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Development of a cardiovascular health education program for primary care patients with hypertension in rural Nigeria: a qualitative study

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Abstract

Background: Patient-centered, culturally tailored cardiovascular health education has the potential to improve hypertension self-management. Despite the high prevalence of hypertension in Sub Sahara Africa, this type of health education is hardly available in this region.

Objective: To describe how we developed and evaluated a culturally adapted Cardiovascular Health Education Program for insured hypertensive patients in rural Nigeria.

Methods: Applying concepts of "cultural adaptation", we took a hypertension education program from Europe as a starting point for program-development. First, we collected information on socio-cultural perspectives on hypertension care through a literature review and qualitative interviews with 40 hypertensive patients and 15 healthcare professionals/insurance managers in Kwara State Nigeria. Second, we used this information to adapt the content (deep structure) and the form (surface structure) of the European program to the unique patient population and circumstances of a primary care clinic in Kwara. Third, we evaluated the adapted program among 149 hypertensive patients from this clinic.

Results: The interviews offered insight into patient perspectives on hypertension, socio-cultural and environmental inhibitors and facilitators for medication/ behavioral self-management (e.g. exercise) and on healthcare professional perspectives on optimal education delivery platforms – group counseling, posters, audiovisuals. These insights were used to adapt elements (e.g., educational tools, content) of the existing educational program. The adapted program has been shown to strengthen medication adherence and consequently blood pressure control among the targeted population.

Conclusion: A culturally tailored Cardiovascular Health Education Program, developed by using a qualitative research approach, offered an effective means for educating patients about blood pressure control in a rural primary care setting in Africa.

Implications: Our description of the program and the process by which it was developed offers a practical framework for developing cardiovascular health education for other patient populations in Africa.

Abbreviations: BP: Blood Pressure; CAHE: Culturally Adapted Hypertension Education; CHEP: Cardiovascular Health Education Program; CVD: Cardiovascular Diseases; HIF: Health Insurance Fund; KSHI: Kwara State Health Insurance; NUFFIC: Netherlands Organization for International Cooperation in Higher Education; SSA: Sub Saharan Africa

Introduction

Background

Hypertension is highly prevalent in sub Saharan Africa (SSA) [1] and raised blood pressure is one of the leading risk factors for cardiovascular disease (CVD) and related premature death in the region [2]. In Nigeria, the estimated hypertension prevalence (systolic blood pressure (BP) ≥ 140 mmHg or diastolic BP ≥ 90 mmHg) is 28.9% among people aged 15 years and older [3]. It is well established that long-term treatment, which includes behavioral adaptations (e.g., weight control, reduced salt intake, regular exercise, smoking cessation and moderate alcohol use) and pharmacotherapy if needed, reduces BP and, concomitantly, the risk of developing CVD and other hypertension-related complications [4]. However, BP control rates are low in SSA [5]. Unfortunately, many people in the region have no access to affordable hypertension care in their communities. In addition,

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in settings where affordable care is available, poor compliance can compromise treatment outcomes [6-8]. Indeed, adequate hypertension management is challenging in SSA and multiple interventions are needed to improve both access to- and compliance with quality care [9].

A review of community-based interventions for CVD prevention in low- and middle income countries suggests that patient education can have a positive effect on treatment adherence and BP control among patients with hypertension [8]. The literature provides ample information on health education programs to support hypertension self- management for patients living in high income countries [10]. However, information on suitable educational programs for patients with hypertension in low resource countries is not available [11]. To fill the gap, in this paper we describe the formative phases by which we developed a cardiovascular health education program (CHEP) that is designed for insured primary care patients with hypertension in Kwara State, Nigeria. By positively influencing patients' perceptions of hypertension and medication, the developed program has been shown to strengthen medication adherence, and consequently BP reduction among the affected population [12].

Context

Kwara State was the fourth poorest State in Nigeria at the time of this study [13]. The majority of the population lives in rural areas and works in agriculture, fishery or (petty) trading. About one third of the population is illiterate. The main ethnic groups in the State are Yoruba and Nupe. Islam and Christianity are the main religions. In 2007, a subsidized health insurance program, the Kwara State Health Insurance (KSHI), was introduced in three rural regions in Kwara, where about 20% of the population lives below the poverty line of 2 USD per day [13]. KSHI provides coverage for consultations, diagnostic tests and drugs for all conditions, that can be managed at a primary care level, including hypertension, and limited coverage for secondary care services. In December 2014, about 67,000 people were enrolled in KSHI. Enrollees paid approximately 8% of the yearly premium of 30 USD themselves, while the Kwara State Government and the Health Insurance Fund subsidized the remaining 92% [14].

