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Compliance with follow-up and adherence to medication in hypertensive patients in an urban informal settlement in Kenya: comparison of three models of care

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Abstract

OBJECTIVE To determine and compare, among three models of care, compliance with scheduled clinic appointments and adherence to antihypertensive medication of patients in an informal settlement of Kibera, Kenya.

METHODS Routinely collected patient data were used from three health facilities, six walkway clinics and one weekend/church clinic. Patients were eligible if they had received hypertension care for more than 6 months. Compliance with clinic appointments and self-reported adherence to medication were determined from clinic records and compared using the chi-square test. Univariate and multivariate logistic regression models estimated the odds of overall adherence to medication.

RESULTS A total of 785 patients received hypertension treatment eligible for analysis, of whom two-thirds were women. Between them, there were 5879 clinic visits with an overall compliance with appointments of 63%. Compliance was high in the health facilities and walkway clinics, but men were more likely to attend the weekend/church clinics. Self-reported adherence to medication by those complying with scheduled clinic visits was 94%. Patients in the walkway clinics were two times more likely to adhere to antihypertensive medication than patients at the health facility (OR 1.97, 95% CI 1.25–3.10).

CONCLUSION Walkway clinics outperformed health facilities and weekend clinics. The use of multiple sites for the management of hypertensive patients led to good compliance with scheduled clinic visits and very good self-reported adherence to medication in a low-resource setting.

keywords hypertension, models of care, walkway clinics, weekend clinics, medical management, operational research

Introduction

Hypertension is a leading cause of morbidity and mortality in adults aged 25 years and older causing an estimated 7.5 million deaths globally [1]. Much of this burden is borne by low- and middle-income countries which have seen a steady increase in newly reported cases, in contrast to high-income countries, which have experienced a decrease [2, 3]. The burden of hypertension in Africa is very high at 46% in adults aged 25 years and older [1, 4]. In developing countries, hypertension is

often detected when it presents with complications resulting from long-term uncontrolled blood pressure (BP) [5].

A 25% relative reduction in raised BP and premature mortality from cardiovascular diseases is possible if risk factor targets for reduced salt intake, diabetes, obesity, alcohol and tobacco use are achieved [6, 7]. The consequences of uncontrolled blood pressure can be fatal; and many lives could be saved if medication adherence was reinforced as BP control can reduce the frequency of complications such as stroke, myocardial infarction and cardiac failure [8].

WHO reports that poor adherence to treatment is a worldwide concern [9]. Even in developed countries, adherence is difficult (approximately 50% at best), and it is much lower in developing countries [9, 10]. Adherence is defined as ‘the extent to which a person’s behaviour – taking medication, following a diet and/or executing lifestyle changes, corresponds with agreed recommendations from a health care provider’ [11]. Adherence to lifestyle modification advice, treatment regimens and regular follow-up is important in BP control, as shown by a study in Cameroon [8].

Two of the most important factors that influence medication adherence in hypertension are the asymptomatic and lifelong nature of the disease as patients must regularly attend clinics and take medication for a condition they cannot feel [12]. Proper management of hypertension requires time commitment and a willingness to take medication, both of which may present a financial burden [13, 14]. Any measures that would reduce the cost of treatment and medication, increase the convenience of monitoring and renewal of medications would likely improve hypertension management [15].

In Kenya, according to a 2015 WHO STEPwise survey, the overall hypertension prevalence was 23.8%, slightly higher in men (25.1%) than in women (23.8%) [16]. About 90% of people living with hypertension were not on treatment; 22% of those diagnosed with hypertension were on medication prescribed by a physician, but only 3% of these were controlled [16]. A population-based survey in 2010 found the hypertension prevalence in Kibera, an informal settlement in Nairobi, to be 12.6%; it was slightly higher in females (13.7%) than in males (11.7%) and increased with age [17].

In Kibera, three models of care have been implemented by Amref Health Africa in Kenya (Amref) to address compliance issues related to hypertension. The goal of the programme is to make it more convenient for patients to have their BP monitored and medications prescribed. The programme is based in three locations: the health facility, walkway clinics (drop-in centres on main roads) and weekend clinics. A previous study found that overall enrolment was significantly higher using three types of locations than a single facility-based location [18]. Although enrolment in the clinics was improved with this novel approach, it is not known whether it produced better clinic attendance or adherence to medication. Multiple sites to improve adherence to medication have been tried before [13], but the use of walkways and dedicated hypertension weekend clinics is new and has never been systematically evaluated in literature.

