medical record should indicate counseling for at least 1 of the following interventions: - weight reduction if obese; - increased physical activity if sedentary; or- low sodium diet.	282(0)	5(1.8)
20	Patients whose BP goal is not achieved should return for follow up and adjustment of medications at monthly intervals until the BP goal is reached	172(64.5)	43(25)
21	Patients with target organ damage, DM or CAD should be offered pharmacotherapy for the co-morbid illness.	109(38.6)	105(96.33)
22	Patients with target organ damage, DM or CAD and stage 1 & 2 hypertension should be offered antihypertensive medication.	109(38.6)	105(96.33)
23	Newly diagnosed Stage 1 and 2 patients should be evaluated by the provider within 1 months of their initial visit.	4(1.4)	1(25)
24	Newly diagnosed patients with hypertensive crises should be evaluated by the provider within 2 weeks of their initial visit.	3(1.1)	0(0)
25	Hypertensive patients with consistent average SBP > 140 or DBP > 90 over 6 months should have one of the following interventions recorded in the medical record: Change in dose or regimen of antihypertensive agents; or repeated education regarding lifestyle modifications.	123(43.6)	32(26.01)

A linear regression shown on table 19 revealed that the percent of indicators scored for which the patients were found to be eligible had significant association and a direct relationship with increasing level of education. Patients with higher education received better care than their illiterate cohorts (16.18% (± 7.24) Vs 26.71% (± 13.83), $p < 0.0001$). No significant association was identified for the other socio-demographic factors included in this study [table 9].

Table 9 Linear regression showing association of socio-demographic factor with mean percentage of care process indicators score, Dil Chora hospital, Dire Dawa, April 1, 2014-March 30, 2015 (n=282)

Variables	%Indicator Score Mean (SD)	B	t	Sig	95% C.I For B	
					Lower	Upper
Age		-0.448	-1.045	.297	-.121	.037
Sex						
Female	16.39(6.89)	1.651	1.665	.097	-.301	3.603
Male	18.04(9.76)					
Occupation						
Employed	17.53(8.83)	-1.014	-1.037	.301	-2.938	.911
Unemployed	16.52(7.41)					
Residence						
Urban	17.15(8.19)	-1.952	-.838	.403	-6.536	2.633
Rural	15.19(8.51)					
Access To Medication						
Pay	16.35(8.58)	1.264	1.288	.199	-.668	3.196
Free	17.62(7.86)					
Marital Status						
Married	17.69(8.47)	-2.558	-2.281	.023	-4.765	-.350
Single	15.13(7.02)					
Educational Status						
Illiterate	16.18(7.24)	1.815	3.735	.000	.859	2.772
Primary	16.03(6.79)					
Secondary	17.10(7.52)					
Higher	26.71(13.83)					
FH of Hypertension						
Yes	17.47(7.07)	-0.528	-.445	.657	-2.865	1.809
No	16.94(8.50)					
Cigarette use						
Yes	14.51(6.01)	2.645	1.050	.295	-2.316	7.607
No	17.16(8.27)					
Alcohol Use						
Yes	27.27(6.43)	-10.292	-1.776	.077	-21.697	1.114
No	16.98(8.17)					
Khat use						
Yes	16.58(7.31)	0.561	.413	.680	-2.116	3.238
No	17.14(8.36)					

Exercise							
Yes	19.37(9.18)	-2.607	-1.700	.090	-5.626	.412	
No	16.76(8.03)						
Coffee use							
Yes	17.15(7.26)	-0.262	-.260	.795	-2.245	1.721	
No	16.89(9.57)						
Salt Reduction							
Yes	17.21(9.19)	-0.362	-.366	.715	-2.306	1.583	
No	16.85(6.68)						

The linear regression model was also used to assess the possible association with this independent factors and revealed that patients with no co-morbid illness had received lower care services than patients with co morbid illness (12.00%(±3.41) Vs 25.10%(±3.41) for DM, 10%(±4.09) for CAD, 25.66%(±20.08) for stroke, 22.75%(±10.27) for HF, 30.19%(±2.29) for CKD, 11.11% and RVI, $p < 0.0001$). The increase in percent of care received also persisted with increasing number of hospitalization since the diagnosis of hypertension (15.54% (±6.43) for patients with no history of hospitalization VS 19.87%(±10.82), 21.08%(±7.88), 30.36%(±9.43) and 26.08% for patients with a history of one, two, three and four or more respectively, $p < 0.0001$). Percent of indicated care received also persisted with increasing number of hospital visit in a year (10.00% for patients with only two visits VS 31.79% for patients with twelve visits respectively, $p < 0.0001$) [table 8].

Table 10 Linear regression showing association of disease related variable with mean percentage of care process indicators score Dil Chora hospital, Dire Dawa, April 1, 2014- March 30, 2015 (n=282)

Variables	%Indicator Score Mean(Std)	B	t	Sig	95% C.I For B	
					Lower	Upper
Co-Morbidities						
Present	24.61(7.42)	12.61	19.269	.000	11.318	13.894
Absent	12.00(3.41)					
Hospitalization Since Diagnosis						
None	15.54(6.43)	3.929	5.719	.000	2.577	5.281
Once	19.87(10.82)					
Twice	21.08(7.88)					

...Table continued

Three Times	30.36(9.43)					
Four Or More	26.08					
Duration Since Diagnosis		-0.592	-1.601	.110	-1.319	.136
Initial Bp						
140-159/90-99	18.95(9.39)	-1.530	-1.943	.053	-3.081	.020
160-179/100-109	17.26(7.98)					
>180/>110	15.82(8.03)					
Number of visit in a year		2.400	10.608	.000	1.955	2.846

Medication related characteristics that were found to have significant association with percentage of indicator score include amount of antihypertensive medications showing a significant reduction in the percentage of the care received with increasing amount of antihypertensive medication given (initial 17.92% (± 8.69) with one medication Vs 15.82% (± 4.79) with three medications, $p \leq 0.001$) and (current 19.23 (± 9.60) with one medication Vs 13.70% (± 4.14) with three medications, $p \leq 0.0001$), hydrochlorothiazide (initial 15.29% (± 6.29), $p \leq 0.0001$ and current 15.28% (± 6.61), $p \leq 0.0001$)), Enalapril (initial 19.82% (± 9.19), $p \leq 0.001$ and current 18.94% (± 8.31), $p \leq 0.0001$)), Nifedipine (current 14.94% (± 7.08), $p \leq 0.002$). Increasing amount of concomitantly used medications were also shown to have significant association with increasing percentage of care process indicator score (none; 11.75% (± 2.73), one; 23.55% (± 10.11), two; 24.75% (± 3.91), three; 28.13% (± 9.72) and four; 12.47% (± 2.88), $p \leq 0.0001$) [table 11].

Table 11 Linear regression showing association of medication related factors with mean percentage of care process indicators Dil Chora hospital, Dire Dawa, April 1, 2014- March 30, 2015 (n=282) .

Variables		% Indicator Score Mean(S.D)	B	t	Sig	95% C.I For B Lower Upper	
Traditional Medicine Use							
	Yes	16.03(6.64)	1.161	.784	.434	-1.755	4.077
	No	17.19(8.39)					
Adherence							
	Adherent	17.03(8.39)	0.028	.027	.978	-1.971	2.027
	Non Adherent	17.06(8.10)					
Number of Initial							

Antihypertensive Medication		One	17.92(8.69)	-3.404	-3.215	.001	-5.488	-1.320	
		Two	13.76(4.97)						
		Three	15.82(4.79)						
Number of Current Antihypertensive Medications		1	19.23(9.60)	-2.933	-3.971	.000	-4.387	-1.479	
		2	15.99(7.12)						
		3	13.70(4.14)						
HCT		Initial	Yes	15.29(6.29)	3.654	3.831	.000	1.777	5.532
			No	18.94(9.50)					
	Current	Yes	15.28(6.61)	6.227	6.113	.000	4.222	8.233	
		No	21.51(9.97)						
Enalapril		Initial	Yes	19.82(9.19)	-3.657	-3.259	.001	-5.865	-1.448
			No	16.17(7.66)					
	Current	Yes	18.94(8.31)	-3.835	-4.033	.000	-5.706	-1.963	
		No	15.10(7.62)						
Nefidipine		Initial	Yes	15.92(7.52)	1.890	1.909	.057	-.059	3.839
			No	17.81(8.55)					
	Current	Yes	14.94(7.08)	3.131	3.052	.002	1.111	5.150	
		No	18.07(8.51)						
Atenolol		Initial	Yes	18.31(11.37)	-1.334	-.632	.528	-5.491	2.823
			No	16.97(7.98)					
	Current	Yes	15.52(8.32)	1.789	1.294	.197	-.933	4.511	
		No	17.31(8.16)						
Methyldopa		Initial	Yes	10.17(0.30)	6.953	1.464	.144	-2.393	16.298
			No	17.12(8.20)					
	Current	Yes	10.52(0.30)	6.551	.797	.426	-9.622	22.724	
		No	17.07(8.20)						
Captopril		Current	Yes	23.80	-6.780	-.825	.410	22.951	9.392
		No	17.03(8.20)						
Number Of Concomitantly									