In 2010, hypertension was identified as the most important risk factor for CVD in rural Kwara, with a prevalence of 21% among the population aged ≥18 years and low levels of awareness (8%), antihypertensive treatment coverage (5%), and BP control (3%) among those with hypertension [15]. As part of its quality improvement program KSHI introduced WHO guidelines for CVD risk management, including hypertension care in contracted primary care clinics [16] and offered them new equipment, organizational support and training to facilitate implementation [17]. But because clinical guidelines offer little guidance on methods for patient education, CHEP was developed to support KSHI's initiative to improve the quality of CVD prevention care in Kwara [18].

Concepts underlying the development of CHEP

According to common sense models of health behaviour [19,20], patients' perceptions of a health problem (e.g., hypertension) and its treatment are an important determinant of treatment adherence. These perceptions can be rooted in individual experiences but also in the broader social, cultural, economic or environmental context of patients' lives. This was also highlighted in recent reviews of studies of patient perspectives on hypertension [21,22]. It is well recognized that "patient-centred" health education can play an important role in promoting adequate hypertension self-management, and particularly education that addresses patient perceptions on hypertension (e.g., its causes, symptoms, duration, severity, and consequences), the recommended treatment and their own ability to use medication and implement the recommended behavioural changes [10,23]. The five A's approach (Ask, Advise, Assess, Assist, and Arrange) is an example of a widely used "patient-centered" approach for supporting hypertension self-management [10]. However, several authors have emphasized it is also vital that educational interventions are "culturally sensitive" and that deep-rooted cultural norms (e.g., beliefs and traditions) and structural factors (e.g., socioeconomic status, health literacy) influencing behaviours of target groups are considered when developing such interventions [24-26]. In doing so, intervention developers must ensure that both the form in which health promotion interventions are delivered *(the surface structure)* and their content (*deep structure)* acknowledge customs, socio-demographic characteristics, and social, cultural and environmental values of the targeted population groups [25,26]. Our work drew upon a practical protocol for hypertension education developed by Beune et al. [27] to support treatment adherence and BP control among Afro-Surinamese and Ghanaian primary care patients with hypertension in the Netherlands. This protocol includes a generic "patient-centred" part, based on the method of the five A's [10] and a "culturally adapted" part, based on a framework proposed by Kleinman. The protocol allows educators to address both individual and cultural specific perspectives on hypertension self-management.

Methods

Design

Cardiovascular Health Education Program (CHEP) was developed in two phases: a formative phase and a construction phase. The goal of the formative phase was to collect information from available literature and from qualitative interviews with 40 primary care patients with hypertension and 11 health care professionals from the participating hospital and 4 health insurance managers from the Kwara State Health Insurance (KSHI) program. The goal of the construction phase was to review information that emerged in the formative phase and to supplement the protocol and materials developed by Beune et al. [27] with information collected during the formative phase, so as to make the program and educational materials relevant to patients in Nigeria.

Participants and setting

The study setting was a busy primary care hospital that participated in the KSHI program in (rural) Kwara State. As common in most parts of rural Africa, at that time rural Kwara similarly experienced an acute shortage of healthcare personnel. During the study period (July 2010 to December 2010) the hospital was managed by an experienced general practitioner assisted by 2 other doctors, 10 nurses, 4 laboratory technicians, 3 pharmacy staff and 4 health information administrative staff. At the same time about 400 hypertensive patients were enrolled in the insurance program and accessed hypertension care in the hospital.

Participants for the perception (interview) studies used in developing the education program include: 40 insured hypertensive patients (16 males and 24 females) for the patients' perspectives study; 2 medical doctors, 2 nurses, 2 laboratory staff, 4 health information (records) staff and 1 pharmacy staff for the healthcare professionals' perspectives study; and 4 KSHI managers (all medical doctors) for the health insurance managers' perspectives study.

Details of the specific methods employed in the interview studies are reported elsewhere [28,29]. For the literature review a narrative approach was used.

Data management and analysis

Data management and analysis of the qualitative interviews was based on grounded theory and supported with MAXQDA software.

Ethics

Ethical approval (Ref: UITH/CAT/189/13/13) was obtained from the University of Ilorin Teaching Hospital on 30th August 2010. Prior to commencement of the study informed consent was obtained from all study participants.

