Compliance With Guidelines of Hypertension Management, and Associated Factors; A Retrospective Cross-Sectional Study Conducted Among the Healthcare Workers

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Abstract

Background: *The prevalence of hypertension complications significantly surging from time to time. The patients are suffering from compromised quality of life, permanent disability, and premature death in developing countries. The question of why this gap? hasn't got a clear response yet.*

Method: *An institutional-based retrospective cross-sectional study designed from patient medical record data was used to assess compliance with hypertension management guidelines. Medical records of adult Patients treated for hypertension from March 2019 to March 2020 were reviewed. Systematic sampling technique from patients' medical records every 10th interval was taken to reach the total sample size. The collected data were checked for completeness, consistency, and accuracy before analysis. Data were coded, entered, and cleaned using Epi-data 7 and exported to SPSS version 25 for analysis.*

Results: *A total of 384 hypertension cases were taken from 2356 cases. Overall compliance with the hypertension guideline was found to be poor; only 75(19.5%) patients managed to follow the guideline in these institutions. The majority complied with the pharmacological Antihypertensive treatment protocols for 238(62.0%) patients, while for 146(38.0%) of the patients the guideline was not followed. Combining the lifestyle modification recommendations and pharmacological antihypertensive treatment to assess compliance with the hypertension management guideline, only 75(19.5%) patients managed as per the guideline, while 309(80.5%) did not.*

Conclusion: *Nearly more than two-thirds of the patients were not managed following the national hypertension guideline, and failing to recommend lifestyle modifications implies, as a result, the majority of the hypertensive patients are being exposed to complications and the need of urgent intervention by the stakeholders against the gap.*

Keywords: Hypertension, Hypertension Guideline, Hypertension Management, Hypertensive Patients, Hypertension Prevalence.

List of Abbreviation

ACEI - Angiotensin Converting Enzyme Inhibitors, CHD - Coronary Heart Disease, CPG- Clinical Practice Guideline, DALYs - Disability-Adjusted Life Years , DM – Diabetes Mellitus, FDREMOH - Federal Democratic Republic of Ethiopia Ministry of Health , GRC - Guidelines Review Committee , HC - Health Center, HDL-C - High Density Lipoprotein Cholesterol , HICs - High-Income Countries , HTN – Hypertension, IRB - Institution Review Board , LDL-C - Low Density Lipoprotein Cholesterol , LMICs - Low and Middle Income Countries , NCDs - Non-Communicable Diseases, OPDs - Outpatient Departments , PHC - Primary Health Care, PHCU - Primary Health Care Units, PHCWs - Primary Health care Workers , SBP - Systolic Blood Pressure, SDG - Sustainable Development Goal.

1. Background

Hypertension is among cardiovascular non-communicable diseases that are non-contagious diseases with long duration; which takes a high percentage of overall mortality, and are known to push many people into poverty due to catastrophic spending on the medical care [1]. To meet SDG and to enhance the management of NCDs the Federal Democratic Republic of Ethiopia

Ministry of Health developed guidelines on management of major non-communicable diseases including HTN in 2016 [2,3]. Guideline is a summary of major study findings which can easily be accessed by practitioners who are too busy to revise the most recent information from major trials. Many practitioners are not aware of these guidelines and a few are aware of them but are not compliant with them [4-7]. Even though hypertension is mostly preventable, its magnitude is increasing globally and in our country Ethiopia [8-16]. Non-compliance to the hypertension treatment guideline is prevalent across the world and is associated with adverse health outcomes, increased incidence of drug resistance, and higher costs of care [17-21]. Studies found that there were substantial gaps between the development and dissemination of guidelines and their implementation in practice; specifically there was no change in health personnel attitude to follow guidelines [22,23].

A study have concluded that health personnel compliance to HTN guidelines has been low [24,25]. Complying with guideline and translating into concrete practice may be a complex process in which health practitioner-related, patient-related, guideline related, and training related factors all play a role [26-28]. An observational study have shown that the health care practitioners' attitudes, behavior towards hypertension management and deviation from the clinical practice guidelines account for 66% of poor control of hypertension [29]. There's also evidence of deficiencies in treatment quality appear due to inadequate implementation of existing treatment recommendations [30]. Generally, several studies were conducted across the world, most of them aren't recent and relevant, and factors affects the compliance with guideline isn't well understood yet. Therefore Policymakers and other stakeholders could be benefited from this study as it helps them to take the appropriate intervention against the gap as there's no study documented on compliance to the recent national NCD guideline before this study.

2. Objective
To determine the prevalence of compliance with the hypertension management guideline among the healthcare practitioners. To identify the factors associated with compliance of hypertension management guideline among healthcare practitioners.

