Hypertension Clinic Registry: Blood Pressure Control Among Hypertensives In A Specialist-Led Clinic In Ghana

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Citation

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Abstract

BACKGROUND AND OBJECTIVES: less than a third of those who receive treatment for hypertension get their blood pressure (BP) controlled to currently recommended targets. Failure of physicians to optimize treatment when encountered with blood pressure that are only fairly above the recommended control thresholds is largely responsible for the uncontrolled BP in treated patients. Knowing what and when to add up patient medication is crucial for an optimum BP control. This research study sought to determine the control of hypertension in a specialist led hypertensive clinic.

METHODOLOGY: We used a retrospective study approach with close-ended questions and medical record review. Blood pressures were measured at booking, 12 months and 24 months using automated sphygmomanometers

RESULTS: 361 patients were recruited for the study. The study revealed that more than half 223 (61.8%) were diagnosed with hypertension (HPT) only and 138 (38.2%) diagnosed of both HPT and diabetes. The majority 234 (64.8%) had family history of hypertension. At booking, almost three quarters 263 (72.9%) of the patients' blood pressure were uncontrolled with a mean and standard deviation of 146.3 and 22.2 mmHg respectively. At the period of 12 months (1 year) more than 249 (69.0%) had controlled blood pressure with a mean and stand deviation of blood pressure of 128.0 and 16.4 mmHg. The majority 272 (75.3%) of the patients' blood pressures were controlled at 24 months with a mean and standard deviation of 125.3 and 15.2 respectively. Patients on single antihypertensive medication were 2.68 times more likely to develop controlled BP as compared to patients on two and more antihypertensive medications (aOR=2.68, CI=1.33-5.41). Number of drugs taken per day was the strong factor associated with controlled BP at twelve months of follow up, such that patients on only one (aOR=7.27, CI=2.93-18.01) or two (aOR=2.49, CI=1.41-4.40) antihypertensive medication were 7.27 and 2.49 times more likely to have controlled BP respectively as compared to patients who were taking more than two antihypertensive medications

CONCLUSION: Specialist-led clinic are effective in achieving good BP control and therefore effort should be made at establishing more of such clinics to reduce the burden of hypertension and achieve optimum blood pressure control among hypertensives. In addition, a combination therapy is preferred to reduce pill burden, increase compliance, and hence achieve optimum BP control. It is imperative for the National Health Insurance scheme to support and promote the usage of more combination therapies for optimal blood pressure control.

INTRODUCTION

The global burden of hypertension was estimated to be 1.4 billion in 2010 and is projected to exceed 1.6 billion by 2025 [1]. Two thirds of the global burden of hypertension is found in low and middle income countries (LMICs) [2]. According to the Ghana Demographic and Health Survey 2014, only 17 per cent of hypertensive women and 6 per cent of hypertensive men were receiving treatment and had their blood pressures under control [3]. Hypertension is an important cardiovascular risk factor that contributes to morbidity and mortality from cardiovascular diseases. Despite the availability of antihypertensive medications, global data suggest that less than half of those classified as hypertensive are aware of their status [4]. Furthermore, less than a third of those who receive treatment for hypertension get their blood pressure (BP) controlled to currently

recommended targets [5]. In 2017, the US Hypertension Guideline redefined hypertension as systolic blood pressure (SBP) of at least 130 with target SBP below 130mmHg for all adults [6]. In 2018, the European Hypertension Guideline recommended initiating pharmacotherapy for SBP above 140mmHg in most adults and at least 130mmHg for those at very high risk for cardiovascular events [7].