Used Meds	0	11.75(2.73)	5.640	14.243	.000	4.861	6.420
	1	23.55(10.11)					
	2	24.75(3.91)					
	3	28.13(9.72)					
	4	12.47(2.88)					

5.6 Quality of Treatment outcome

To determine the level of blood pressure control, average of the last three BP readings within the study period was calculated for each study subject. Accordingly 189(67%) of patients blood pressure was above their respective goal and 93(33%) of patients had achieved their respective goal. Among all of the study subjects the systolic and diastolic BP was in range of (110-193) and (67-110) with a mean of 142.57(±14.26) and 87.63(±7.46) respectively.

No significant association was identified between quality of blood pressure control and socio-demographic characteristics and risk behaviors of the study participants (table 13).

Table 12 Logistic regression showing associations of socio-demographic variables with BP control, Dil Chora hospital, Dire Dawa, April 1, 2014-March 30, 2015 (n=282)

Variables	Goal Bp Achieved %	Sig	COR	95.0% C.I. For COR	
				Lower	Upper
Age		.442	.992	.972	1.013
Sex					
Female	29.2%	.099	.655	.396	1.083
Male	38.6%		Ref.		
Occupation					
Retired	33.3%	.743	.901	.484	1.678
Farmer	60.0%	.197	.300	.048	1.866
Trader	46.4%	.122	.520	.227	1.191
Employed	27.7%	.663	1.178	.563	2.464
Unemployed	31.1%		Ref.		
Residence					
Urban	32.0%	.112	2.483	.810	7.610
Rural	53.8%		Ref.		
Access To Medication					
Pay	35.2%	.874	Ref.		
Free	31.2%	.974	1.013	.467	2.197
Marital Status					

Married	32.1%		Ref.		
Single	39.4%	.974	1.013	.467	2.197
Divorced	33.3%	.548	.736	.270	2.004
Widow	32.4%	.972	.957	.078	11.719
Educational Status					
Illiterate	31.2%		Ref.		
Primary	31.1%	.974	1.017	.363	2.852
Secondary	39.3%	.972	1.020	.337	3.092
Higher	31.6%	.543	.712	.238	2.128
Religion					
Muslim	37.1%	.181	2.826	.617	12.938
Orthodox	30.7%	.075	3.769	.875	16.244
Protestant	62.5%		Ref.		
FH of hypertension					
Yes	29.5%	.515	1.227	.662	2.274
No	33.9%		Ref.		
Cigarette use					
Yes	36.4%	.808	.856	.244	3.000
No	32.8%		Ref.		
Alcohol Use					
Yes	28.6%	.999	8.034e8	.000	.
No	33.6%		Ref.		
Khat use					
Yes	44.2%	.092	.567	.292	1.098
No	31.0%		Ref.		
Exercise					
Yes	40.6%	.330	1.454	.684	3.090
No	32.0%		Ref.		
Coffee use					
Yes	30.3%	.219	1.374	.827	2.282
No	37.4%		Ref.		
Salt Reduction					
Yes	32.3%	.779	1.074	.651	1.773
No	33.9%		Ref.		

A univariant binary logistic regression used to determine possible association between diseases related variables and quality of blood pressure control revealed significant association with presence of co morbidity and history of hospitalization since the diagnosis of hypertension.

Strong association was found between history of hospitalization and BP control. Hence the percentage of patients with optimal quality of BP control persistently decreases with increasing number of hospitalization since the diagnosis of hypertension [table 14].

Table 13 Logistic regression showing associations of disease related variable with BP control. Dil Chora hospital, Dire Dawa, April 1, 2014-March 30, 2015 (n=282)

Variables	Goal BP achieved %	Sig	COR	95.0% C.I. For COR	
				Upper	Lower
Co-Morbidities					
None	40.8%		Ref.		
DM	16.3%	.000	3.542	1.882	6.667
CAD	100.0%	1.000	.000	.000	.000
Stroke	55.6%	.388	.552	.143	2.129
HF	16.7%	.263	3.450	.394	30.181
CKD	50.0%	.794	.690	.042	11.220
RVI	33.3%	.794	1.380	.123	15.519
Hospitalization Since Diagnosis					
None	36.0%		Ref.		
Once	28.8%	.285	1.391	.759	2.551
Twice	10.0%	.128	5.063	.629	40.769
Three Times	20.0%	.472	2.250	.247	20.515
Duration Since Diagnosis		.179	1.064	.972	1.164
Initial Bp					
140-159/90-99	29.4%	.367	1.488	.628	3.527
160-179/100-109	31.1%	.265	1.371	.787	2.388
>180/>110	38.3%				
Number Of Visit In A Year		.383	1.090	.898	1.324

There was also no significant association with amount of currently used anti-hypertensive medication. Significant association was found with only Enalapril from the six type of currently used antihypertensive medication. Though the association is weak (COR; 1.809, 95%CI; 1.099-2.993), Enalapril achieved 26.6% of optimal BP control from 143 patients. Significant association (COR; 1.548, 95%CI; 1.147-2.088) was also found with amount concomitantly used medications. A strong association with the high percentage (41%) of optimal BP achievement for patients taking zero amount of concomitantly used medication. This percentage drops down from

high to the lowest consecutively with increasing amount from 0 to 3 concomitantly used medications [table 15].

Table 14 Logistic regression showing association among different categories of each medication related variable with BP control. Dil Chora hospital, Dire Dawa, April 1, 2014-March 30, 2015 (n=282)

Variables		Goal BP achieved %	Sig	COR	95.0% C.I. For COR	
					Lower	Upper
Traditional Medicine						
Use	Yes	34.3%	.861	.935	.443	1.974
	No	32.8%		Ref.		
Adherence	Adherent	34.0%	.082	.667	.392	2.098
	Non Adherent	32.4%		Ref.		
Number Of Initial Antihypertensive Medication	One	30.8%	.205	.709	.417	1.206
	Two	42.1%				
	Three	25%				
Number Of Current Antihypertensive Meds	One	35.4%	.517	1.137	.771	1.676
	Two	31.4%				
	Three	31.0%				
Hydrochlorothiazide						
Initial	Yes	36.3%	.219	.731	.444	1.205
	No	29.4%		Ref.		
Current	Yes	33.2%	.914	.970	.559	1.685
	No	32.5%		Ref.		
Enalapril						
Initial	Yes	26.5%	.192	1.499	.816	2.752
	No	35.0%		Ref.		
Current	Yes	26.6%	.021	1.809	1.094	2.993
	No	39.6%		Ref.		
Nefidipine						
Initial	Yes	36.8%	.256	.747	.452	1.236
	No	30.4%		Ref.		
Current	Yes	39.1%	.127	.667	.396	1.123
	No	30.0%		Ref.		
Atenolol						
Initial	Yes	37.5%	.693	.810	.285	2.301
	No	32.7%		Ref.		
Current	Yes	34.1%	.863	.940	.467	1.893

			...Table continued			
	No		32.8%		Ref.	
Methyldopa						
	Initial	Yes	.0%	.999	8.077e8	.000
		No	33.3%		Ref.	
	Current	Yes	.0%	1.000	7.991e8	.000
		No	33.1%		Ref.	
Captopril						
	Current	Yes	.0%	1.000	7.991e8	.000
		No	33.1%		Ref.	
Number Of Concomitantly Used Meds						
		None	41.0%	.004	1.548	1.147
		One	25.0%			
		Two	20.0%			
		Three	.0%			
		≥Four	66.7%			

Quality of BP control and quality of health care process were found to have strongly significant association (COR; 1.078, 95%CI; 1.037-1.121). The binary logistic regression shows a decreasing number of patients with optimal quality of BP control with an increase in percentage of quality of health care process indicator score.