These models are different from other multiple site approaches in that they have been adapted for informal

settlements. Many people in Kibera are casual labourers working either in industries or wealthy homes outside the settlement. In the morning, many of these people leave the slum in search of work and in the evening return home through defined routes used daily. The walkway clinics are strategically placed at points of entry into Kibera to capture as much of the human traffic as possible.

Comprehensive screening, counselling, diagnosis and treatment are offered to this population that would have otherwise not been able to receive these services during normal working hours (0800–1700 hours) at the clinic. This population cannot afford to sacrifice a day of work to treat an asymptomatic disease, as shown by a study in Korogocho slums, Nairobi [19].

Thus, the aim of this study was to determine and compare, among the three models, compliance with scheduled clinic appointments of patients and self-reported adherence to antihypertensive medication in the informal settlement of Kibera, Kenya.

Methods

Design and setting

This was a retrospective analysis of routinely collected project data. Healthy Heart Africa (HHA) is an innovative programme created to tackle the rising burden of hypertension and cardiovascular diseases (CVD) in Africa [20]. The programme aims to reach 10 million patients with hypertension in Africa by 2025. This will be achieved by awareness creation on symptoms and risk factors, supporting local health systems, and by offering screening and reduced-cost treatment. The programme is funded by AstraZeneca and has four local partners in Kenya implementing different models of care; Amref is one of these partners.

In Kibera, the project is implemented in collaboration with the Ministry of Health in government-run health facilities and some private clinics. The Kibera Community Health Centre (KCHC), an Amref-sponsored clinic, is an example of a public-private partnership in health where some of the staff at the clinic are supported by Amref, while the rest are Ministry of Health (MOH) staff. In this health facility, HHA supports – through Amref – awareness creation, BP screening, provision of highly subsidised medication and support group formation by patients. As the health facility is partly owned by Amref, a small fee is charged for treatment and medication. This goes into a revolving fund for sustainability (Box 1).

The main objective of the project is to reduce the burden of hypertension by creating awareness, providing quality BP screening, diagnosis, counselling and

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care, including medication. When the project started in 2014, we aimed to screen around 134 000 people and treat 13 200 people with hypertension in Kibera between April 2014 and June 2017. The main service delivery models included a community education strategy and triaging at health facilities. Due to low linkage to care, two other sites were introduced in October 2015: the walkway and weekend services to make screening, diagnosis, treatment and follow-up more accessible to patients, thereby improving adherence to care.

Facility-based services

All patients at Amref-supported clinics are required to have their BP taken (Box 1). This is either done by a triage nurse or a trained community health worker (CHV). The information is recorded in screening registers. Those found to have elevated BP are transferred into the linkage register for follow-up. Diagnosis is made after three elevated BP measurements are recorded on three separate visits within 2 months. Once diagnosed with hypertension, a patient file is opened and all subsequent visit information is recorded there. A risk factor analysis is done for all patients upon enrolment. Patients are given a one-month supply of antihypertensive medication (Box 1) and asked to return in one month unless the doctor advises a shorter or longer appointment period.

Community strategy of care

A community model was tried between 2014–2015 where CHVs were deployed in the community, going from house to house, taking BP readings of people aged 18 years and above and referring those with elevated BP to the health centres for treatment. This was very effective in increasing screening coverage but poor in terms of linkage; most of the patients referred to the clinic did not show up due to work-related issues, long wait times and poor customer care. Hence, we introduced the walkway and weekend clinics.

Walkway services

The “walkways” are a drop-in-clinics located on commonly-used roadways outside or near the clinic that identified patients are linked to after diagnosis. They operate between 1630 h and 1830 h, three days a week, and offer comprehensive care (screening and treatment) for the newly-diagnosed and existing patients who would have otherwise been unable to keep their facility appointments during normal working hours.

Weekend services

Weekend services are offered on Saturdays and Sundays at the Amref facility. Again, comprehensive services are offered and once registered, patients can continue to be followed up on weekends. Similarly, comprehensive care is offered in places of worship between 0900 and 1600 hours on worship days; once registered, patients can continue to be followed up on weekends or if they prefer, are referred to a clinic near their home for follow-up.

The walkway and weekend clinics are manned by CHVs who take BP readings and a clinician who supervises the CHVs, diagnoses, treats patients and dispenses medication. The clinicians are drawn from project sites and work on a rotational basis.