Risk factor for developing hypertension can be grouped into two; modifiable and non-modifiable. Whilst not much can be done for non-modifiable risk factors such as age, race, sex, family and genetic composition, modifiable risk factors can be adjusted or changed to reduce or prevent hypertension. These modifiable risk factors include; obesity, excessive salt intake, inactivity or lack of exercise, high fat diet, tobacco use, alcohol consumption [8]. Clearly, achieving optimal blood pressure control is necessary to prevent hypertension induced end organ damage such as cardiovascular diseases, stroke, and renal impairment. Due to the chronicity of hypertension and the need for continued medication adherence, optimal BP control can be quite a difficult task to achieve [9]. It has been documented by Rose et al. that failure of physicians to optimize treatment when encountered with blood pressure that are only fairly above the recommended control thresholds is largely responsible for the uncontrolled BP in treated patient [10][11]. O'Conner describes this as Clinical inertia and it is one of the major obstacles to an effective blood pressure control [12]. Knowing what and when to add up patient medication is crucial for an optimum BP control. In Ghana, a major challenge to hypertension management in the primary care settings is the unavailability of drugs at the service delivery point [13]. Patients sometimes travel a long distance to get their medications.

Cultural, as well as socioeconomic, factors appear to be quite important in the African setting. As Chowdhurry and colleagues found, advanced age, female gender and place of residence can negatively impact hypertension control [14]. Belief in herbal and traditional medicine and social pressure to resort to such treatments can severely affect adherence to proven medications, and ultimately, BP control [13]. Duration of hypertension, treatment adherence, number of antihypertensive medications, and availability of medications at point of care and the tier of health institution are other significant factors associated with the control of hypertension [15]. The economic burden associated with the management of hypertension cannot be overemphasized, especially in settings where Health insurance is not effectively implemented. Out-of-pocket payments for medications can result in financial hardship and can reduce medication adherence [16].

Specialist hypertensive clinic are more effective in reducing blood pressure to targets [17]. In the united kingdom, hypertension is managed primarily in the primary care settings but Individuals who are not able to meet target BP are subsequently referred to hypertension specialist clinic [17]. In Ghana hypertension is managed at all levels of health care but more commonly in the district hospitals and private hospitals. Similar to the UK cases of uncontrolled hypertension and those with target organ damage are referred to the specialist physician led clinic. Due to low number of such specialist led clinics, the few ones are usually overwhelmed with a number of cases. This study seeks to determine control of hypertension in a specialist led clinic at the County Hospital in Kumasi, Ghana.

METHODOLOGY

STUDY DESIGN AND SETTING

This study was retrospective and involved the use of structured close-ended questions and medical record review. Blood pressures were measured at booking, 12 months and 24 months using automated sphygmomanometers. The results were recorded for each participant. The study was undertaken at a large private hospital in the Kumasi Metropolis. County Hospital serves a large population in the Abrepo, Bokyen and Asuofia areas being the only secondary level health facility within a 10-kilometre radius.

The Clinic has a population of more than 500 patients. In this clinic the physician has adopted the use of both lifestyle and pharmacotherapy and has a nutritionist who regularly provide dietary council and support. Review in the clinic is done every 8weeks for patients with controlled BP but shorter review for those with uncontrolled BP.

Study procedures

Three seated Blood Pressure (BP) measurements were obtained, after 5 minutes rest, from each participant by the researcher. Hypertension was defined as an average systolic BP (SBP) ≥140 mmHg and/or an average diastolic BP (DBP) ≥ 90 mm Hg, and/or referred hypertensive patients from peripheral hospital. Control of hypertension was defined as having an average SBP <140 mm Hg and/or an average DBP < 90 mm Hg.

Study population

The study involved hypertensive patients, aged 18 years and above and who have been enrolled in the Hypertensive Clinic for at least 12 months. The study was conducted between October 2019 and January 2020. County hospital runs two (2) hypertension clinics per week and sees an average of thirty-five (35) patients per clinic day. The hospital runs a counseling, dietary education session and short fitness exercise for patients on every clinic day.

Data collection, Processing and Analysis.

Data for the study was collected using an electronic questionnaire (open data kit (ODK). The electronic questionnaire included variables on sociodemographic characteristics, clinical characteristics, class of drugs taken by the patients and the Morisky adherence scale (MMAS-8) were used to collect the data. The questionnaire was pilot tested on 36 hypertensive patients from the clinic and modified accordingly before the study was begun. The research team collected data from patients and their medical records. All uploaded dataset were reviewed for completeness.