Results

Formative phase

Surface structure: The information gleaned from the literature provided little information about the best form for educational programs for the priority group of CHEP. However, interviews with health care professionals provided some relevant insights. They suggested various educational forms or strategies for enhancing patients' hypertension self-management capacities that are suitable within rural contexts in Africa where financial resources and health care personnel are limited: periodic group education led by trained nurses or paramedics (in addition to individual consulting room education); cardiovascular health clubs for patients to stimulate regular exercise and healthy dieting; the use of well known "positively living" community figures and peers as educators; involvement of patients' family members in education to ensure necessary social support for hypertension management; the use of local languages or interpreters in education; the use of pictorial and audiovisual materials (audiovisuals, posters, pictures, pamphlets) to reinforce learning, especially for illiterate patients. Moreover, the professionals emphasized that the organization of educational events during religious holidays, Muslim prayer hours and market days should be avoided. They also viewed the use of a "contact tracing system" to remind patients of their scheduled clinic visits as an educational tool.

Deep structure: In order to develop the content of CHEP we sought "in-depth" information on how patients' "explanatory models" of hypertension (understandings of the causes, mechanisms or pathophysiology, course of illness, symptoms) and its treatment relate to their daily hypertension self-management behaviours. To this end we conducted a qualitative interview study to investigate perceptions on hypertension and its management among primary care patients with hypertension in Kwara State [27] and reviewed similar studies from Nigeria on this topic [30,31]. Table 1 summarizes some of the main themes that emerged from the study and the literature, the self-management coping strategies employed by patients and the specific educational teachings which the CHEP trainers used to address foci of insufficient hypertension knowledge that emerged from patients' perceptions. These themes illustrate that poor knowledge, cultural beliefs and customs and contextual factors may hamper adherence to treatment among patients, but that the local context also provides specific possibilities for harnessing adherence. To enhance the cultural sensitivity profile of the intervention we selected from the interview data aspects of the people's culture, practices and beliefs with clear health benefits. For example participants were taught to use suitable local salt substitutes in place of salt, and the healthier vegetable oil in place of red palm- and groundnut oils in preparing their meals. We encouraged consumption of fruits and vegetables which are cheap and abundantly available in the community, and re-orientated participants on perceived prejudiced cultural practices about local stimulants, tobacco and alcohol. To achieve physical fitness with less difficulty we encouraged the use of locally available environmental materials and cultural practices that are user-friendly to get enough exercise daily. Examples of these include: performance of usual household chores involving low- and medium level physical activities, brisk walking to- and from farm/other locations, farming/gardening activities, cultural and religious activities e.g., dancing, clapping, singing, drumming etc. and if feasible other more conventional exercise types like swimming, spot jogging and cycling to- and from farm/other destinations. Furthermore, participants were enlightened and trained on new strategies to achieve consistent use of prescribed medication to improve self-management capacities. To promote attractiveness and acceptance of the intervention by participants the physical activities were practiced within training sessions and thereafter set as goals to be achieved at home in between training sessions. Moreover, an audiovisual on environmentally possible user-friendly exercise regimes starred by familiar peers was viewed by participants at the beginning of each training session (Table 1).

Construction phase

CHEP: Based on the formative phase, we developed a final protocol for CHEP with the following overall objectives:

1) To enhance patients' understanding of hypertension and its treatment/management.

2) To raise patients' awareness and confidence on how they can manage hypertension in their daily lives.

3) To raise patients' awareness and confidence on how they can cope with the challenges in managing hypertension in the long run.

In order to achieve these objectives we developed a final program for cardiovascular health education that consisted of three sequential modules for group-based educational sessions. Table 2 provides an overview of the specific objectives and the proposed content and educational tools for each of these modules/sessions. The CHEP trainings were facilitated by a medical doctor (the researcher) and a trained nurse who is a native of the local community and had undergone prior training in CVD prevention strategies (Table 2).

Translation of findings from formative phase into CHEP

CHEP was inspired by the three modules of the culturally adapted hypertension education (CAHE) program developed by Beune *et al.* [27]. The overall- and specific objectives of the educational sessions of CHEP as listed above are similar to those of CAHE (Supplementary file). However, based on information from the formative phase, several changes were made to components of CAHE, so as to adapt the program to the Nigerian socio-cultural context (Table 3).