3. Methods
3.1 Study Area
The study was conducted at four governmental health care units found in Illubabor and Buno Bedelle zones. One health center from Metu which is an administrative town of Ilu-Ababora Zone in South West Ethiopia, Oromia region which is located 600km from the capital city of Ethiopia, Addis Ababa. Mettu, located in the Illubabor Zone of the Oromia Region along the Sor River, this town has a latitude and longitude of 8°18′N 35°35′E and an altitude of 1605m. Another one health center was included in the study from Gore town which located 18 Kms away from mettu town. In addition, two governmental health care units from Bedelle town were also part of the study. Bedelle town is located in the south west of Ethiopia, 480Km from the capital Addis Ababa. The town have one general hospital, one health center and few private medium clinics. In all selected health care units,

mostly nurses and health officers and rarely general practitioners have been trained on the HTN guideline and they were working at their respective Outpatient Departments [15,16].

3.2 Study Design and Period
A retrospective cross sectional study design was conducted from March to April/2020 in Illubabor and Buno Bedelle zones, Oromia regional state, south west Ethiopia.

3.2.1 Source Population
All medical records of hypertension patients treated from March, 2019 to March, 2020.

3.2.2 Study Population
All sampled medical records of HTN patients who are treated in the health care units.

3.3 Study Variables
Dependent variable: - Compliance to HTN management guideline.
Independent variables:- Supervision, Health Care unit level, Resources/supplies, Year of service, professional background, Qualification, Training, Attitude of the health practitioners' towards HTN guideline, Knowledge of the guideline and coo morbid cases.

3.4 Eligibility
Inclusion Criteria:-Medical records of adult Patients (>18 years old) treated for hypertension between March 1st, 2019 and March 1st, 2020
Exclusive Criteria: Criteria for exclusion were medical records with missing information at first or consecutive follow up, and those for which inadequate information was available to establish whether appropriate treatment was received.

3.5 Sample Size Determination
The sample size for this study was calculated using a single population proportion formula based on the following assumptions:

$$n= \frac{(Z_{\alpha/2})^2 \, P \, (1-P)}{(d)^2}$$

Where: n-minimum sample size required for the study
d- Margin of error=0.05
$Z_{\alpha/2}$- Value of standard normal distribution (Z=1.96) with confidence interval of 95% and α is 0.05

$$n= \frac{(Z_{\alpha/2})^2 \, P \, (1-P)}{(d)^2} = \frac{(1.96)2 \, 0.519 \, (1-0.519)}{(0.05)2} = 383.605 \approx 384$$

For the sample size calculation, the prevalence of compliance to hypertension management guideline was obtained from a previous study conducted in South Africa that found 51.9% to be overall compliance to HTN guideline [40].

3.6 Sampling Technique
First, total sample size (384) was estimated based on the total number of HTN patients visited the governmental primary care units in 2019. Next the determined sample was proportionally

allocated to each health units as follows Bedelle hospital=120, Bedelle HC=84, Gore HC=60, Mettu HC=120. Finally, simple random sampling method was used to select the first study population then systematic sampling was used to select consecutive study population.

3.7 Data Collection Technique and Instrument

A checklist was created using the National HTN guideline consensus points to assess for compliance with the recommendations and questionnaire was adopted from previous similar studies to assess factors associated with primary care practitioners' compliance with guidelines on the basis of the existing published recommendations for the diagnosis, treatment, and other activities of HTN [3,33]. Data was collected by principal investigator. Since associated factors cannot be assessed from medical records, first primary data was collected from health practitioners' so that the specific time period they were in the NCD/HTN OPD and specific patients treated could be known and traced on medical record of patients. The questioner includes Health personnel biographic data(age, sex, specialization, experience, training on HTN guideline, availability of resource, health care unit, qualification and others); in order to avoid recall bias they were requested to check the health units 12 months schedule, and they were also requested to fill the questioners' on spot.

The medical record of each patient was traced on the hospital/health centers Health management information system (HMIS) registration book following the specific time period allocated by the health practitioners'. Information from medical records include: patients General information, date at which the pharmacological treatment was initiated by the specific health practitioners', appointment status, date of consecutive follow-up, Data on blood pressure from the first and second appointments, presence of co morbidities, classification of disease given by the health practitioners', prescribed antihypertensive medication, and if any recommendation of lifestyle modification was made. Once the medical records were identified, the medical record number (MRN) was collected and a study identification number (Study ID) was assigned to each clinical chart so that similar patient's card will be excluded if appeared on another health practitioner' review (even if a patient is seen by more than one health practitioners', it was reviewed only for one health practitioner). The study identification number went from 001 to 384. This code was stored in electronic format, encrypted using the encryption software Mac OS X version 10.9.8, and password-protected on the principal investigator's personal computer. Only the principal investigator has access to this file and to the personal computer where it is stored. No other identifier was collected, such as name, participant's home address.

4. Data Quality Assurance

To assure the high quality of the data, emphasis was given in designing data collection instrument. In order to test the reliability and assure the quality of the data, pretest of approximately 15% (maximum number was thought to yield the more accurate result) of the sample was performed. The following variables were tested: age, systolic and diastolic blood pressures during the first and second appointments, classification by health prac-

titioners', lifestyle modification recommendations during first appointment, medications prescribed in the first appointment and existing co morbidities. To assess the level of an agreement between the two abstractors, a kappa statistics was used for the categorical variables and the intra class correlation coefficient was undertaken for continuous variables. The kappa coefficient ranged from 0.854 to 1.000 and the intra class correlation coefficient ranged from 0.940 to 0.996, showing very good to excellent agreement between the pre testers.