The data was analyzed using Stata/SE 14.0 statistical software (StataCorp. 4905 Lakeway Drive Station, Texas 77845, USA). Descriptive statistics were performed for all variables and expressed as means and standard deviation for continuous variables.

Bivariate analysis (logistic regression) was done to measure the strength of the association between socio-demographic, BP level, antihypertensive drug used and medication adherence score. These were presented as crude (unadjusted) odds ratio. Multivariate logistics regression model was fitted using forward stepwise approach to adjust for the effect of other confounding factors in order to unravel the true factors associated with medication adherence score. The regression models controlled or adjusted for age, gender, educational level, occupation, cigarette smoking and family history of hypertension

All statistical analysis was done at a 95% significance level with p values < 0.05 considered as statistically significant.

RESULTS

Socio-demographic Background of Hypertensive Patients

Three hundred and sixty-one patients (361) were recruited for the study, More than three quarters 296 (82.0%) of the patients were females and 65 (18.0%) were males. With more than half 219 (66.7%) of the patients aged more than 55 years. Almost half 171 (47.4%) were unskilled in occupation. More than one quarter 135 (37.4%) of the patients had completed secondary level of education. Almost all 359 (99.5%) patients were enrolled on National Health Insurance Scheme (NHIS) and 18 (5.0%) had either a past or current history of smoking. (Table 1).

Clinical Characteristics of Hypertensive Patients

The study revealed that more than half 223 (61.8%) of the patients were diagnosed with hypertension (HPT) only and 138 (38.2%) diagnosed of both HPT and diabetes. Majority 234 (64.8%) had family history of HPT and 124 (34.4%) had family history of diabetes. At booking, almost three quarters (n=263; 72.9%) had uncontrolled BP with a mean systolic BP of 146.3 (SD of 24.6 mmHg). At 12 months, 69.0% had their BPs controlled, with a mean systolic BP of 128.0 (SD of 16.4 mmHg). At 24 months, three-quarters of all patients (75.3%) had achieved BP targets with a mean systolic BP of 125.3mmHg (SD of 15.2 mmHg). Twenty-nine representing 8.0% of the patients were diagnosed with some form of comorbidities and 37 (10.2%) of the patients had impairment of kidney function (Table 2).

Factors associated with uncontrolled levels of BP among hypertensive patients

The study revealed a significant association between blood pressure (BP) levels (at booking, 12 months and 24 months) and socio-demographic and clinical characteristics of patients.

Based on the results of the BP at booking, patients with family history of HPT were 2.19 times more likely to achieve controlled BP as compared to patients with no family history of HPT (aOR=2.19, CI=1.21-3.96). Patients on one antihypertensive medication were 2.68 times more likely to have controlled BP as compared to patients on two or more antihypertensive medications (aOR=2.68, CI=1.33-5.41).

Also, number of drugs taken per day was the strong factor associated with controlled BP at twelve months of follow up, such that patients on only one (aOR=7.27, CI=2.93-18.01) or two (aOR=2.49, CI=1.41-4.40) antihypertensive medications were 7.27 and 2.49 times respectively, more likely to achieve controlled BP as compared to patients who were

taking more than two antihypertensive medications.

Educational level, diagnosis and number of drugs taken per day were the factors that influenced BP control after 12 months. The study revealed that patients who had completed tertiary or were in tertiary level of education were 79.0% less likely to develop controlled BP as compared to those with no formal education, basic education or secondary education (aOR=0.19, CI=0.06). Patients diagnosed with both HPT and diabetes were 45.0% less likely to develop controlled BP as compared to patients who were diagnosed with HPT only. Also, patients who were on one or two antihypertensive medication were 7.61 (aOR=7.61, CI=2.67-21.68) and 2.85 (aOR=2.85, CI=1.51-5.37) more likely to develop controlled BP respectively as compared to patients on more than two antihypertensive medications. (Table 3).