Firstly, rather than individual counseling, which was used in CAHE, CHEP used group-interviewing, group-discussions and group-education as the main educational tools. Secondly, to reinforce education about medication use and lifestyle adaptations, CHEP used posters with images, a video film and physical exercise sessions at the clinic's compound. Instead, CAHE used a booklet containing written information. Given the low literacy rate of the priority groups of CHEP, pictorial information and practical exercises were deemed more appropriate. Finally, in order to ensure cultural sensitivity, we designed the form (surface structure) and the specific content (deep structure) of CHEP by using findings from the interviews held during formative phase as illustrated in Table 3.

Table 1. Explanatory models on hypertension, self-management and educational counseling derived and tailored to address patients' perspectives.

Theme / Patient perceptions on hypertension	Hypertension self-management	Tailoring educational counseling to patient perspectives
Cause of hypertension		
Thinking too much/stress	Staying calm (through cigarettes, snuff and alcohol)	Counsel on ineffectiveness of use of stimulants in addressing psychological stress/thoughtfulness; emphasize the counterproductive effects too
Worried about their poverty states and resultant poor living conditions	Praying things will change	In addition to their prayer strategy, advise on pragmatic diversification of economic and occupational activities
Course of hypertension		
Hypertension comes and goes; not present when you feel well	Stop medication when feels well; only takes medication/ treatment when blood pressure is perceived to be high	Enlighten on the cyclical nature of hypertension signs and symptoms despite its incurability and chronic nature; emphasize need for consistent medication use to achieve effective control
Hypertension is curable	Abandoning pills/treatment due to perceived curability of hypertension	Enlighten on incurability, chronic and lifelong nature of hypertension
Symptoms of hypertension		
Not always noticeable, only doctors know all about hypertension	Mention observed symptoms to doctor, stop treatment unilaterally, only follow treatment when doctor advises so	Enlighten on the often silent and non-symptomatic nature of hypertension despite its dangers
Medication management of hypertension		
- Easily forgets to take medications - Pills have intolerable side-effects	- Missing medication due to forgetfulness - Missing medication due to side-effects	- Improve on forgetfulness by identifying pills dosing with some daily accustomed practices e.g. eating meals, daily prayers - Encourage optimal patient – doctor communication for ideas on overcoming medication side-effects - Encourage patients to seek social/family support on reminders on pill taking and visit compliance - Emphasize life-long nature of hypertension/treatment
White man's pills (orthodox pills) are better than local herbal medications	Take medication/pills regularly as instructed	Applaud and encourage continued consistency in medication use
Trusts in herbal medication	Change medication regimen Replace/compliment prescribed medication with herbal medicines	Highlight the inefficacious nature of herbal remedies for hypertension using hard evidences of failed treatment
Trust in faith healing; with prayer hypertension will surely go	Replace or supplement/reinforce prescribed medication with faith healing; relies on faith healing/prayer	Explain lack of statistics or scientific proofs on effectiveness of faith healing regarding hypertension using hard evidences of failed treatment
Long waiting time, inflexible clinic hours, drug stock outs	- Cannot refill pills, therefore unable to comply with prescription - Missing pills due to missed clinic visits/medication stock outs	Encourage optimal patient – doctor communication for ideas on how to address irregular medication use due to traveling, medication stock-outs, missed clinic visits
Medication use not possible during religious fasting	- Abstains from medication during religious fasting periods - Missing medication due to religious fasting practices	Encourage optimal patient – doctor communication for ideas on how to address irregular medication use due to religious fasting practices
Behavioral management of hypertension: salt reduction		
Patient not aware of relation between BP and salt	Overuse salt even though well aware of hypertension diagnoses	Enlighten on relationship between salt and hypertension. Discourage the typical African dislike of low salt diet
Local food preservation (against microbial decomposition) and preparation customs require salt use	Ignores recommendations to reduce salt	Discourage cultural use of salt for food preservation purposes; suggest use of heat-drying (abundant from sun) for food preservation
Cultural use of salted solutions to treat abdominal ailments	Ignorantly overuse salt for medicinal reasons	Discourage cultural use of salt for medicinal purposes
Increasing trend to eat salt-preserved canned and processed foods in rural regions	Continued ignorant overuse of salt	Enlighten and discourage salt overuse through consumption of processed foods
Local substitutes for salt Iru (Locust bean paste) are cheaply available	Uses Iru in place of/or in addition to salt	Encourage use of available salt substitutes like Iru as an alternative to salt for food preparation and seasonings
Behavioral management of hypertension: weight control and diet		
A large body size is perceived as sign of wealth, health, beauty	Tends towards increasing body size (gaining weight) to look healthy	Provide examples of slim people who are perceived as healthy and beautiful
Heaviness is inherited	Weight gain inevitable; would rather over-eat to gain weight	Enlighten on controllability of weight gain for health reasons despite possible inheritableness
Local dietary customs encourage preparation of fattening meals with readily available and cheap red palm and ground nut oil, calorie-rich starched foods and goat meat	Helplessness, nothing can be done	De-emphasize local tendencies for composing unhealthy diet (palm oil and groundnut oil, excessive meat consumption)
Low consumption of vegetables and fish despite availability and at low/reasonable cost?	Increases consumption of fish, fruits and vegetables	Exploit local possibilities for healthy diet (fruit farming, vegetable gardening, fishing etc)
Behavioral management of hypertension: exercise		
Little knowledge of relationship of exercise to blood pressure	Sees no need to exercise to lower BP	Enlighten on the positive relationship between exercise and lowered blood pressure