4.1 Data Processing and Analysis

The data was cleaned using Epi- data 7 software and exported into SPSS version 25 for analysis.

4.1.1 In the Univariate Analysis Section

Q-Q plots were used to determine whether the continuous variables are normally distributed or not. The mean and standard deviation were used for normally distributed continuous variables, whereas the median and interquartile range (IQR) were considered for not normally distributed continuous variables. Categorical variables were presented using frequencies and proportions.

4.1.2 In the Bivariate Analysis Section

An independent sample t test was used for normally distributed continuous variables. Wilcoxon Sum-Rank test used for continuous variables that are not normally distributed and chi-squared test was used for categorical variables.

4.1.3 In the multivariate analysis section

Variables that are fulfilled the minimum statistical requirement in a bivariate analyses included in this final model to identify the independent predictors. P-value, 95%CI and AOR were considered in judging the significance of the associations.

❖ **Operational Definition**
• **Compliance to HTN Guideline-**is an application of the strategy or the guideline according to the recommended manner. The level of compliance can be categorized as high level, and low level [40].
• **Health Practitioners'-** are those whose professional backgrounds are nurses, health officers, and general practitioners' involved on HTN management.
• **Supplies\Resources-** are equipment's used in the management of hypertension including the printed guideline, presence of separate NCD/HTN outpatient department, laboratory, medications, BP cuff etc.
• **Compliance-** ability of health practitioners to follow NCD guideline of HTN assessment, diagnosis, treatment process and all activities listed on the guide line by FDREMOH.
• **High Level Compliance**
Correct implementation of recommended strategy for above 50% of patients
• **Low Level Compliance**
Below 50%: correct implementation
The knowledge evaluating portion of the questionnaire consisted of 12 multiple-choice questions. A score of "1" point will be credited to each correct answer and "0" to each wrong answer and unanswered question.

• **Level of Knowledge** will be indicated as:

0-4 correct answer is Poor knowledge

5-8 correct answer is reasonable

9 and more correct answer is good

• **Attitude** evaluation portion, consisting of 6 items, will be developed on the basis of extensive literature review [38]. These items will be based on a 5-point Likert scale ranging from "Strongly Disagree" to "Strongly Agree" and scored as:

Strongly disagree=1, Disagree=2, Undecided=3, Agree=4, and strongly agree=5.

Negative items were scored reversely, so that the high score reflects more positive attitude.

5. Result

5.1 Patients' Clinical Characteristics

Table 1 shows patients' clinical characteristics. Among the patients, 97(25.3%) of them were diagnosed as having hypertension for the very first time, whereas 287(74.7%) were on follow up treatment. For hypertension classification, 68(17.7%) of participants were classified as Stage II, 12(3.1%) classified as Stage I, 29(7.6%) were classified as having hypertensive crisis and 275(71.6%) were classified using other classifications like mild-moderate and controlled- uncontrolled. During the first appointment, the mean systolic blood pressure (SBP) was 153.8mmHg (± 23.5), while the mean diastolic blood pressure (DBP) was 97.1mmHg (± 33.8). In the consecutive appointment, the mean SBP was 142.5mmHg (± 17.0) and the mean DBP was 89.9mmHg (± 9.9). For the number of co morbidities, 347(90.4%) had no co morbidities, 24(6.3%) had diabetes mellitus, while 13(3.4%) had stroke. For blood pressure status on the consecutive follow up; 142(37.0%), 185(48.2%), 57(14.8%) of them had uncontrolled, controlled and below target level which is 140/90 of the guideline consecutively.

On the other hand, table 2 presents the treatment characteristics of the patients. Regarding the number of antihypertensive medication, 274(71.4%) of cases were prescribed with one medication, 78(20.3%) of cases were prescribed two antihypertensive medications and 10(2.6%) was prescribed with three medications while 22(5.7%) of them referred to higher facilities. Lifestyle modification recommendations were given to 79(20.6%) of participants, while they weren't given to 305(79.4%). The majority complied with the pharmacological Antihypertensive treatment protocols for 238(62.0%) patients, while for 146(38.0%) of the patients the guideline were not followed. Combining the lifestyle modification recommendations and pharmacological antihypertensive treatment to assess compliance with the hypertension management guideline, only 75(19.5%) patients were managed following the guideline, while 309(80.5%) did not.