Patient movement

The population of Kibera is very transient and patients move between treatment sites in and outside the settlement. Common reasons are treatment costs at the Amref facility and incentives offered by other NGOs running hypertension projects. Patients also tend to move to clinics closest to their homes if enrolled in a clinic further away. Movement to clinics outside Kibera occurs when patients with severe hypertension are referred to tertiary referral hospitals for care, or when they relocate to their rural home or temporarily for work or travel. As in most slums, many residents of Kibera were born outside Nairobi; hence, the considerable in and out-migration [21]. To address this issue, our patients are issued with a ‘Passport to a Healthy Heart’, a booklet containing a summary of their hypertension information including lifestyle modification advice, risk factors, ongoing BP readings, medication history and their unique identification number. This makes patients’ identification easy as they move between project sites and other clinics in Kibera. Definitions of hypertension and treatment guidelines are described in Box 1.

Patient population

All patients with hypertension from three clinics, six walkway clinics and a weekend clinic in Kibera who were on antihypertensive medication and considered actively in care for at least 6 months during the study period (April 2015–December 2016) were included.

Data variables, sources of data and data collection. The variables collected included: unique patient identifier, date enrolled into care, last visit, point of enrolment and point of care (health facility, walkway and weekend

Box 1 Definitions of elevated blood pressure and treatment guidelines for hypertension

Not all patients were triaged in the health facilities Amref works with before HHA. BP readings were mostly taken on a need-to-know basis mostly under direction from the doctor/clinician when patients presented with symptoms of hypertension. There were no protocols for hypertension management and doctors prescribed antihypertensive medication with the aim of short-term BP control. Once the patient's BP was controlled, some patients were taken off medication. Currently in all HHA sites, treatment guidelines endorsed by the Ministry of Health and AstraZeneca are used to determine appropriate advice, including lifestyle changes and medications.

Treatment guidelines: Before taking blood pressure (BP) measurements, the patient should sit quietly for 3–5 min. The correct size cuff and bladder should be used. Measurement of the BP is made while the patient is seated on a chair with a back rest and with the arm relaxed and supported at the level of the heart. Two BP readings are taken at least 2 min apart. BP in both arms should be taken at the first visit, and the arm with the highest BP should be used for future measurements. Patients with diabetes, patients complaining of symptoms suggestive of postural hypotension (e.g. dizziness, unsteadiness or fainting when changing posture) and the elderly patients should stand while having their blood pressure taken. This BP is then compared with their sitting BP.

Hypertension is defined in different stages as: mild (140/90–159/99 mmHg), moderate (Systolic BP \geq 160 and/or diastolic BP \geq 100 mmHg) and severe (Systolic BP \geq 180 and/or diastolic BP \geq 110 mmHg). Three elevated blood pressure readings are required before a diagnosis is made, and patients are started on treatment. For those with mild-to-moderate hypertension and without risk factors, they are enrolled into care on contact.

Patients with mild hypertension and no risk factors are treated with lifestyle modification only for up to 3 months, upon which medication is prescribed if the desired BP (of \leq 140/90 mmHg and $<$ 150/90 mmHg for age \geq 80 years) is not achieved. For those with risk factors, treatment decisions are made on a case by case basis while those with severe hypertension are treated with antihypertensive medications on contact and referred for specialized treatment. All patients receive lifestyle modification education on every clinic visit before and after treatment.

The first line of treatment is a long-acting calcium channel blocker (CCB) or thiazide diuretic. If the desired BP is not achieved, a combination of therapies of CCB plus a thiazide diuretic, and then an angiotensin converting enzyme inhibitor (ACEI) are used. Patients at the ACEI plus CCB level require referral. The protocol for the identification and management of HTN is appended below (Appendix 1).

Patients in the project are given antihypertensive medication from two sources: the government-run Kenya Medical Supplies Authority (KEMSA) and Mission for Essential Drugs and Supplies (MEDS) funded by AstraZeneca. Medication supplied by KEMSA is provided free of charge at government clinics while those from AstraZeneca are provided at a highly subsidized cost of USD\$1 (Ksh100) per month. Patients started on drugs from KEMSA can get access to project drugs if they are out of stock in the clinics or they require more potent drugs. The ministry of health treatment protocol is used by clinicians to decide which drugs to start patients on, when to increase or decrease doses and when to prescribe the next class of drugs class of drugs [37].

clinic), demographics (age, sex), hypertension risk factors (smoking, drinking, body mass index [BMI], diabetes, diet, physical inactivity, family history of CVDs) and HIV status. Information routinely recorded on each clinic visit included: date of clinic appointment, BP, self-reported adherence, medication regimen and next appointment date.