- Cultural perceptions that exercise/sports is for unserious or greedy persons who walk to avoid travel costs, and dangerous for older adults. - Poor awareness of how to exercise	- Lacks interest in conventional physical fitness activities - Reluctant to exercise for fear of adverse effect on health and increasing age status - Prefers simple, practicable, user-friendly exercise regimes	- Enlighten on positive effect of exercise on blood pressure despite increasing age - De-emphasize reliance on conventional regimented physical exercise activities (sports) - Exploit possibility to achieve physical fitness with usual everyday activities (household chores; religious activities, e.g., clapping, dancing; leisurely activities, e.g. singing, drumming, dancing; work-related activities, e.g., farming, gardening; food preparation activities, e.g. wood axing, yam pounding). - Encourage patient-friendly preferred forms of moderate conventional exercise activities such as on the spot jogging, brisk walking and cycling to and from work/farm -Organize physical fitness sessions
Behavioral management of hypertension: alcohol, tobacco, stimulants		
Alcohol and tobacco culturally perceived useful and increasingly available in various consumable forms (e.g. palm wine, snuff)	Uses alcohol and tobacco products for socio-cultural reasons (e.g. to stimulate work, relieve stress etc) despite awareness of hypertensive status	Enlighten on the dangers of alcohol and tobacco to cardiovascular health despite perceived cultural usefulness; risks outweigh benefits
Religion and gender perspectives discourages use	Exploits religious and gender abhorrence of stimulants use to limit or quit use of alcohol and tobacco products	Capitalize on existing cultural and religious abhorrence of these unhealthy social habits to further reinforce behavior change message
Social support for hypertension management		
Family, peers, local leaders, media are potential sources of supports	- Helpless about inadequate support from family and community which hampers clinic visits, regular medication use and behavioral changes - Exploits support from family with regards to cooperation on dietary prescriptions like low salt diet - Exploits support from community and religious leaders who routinely reinforce counseling on regular pills use and healthy behavior	-Encourage participants to seek adequate support from family members in following prescribed treatments - Invite family members of patients and solicit their supports and cooperation to help patients achieve treatment adherence - Exploit the opportunities presented through potential roles of community leaders and religious organizations in additional counseling on pills adherence and healthy behavior

An overview of the key information that was provided to CHEP trainers about commonly held patient perspectives that may either hinder or enable adherence to treatment is also shown in Table 1. This information was used by the educators to facilitate training on specific topics such as what hypertension is, or what can encourage appropriate medication, dietary or behavioral adaptations.

Evaluation

CHEP was implemented for a group of 149 primary care patients who were not sufficiently adherent to treatment recommendations or had BP above target after they had received guideline-based treatment for at least one year in the context of KSHI program. In a previous published report of a pretest/posttest study, we have shown that the developed program CHEP was able to strengthen medication adherence, in particular by positively influencing patients' perceptions of medications [12].

Discussion

CHEP is an educational program that was designed specifically for primary care patients with hypertension in Nigeria, with the aim to enhance their understanding of hypertension and better disease self-management. The rationale for developing this program was based on research which has demonstrated that a poor understanding of hypertension or aspects of the treatment may hamper adequate BP control among patients with hypertension, even if they receive affordable guideline-based treatment [12]. Rather than relying solely on information from healthcare providers on what patients need to know to manage hypertension, CHEP was developed using a formative approach that also considered data from qualitative interview studies on affected patients' perspectives regarding inhibitors and facilitators for managing hypertension. An existing educational program for patients in Europe, CAHE [27] that combines principles of patient-centeredness and cultural sensitivity, was taken as point of departure in developing CHEP. Notions from Resnicow (1998) on cultural adaptation of health education were employed to adapt the program to fit the patient population in the program area.