Characteristic	
First visit SBP, mmHg; Mean (SD)	153.8(± 23.5)
First visit DBP, mmHg; Mean (SD)	97.1(± 33.8)
Follow-up SBP, mmHg; Mean (SD)	142.5(± 17.0)
Follow-up DBP, mmHg; Mean (SD)	89.9(± 9.9)
Appointment status; n (%)	
Initial	97(25.3)
Follow up	287(74.7)
Total	384(100)
Disease stage on record; n (%)	
Pre hypertension	0
Stage I HTN	12(3.1)
Stage II HTN	68(17.7)
Hypertensive crisis	29(7.6)
Other staging	275(71.6)
Total	384(100)
Co morbidities; n (%)	
None	347(90.4)
DM	24(6.3)
Stroke	13(3.4)
total	384(100)
BP Status; n (%)	
Uncontrolled	142(37.0)
Controlled	185(48.2)
Below target	57(14.8)
Total	384(100)

Note. SD = standard deviation; n = number of subjects; SBP, systolic blood pressure; DBP, diastolic blood pressure; HTN, hypertension; DM, diabetes mellitus. For continuous and normally distributed variables the mean was used as central tendency measure.

Table 1: The Patients' Clinical Characteristics

Characteristics	
Number of Antihypertensive medication(s) prescribed; n (%)	
1 medication prescribed	274(71.4)
2 medications prescribed	78(20.3)
3 medications prescribed	10(2.6)
Referred to higher facilities	22(5.7)
Total	384(100)
Lifestyle Modifications recommended; n (%)	
YES	79(20.6)
NO	305(79.4)
Total	384(100)
Antihypertensive medication(s) following the guideline; n (%)	
YES	238(62.0)
NO	146(38.0)
Total	384(100)
Management compliance with HTN guideline; n (%)	
YES	75(19.5)
NO	309(80.5)
Total	384(100)

Note. n = number of subjects; HTN= hypertension; the result of management compliance with HTN guideline was yielded by combining lifestyle recommendations and anti-hypertensive medications; YES= for whom guideline recommendation was followed; NO=for whom guideline recommendations not followed.

Table 2: Treatment Characteristics of Study Participants

5.2 Biographic Characteristics of Health Practitioners'

As shown on table 3, there were more males 13(68.4%) than females 6(31.6%); and the mean age of the health practitioners' were 33.9 years (± 7.8). Regarding professional background; 6(31.6%) were general practitioners' (GPs), 9(47.9%) were health officers (HOs) and 4(21.1%) of them were nurses. Qualification of health practitioners' were a first degree for all of them which named as: 13(68.4%) had BSc degree and 6(31.6%) of them were medical doctors and their mean year of clinical experience were 5.3 years (±3.3). From the health practitioners', most of; 13(68.4%) were enrolled in health centers whereas 6(31.6%) were in hospital; 12(63.2%) of them responded as having resources for management of hypertension and 7(36.8%) didn't. Among the study participants 7(36.8%) have received training on Hypertension guideline where 12(63.2%) were not trained. 5(26.3%) responded as having close supervision and 14(73.7%) had no supervision.

Age (years) Mean; (±SD)	33.9(± 7.8)
Sex; n (%)	
Male	13 (68.4)
Female	6 (31.6)
Designation; n (%)	
General practitioner	6 (31.6)
Health officer	9 (47.9)
Nurse	4 (21.1)
Qualification; n (%)	
Medical doctors	6 (31.6)
BSc	13 (68.4)
Year of experience; Mean (±SD)	5.3(± 3.3)
Training status; n (%)	
Trained	7 (36.8)
Not trained	12 (63.2)
Work place; n (%)	

Health center	13 (68.4)
Hospital	6 (31.6)
Resource available; n (%)	
Yes	12 (63.2)
No	7 (36.8)
Have supervision; n (%)	
Yes	5 (26.3)
No	14 (73.7)

Note. SD = standard deviation; n = number of subjects; for continuous and normally distributed variables the mean was used as central tendency measure.

Table 3: Demographic Characteristics of the Health Practitioners'