All patient data were recorded in patient files by clinicians and later keyed into an electronic database, International Quality Care (IQ Care), by Futures group [22]. For this study, the primary data source was IQ Care. Data retrieval and cleaning took place between April and October 2017. Verification and comparison were

carried out from patient files, the patients' master list and clinic appointment books. Data were stratified by health facility, walkway and weekend for analysis.

Compliance with scheduled clinic visits was defined as a proportion of visits attended against those scheduled. Compliance was defined as when a patient came for a visit not more than 90 days before the scheduled appointment for an early visit and not later than 7 days after the appointment date. Adherence to medication was self-reported as a "yes" or "no" and only calculated for those who attended a clinic visit. The binary response was recorded after clinicians enquired with several questions to ascertain adherence.

Analysis

To determine attendance to clinic visits and self-reported adherence to medication, we analysed patients who had been in the programme for more than 6 months and were active between April 2015 and December 2016. Data were downloaded to Excel and exported to STATA Version 12 for analysis. Data were summarised using ranges, means, \pm standard deviations (SDs) and frequencies (percentages) where appropriate. Compliance with clinic visits and adherence was compared between models using the chi-square test. Univariate and multivariate logistic regression models were used to estimate the odds of overall adherence to medication. Sex and age of the patient at enrolment were *a priori* included in the multivariable model while other risk factors for hypertension were not included because they were not significant at $P < 0.05$ level. Model results were shown as odds ratios (OR) and adjusted OR (aOR) with 95% confidence intervals (CI).

Ethics approval

Ethics approval was obtained from the Amref Health Africa in Kenya Ethics & Scientific Review Committee. This research fulfilled the exemption criteria set by the Médecins Sans Frontières Ethics Review Board for *a posteriori* analysis of routinely collected clinical data and thus did not require MSF ERB review. The study was also approved by the Ethics Advisory Group of the International Union Against Tuberculosis and Lung Disease, Paris, France.

Results

There were 3861 patients with hypertension registered in the programme, of whom 785 had visited a clinic 6 months after enrolment and whose visits were eligible for analysis (Figure 1). Table 1 describes their demographic characteristics. The average age was 48 and two-thirds were women with almost all married/cohabiting.

Between April 2015 and December 2016, 11 396 clinic visits were recorded. Of these, 5879 were clinic visits from patients who had been in the project >6 months (Table 2). The health facility had the highest number of visits (64%) while the weekend clinics had the fewest (3%). In 5705 of these clinic visits, patients were given antihypertensive medication with the vast majority prescribed a single pill per day.

Of the 4960 scheduled follow-up visits, the health facility group were more compliant (64%) than either walkway (60%) or weekend clinic attenders (55%)

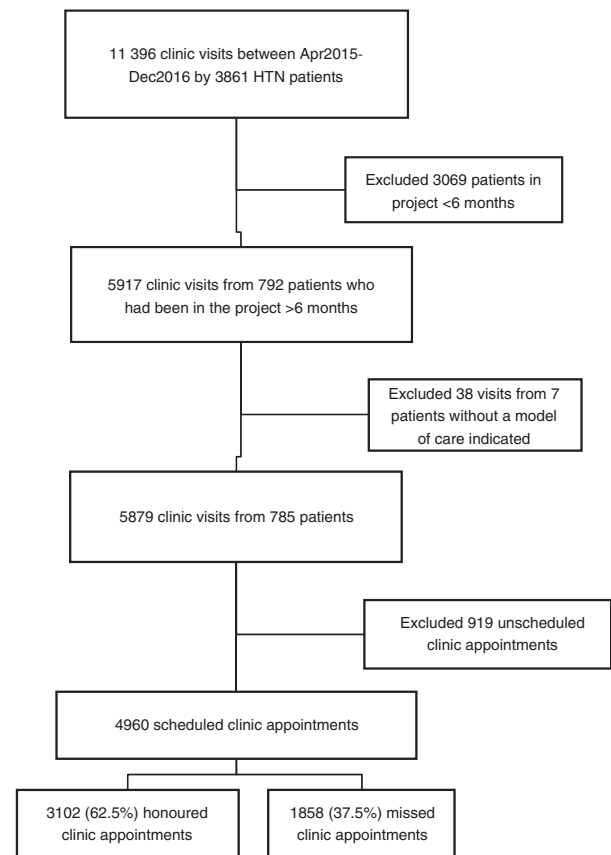


Figure 1 The number of clinic visits from April 2015–December 2016.