Quality of BP control and quality of care based on the patient perception were found to have strongly significant association (COR; 0.971, 95%CI; 0.950-0.992, $p \leq 0.008$). The binary logistic regression shows an increase in number of patients with optimal quality of BP control with an increase in NORPEQ score.

5.7 Quality of care based on the Patient experience and satisfaction

The validity test is made using Pearson correlation and it gives the validity of the NORPEQ questioner to measure the health care experience for this particular study populations. Both of the correlations between general satisfaction and incorrect treatment with the NORPEQ scores were significant and range from a low to a high level for general satisfaction and from high to low for incorrect treatment. Compared with patients who stated that they had not received any incorrect treatment, those reporting that they had received incorrect treatment to a small or some extent had scores that were 16.93 and 22.47 points lower on the 0–100 scale respectively. Accordingly the NORPEQ was found to be valid for this study population.

Table 15 Correlation between Mean (SD) NORPEQ scores and perceptions of general satisfaction and incorrect treatment Dil Chora hospital, Dire Dawa, April 1, 2014- March 30, 2015 (n=282)

Variable	Response scale	NORPEQ score(mean)	Correlation	p-value
Incorrect treatment	Not at all	85.53	-0.432 ^{**}	0.000
	To small extent	68.61		
	To some extent	63.06		
General satisfaction	Not at all	40.00	0.717 ^{**}	0.000
	To small extent	43.33		
	To some extent	66.67		
	To a large extent	83.24		
	To a very large extent	96.93		

The only missing data at 1.8% was for the items relating to whether the information given to the patient were necessary about how tests and examinations would be conducted, because the patients say they don't know where to put it. The questioners with this missing data were reported written as "I don't know". Score distributions for items were skewed towards positive experiences with item means ranging from 4.05(±0.729) to 4.39(±0.581) for the items relating to whether the doctors talk to the patients in a way they could understand and confidence in the doctors' medical competence respectively on a 1 to 5 scale. The largest ceiling effect was 43.6% for the item relating to doctors' medical competence. The study participants rated an average of 83.85(SD; ±12.65) on their experience of the care service (table 17).

Table 16 Means and frequencies of NORPEQ scores of hypertensive patients Dil Chora hospital, Dire Dawa, April 1, 2014-March 30, 2015 (n=282)

Items	N	Mean (SD)	1	2	3	4	5
NORPEQ score	282	83.85 (12.65)	N (%)	N (%)	N (%)	N (%)	N (%)
Did the doctors talk to you in a way you could understand?	282	4.05(0.73)	0(0)	4(1.4)	56(19.9)	144(51.1)	78 (27.7)
Do you have confidence in the doctors' medical competence?	282	4.39(0.58)	0(0)	0(0)	14(5)	145(51.4)	123 (43.6)
Do you have confidence in the nursing staff's medical competence?	282	4.18(0.79)	0(0)	13(4.6)	28(9.9)	136(48.2)	105 (37.2)
Did you experience the nursing staff showed concern for you?	282	4.16(0.84)	2(0.7)	13(4.6)	30(10.6)	130(46.1)	107 (37.9)
Did you experience that the doctors and nursing staff were interested in your description of your own situation?	282	4.21(0.77)	2(0.7)	6(2.1)	29(10.3)	139(49.3)	106 (37.6)
Were you given the information you thought were necessary about how tests and examinations would be conducted?	277	4.17(0.89)	0(0)	6(2.1)	24(8.5)	143(50.7)	104 (36.9)
Overall, was the treatment and care you received at the hospital satisfactory?	282	4.06(0.62)	4(1.4)	1(0.4)	18(6.4)	209(74.1)	50 (17.7)
Do you believe you were in any way given the wrong treatment (as far as you are able to judge)?	282	1.15(0.52)	257 (91.1)	8(2.8)	16(5.7)	1(0.4)	0(0)

The NORPEQ total score is scored 0–100

Among socio-demographic factors and risk behaviors age, sex, and residence were found to have significant association with NORPEQ score. As the age goes from low to high so do the NORPEQ score, female patients and patients from rural area were also found to a strongly significant association with higher scores[table 20].

Table 17 Mean NORPEQ scores and level of association between patient experience and socio-demographic variables, Dil Chora hospital, Dire Dawa, April 1, 2014-March 30, 2015 (n=282)

Variables	NORPEQ score Mean (SD)	B	T	Sig	95% C.I for B Lower Upper	
Age		1.536	2.480	.014	.317	2.755
Sex						
Male	80.88(13.62)	-4.996	-3.313	.001	-7.965	-2.027
Female	85.87(11.56)	Ref.				
Occupation						
Unemployed	94.00(8.30)	1.77	1.172	.242	-1.201	4.735
Employed	82.94(11.86)	Ref.				
Residence						
Urban	83.33(12.62)	11.282	3.192	.002	4.325	18.239
Rural	94.62(7.76)					
Access						
Medication						
Paying	82.80(12.57)	1.892	1.249	.213	-1.089	4.873
Free	84.69(12.68)	Ref.				
Marital Status						
Single	85.45(10.17)	4.06	2.347	.020	.654	7.464
Married	82.84(12.90)	Ref.				
Educational status						
Illiterate	85.37(13.96)	-1.907	-2.509	.013	-3.403	-.411
Primary	83.22(10.15)					
Secondary	83.12(11.57)					
Higher Education	77.02(11.00)					
Family history of Hypertension						
Yes	84.09(11.31)	-0.313	-.171	.865	-3.919	3.294
No	83.79(13.02)	Ref.				
Cigarette use						
Yes	83.64(15.09)	0.226	.058	.954	-7.445	7.897
No	83.86(12.57)	Ref.				
Alcohol Use						

....Table continued						
Yes	90.00(14.14)	-6.190	-.689	.491	-23.874	11.493
No	83.81(12.65)	Ref.				
Khat use						
Yes	82.48(10.74)	1.620	.773	.440	-2.507	5.747
No	84.10(12.96)	Ref.				
Exercise						
Yes	83.44(11.34)	0.469	.197	.844	-4.213	5.151
No	83.90(12.82)	Ref.				
Coffee use						
Yes	84.61(10.27)	-1.993	-1.285	.200	-5.044	1.059
No	82.62(15.76)					
Salt Reduction						
Yes	84.37(13.34)	-1.200	-.788	.431	-4.198	1.797
No	83.17(11.68)	Ref.				

The linear regression also showed that hospitalization since the diagnosis of hypertension had a strongly significant association with patient experience among disease related factors. As the number of hospitalization increases score the NORPEQ score was shown to decrease significantly. Presence of co-morbid illness was also found to have significant association with lower NORPEQ score [table 19].

Table 18 The mean NORPEQ scores and level of association between patient experience and disease related factors Dil Chora hospital, Dire Dawa, April 1, 2014-March 30, 2015 (n=282) .

Variables	NORPEQ score Mean(±std)	B	t	Sig	95% C.I for B	
					Lower	Upper
Co-Morbidities						
Present	82.10(11.87)	-5.30	-3.516	.001	-8.264	-2.332
Absent	85.97(12.03)	Ref.				
Hospitalization since diagnosis						
None	86.02(10.40)	-6.734	-6.441	.000	-8.792	-4.676
Once	81.82(12.92)					
Twice	66.67(20.00)					
three times	59.33(21.13)					
four or more	80.00()					

Duration since diagnosis		0.017	.030	.976	-1.110	1.145
Initial BP						
140-159/90-99	82.75(13.37)	0.829	.678	.498	-1.578	3.237
160-179/100-109	83.77(11.95)					
>180/>110	84.48(13.82)					
Number of visit in a year		-0.523	-1.268	.206	-1.334	.289

None of the medication related variables found to have no impact on quality of care based on the patient experience [table 20].

Table 19 The mean NORPEQ scores and level of association between patient experience and disease related factors Dil Chora hospital, Dire Dawa, April 1, 2014-March 30, 2015 (n=282) .