CHEP provides a framework for cardiovascular health education for patients with hypertension in Nigeria. However, the majority of the population investigated in the formative interview study had health insurance (100%), a low level of formal education (92%), was of Nupe or Yoruba origin, practicing either Christianity or Islam and did not suffer from hypertension-related complications or co-morbidity [27]. Therefore, CHEP may not have addressed the concerns of all hypertensive patients in Nigeria, including those from other social strata and ethnic and linguistic groups or patients treated in tertiary care hospitals. Future formative studies are needed to develop and test the CHEP framework among larger populations. Our initial evaluation in a non-controlled study suggests that CHEP can be implemented in rural primary care practices in Nigeria and that it can lead to a decrease in patients' concerns about medication use and an increase in medication self-efficacy, and, concomitantly, better medication adherence [12]. There is a potential to further test the impact of CHEP on treatment adherence and BP control in future using randomized studies.

Conclusion

This paper provides a detailed description of the development and design of a program for cardiovascular health education that is applicable to patients with hypertension in rural Nigeria. The strength of the program is that it was developed based on "patient-centered" and "culturally-sensitive" approaches to health promotion using qualitative interviews with stakeholders. The program and formative process for developing CHEP described in this paper offer a framework for developing or adapting similar educational programs for other patient populations with high risk of CVD in Africa. Even though we have shown that the developed program was able to strengthen medication adherence, in the next phase CHEP will need to be evaluated in rigorous controlled studies.

Practice implications

Although CHEP was developed in the context of a specific program

Table 2. Overview of group-based cardiovascular health education program (CHEP)