Table 1

Socio-demographic Background of Hypertensive Patients

Variable	Frequency (n=361)	Percentage (%)
Gender		
- Female	296	82.0
- Male	65	18.0
Age (years)		
- Middle age (36-55)	142	39.3
- Older adult (>55)	219	66.7
Occupation status		
- Unemployed	140	38.9
- Unskilled	171	47.4
- Skilled	27	7.5
- Professional	23	6.2
Educational level		
- No formal education	65	18.0
- Basic education	119	33.0
- Secondary education	135	37.4
- Tertiary	42	11.6
Enrolled on insurance		
- No	2	0.6
- Yes	359	99.4
Smoking history		
- No	343	95.0
- Yes	18	5.0

Table 2

Clinical Characteristics of Hypertensive Patients

Variable	Frequency (n=361)	Percentage (%)
Diagnosis		
- HPT	223	61.8
- Both HPT and Diabetes	138	38.2
Family history of hypertension		
- No	95	26.3
- Yes	234	64.8
- Do not know	32	8.9
Family history of diabetes		
- No	201	55.6
- Yes	124	34.4
- Do not know	36	10.0
Medication adherence		
- Non-adherent	154	42.7
- Adherent	207	57.3
Blood pressure at booking		
- Controlled	98	27.1
- Uncontrolled	263	72.9
Mean (SD)	146.3 (±22.2)	
Blood pressure at 12 months		
- Controlled	249	69.0
- Uncontrolled	112	31.0
Mean (SD)	128.0 (±16.4)	
Current blood pressure		
- Controlled	272	75.3
- Uncontrolled	89	24.7
Mean (SD)	125.3 (±15.2)	
Comorbidity		
- No	332	92.0
- Yes	29	8.0
eGFR (ml/min/1.73m^2)		
- Non-impaired kidney (<60)	281	77.8
- Impaired kidney (≥60)	37	10.2
- Not assessed	43	11.9

Table 3

Bivariate and multivariate logistic regression analysis of factors associated with uncontrolled levels of BP among hypertensive patients