5.3 Health Practitioners' Knowledge, Attitude, and Compliance to HTN Guideline

The mean number of correct answers was 6.42 ± 6.25 (range 2–12). The absolute number of guidelines conforming answers in the total study population is shown on Figure 1. From the questions: two, four, five, and twelve questions were answered by 1(5.3%) health practitioner; while seven questions and eight questions were answered by 2(10.5%) health practitioners. Six questions and nine questions were answered correctly by 4(21.1%) study participants. Among the remaining 3(15.8%) study participants answered three questions correctly and none of the study participants have answered less than two questions. The knowledge status of health practitioners in the total study participants is presented on Figure 2. Analysis of the replies to the questionnaire showed that similar proportion of the participants had good 5(26.3%) and poor 5(26.3%) knowledge of hypertension guideline/2016, whereas 9(47.4%) of them had reasonable knowledge. The participants' attitude and compliance to the hypertension guideline were explained in the Table 4.
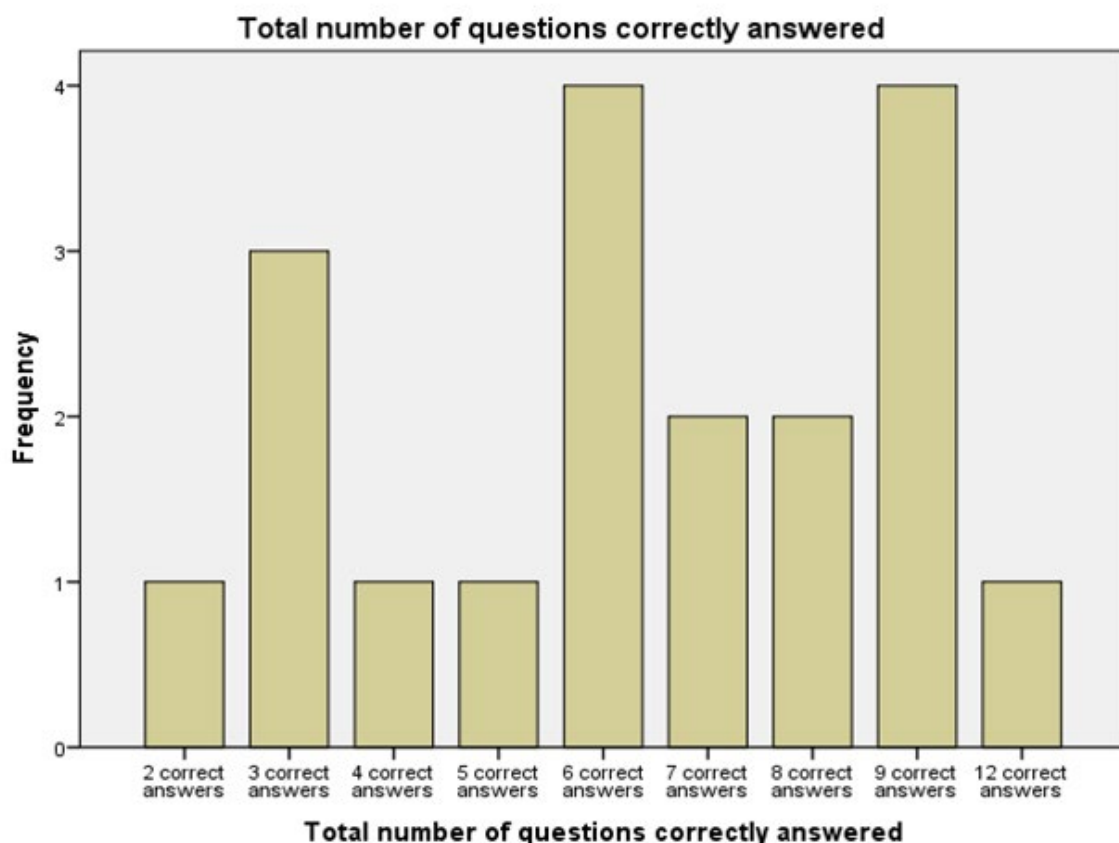

Figure 1: Absolute Number of Correct Answers to the 12 Questions on Knowledge of HTN Guideline in the 19 Respondent Health Practitioners'.

Health practitioners' in the study were highly positive towards the HTN guideline (2016), with mean attitude score of 23.63 ± 4.13, ranging from 11 to 30 on a 30-point scale. Health practitioners' responses to attitude statements are given in Table 5. A total of 75 (19.5%) patients were managed in compliance with guidelines. The mean compliance of health practitioners to hypertension management guideline was 3.95 ± 4.76 ranging from 0 to 14 per maximum of 21 patients observed per health practitioner.
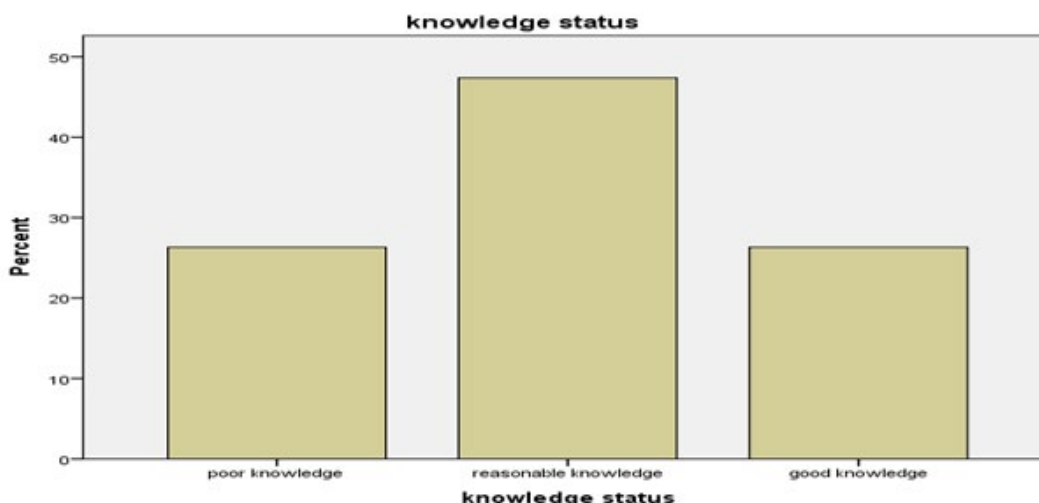
Figure 2: Health Practitioners' Knowledge Status on the Basis of Criterion Used for Adequate Knowledge