Sessions	**Intervention**		
	Group session 1 (*CHEP-1*) (week 3)	**Group session 2 (*CHEP-2*) (week 7)**	**Group session 3 (*CHEP-3*) (week 15)**
Overall objectives	To enhance patients' understanding of hypertension and its treatment/management	To raise patients' awareness and confidence on how they can manage hypertension in their daily lives	To raise patients' awareness and confidence on how they can cope with the challenges in managing hypertension (in the long run)
Session objectives	To elicit participants' ideas about hypertension and treatment; inform them about medical perspective; reach consensus; and establish treatment objectives for next session – *CHEP-2*	To explore daily challenges participants face in managing hypertension; how they currently cope with the identified challenges; inform them on how they may cope better; and establish objectives for next session – *CHEP-3*	To explore daily challenges participants face in managing hypertension; how they currently cope with the identified challenges, inform them on how they may cope better; and establish how they can continue to deal with the challenges in future
Session duration	2 hours	2 hours, 30 minutes	2 hours, 30 minutes
Educational tools	Group discussion/ instruction led by trainers, individual assignment	Discussion of results of individual assignment, group discussion, instruction led by trainers, supported by posters and video, individual assignment	Discussion of results of individual assignment, group discussion/ instruction by trainers, supported by posters and video
Program instructions	**1.1: Hypertension and its management: group discussion (30 minutes)** • What is hypertension? • Is hypertension a disease? • What are your views about hypertension? • What causes hypertension? • Who can get hypertension? • Is hypertension dangerous, If so, how dangerous is it? • Is hypertension curable? • How long does hypertension last? • How does hypertension present? • How did you get your hypertension? • What can you do to prevent hypertension? • How can hypertension be treated? • How is hypertension related to your lifestyle and what you eat? **1.2: What patients can do to manage hypertension: interactive instruction (30 minutes) *** • Take your medications regularly as prescribed • Seek support from your family/friends on reminders in taking your drugs regularly and in reducing salt intake • Adopt healthy diet (described) • Decrease amount of sodium/salt in your diet • Stay physically active / exercise regularly • Lose excess weight • Quit smoking • Quit/reduce alcohol intake • Quit snuff, Kola nuts • Limit exposure to emotional stress **1.3: Addressing what can make hypertension management difficult for patients: group discussion (30 minutes)** • Taking your pills regularly • Reducing salt intake • Adopting a healthy diet • Staying physically active **1.4: How to overcome obstacles: instruction (20 minutes) **** **1.5: Individual assignment (10 minutes)** • Set 3 goals on what you want to achieve before your next CHEP visit to keep your blood pressure controlled (e.g. reduce salt consumption, increase physical activity through exercise)	**2.1: Medication use: group discussion (15 minutes)** • What challenges do you face? • How did you cope? **2.2: Dietary advice/salt: group discussion (15 minutes)** • What challenges do you face? • How did you cope? **2.3: Weight reduction/exercise group discussion (15 minutes)** • What challenges do you face? • How did you cope? **2.4: Attending your follow-up appointments regularly as advised group discussion (15 minutes)** • What challenges do you face? • How did you cope? **2.5: Audiovisual '*Living positively with hypertension*': Instruction (25 minutes)** • View and discuss video "living positively with hypertension" and some patient-centered exercise regimes to help coping (**35 minutes**) **2.6: Simple exercises you can do at home (20 minutes)** • Poster teaching session (**5 minutes**) • Practical exercise session (**15 minutes**) **2.7: Individual assignment (10 minutes)**: • Set 3 goals on what you want to achieve before your next CHEP visit to keep your blood pressure controlled (e.g. reduce salt consumption, increase physical activity through exercise)	**3.1: Medication use: group discussion (15 minutes)** • What challenges do you face? • How did you cope? **3.2: Dietary advice/salt: group discussion (15 minutes)** • What challenges do you face? • How did you cope? **3.3: Weight reduction/exercise group discussion (15 minutes)** • What challenges do you face? • How did you cope? **3.4: Attending your follow-up appointments regularly as advised group discussion (15 minutes)** • What challenges do you face? • How did you cope? **3.5: Audiovisual '*Living positively with hypertension*': Instruction (25 minutes)** • View and discuss video "living positively with hypertension" and some patient-centered exercise regimes to help coping (**35 minutes**) **3.6: Simple exercises you can do at home (20 minutes)** • Patient friendly exercise practice sessions using: local activities such as wood cutting, gardening, mortar grinding, drawing water from well, other household chores, farming, biking, brisk walking, leisure activities e.g. drumming, dancing. **3.7: Final closing session (Instructions), 10 minutes** In moving forward: • Make the lessons learnt from this program your daily routine for life • Take your drugs regularly • Exercise daily, regularly • Reduce salt intake and adopt healthy diet • Attend your follow-up clinic regularly • Get needed support from family members/ friends in your hypertension self-management efforts • Read/consult your hypertension information leaflet/pamphlet regularly for additional support • View attentively the audiovisuals that will be made available to you during waiting time in clinic
Additional information: - Two trainers guided the sessions - Sessions were held in English, Yoruba and Nupe with a translator - All sessions included a 5 minute welcome - Results of participants' homework assignments were discussed with the trainers 15 minutes before the start of next sessions - During breaks, patients viewed educational posters *Power points are used ** Posters are used			

Table 3. Adapted components of the cardiovascular health education program

Aim	Specific aims	Educational tools	Cultural adaptations	
			Form	**Content**
Enhance patients understanding of hypertension /treatment	Explore patient perspectives on hypertension and treatment	Group interviewing to elicit various explanatory models, using open questions	Education offered in local languages by trained doctors/nurses familiar with the local context	Educators are familiar with information on ways in which patients in local setting perceive hypertension and treatment, elicit additional information from trainees
	Inform patients on medical perspective on hypertension and treatment	Group education to inform patients about medical models	Idem	Instruction uses applicable patient perceptions to enable education to re-orient misunderstandings of hypertension
	Agree on key issues as regards to hypertension and treatment	Group discussion	Idem	
	Set feasible treatment goals	Fill out personal patient booklet	Assist illiterate patients to note treatment goals	
Raise patients' awareness and confidence on how they can manage hypertension in their daily lives	Explore daily challenges with medication use, weight control, salt use and exercise	Group interviews	Education offered in local languages by trained doctors/nurses familiar with the local context	Educators are familiar with and use information on inhibitors of treatment adherence in local setting; information from trainees is used
	Explore/provide examples of adequate ways to cope with challenges with medication use, weight control, salt use and exercise	Group interviews	idem	Educators are familiar with information on ways for coping with hypertension treatment in local situation; Trainees provide additional information
	Provide examples of adequate/ feasible ways for facing challenges with medication use, weight control, salt use and exercise	Posters	Posters provide pictures to make them accessible to illiterate patients	Posters use examples of ways of coping suggested by patients in formative phase
		Video about coping with life style modification	Community members used as actors/ script writers to allow identification	Video uses examples family situations that inhibit/facilitate lifestyle adaptations
	Skills development for adherence	Group education	Educational session referring to commonly encountered obstacles	How to find support for continued medication adherence from doctor and family; what are cheap, locally available foods for substituting salt and composing a healthy diet; what are feasible ways for daily exercise; what are ways for using family members, community/ religious groups to support healthy eating practices and exercise
		Exercise classes at health facility		Use of common daily activities as forms of exercise