Variable	BP at first visit/booking		BP at 12 months		BP at 24 months	
	OR (95%CI)	aOR (95%CI)	OR (95%CI)	aOR (95%CI)	OR (95%CI)	aOR (95%CI)
Gender						
- Female	Ref	Ref	Ref	Ref	Ref	Ref
- Male	0.62 (0.32-1.20)	0.80 (0.36-1.77)	1.11 (0.62-2.00)	0.96 (0.45-2.04)	1.00 (0.54-1.87)	1.44 (0.58-2.04)
Age (years)						
- Middle age (36-55)	Ref	Ref	Ref	Ref	Ref	Ref
- Older adult (>55)	0.69 (0.43-1.10)	1.10 (0.61-2.00)	0.72 (0.45-1.40)	1.04 (0.58-1.87)	0.72 (0.44-1.20)	1.44 (0.64-3.26)
Occupation status						
- Unemployed	Ref	Ref	Ref	Ref	Ref	Ref
- Unskilled	1.79 (1.07-2.99)*	1.64 (0.91-3.00)	1.38 (0.86-2.23)	0.90 (0.52-1.56)	1.26 (0.86-2.11)	1.00 (0.55-1.84)
- Skilled	0.83 (0.29-2.39)	1.29 (0.39-4.22)	1.11 (0.46-2.66)	0.89 (0.30-2.52)	1.06 (0.42-2.72)	0.79 (0.26-2.39)
- Professional	1.60 (0.60-4.26)	1.20 (0.31-4.64)	2.64 (0.85-8.19)	0.51 (0.12-2.15)	1.34 (0.47-3.87)	2.91 (0.69-12.27)
Educational level						
- No formal education	Ref	Ref	Ref	Ref	Ref	Ref
- Basic education	0.84 (0.42-1.67)	0.73 (0.34-1.56)	0.79 (0.41-1.50)	1.63 (0.79-3.35)	0.77 (0.36-1.65)	0.58 (0.25-1.34)
- Secondary education	1.02 (0.53-1.98)	0.80 (0.38-1.70)	1.18 (0.62-2.25)	0.94 (0.45-1.95)	0.67 (0.32-1.41)	0.74 (0.59-3.09)
- Tertiary	1.17 (0.50-2.74)	1.05 (0.34-3.22)	1.11 (0.47-2.60)	1.19 (0.40-3.57)	0.37 (0.15-0.89)*	0.19 (0.06-0.59)*
Diagnosis						
- HPT	Ref	Ref	Ref	Ref	Ref	Ref
- Both HPT and Diabetes	1.96 (1.22-3.13)*	1.44 (0.83-2.48)	0.80 (0.51-1.26)	0.70 (0.40-1.20)	0.65 (0.40-1.05)	0.55 (0.31-3.26)*
Smoking history						
- No	Ref	Ref	Ref	Ref	Ref	Ref
- Yes	0.52 (0.15-1.84)	0.69 (0.16-2.98)	0.43 (0.12-1.51)	0.37 (0.09-1.51)	0.84 (0.29-2.43)	0.96 (0.27-3.42)
Family history of hypertension						
- No	Ref	Ref	Ref	Ref	Ref	Ref
- Yes	0.86 (0.51-1.46)	0.71 (0.38-1.32)	1.02 (0.61-1.70)	0.86 (0.47-1.57)	0.75 (0.43-1.32)	0.71 (0.37-1.36)
- Do not know	0.80 (0.32-2.00)	0.50 (0.13-1.85)	1.18 (0.49-2.85)	1.34 (0.40-4.55)	1.99 (0.63-6.30)	1.46 (0.36-6.02)
Family history of diabetes						
- No	Ref	Ref	Ref	Ref	Ref	Ref
- Yes	2.09 (1.27-3.44)*	2.19 (1.21-3.96)*	1.09 (0.68-1.79)	1.37 (0.76-2.46)	0.82 (0.49-1.36)	1.00 (0.54-1.88)
- Do not know	1.41 (0.63-3.16)	2.11 (0.66-6.78)	1.06 (0.49-2.09)	1.05 (0.35-3.04)	2.00 (0.74-5.42)	1.74 (0.50-6.07)
Comorbidity						
- No	Ref	Ref	Ref	Ref	Ref	Ref
- Yes	1.02 (0.44-2.40)	1.11 (0.44-2.80)	0.69 (0.28-1.66)	0.66 (0.25-1.74)	0.85 (0.36-1.99)	0.82 (0.31-2.14)
Number of drugs taken per day						
- One	3.03 (1.66-5.54)*	2.68 (1.33-5.41)*	5.97 (2.58-13.81)*	7.27 (2.93-18.01)*	6.4 (2.44-16.75)*	7.61 (2.67-21.68)*
- Two	1.06 (0.61-1.84)	1.00 (0.55-1.82)	2.28 (1.36-3.82)*	2.49 (1.41-4.40)*	2.58 (1.46-4.56)*	2.85 (1.51-5.37)*
- More than two	Ref	Ref	Ref	Ref	Ref	Ref

**p-value significant at <0.05*

DISCUSSION

Hypertension is an important cardiovascular risk factor which if left uncontrolled can lead to myocardial infarction, heart failure, stroke and renal impairment [18].Blood pressure reduction as low as 5mmHg can lead to 7% decrease in all-cause mortality, with a 14% and 9% decrease in mortality from stroke and coronary heart disease, respectively[19]. In this study, only 27.2% (98) of the clients had their blood pressure controlled at booking. Most of the cases had been referred from other hospitals due to inability to achieve an optimum BP control or self-referred because they were not satisfied with the control of their BP's.
Family history is an important non modifiable risk factor for the development of hypertension [20]. Various theories and mechanism have been proposed to explain the increased risk of hypertension among people with positive family history [21]. Among these mechanisms include: genetic trait related to high blood pressure such as sodium lithium counter-transport, low urinary kallikrein excretion, high fasting plasma insulin concentration, elevated uric acid level, high density LDL sub-fractions, fat pattern index, oxidative stress, ad shared environmental factors such as sodium intake and heavy metal exposure [22][23][24] [25].