Statements	SD	D	UD	A	SA
I have trust in the recommendations and developing committee of HTNG(2016)	1	-	-	11	7
HTNG(2016) on the management of hypertension is helpful for Health practitioners'	2	-	-	8	9
Adherence to HTNG (2016) Would produce desired out come	1	1	1	8	8
HTNG(2016) is motivated by desire to cut cost	-	-	4	9	6
HTNG(2016) decreases doctors' autonomy	6	6	3	4	-
HTNG(2016) is too rigid to apply to individual patients	3	6	5	5	-
compliance to HTN guideline (2016) Mean (±SD)	3.95(±4.76)				

Note: mean is used to show health practitioners' compliance to guideline as Mean (±SD); HTN= hypertension; SA=strongly agree; A=agree; UD=undecided; DA=disagrees=strongly disagree.

Table 4: Attitude and Compliance to HTN Guideline

5.4 Factors Associated to Health Practitioners' Compliance with HTN Guideline (2016)

Those health practitioners' who were working at health center were more compliant (4.4, ±5.3) than those working at hospital (3.0, ±3.5). However, this difference was not statistically significant (p=0.555). Among the study participants those who said they have close supervision were more compliant with mean compliance of (4.0, ±4.8) than those who said they don't (1.8, ±2.8). When we compare health practitioners' compliance with their professional background, Nurses have shown more compliance (8.8, ±6.2) to the guideline than their counter general practitioners (3.0, ±3.5) and health officers. But the difference between the study groups was not statistically significant (p=0.094). Health practitioners' with BSc qualification were more compliant (4.4, ±5.3) compared to Medical doctors whose mean compliance was (3.0, ±3.5). And again the difference between them was not statistically significant (p=0.555).

Among study participants, those who had training on the guideline have better compliance (8.7, ±3.7) than their counter untrained parts (1.1, ±2.3); and the difference between these groups have shown statistical significance (p≤0.001). Study participants with good knowledge have better compliance (5.2, ±5.4) than those who have poor knowledge of guideline and better compliance (4.8, ±6.1) than who have reasonable knowledge whose compliance was (2.8, ±3.8). However the difference between these groups were not statistically significant (p=0.894). Health practitioners with total attitude score of ≤20 have more (6.5, ±3.5) compliance than whose total attitude score was >25 (4.4, ±5.9) whose compliance was better than those who had total attitude score of 21-25 (3.3, ±4.6). But the difference between these study groups have no statistical significance (p=0.815).

Health practitioners have shown better compliance (0.2, ±0.4) when they have treated patients with hypertension only and patients with stroke than when they have treated patients with diabetes mellitus (0.1, ±0.3). However this difference have no statistical significance (p=0.817). Patients who have been on their first visit to the health practitioners' were treated more compliantly (0.4, ±0.5) than those who were on their follow up visit (0.1, ±0.3). And this difference has shown statistical significance of (p≤0.001), (Table-5).

Variables	Compliance to HTNG (2016); Mean (±SD)	*P*value*
Resource available		
Yes [a]	5.6(±5.1)	0.049
No	1.1(±2.3)	
Supervision		
Yes [a]	4.0(±4.8)	0.001
No	1.8(±2.8)	
Work place		
Health center [a]	4.4(±5.3)	0.555
Hospital	3.0(±3.5)	
Age		
≤30	3.9(±4.7)	0.967
>30 [a]	4.0(±4.8)	
Sex		
Male [a]	4.2(±4.5)	0.781
Female	3.5(±5.6)	
Year of clinical experience		
<2 years [a]	4.6(±8.0)	0.521
2-4 years	4.5(±3.9)	
5-8 years	3.9(±5.3)	
>8 years	2.3(±3.2)	
Professional background		
GP	3.0(±3.5)	0.094
Health officer	2.4(±3.7)	
Nurse [a]	8.8(±6.2)	
Qualification		
BSc [a]	4.4(±5.3)	0.555
MD	3.0(±3.5)	
Training status		
Not trained	1.1(±2.3)	0.001
Trained [a]	8.7(±3.7)	
Knowledge of HTNG		
Poor knowledge	4.8(±6.1)	0.894
Reasonable knowledge	2.8(±3.8)	
Good knowledge [a]	5.2(±5.4)	
Attitude towards HTNG		
≤20 [a]	6.5(±3.5)	0.815
21-25	3.3(±4.6)	
>25	4.4(±5.9)	
Co morbid cases		
No co morbidities [a]	0.2(±0.4)	0.817
HTN+DM	0.1(±0.3)	
HTN+STROKE	0.2(±0.4)	
App status		
First visit [a]	0.4(±0.5)	≤0.001
Follow-up	0.1(±0.3)	

Note. HTNG= hypertension management guideline; GP= general practitioners; MD=Medical doctors, HTN=hypertension; DM= diabetes mellitus; App status= appointment status; SD = standard deviation; P-values were obtained by using the chi-square test for categorical variables, t-test for continuous variable. Mean (±SD) was used to express compliance status of health practitioners';*p<.05. a Reference group. There were no missing data during the analysis (n=19).