Variables		NORPEQ Score Mean(S.D)	B	T	Sig	95% C.I For B Lower Upper	
Traditional Medicine Use							
	Yes	84.76(11.41)	-1.037	-.453	.651	-5.540	3.466
	No	83.72(12.83)	Ref.				
Adherence							
	Adherent	83.24(11.46)	0.972	.621	.535	-2.110	4.055
	Non Adherent	84.20(13.30)	Ref.				
No of Initial Antihypertensive Medication							
	One	83.98(12.73)	-0.813	-.489	.625	-4.085	2.460
	Two	83.68(12.48)					
	Three	79.17(12.29)					
No of Current Antihypertensive Medications							
	One	83.19(10.80)	0.345	.295	.769	-1.961	2.651
	Two	84.64(13.77)					
	Three	82.64(13.84)					
HCT							
Initial							
	Yes	84.41(13.11)	-1.147	-.760	.448	-4.116	1.823
	No	83.26(12.15)	Ref.				
Current							
	Yes	84.41(13.33)	-1.948	-1.166	.244	-5.234	1.339
	No	82.46(10.67)	Ref.				

Enalapril							
Initial	Yes	82.40(10.52)	1.913	1.087	.278	-1.552	5.377
	No	84.31(13.24)	Ref.				
Current	Yes	83.82(11.64)	0.062	.041	.967	-2.909	3.033
	No	83.88(13.65)	Ref.				
Nefidipine							
Initial	Yes	83.54(12.85)	0.529	.344	.731	-2.496	3.555
	No	84.07(12.54)	Ref.				
Current	Yes	83.26(15.01)	0.879	.547	.585	-2.287	4.046
	No	84.14(11.36)	Ref.				
Atenolol							
Initial	Yes	86.46(11.83)	-2.762	-.848	.397	-9.173	3.650
	No	83.70(12.70)	Ref.				
Current	Yes	83.33(12.69)	0.609	.284	.776	-3.604	4.821
	No	83.94(12.66)	Ref.				
Methyldopa							
Initial	Yes	72.22(21.43)	11.756	1.606	.109	-2.654	26.166
	No	83.98(12.65)	Ref.				
Current	Yes	96.67	12.859	-1.015	.311	-37.797	12.08
	No	83.81(12.65)	Ref.				
Captopril							
Current	Yes	80.00	3.867	.761	21.1	28.847	
	No	83.87(12.67)	Ref.				
No of Concomitantly Used Medications							
	None	85.24(12.74)	-1.250	1.565	.119	-2.823	.322
	One	81.86(12.27)					
	Two	82.06(10.59)					
	Three	75.00(24.01)					
	Four	97.78(3.85)					

Quality of care based on the patient's perception and quality of health care process were found to have strongly significant association ($\beta=-0.211$, 95% CI, -0.503—0.148, $p<0.0001$). The linier regression shows a decrease in NORPEQ score with an increase in percentage of quality of health care process indicator scored.

5.8 Predictors of quality of care

5.8.1 Predictors of quality of health care process for hypertensive patients

To determine the independent predictors of health care process indicator score, independent variables that have significant association with indicator score were included for analysis using multiple linear regression. Accordingly, the analysis revealed that educational status, history of Hospitalization since diagnosis, Frequency of visit in a year, Amount of initial antihypertensive medication, Current hydrochlorothiazide and Amount of concomitantly used were found to be independent predictors of higher quality of hypertensive care process[table 23].

Table 20 Linear regression showing the combined impact of socio-demographic, disease related and medication related conditions on quality of health care process for hypertensive patients Dil Chora hospital, Dire Dawa, April 1, 2014-March 30, 2015 (n=282)

Variables	% Indicator Score Mean(S.D)	B	t	Sig	95% C.I For B	
					Lower	Upper
Constant		3.105	.983	.326	-3.113	9.324
Educational Status						
Illiterate	16.18(7.24)	1.492	4.703	.000	.868	2.117
Primary	16.03(6.79)					
Secondary	17.10(7.52)					
Higher	26.71(13.83)					
Co-Morbidities						
Present	24.61(7.42)	0.657	1.939	.054	-.010	1.323
Absent	12.00(3.41)					
Hospitalization Since Diagnosis						
None	15.54(6.43)	1.693	3.471	.001	.732	2.653
Once	19.87(10.82)					
Twice	21.08(7.88)					
Three Times	30.36(9.43)					
Four Or More	26.08.					
Number of visit in a year		1.363	7.389	.000	1.000	1.726
Amount of Initial Antihypertensive Medication						
One	17.92(8.69)	-2.419	-2.717	.007	-4.171	-.666

	Two	13.76(4.97)						
	Three	15.82(4.79)						
Amount of Current Antihypertensive Meds	One	19.23(9.60)	1.557	1.627	.105	-.327	3.442	
	Two	15.99(7.12)						
	Three	13.70(4.14)						
Hydrochlorothiazide	Initial	Yes	15.29(6.29)	-0.005	-.006	.996	-1.724	1.714
		No	18.94(9.50)	Ref.				
	Current	Yes	15.28(6.61)	3.744	2.858	.005	1.165	6.322
		No	21.51(9.97)	Ref.				
Enalapril	Initial	Yes	19.82(9.19)	-0.498	-.515	.607	-2.403	1.407
		No	16.17(7.66)	Ref.				
	Current	Yes	18.94(8.31)	-0.498	.411	.681	-1.917	2.929
		No	15.10(7.62)	Ref.				
Nefidipine	Current	Yes	14.94(7.08)	1.680	1.488	.138	-.543	3.904
		No	18.07(8.51)	Ref.				
No Of Concomitantly Used Meds	None	11.75(2.73)	3.571	8.880	.000	2.779	4.363	
	One	23.55(10.11)						
	Two	24.75(3.91)						
	Three	28.13(9.72)						
	≥Four	12.47(2.88)						

Level of significance: $p < 0.05$

5.8.2 Predictors of quality of treatment outcome

To determine the independent predictor of quality of blood pressure control, independent variables that were found to have significant association were included for analysis using multi-variable binary logistic regression. Accordingly the analysis revealed that diabetes (AOR; 3.200' 95%CI; 1.230-8.325) was the independent predictor of su-optimal quality of BP control [table 24].

Table 21 Logistic regression showing the combined impact of socio-demographic, disease related and medication related conditions on quality of BP control Dil Chora hospital, Dire Dawa, April 1, 2014-March 30, 2015 (n=282)

Variables	BP goal achieved	Sig.	AOR	95.0% C.I; for AOR	
				Lower	Upper
Co-morbidity					
ab	40.8%		Ref.		
Diabetes	16.3%	.017	3.200	1.230	8.325
CAD	100.0%	1.000	.000	.000	.
Stroke	55.6%	.310	.467	.108	2.028
HF	16.7%	.494	2.326	.207	26.075
CKD	50.0%	.736	.582	.025	13.513
RVI	33.3%	.620	1.864	.159	21.889
Hospitalization					
None	36.0%		Ref.		
Once	28.8%	.336	1.406	.702	2.817
Twice	10.0%	.206	3.964	.469	33.508
Three times	20.0%	.656	1.823	.130	25.623
Four times	.0%	1.000	3.134E8	.000	.
Currently on Enalapril	26.6%	.142	1.501	.873	2.582
Number of concomitantly used meds		.766	.935	.602	1.453

5.8.3 Predictors of quality of care based on the patients' perception

To identify predictors of quality of care based on the patients' perception, independent variables that have significant association with patient experience were included for analysis using multiple linear regression with a back ward step wise approach. Accordingly the analysis revealed that age, sex, residence and history hospitalization since the diagnosis of hypertension were

found to be independent predictors of higher quality of care based on the patient's perception [table 25].