(Table 3). The difference was statistically significant ($P < 0.006$).

Overall, self-reported adherence to medication of those who complied with scheduled clinic visits was 94%, with walkway at 96%, facility at 94% and weekend at 88%. These results were significant ($P < 0.001$).

In univariate logistic regression analysis, patients who accessed hypertension services through walkway clinics were two times more likely to adhere to antihypertensive medications than those who received services at the health facility (OR 1.97, 95% CI 1.25–3.10). Patients who received hypertension services through the weekend clinic were 76% less likely to adhere to antihypertensive medication than those who received services at the facility (AOR 0.24, 95% CI 0.10–0.57). The association between the model of hypertension service delivery and self-reported adherence to medication remained significant even after adjusting for sex and age at enrolment.

Table 1 Demographic and clinical characteristics of hypertensive patients in the Healthy Heart Africa project in Kibera, Kenya 2015–16

Characteristic	Overall	Health facility N (%)	Walkway N (%)	Weekend N (%)
Total number of patients	785	485 (62)	277 (35)	23 (3)
Age (years), Mean [standard deviation]	48 (11)	48 (12)	49 (11)	51 (13)
Gender				
Male	290 (37)	170 (35)	107 (39)	13 (56)
Female	495 (63)	315 (65)	170 (61)	10 (44)
Marital status				
Married/Cohabiting	505 (73)	306 (74)	182 (71)	17 (74)
Single/separated/divorced/widowed	187 (27)	108 (26)	73 (29)	6 (26)
Risk factors				
Diabetic	10 (1.3)	6 (1.2)	4 (1.4)	0
Tobacco use	24 (3)	17 (4)	7 (3)	0
Harmful alcohol consumption	51 (7)	35 (8)	14 (5)	2 (9)
Physical inactivity	389 (84)	301 (88)	70 (70)	17 (85)
Unhealthy diet (low fruit and vegetable consumption)	75 (16)	45 (13)	29 (28)	1 (5)
Medication Regimen				
Taking a single pill	729 (99)	450 (99)	257 (100)	22 (100)
Taking multiple pills	5 (1)	5 (1)	0	0
Time in project (months)*, median [IQR]	10 [8–13]	12 [8–14]	9 [7–11]	10 [8–13]

IQR, interquartile range.

*Time in project after 6 months of treatment.

Table 2 Visits made to a Healthy Heart Africa project clinic by hypertension patients in care for 6 months in Kibera, Kenya 2015–16

Model	Visits N (%)	One pill/day N (%)	Multiple pills/day N (%)
Facility	3785 (64)	3641 (99%)	49 (1%)
Walkway	1940 (33)	1858 (99.7%)	5 (0.3%)
Weekend	154 (3)	152 (100)	0
Total	5879 (100)	5651*	54*

*Total = 5705 clinic visits had medication (*5651 + *54 = *5705), 104 had no meds or patients were put on lifestyle modification only.

Table 3 Compliance with scheduled clinic appointments in Healthy Heart Africa project clinics by hypertension patients in care for ≥ 6 months in the in Kibera, Kenya 2015–16

Model	Scheduled visits (N)	Attended visits N (%)	P-Value*
Health Facility	3220	2064 (64)	
Walkway	1609	966 (60)	0.006*
Weekend	131	72 (55)	0.03*
Total	4960	3102	0.006*

* $P = 0.006$ is the comparison of trend for the three models, it is also the P -value we got when we compared the health facility to the walkway model, * $P = 0.03$ compares health facility to the weekend model.

Discussion

This study shows that the use of multiple sites/models for the management of hypertensive patients leads to reasonable compliance with scheduled clinic visits and very good self-reported adherence to medication among those who attended clinic.

Compliance with the health facility model was better than in walkway and weekend clinics. A study in Latin America found that frequent patient follow-up yielded good BP control as it offered opportunities for frequent BP monitoring, access to information especially on lifestyle modification and medication adjustments if BP was uncontrolled [23].