Table 5: Factors Associated to Health Practitioners' Compliance with HTN Guideline (2016)

5.5 Multivariate Analysis

Table 6 shows result of multivariate analysis of significant factors of hypertension management guideline compliance. In this model, availability of resource (adjusted odds ratio [AOR] =0.400, 95% CI: =0.203-0.788), supervision status (adjusted odds ratio [AOR] =0.497, 95% CI: =0.308-0.892), training status (adjusted odds ratio [AOR] =0.250, 95% CI: =0.107-0.584), and appointment status (adjusted odds ratio [AOR] =0.091, 95% CI: =0.024-0.352) had significant positive association with compliance to hypertension management guideline.

Variables	B	SE	P value	AOR	95% CI
Resource available	0.915	0.346	0.018	0.400	0.203-0.788
Ref=yes					
Supervision	0.725	0.138	0.038	0.497	0.308-0.892
Ref=yes					
Training status	0.288	0.764	0.036	0.250	0.107-0.584
Ref=trained					
App status	2.394	0.688	0.001	0.091	0.024-0.352
Ref=initial					

Note: AOR= adjusted odds ratio CI=confidence interval; B=beta; SE=standard error; App stat= appointment status; ref=reference group .Only statistically significant results are given in the table.

Table 6: Multivariate Analysis of Factors of Hypertension Management Guideline Compliance

6. Discussion

In this study overall compliance of health practitioners' to FDRE-MOH HTN guideline were found to be poor; only 75(19.5%) of patients were managed following the guideline. Nearly more than two-thirds of the patients were not managed following the national hypertension guideline, and failing to recommend lifestyle modifications implies, as a result majority of the hypertensive patients are being exposed to complications and the need of urgent intervention by the stakeholders against the gap. This finding is lower than a finding from study in Malaysia which similarly revised medical record of patients and found 67.1% of them received guideline compliant treatment [33]. It's also lower than a finding of compliance to Malaysian clinical practice guideline which indicated that two third (73.5 %) of the entire treatment were in compliance with Clinical practice guideline [38], and fewer than the finding from South Africa with over all compliance of 51.9% [42]. This poor compliance in the current study is because the study participants have very poor compliance to life style recommendations which is applied for only 79(20.6%) patients.

The mean compliance of health practitioners to hypertension management guideline was 3.95 ± 4.76 starting from 0 to 14 per maximum of 21 patients observed per health practitioner. This finding is similar to a study which find the median number of guidelines compliant prescriptions was 13 (range 5–20) per 20 patients seen per each health practitioner [48]. From the study, 13(68.4%) of the health practitioners' were males and the mean age of the health practitioners' were 33.9 years (± 7.8). Regarding professional background; 6(31.6%) were general practitioners' (GPs), 9(47.9%) were health officers (HOs) and 4(21.1%) of them were nurses; 13(68.4%) of them had BSc degree and 6(31.6%) of them were medical doctors and their mean year of clinical experience were 5.3years (± 3.3). Among the health practitioners', 13(68.4%) of them were enrolled in health centers whereas 6(31.6%) were in hospital. 12(63.2%) health practitioners' had resources for management of hypertension; there were 7(36.8%) trained and 5(26.3%) health practitioners who had close supervision. These characteristics of the study participants is incomparable with other studies because of variation in methodology and characteristics of the study participants; which found mean age of the physicians to be 41.05 ± 8.71 years and 59 (73.8%) were males 41 (51.2%) of them to have practiced for more than 10 years [48].

In the study mean number of correct answers to knowledge assessing questions was 6.42 ± 6.25 (range 2–12) which is better than a study that found mean score of correct answers to be 5.3 points [46]. From the questions: Six questions (half of total), were answered correctly by 4(21.1%) study participants and none of the study participants have answered less than two questions; which was comparable to a study whose only 20.1% of the study population correctly answered at least six of the questions [44]. This better score of knowledge status is related to training and because some of the guideline terms were similar to other international guidelines such as WHOs. In current study, similar proportion of the participants, 5(26.3%) had good and 5(26.3%) poor knowledge of hypertension guideline/2016, whereas 9(47.4%) of them had reasonable knowledge. However this finding is less than study which showed 40% of the physicians knew the guidelines adequately and was much less than a study whose 73.07% of study populations had adequate knowledge of guidelines [33,45].

Most of health practitioners' in the current study showed positive attitude towards the HTN guideline (2016), with mean attitude score of 23.63 ± 4.13, ranging from11 to 30 on a 30-pointscale. They trust the guideline as well as its developers. Almost all of them believed that the guideline is useful for them and complying to it would produce best patients' outcomes. This health practitioners' attitude was very close to study from Malaysia, in which mean attitude score of 23.15 ± 1.34 was found [33]. According to this study finding, health practitioners' who were working at health center were more compliant but no significant association

was found with compliance to the guideline. Having close supervision and resources that needed for hypertension management were also found to have better compliance than their counter parts on bivariate analysis. These factors also found to have positive association with the dependent variable; compliance to HTN guideline on multivariate analysis at (adjusted odds ratio [AOR] =0.497, 95% CI: =0.308-0.892), ([AOR] =0.400, 95% CI: =0.203-0.788) respectively.