Table 22 Linear regression showing the combined impact of socio-demographic, disease related and medication related conditions on quality of care based on the patients' perception Dil Chora hospital, Dire Dawa, April 1, 2014-March 30, 2015 (n=282)

Variables	NORPEQ Score Mean (SD)	B	T	Sig	95% C.I For B	
					Lower	Upper
Constant		83.056	44.127	.000	79.351	86.761
Age		1.722	2.888	.004	.548	2.896
Sex						
Female	85.87(11.56)	-4.654	-2.755	.006	-7.979	-1.328
Male	80.88(13.62)					
Residence						
Urban	83.33(12.62)	11.250	3.436	.001	4.805	17.695
Rural	94.62(7.76)					
Marital Status						
Single	85.45(10.17)	0.967	1.402	.162	-.391	2.324
Married	82.84(12.90)	Ref.				
Educational Status						
Illiterate	85.37(13.96)	0.173	.202	.840	-1.510	1.855
Primary	83.22(10.15)					
Secondary	83.12(11.57)					
Higher Education	77.02(11.00)					
Co-Morbidities						
Present	82.10(11.87)	-0.674	-1.020	.309	-1.976	.627
Absent	85.97(12.03)					
Hospitalization Since Diagnosis						
None	86.02(10.40)	-6.064	-5.812	.000	-8.117	-4.010
Once	81.82(12.92)					
Twice	66.67(20.00)					
Three Times	59.33(21.13)					
Four Or More	80.00()					

Level of significance: p < 0.05

6. Discussion

This study provided practically useful information regarding the quality of care provided to patients with hypertension which is one of the leading causes of outpatient visits, admissions and deaths in Ethiopia. The findings of this study can be used in quality improvement work as it examined quality of care from the point of the health care structure, patient experience, health care process and treatment outcome using univariate as well as multivariate analysis which allowed it to capture the multidimensional and complex reality of hypertensive patients care in hospital.

The overall structural standard achievement for hypertensive care system in Dil Chora hospital was 70.6% i.e. from 17 structural standards 12 standards were achieved. This study showed that the hospital structure is much better than those from previous studies (24). Eight of the nine structural standards included in the Botswana study were also included in this study (24). In the previous study none of the structural standards were met before quality improvement work and only 66.67% of structural standards were met after the quality improvement work (24). Unlike the previous study, when the common structural standards were compared seven of the eight structural standards were achieved in this hospital (87.5% Vs 0% in the baseline audit and 75% in the re-audit after quality improvement work). Unlike the situational analysis conducted in Oromia region the hospital has a well functional format for appointment, registration and investigation request (8). The previous study also showed that 21% of facilities have a designated HTN clinic but in this study hospital only designated clinic for NCD services was found (8).

In this study none of the patients received optimal quality of health care process. The overall percentage of health care process indicator score was 17.06%, which is very low compared to previous studies conducted in USA(72%), Ethiopia(38.5%) and in Botswana (45.46%)(24, 25, 30). This may be because the hospital had only one chronic care unit for many of chronic illness managed in the hospital except for ART and TB which had resulted in heavy burden of work on the care unit and staff making it difficult, if not impossible, to individualize the care process for hypertensive patients. And as Ethiopia is a low income country, most people cannot afford to cover the costs that are necessary to provide the recommended care process.

Patients with better educational status are likely to achieve, on average, 0.179 more care process indicators than those with lower educational status. This finding is consistent with previous study (30). With increasing educational status the patients achievement of the recommended care also significantly increases possibly because they question and demand for essential care service. Another potential explanation could also be their ability to cover the necessary costs associated with the provision of care processes. Patients with one or more history of hospitalization are likely to achieve, on average, 0.139 more care process indicators than those with no history or less frequent history of hospitalization since the diagnosis of hypertension, suggesting that providers may be targeting patients at highest risk for hypertensive complications or the illness that caused their hospitalization may also require its own basic recommended care process which may also recommended for hypertension care e.g. blood sugar measurement for diabetic patients.

Patients who had been initially treated with a double or triple antihypertensive medication are likely to achieve, on average, 0.134 less process indicators than patients who initially received a single antihypertensive medication. As the data in this study suggests patients who were taking two antihypertensive medication initially had better BP goal achievement than those with single medication (42.1% Vs 30.8), suggesting that providers may again be targeting patients with poorer health condition and at risk for hypertensive complication. Patients who are not taking hydrochlorothiazide are likely to achieve, on average, 0.206 more process indicators than those who are currently on hydrochlorothiazide. As data of this study suggests most (84%) of patients with no co-morbid illness are receiving HCT than their counter parts (e.g. 54.3% of diabetic patients). This finding also reiterate the above finding that patients with poorer health condition or at risk for hypertension complication may have been targeted by the providers and their co-morbidity may also require its own basic recommended care process which may also recommended for hypertension care e.g. blood sugar measurement for diabetic patients. For similar reasons patients who are concomitantly taking other medications are likely to achieve, on average, 0.41 more than those who are not concomitantly taking other medications.

Patients with more frequent hospital visits are likely to achieve, on average, 0.304 more process indicators than patients with less frequent visits. As the data in this study suggests, this is because patients who had a more frequent visit were those with co-morbid illness (e.g.

4.71(\pm 1.34) for patients without co morbidity Vs 6.64(\pm 2.05) for diabetic patients) which also reiterate the above finding. This finding also suggest that following hypertensive patients more frequently had a positive implication on the quality of the care process provided in a year.

The proportion of patients with optimal BP control was very low in this study hospital, which was lower than findings in other countries and other referral hospital of Ethiopia (22, 24, 25, 30, 31). But this finding was consistent with two previous studies (16, 26). Such very low level of BP control could primarily be the result of the identified very low quality of health care process provided, which negatively affect timely adjustment of dose and regimens. And the other potential explanation could be a very long months of stock outs for essential anti-hypertensive medications. Patients with co-morbid diabetes are 3.2 times more at risk of sup-optimal BP control. This may be due to the influences of the disease itself on the BP of these patients or the complexity of the required care for these patients which may divert providers focus from achieving goal BP. This finding was different from previous study, that was conducted in USA, which found that patients with diabetic co-morbidity are more likely to have their BP controlled (30). This may be because of the observed difference in the care process provided which was very high compared to this study. The other potential explanation could be better care setups and processes for diabetic care to.

The overall patient experience score was higher with NORPEQ score of 83.35 which is consistent with previous study (57, 59, 60). The lowest mean score on the questioner was for item relating to weather the doctor talk to the patients in a way they could understand. The city of Dire Dawa is cosmopolitan city with diverse ethnic groups dominantly Amharic, Oromifa and Somali speaking residents. Though the official language of the city administration is Amharic, there are people who can't speak this language which may have created gaps in communication between the physician and the patients. On the other hand, the highest score was for item relating to patients confidence on the doctor professional competence. This may be because of the long stayed myth in our society that doctors are the most competent professional or it may be because of the doctor's ability empathize with the patient, got into the storm of emotions anxious patients suffer and yet, not lost the clinical point of view and was really looking for solutions for patient problems. A correlation test for validity of NORPEQ for this study was found to be strongly

significant and proved that this questioner was appropriate to achieve the objective of this study. And this finding was consistent with previous studies (57, 59, 60). Patients with older age are likely to score, on average, 0.164 more NORPEQ score than younger patients and Male patients are likely to score, on average, 0.181 less NORPEQ score than female patients. These findings were consistent with previous studies (38, 39, 27). Patients who live in the rural area are likely to score, on average, 0.187 more NORPEQ score than patients living in urban area. Patients with one or more history of hospitalization are likely to score, on average, 0.323 less NORPEQ score than patients with no or less frequent history of hospitalization. The finding suggests that poor health condition can be a formidable cause for patient's dissatisfaction on health care service. This finding was also consistent with previous studies (27, 28, 41, 57, 59, 60).

This study is the first to examine quality of hypertensive care across four main quality measures and the relationship between them. The structure of the health care system is the basic requirement for any health care institution to provide basic care process and also it's thought to affect both the health care outcome and the patient experience while in the care institution. The study hospital was found to have relatively better quality of hypertensive care structure compared to previous studies (8, 24), though one of the most essential anti-hypertensive medication(hydrochlorothiazide) was not available for six months which may be the cause of low percentage of BP goal achievement. On the other hand, while the care structure was sufficiently equipped to perform most of the recommended care process, the overall care process provided was unacceptably low. The possible reason for this may be large number of patients the hospital had to accommodate in a day which may add additional burden on the physicians, laboratory and pharmacy units that compromise the individualization of care for hypertensive patients. The other potential explanation could be unorganized work environment that does not allow individualization of the care service.