Self-reported adherence in the walkway model was better than in health facility and weekend clinics. The self-reported adherence in this study is much higher than shown in other studies in Africa: 53.8% in Korogocho slum, Nairobi [24], 57.2% in Nigeria [25] and 67.2% in North-west Ethiopia [26]; it is also higher than in Pakistan (76.6%) [27] and Sunderland (79%) [28]. The difference in results may be due to sociodemographic characteristics, self-reported adherence or models of care. Most of the other studies were based in hospitals, whereas ours was conducted in multiple sites with a larger sample size. However, the Sunderland study was similar to ours in that study participants had been enrolled on treatment and taking antihypertensive medication for more than 6 months [28].

These positive results may be attributed to the strategic placement of places where patients can have their BP monitored easily and medications refilled conveniently. The same medical staff in the health facilities worked in the walkway and weekend clinics as in the community and clinic sites. They provided the same consistent care that facilitated follow-up. Other very important factors were the single-pill-per-day regimen for the vast majority of patients and the availability of free or highly subsidised treatment and medication in project sites [26]. The proportion of females was significantly higher than males. Studies have shown that women have better adherence than men [29]. Also, most patients had been on medication less than 10 months; and adherence may be better early in treatment [30].

The much smaller number of patients at the weekend clinic was disappointing but it did seem to provide some access for men, who were more represented there. Despite the small number of uptakers, and resources permitting, continuing this clinic might be justified [18].

The gap in clinic attendance is still concerning but may be partly caused by the mobile nature of the population. A cohort of patients with hypertension and/or diabetes in Kibera lost 31% to follow-up (LTFU), which is in line with our findings (36%) [31]. Patients have many reasons to miss a scheduled appointment and convenience of placement does not address them all. Expanding the use of the “Passport to a Healthy Heart” may permit better continuity of care for patients moving from one clinic to another and improve follow-up. Countrywide implementation of a unique patient identifier and connection of electronic medical records may also aid with tracing and continuing care for patients who move upcountry.

Both the walkway and health facility models had good compliance and adherence. This is a new finding and important in the context of non-communicable disease (NCDs) care in Africa, which does not have a strong infrastructure. To our knowledge, no studies have evaluated the placing of clinics in areas of convenience for patients as a strategy to improve clinic attendance and adherence to medication in an African context, particularly in an informal setting.

In high-income countries, the use of outpatient centres, general practitioners’ offices and stand-alone outpatient hospital clinics provides some level of convenient access for patients with hypertension [13]. Some studies that focused on the convenience of access (one based on home visits and another on workplace visits by medics) did not show significant increases in medication adherence [32] whereas others on hypertension management by community pharmacies in a patient-centred model of care did

show improvements [33]. The pharmacies may have benefited from the convenience factor for their results. However, these services did not provide comprehensive services at a convenient location for patients.

A strength of this study is that it was sub-county wide and is likely representative of the situation in Kibera. The same medical staff and CHVs worked in all three locations and followed the same protocol for hypertension management. The study followed sound ethical practices and adhered to STROBE guidelines [34, 35].

Our study had some limitations. Adherence to medication was self-reported and hence could have been influenced by social desirability; a binary assessment of adherence was used in the report, precluding assessment of partial adherence [36]. As is usual for use of routinely collected data, there were some gaps and we were unable to account for all followed up patients.

There are a number of operational lessons from this study: (i) placing full-service clinics in strategic locations to account for travel to work may be effective; (ii) offering services for men outside working hours may increase their participation; (iii) using a simple pill regimen likely increases adherence; (iv) it is worth investing in a portable method of recording BP and current medication (passports) for patients when they move to different points of care.

Implications for policy and practice are that hypertension screening coverage in Kenya is still very low. The use of the three models of care can increase awareness levels, screening and treatment coverage [18]. Among those on treatment, these models have the potential to improve compliance with clinic visits and self-reported adherence to medication. They are scalable and can be implemented cost-effectively if integrated into existing infrastructure as funding for NCD control is scarce.

Conclusion

Conveniently placed treatment sites for hypertension, manned by trained healthcare providers and offering comprehensive care at times suitable to patients resulted in good compliance with scheduled clinic visits and self-reported adherence to medication. Our model may be successful in low-income contexts.