Even though previous studies didn't show these factors have association with HTN guideline, it was expected that the better the health system, the better the outcome will be; and this finding shall be one of the strengths of the current study. Advanced age (>30) and male sex have also been found to comply more, with mean score of 4.0($\pm$4.8) and 4.2($\pm$4.5) respectively, with no statistical significance found at bivariate analysis. The reason of this finding can be advantage of having more numbers compared to their counter parts as explained at health practitioners' biographic characteristics. The study also found study participants with less clinical years of experience and BSc qualification were seen to comply better than those with long duration of experience and medical doctors. This finding was inconsistent with study conducted in Hong Kong, which stated health practitioners' with higher qualifications and longer duration of practice performed better as compared to health practitioners' with lower qualifications [50].

The reason to the contrary finding is that study from Hong Kong was a large number of study participants survey and in the current study there was again quantitative advantage of the complying study groups. Previous study stated degree of compliance to guideline can be affected by their specialty and coo work; and in the current study nurses have shown more compliance (8.8, $\pm$6.2) to the guideline than their counter general practitioners (3.0, $\pm$3.5) and health officers [49]. But the difference between the study groups was not statistically significant (p=0.094). Training was found to have positive effect on the health practitioners' compliance to HTN guideline in multivariate analysis (adjusted odds ratio [AOR] =0.250, 95% CI: =0.107-0.584). This factor was not also indicated in previous studies; but, it is obvious that training can bring such out comes as found in this study. Study participants with good knowledge were found to have better compliance with the guideline in the management of hypertension. This finding is consistent with finding of study which Statistically significant correlation was observed between knowledge and practice scores [33]. And this finding is against studies from Italy [45,46]. Statistically no significant association was found between health practitioners' attitude and their compliance. Applying positive Attitudes can be influenced by many factors, such as their knowledge, past clinical experience, beliefs about guidelines, outcome expectations, peers' opinions, and guidelines characteristics [41].

Health practitioners' compliance to HTN guideline is found to have significant positive association with patients appointment status (adjusted odds ratio [AOR] =0.091, 95% CI: =0.024-0.352); in which patients on their initial visit found to receive compliant treatment. The reason is that most of health practi-

tioners' tend to give life style recommendations to patients whom they have met for first time and didn't apply same for patients who are on second and consecutive visits. This justification was indicated on a table of patients' treatment characteristics. Health practitioners have shown better compliance (0.2, $\pm$0.4) when they have treated patients who had hypertension only and hypertensive patients with stroke than when they have treated hypertensive patients with diabetes mellitus (0.1, $\pm$0.3). This finding is consistent to a study from Malaysia that showed Doctors poorly adhered to guidelines in hypertensive patients with diabetes [40].The reason is because patients with concurrent co morbidities of overlapping path physiological pathways and management like hypertension and cardiovascular disease are more likely to receive guidelines adherent management [31].

7. Conclusion
Complying to guidelines were believed to reduce risk of long-term morbidity and mortality, improve quality of life, and bring lower healthcare costs [18,19]. This is the first study in Ethiopia which assessed health practitioners' compliance to HTN guideline and its associated factors. Only 75(19.5%) of patients were managed following the guideline, and nearly more than two-thirds of the patients were not managed following the national hypertension guideline. Failing to recommend the lifestyle modifications was the major none compliance to the guideline. Effort is demanded of the stake holders to increase the compliance with guide line as it could help to diminish the emerging complications.

Declaration
We, the undersigned, declare that this paper is our original work has never been presented in any University and we understand that plagiarism will not be tolerated and all directly quoted material has been appropriately referenced

Conflict Interest
The authors declared they have no competing interests.

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Author's Contribution
GM and BAA: Conceived data and designed a study, supervised the data collection, performed the analysis, interpreted data, drafted a manuscript, and revised and approved a manuscript for publication. DM: Assisted in designing the study, and data analysis, involved in data analysis and interpretation, and critically reviewed the manuscript.

Consent for Publication
Not applicable

Ethics Approval and Consent to Participate
Ethical approval was obtained from Addis Ababa University Institutional Review Board (IRB-AAU), college of health sciences research committee evidenced by meeting date: 09/2012EC. Following the approval by IRB, an official letter of co-operation was written to the study area. The study was conducted after per-

mission from concerned management bodies was taken. Written Informed consent was taken from health practitioners' and data was collected after permission. Informed consent was obtained from all the subjects and all the necessary measures have been taken to secure the confidentiality and all benefits of the patients. Charts were reviewed in separate rooms, no mention has made of the names of the patients and care providers or anything related to the study. Data have been treated confidentially as subjects identified by number only, and all methods were carried out in accordance with relevant guidelines and regulations.

Availability of Data and Materials

The datasets generated and/or analyzed during the current study are not publicly available for because of to prevent any kinds of misuse by public before publication but are available from the corresponding author on reasonable request.

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