In this study the relationship between the three dependent variables (quality of the care process, quality of BP control and quality of care based on the patient experience) among the four quality measures were examined through different statistical analysis. Accordingly, higher quality of BP control was found to have significant association with lower quality of care process scored which was different from previous studies (24, 30). As the data in this study suggests patients who received better care process are those with co-morbid illness and the study also showed that most

of patients with co-morbid illness are diabetic patients who were found to be three times more at risk of uncontrolled BP. Higher percentage of care process score was found to have significant association with lower NORPEQ score, suggesting that additional costs and increase in waiting time required to provide the recommended care processes could be a cause for the decrease in the patients experience score. And it may also be perceived by the patients as an indication for their deteriorating health condition. Finally, higher NORPEQ score was found to have significant association with higher percentage patients with goal BP achieved. This finding was consistent with previous studies(57, 59, 60).

Limitation of the study

It was difficult to know sphygmomanometers were calibrated regularly and thus the blood pressure measurements used in the study were not taken under ideal conditions. The adherence of staff to the rules for blood pressure measurement was also not assessed.

Though there are a lot of evidence for data quality, reliability and validity of the NORPEQ patient experience questioner including evidence for cross-cultural equivalence with five Scandinavian countries, there is no evidence for cross-cultural equivalence with African countries particularly Ethiopia.

In this study the recommended care is considered provided if only it was recorded in the patient's medical record. Considering the fact that poor recording history in our health institutions, it is possible that documentation differences rather than true quality differences explain some of the observed variations in process quality or outcomes.

7. Conclusion and Recommendation

7.1 Conclusion

This study found that the quality of care provided to hypertensive patients in the study hospital was very low. The findings of this study showed that quality of care as measured by achievement of structural standards and patient experience is relatively better and quality of care as measured by level of health care process achievement and level of BP control was very low. Patients with better educational status, history of hospitalization, more frequent hospital visit and taking multiple antihypertensive and concomitantly used medications are likely to achieve more recommended care processes. Hypertensive patients with co-morbid diabetes are three times more at risk of sub-optimal BP control than hypertensive patients with no co-morbidity. And patients with female gender, older age and living in a rural area are likely to score more on their experience of the care service.

7.2 Recommendations

- The federal ministry of health should promote the provision of optimal quality of care for hypertensive patients throughout the health care system by preparing quality standards and implementing periodic audit based on those quality standards.
- The hospitals medication supply management unit should regularly monitor stock levels and procure antihypertensive medications before stock outs. Small and medium BP cuffs should also be procured and provided to the care unit.
- The health professionals in the care unit should prepare a checklist that can help guide the care of hypertensive patients and insert it into medical record of each hypertensive patients. The checklist should contain individual's numerical goal blood pressure, care processes that should be provided at each visit and yearly.
- In addition to patients who already developed complications of hypertension or had a co-morbid illness, other hypertensive patients should also be given due attention to provide the recommended care process.
- Treatment of hypertensive patients should be directed towards achieving optimal BP control by preparing time sensitive BP goal, periodic evaluation of their treatment, timely adjustment of needed changes on their medications and educating them on important life style modifications.
- Future researches should test the validity and reliability of questioners like the NORPEQ so that, questions that relate to patients actual, more objective experiences in the health care services and that aims to avoid value judgments can be used to measure the patients experience in our health care institutions.
- Finally, future researches on quality of care for hypertensive patients in other hospitals throughout the country should also be conducted so that, unsought quality gaps during patients routine counseling and clinical evaluations at follow up visits will be identified and health professionals at hypertension treatment and care units will be alerted to make emphasis on those quality gaps

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Annexes

Annex I; English version of the questioners

Patient experience questioner

1. Did the doctors talk to you in a way you could understand?

- | | |
|-------------------------|---------------------------|
| 1. Not at all | 4. To a large extent |
| 2. To a small extent | 5. To a very large extent |
| 3. To a moderate extent | |

2. Do you have confidence in the doctors' medical competence?

- | | |
|-------------------------|---------------------------|
| 1. Not at all | 4. To a large extent |
| 2. To a small extent | 5. To a very large extent |
| 3. To a moderate extent | |

3. Do you have confidence in the nursing staff's medical competence?

- | | |
|-------------------------|---------------------------|
| 1. Not at all | 4. To a large extent |
| 2. To a small extent | 5. To a very large extent |
| 3. To a moderate extent | |

4. Did you experience the nursing staff showed concern for you?

- | | |
|-------------------------|---------------------------|
| 1. Not at all | 4. To a large extent |
| 2. To a small extent | 5. To a very large extent |
| 3. To a moderate extent | |

5. Did you experience that the doctors and nursing staff were interested in your description of your own situation?

- | | |
|----------------------|---------------------------|
| 1. Not at all | 4. To a large extent |
| 2. To a small extent | 5. To a very large extent |

3.To a moderate extent

6. Were you given the information you thought were necessary about how tests and examinations would be conducted?

1.Not at all

4. To a large extent

2.To a small extent

5. To a very large extent

3.To a moderate extent

7. Overall, was the treatment and care you received at the hospital satisfactory?

1.Not at all

4. To a large extent

2.To a small extent

5. To a very large extent

3.To a moderate extent

8. Do you believe you were in any way given the wrong treatment (as far as you are able to judge)?

1.Not at all

4. To a large extent

2.To a small extent

5. To a very large extent

3.To a moderate extent

Socio demographic

1	Card number		
2	Age		
3	Sex/gender		
4	Living area	In the city	
		Outside of the city	
5	Religion	Orthodox	
		Protestant	
		Catholic	
		Others	
6	Marital status	Single	
		Married	
		Divorced	
		Widow	
7	History of smocking		
8	History of alcohol use		
9	Family History of DM		
10	Family History of hypertension		
11	Ethnicity		
12	Access to health care and medication	Free	
		Paying	
13	Occupation		
14	Monthly income		

Disease related factors

No	Factors		Status	Description/values	
1	Co-morbidities	DM			
		CAD			
		Non CAD			
		HF			
2	Hospitalization since diagnosis	Once			
		Twice			
		Three times			
		More			
3	Duration since diagnosis				
	Initial organ function test	Renal	BUN		
			Creatinine/ cl		
		Hepatic	AST		
			ALT		
		Eye			
4	Stage of hypertension at diagnosis	Pre-hypertension			
		Stage 1 hypertension			
		Stage 2 hypertension			
5	Base line laboratory values	Serum, plasma, or blood glucose;			
		Serum potassium;			
		Serum creatinine			
		Serum cholesterol			
		Serum triglyceride			
		Serum LDL			
		Serum HDL			
		Urinalysis			

Medication related factors

Initial Antihypertensive medications

Drug	Dose	Frequency	Duration

Current Antihypertensive medications

Drug	Dose	Frequency	Duration

Concomitantly used medications

Drug	Dose	Frequency	Duration	Prioritized description of the condition

Additional medications specify(PRN Drug Therapy, traditional medications...)

Drug	Dose	Frequency	Duration	Prioritized description of the condition

Adherence

Scores: >2 = low adherence

1 or 2 = medium adherence

0 = high adherence

Question	Patient Score (Yes/No) N=0	Answer Y=1;
Do you sometimes forget to take your medicine?		
People sometimes miss taking their medicines for reasons other than forgetting. Thinking over the past 2 weeks, were there any days when you did not take your medicine?		
Have you ever cut back or stopped taking your medicine without telling your doctor because you felt worse when you took it?		
When you travel or leave home, do you sometimes forget to bring along your medicine?		
Did you take all your medicines yesterday?		