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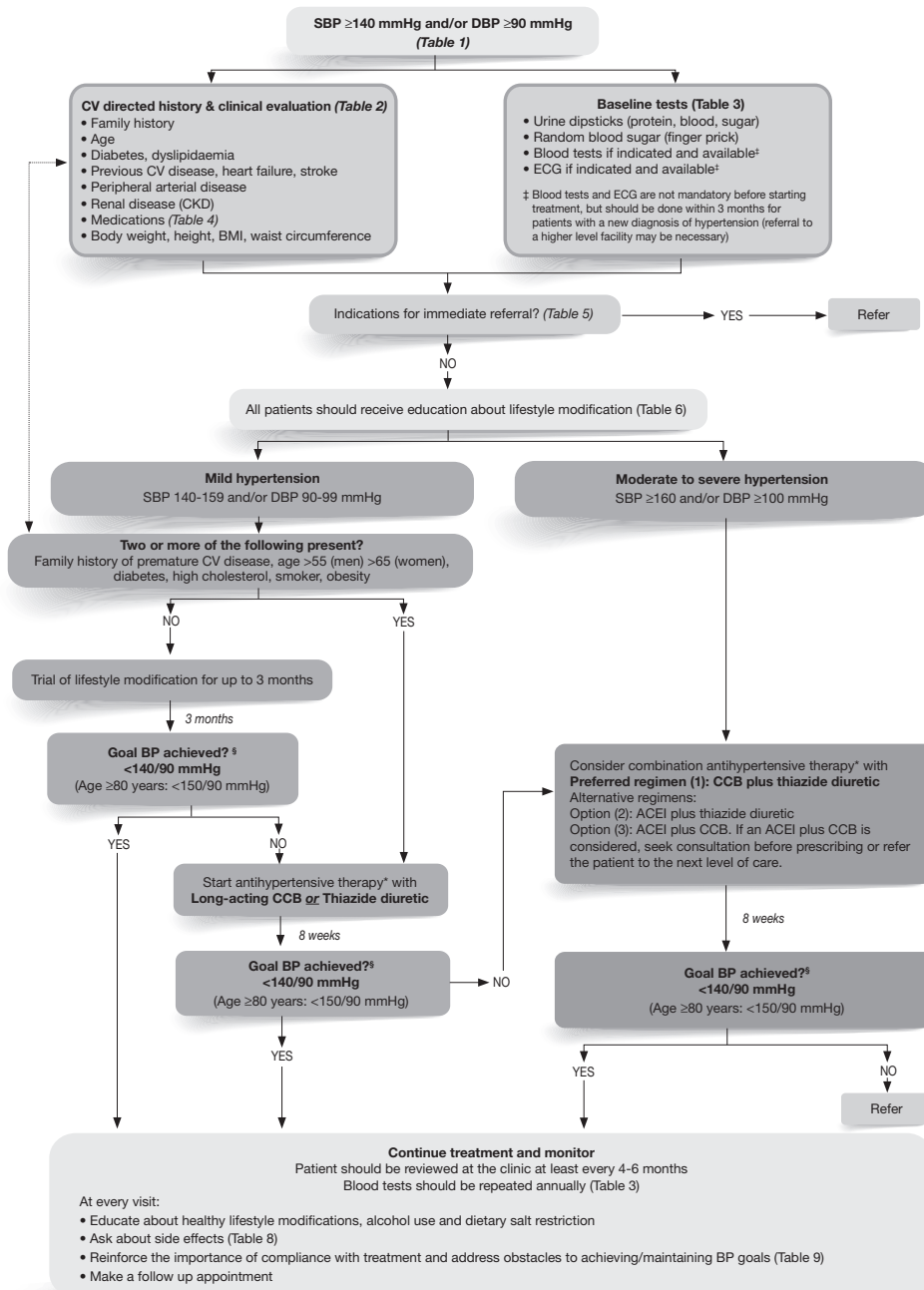
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Appendix I

Protocol for the identification and management of hypertension in adults in primary care



[§]If goal BP is not achieved, assess compliance with medication, alcohol use and use of NSAIDs before deciding to intensify antihypertensive therapy (see Table 9)
*If no contraindications (Table 7)
ACEI: Angiotensin converting enzyme inhibitor; CCB: Calcium channel blocker; CKD: Chronic kidney disease; CV: Cardiovascular; DBP: Diastolic blood pressure; NSAIDs: Nonsteroidal anti-inflammatory drugs; SBP: Systolic blood pressure; < Less than; > Higher than; ≥ Equal to or higher than
This protocol is for use in the demonstration sites of the Healthy Heart Africa project