Most of the participants had a strong family history of hypertension. Having a close family member with a history of HPT may mean that people may be on the lookout for HPT and seek early care. Additionally, they may be more familiar with and more adjusted to taking medications regularly since they have been in close contact with someone who had to. However, unearthing the reasons for this association was beyond the scope of the current study but is an interesting observation that should be subject to further research.

For optimal control of blood pressure, both pharmacologic and non-pharmacologic therapies play a vital role [26]. The physician and most importantly the patient's ability to blend the two is crucial to achieve blood pressure control. Strict adherence to life style modifications may be enough for a good BP control [27]. Instituting a pharmacological therapy without a proper lifestyle modification may not yield any appreciable nor lasting results. Clearly, majority (75.3%) of the patients in this study had their current blood pressure controlled with a mean and standard deviation of 125.3 and 15.2 respectively. By 12 months of follow up in the clinic, 69% of the patient will have their blood pressure well controlled already. The significant improvement in mean systolic BP achieved in this study can be attributed to the integrated approach of lifestyle modification backed by appropriate pharmacotherapy. The consistent reduction in mean systolic blood pressure over the 24 –month period, as well as the large number of participants who achieved controlled BP targets provides strong support for an integrated approach that combines dietary, lifestyle modifications and medications in a coordinated manner.

The reduced control of hypertension among the educated in this study may partly be due to their busy schedule. They are most likely to forget to take their pill. Okai et al 2020 cited forgetfulness as a cause of poor adherence and hence poor BP control. However, contrary to this study, other studies have found good control of hypertension amongst the educated group [3][28][29][30].

The number of drugs taken per day was another strong factor associated with achieving BP control at 12-months follow up. In our study, patients taking only one drug were 7 times (aOR=7.27, CI=2.93-18.01) more likely to achieve BP control at 12 months. The odds reduced to 2.49 (aOR=2.49,

CI=1.41-4.40) for those on 2 drugs.

High pill burden has been shown to be associated with poor adherence to medication [13], [31]–[33]. A lower pill burden promotes medication compliance and adherence, and is less likely to confuse patients and caregivers. In turn, good medication adherence promotes achievement of BP targets. However, most antihypertensives provided on the National Health Insurance Scheme (NHIS) medications list are available as single ingredient tablets and this may contribute to high pill burden. Most fixed-dose combination (FDC) pills for HPT are expensive and only available at private pharmacies. Of note, patients with hypertension and diabetes were less likely to achieve BP targets at 12 months. Whilst, the current study design does not allow us to delve into possible reasons for this, increased pill burden from taking medications for two chronic conditions could be a contributory factor. Increasing the availability of FDC tablets on the NHIS benefits list for management of chronic diseases such as Diabetes Mellitus and hypertension will have overall benefits for medication compliance and achievement of treatment targets.

CONCLUSION

In conclusion, specialist-led clinics are effective in helping patients achieve BP control and therefore effort should be made at establishing more of such clinics to promptly signpost at risk patients in order to reduce its untoward complications. In addition, combination therapy is preferred to reduce pill burden, increase compliance, and ultimately achieve optimum BP control amongst hypertensive patients. It is imperative for the National Health Insurance scheme to support and promote the usage of more combination therapies for optimal blood pressure control.

KEYPOINTS

- Specialist-led clinics are effective in helping patients achieve Blood pressure control.
- Reducing pill burden increases compliance to hypertension therapy and hence blood pressure control.
- Combination pills may be preferred for effective hypertension control.
- National Health Insurance scheme to support and promote the usage of more combination therapies.

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