When you feel like your symptoms are under control, do you sometimes stop taking your medicine?	
Taking medicine every day is a real inconvenience for some people. Do you ever feel hassled about sticking to your treatment plan?	
<p>How often do you have difficulty remembering to take all your medicine?</p> <p>_A. Never/rarely</p> <p>_ B. Once in a while</p> <p>_C. Sometimes</p> <p>_ D. Usually</p> <p>_ E. All the time</p>	<p>A = 0;</p> <p>B-E = 1</p>
	Total score_____

Annex II Check list for process indicators

No	Indicators	Eligible		Status	
		yes	N o	Done No/visit	Not done
1	Systolic and diastolic blood pressure should be measured on patients otherwise presenting for care at each visit.				
2	Physical examination: Examination of the fundi at each visit.				
3	Examination of heart at each visit.				
4	Examination of heart at each visit.				
5	Examination of abdomen for bruits at each visit.				
6	Examination of peripheral arterial pulses at each visit.				
7	Examination of neurologic system at each visit.				
8	A calculation of body mass index (BMI) yearly.				
9	Urinalysis yearly.				
10	Blood glucose test yearly				
11	Serum potassium test yearly				
12	Serum creatinine test yearly				
13	Serum LDL test yearly				
14	Serum HDL test yearly				
15	Serum triglyceride test yearly				
16	An ECG examination once yearly				
17	Urinary albumin excretion should be quantitated and monitored on an annual basis in high-risk groups, such as those with diabetes or renal disease.				
18	All people with hypertension (stages 1 and 2) should be treated.				
19	First-line treatment for patients with pre-hypertension, is lifestyle modification. The medical record should indicate counseling for at least 1 of the following interventions prior to initiating pharmacotherapy: - weight reduction if obese;- increased physical activity if sedentary; or- low sodium diet.				
20	Treatment for Stage 1 and Stages 2 hypertension should include lifestyle modification. The medical record should indicate counseling for at least 1 of the following interventions: - weight reduction if				

	obese; - increased physical activity if sedentary; or- low sodium diet.				
19	Patients whose BP goal is not achieved should return for follow up and adjustment of medications at monthly intervals until the BP goal is reached				
21	Patients with target organ damage, DM or CAD should be offered pharmacotherapy for the co-morbid illness.				
21	Patients with target organ damage, DM or CAD and pre-hypertension, stage 1 & 2 hypertension should be offered antihypertensive medication.				
22	Newly diagnosed Stage 1 patients should be evaluated by the provider within 1 months of their initial visit.				
23	Newly diagnosed Stage 2 patients should be evaluated by the provider within 1 months of their initial visit.				
24	Newly diagnosed patients with hypertensive crises should be evaluated by the provider within 2 weeks of their initial visit.				
25	Hypertensive patients with consistent average SBP > 140 or DBP > 90 over 6 months should have one of the following interventions recorded in the medical record: Change in dose or regimen of antihypertensive agents; or repeated education regarding lifestyle modifications.				

Annex III Check list for structure indicators

No	Structure	Available functional	&	Available but not fully functional	Not Available or not functional
1	sphygmomanometer (blood pressure machine)				
2	blood pressure cuff	small,			
		Medium			
		Large			
3	weighing scale				
4	height scale				
5	specimen tubes for blood tests				
6	an ECG machine				
7	specimen bottles for urine				
8	Investigation request forms (laboratory and ECG)				
9	Prescription forms				
10	Appointment book				
11	Patient Appointment card				
12	Patient allergy card				
13	Diuretics				
14	ACE inhibitors				
15	Calcium channel blockers				
16	Cardio selective B-blockers				

Annex IV Check list for treatment outcome

Goal BP

			Goal	Goal BP achieved	
				Yes	No

Annex V Amharic version of the questioner

ክፍልአንድ :- ስነህዝብ ናማህበራዊ ጉዳዮች

ካርድ ቁጥር-----

ቀን -----

101. እድሜ -----

102. የታ 1.ወንድ 2. ሴት

103. ሥራ

1. ጡረተኛ
2. ስራ የሌለው
3. ነጋዴ
4. አርሶአደር /ገበሬ/
5. ስራ ያለው(የመንግስት-ሠራተኛ ፣የግል ተቀጣሪ)

104. የትምህርት ደረጃ

1. ያልተማረ/ች
2. አንደኛ ደረጃ ትምህርት
3. ሁለተኛ ደረጃ ትምህርት
4. ኮሌጅና ዩኒቨርሲቲ

105. ሐይማኖት

1. ኦርቶዶክስ
- 2.ሙስሊም
- 3.ፕሮቴስታንት
- 4.ሌላ ከሆነ ይጠቀስ-----

106. የጋብቻ ሁኔታ

1. ያገባ/ች
2. ያላገባ/ች

- 3. የፈታ/ች
- 4. ባልየሞተባት

ክፍል ሁለት:- የአኗኗርሁኔታ

107. ሲጋራ ታጨሳለህ ?

- 1. አጨሳለው
- 2. አላጨሰም

መልሱ አጨሳለው ከሆነ በቀን ምን ያህል ሲጋራ በቁጥር-----

108. የአልኮል መጠጥ ትጠጣለህ/ሽ ?

- 1. እጠጣለው
- 2. አልጠጣም

መልሱ እጠጣለው ከሆነ በቀን ምን ያህል የአልኮል ጠርሙስ -----

109. ጫት ትቅማለህ/ሽ ?

- 1. እቅማለው
- 2. አልቅምም

110. የአካል እንቅስቃሴ ታደርጋለህ/ሽ ?

- 1. አደርጋለው
- 2. አላደርግም

መልሱ አደርጋለው ከሆነ በሳምንት ምን ያህል ጊዜ-----,

111. ቡና ትጠጣለህ/ሽ?

- 1. እጠጣለው
- 2. አልጠጣም

112. ባህላዊ መድሃኒት ትጠቀማለህ/ሽወይ?

- 1. አዎ
- 2. አልጠቀምም

113. የመኖሪያ ቦታ

- 1. ከተማ ውስጥ
- 2. ከከተማ ውጪ

114. የህክምና አገልግሎት የምታገኘው

- 1. በነፃ
- 2. በገንዘብ

115. በምግብ ውስጥ የጨው መጠን ቀንሰዋል

- 1. አዎ
- 2. አልቀነስኩም

116. በ በተሰቦ ውስጥ የደም ገፊት በሽታ ያለብት አለ

- 1. አዎ
- 2. የለም

ለሚከተሉት ጥያቄዎች መልሱ አዎንክሆነ 1 የለምክሆነ 0 ዓፉ	አዎ =1 / የለም = 0
1. አንዳንድ ጊዜ መድሃኒት ህን/ሽን መውሰድ ትረሳለህ/ሽ ?	
2. አንዳንድ ጊዜ ከመርሳት ውጪ መድሃኒቶች የማይወሰዱበት አጋጣሚ አለብህ/ሽ ለፈውሁለት ሳ ምንት መድሃኒት ህን/ሽን ያልወሰድክበት/ያልወሰድሽበት ቀን አለ?	
3. መድሃኒት ህን/ሽን ስትወስዱ በጎንዮሽ ጉዳት ምክንያት ለሚከታተልህ/ሽ ባለሞያ ሳታሳውቅ/ቂ አቁመህ/ሽ ወይም መጠኑን ቀንሰህ/ሽ ታውቃለህ/ሽ ?	
4. መንገድ ስትገባ/ሽ ወይም ለረዥም ሰዓታት ከቤት ህ/ሽ ስትርቅ መድሃኒት ህን/ሽን አንዳንድ ትረሳለህ/ሽ ?	
5. መድሃኒት ህን/ሽን ትላንት ወስደህል/ሻል ?	
6. ህመም ማቆሚያ ተሽሎኛል ብለህ/ሽ በማሰብ አንዳንድ መድሃኒት መውሰድ ታቆማለህ/ሽ ?	
7. መድኒት መውሰድና ህክምና በምትከታተልበት/ይበት ጊዜ የመሰላቸት ሁኔታ ገጥሞህ ያውቃል ?	
8. ሁሉንም መድሃኒት ህን/ሽን ለመውሰድ የመርሳት ችግር ያጋጥምህል?	
<p>ሀ. በፍፁም</p> <p>ለ. ከስንት አንዴ</p> <p>ሐ. አንዳንዴ</p> <p>መ. ብዙ ጊዜ</p> <p>ሠ. ሁል ጊዜ</p>	<p>ሀ=1</p> <p>ለ=</p> <p>ሠ=</p> <p>0</p>

ታካሚዎች በህክምና አሰጣጥ እና እንክብካቤ ላይ ያላቸው ልምድና እርካታ መለኪያ

1. ሀኪምዎ በሚገባዎት ሁኔታ አናግሮታል ?

ሀ. እጅግ በጣም ገብቶኛል	መ. በትንሹ ገብቶኛል
ለ. በጣም ገብቶኛል	ሠ. በጭራሽ አልገባኝም
ሐ. በመጠኑ ገብቶኛል	
2. በ ሀኪምዎ የሞያ ብቃት ምን ያህል ይተማመናሉ?

ሀ. እጅግ በጣም እተማመናለሁ	መ. በትንሹ እተማመናለሁ
ለ. በጣም እተማመናለሁ	ሠ. በጭራሽ አልተማመንም
ሐ. በመጠኑ እተማመናለሁ	
3. በ ነርሶች የሞያ ብቃት ምን ያህል ይተማመናሉ ?

ሀ. እጅግ በጣም እተማመናለሁ	መ. በትንሹ እተማመናለሁ
ለ. በጣም እተማመናለሁ	ሠ. በጭራሽ አልተማመንም
ሐ. በመጠኑ እተማመናለሁ	
4. በ ነርሶች የተደረገሎት እንክብካቤ ምን ያህል በቂ ይመስሎታል ?

ሀ. እጅግ በጣም በቂ ነው	መ. በትንሹ በቂ ነው
ለ. በጣም በቂ ነው	ሠ. በጭራሽ በቂ አይደለም
ሐ. በመጠኑ በቂ ነው	
5. ሀኪምዎ እና ነርሶቹ የርሶን የጤና ችግር ምን ያህል የተረዱሎት ይመስሎታል ?

ሀ. እጅግ በጣም ተረድተውኛል	መ. በትንሹ ተረድተውኛል
ለ. በጣም ተረድተውኛል	ሠ. በጭራሽ አልተረዱኝም
ሐ. በመጠኑ ተረድተውኛል	
6. ስለተደረገሎት የጤና ምርመራ የተሰጠት መረጃ ምን ያህል በቂ ነው ?

ሀ. እጅግ በጣም በቂ ነው	መ. በትንሹ በቂ ነው
ለ. በጣም በቂ ነው	ሠ. በጭራሽ በቂ አይደለም
ሐ. በመጠኑ በቂ ነው	
7. በአጠቃላይ በሆስፒታሉ በተደረገሎት ህክምና እና አንክብካቤ ምን ያህል ረክተዋል ?

ሀ. እጅግ በጣም ረክቻለሁ	መ. በትንሹ ረክቻለሁ
ለ. በጣም ረክቻለሁ	ሠ. በጭራሽ አልረካሁም
ሐ. በመጠኑ ረክቻለሁ	
8. የተሰጠት መድሀኒት እና ህክምና ስህተት ነው ብለው አሰበው ያውቃሉ ?

ሀ. እጅግ በጣም አሰቤ አውቃለሁ	መ. በትንሹ አሰቤ አውቃለሁ
ለ. በጣም አሰቤ አውቃለሁ	ሠ. በጭራሽ አሰቤ አላውቅም
ሐ. በመጠኑ አሰቤ አውቃለሁ	

Annex VI Proposed process and structure indicators to be sent to the expert panel for scoring

Development of process and structure quality indicators

The structure and process indicators for hypertensive quality of care are developed by reviewing the scientific literature and clinical practice guidelines pertaining to hypertensive care. The indicators that will represent clinical processes across the spectrum of hypertensive care are developed based closely on JNC-VII and the NICE quality standards for hypertension. And The indicators that will represent the health care structure for hypertensive care are developed based on a study conducted in Moshupa District, Botswana on Quality improvement cycle and NICE quality standards for hypertension. An expert panel of three physicians and two clinical pharmacists will review the indicators and supporting evidence. The panel will rate each indicator's feasibility and validity using a 5-point Likert scale. Indicators will be accepted if their median validity and feasibility score is 2 or lesser.

The process quality indicators include Diagnostic, Treatment and Follow up indicators. And the quality indicators for health care structure include diagnostic instruments, medical supplies, antihypertensive medications and formats.

The panel will be expected to score each indicator for validity and feasibility based on a 5-point scale ranging from “Strongly Disagree” on one end to “Strongly Agree” on the other with “Neither Agree nor Disagree” in the middle. The panels are kindly asked to indicate their level of agreement with a given statement by way of an ordinal scale. That is by inserting the number assigned to each statement in the box provided in front of each quality indicator for both their validity and feasibility.



Check list for health care process indicator

No	Indicators	Valid	Feasible
1	Systolic and diastolic blood pressure should be measured on patients otherwise presenting for care at each visit.		
2	Physical examination: Examination of the fundi at each visit.		
3	Examination of heart at each visit.		
4	Examination of heart at each visit.		
5	Examination of abdomen for bruits at each visit.		
6	Examination of peripheral arterial pulses at each visit.		
7	Examination of neurologic system at each visit.		
8	A calculation of body mass index (BMI) yearly.		
9	Urinalysis yearly.		
10	Blood glucose test yearly		
11	Serum potassium test yearly		
12	Serum creatinine test yearly		
13	Serum LDL test yearly		
14	Serum HDL test yearly		
15	Serum triglyceride test yearly		
16	An ECG examination once yearly		
17	Urinary albumin excretion should be quantitated and monitored on an annual basis in high-risk groups, such as those with diabetes or renal disease.		
18	All people with hypertension (stages 1 and 2) should be treated.		
19	First-line treatment for patients with pre-hypertension, is lifestyle modification. The medical record should indicate counseling for at least 1 of the following interventions prior to initiating pharmacotherapy: - weight reduction if obese;- increased physical activity if sedentary; or- low sodium diet.		
20	Treatment for Stage 1 and Stages 2 hypertension should include lifestyle modification. The medical record should indicate		

	counseling for at least 1 of the following interventions: - weight reduction if obese; - increased physical activity if sedentary; or- low sodium diet.		
19	Patients whose BP goal is not achieved should return for follow up and adjustment of medications at monthly intervals until the BP goal is reached		
21	Patients with target organ damage, DM or CAD should be offered pharmacotherapy for the co-morbid illness.		
21	Patients with target organ damage, DM or CAD and pre-hypertension, stage 1 & 2 hypertension should be offered antihypertensive medication.		
22	Newly diagnosed Stage 1 patients should be evaluated by the provider within 1 months of their initial visit.		
23	Newly diagnosed Stage 2 patients should be evaluated by the provider within 1 months of their initial visit.		
24	Newly diagnosed patients with hypertensive crises should be evaluated by the provider within 2 weeks of their initial visit.		
25	Hypertensive patients with consistent average SBP > 140 or DBP > 90 over 6 months should have one of the following interventions recorded in the medical record: Change in dose or regimen of antihypertensive agents; or repeated education regarding lifestyle modifications.		

Check list for availability of health care structure indicators

No	Structure	Valid	Feasible
1	aneroid sphygmomanometer (blood pressure machine)		
2	blood pressure cuff	small,	
		Medium	
		Large	
3	weighing scale		
4	height scale		
5	specimen tubes for blood tests		
6	an ECG machine		
7	specimen bottles for urine		
8	Investigation request forms (laboratory and ECG)		
9	Prescription forms		
10	Appointment book		
11	Patient Appointment card		
12	Patient allergy card		
13	Diuretics		
14	ACE inhibitors		
15	Calcium channel blockers		
16	Cardio selective B-blockers		

Annex VII consent form

Written consent

Greeting

Dear participants, my name is-----I am from----- . I am part of a team of people who are carrying out a study on the assessment of the quality of care provided to ambulatory hypertensive patients at Dil Chora hospital. I would like to ask you some question regarding the topic. The result of this study will help as an input to improve the quality of the care service for hypertensive patients in this hospital and beyond.

The questions about your experience on the hospital’s care service and on your medications that I would like to ask you will take about 20 minutes of your time. What you tell me will be kept strictly confidential. This information will be kept securely and no one outside of this research team will find out the answers that you give me. During the course of interview, you are free to stop the interview at any point, or not to answer any of the questions that we ask. And if you allow me I would also like to see your medical record for few minutes. However, we hope that you will participate in this study

Since your views are important. May I begin the interview now?

1. Yes 2. No

Informed consent certified by

Participant Signature_____

Date of interview _____Time started_____ Time completed_____

Result of interview: 1. Completed 2. Respondent not available

Declaration

I, the undersigned, declare that this thesis is my original work, has not been presented for a degree in this or any other university and that all sources of materials used for the thesis have been fully acknowledged.

Name: Hilawie Hawaz

Signature: _____

Name of the institution: Jimma University

Date of submission: _____

This thesis has been submitted for examination with my approval as University advisor

Name and Signature of the first advisor

Mr Tesfahun Chanie, B.Pharm, Msc, assistant professor of Clinical Pharmacy

Name and Signature of the second advisor

Dr Elias Ali, MD, MPH, assistant professor of public health

Name and Signature of the internal examiner

Mr. Sadikikhalmahadi Hussen (B.Pharm, MSc. In clinical pharmac)