to improve the quality of cardiovascular care for insured primary care patients with hypertension in Kwara State Nigeria, both the described process for developing CHEP and the protocol itself can be used as a framework for developing and testing cardiovascular health education in other settings in SSA. As CHEP has shown to have a potential to improve hypertension management and adherence to treatment among a selected group of patients, wider implementation and further evaluation in other settings is recommended.

Authors' contributions

AOO drafted the manuscript, conducted the study and participated in the design of the study. JH, KS, CS and MH originally designed the study. JH and KS provided substantial input and critically revised several drafts of the manuscript. AO, CS, E.J.A.J, JH, KS, MH, OAB and TA revised the manuscript for important intellectual content. AOO, JH and KS participated in the data collection. CS, E.J.A.J, JH and KS advised in the data analysis. AO, CS, JH, KS and TA are members of the supervisory board. All authors read and approved the final draft.

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Competing interest

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References

1. World Health Organization (2015) Global status report on noncommunicable diseases 2014.

2. Lim SS, Vos T, Flaxman AD, Danaei G, Shibuya K, et al. (2013) A comparative risk assessment of burden of disease and injury attributable to 67 risk factors and risk factor clusters in 21 regions, 1990–2010: a systematic analysis for the Global Burden of Disease Study 2010. *Lancet* 380: 2224-2260. [Crossref]

3. Adeloye D, Basquill C, Aderemi AV, Thompson JY, Obi FA (2015) An estimate of the prevalence of hypertension in Nigeria: a systematic review and meta-analysis. *J Hypertens* 33: 230-242. [Crossref]

4. Murray CJ, Lauer JA, Hutubessy RC, Niessen L, Tomijima N, et al. (2003) Effectiveness and costs of interventions to lower systolic blood pressure and cholesterol: a global and regional analysis on reduction of cardiovascular-disease risk. *Lancet* 361: 717-725. [Crossref]

5. Kayima J, Wanyenze RK, Katamba A, Leontsini E, Nuwaha F (2013) Hypertension

awareness, treatment and control in Africa: a systematic review. *BMC Cardiovasc Disord* 13: 54. [Crossref]

6. De Geest S, Sabaté E (2003) Adherence to long-term therapies: evidence for action. *Eur J Cardiovasc Nurs* 2: 323. [Crossref]

7. Mendis S, Abegunde D, Oladapo O, Celletti F, Nordet P (2004) Barriers to management of cardiovascular risk in a low-resource setting using hypertension as an entry point. *J Hypertens* 22: 59-64. [Crossref]

8. van de Vijver S, Oti S, Addo J, de Graft-Aikins A, Agyemang C (2012) Review of community-based interventions for prevention of cardiovascular diseases in low- and middle-income countries. *Ethn Health* 17: 651-676. [Crossref]

9. Brown MT, Bussell JK. Medication adherence: WHO cares? *Mayo Clin Proc* 86: 304-314.

10. Whitlock EP, Orleans CT, Pender N, Allan J (2002) Evaluating primary care behavioral counseling interventions: An evidence-based approach. *Am J Prev Med* 22: 267-284. [Crossref]

11. Hubley J (2006) Patient education in the developing world--a discipline comes of age. *Patient Educ Couns* 61: 161-164. [Crossref]

12. Odusola AO, Nelissen H, Hendriks M, Schultsz C, Wit F, et al. (2016) How Group-Based Cardiovascular Health Education Affects Treatment Adherence and Blood Pressure Control among Insured Hypertensive Nigerians: A Pre-Test, Post-Test Study. *World J Cardiovasc Dis* 5: 181-198.

13. Gustafsson-Wright E, Schellekens O (2013) Achieving universal health coverage in Nigeria one state at a time: a public-private partnership community-based health insurance model. Wash. Brook. Inst.

14. Health Insurance Fund (2014). Available from: http://www.hifund.org/

15. Hendriks ME, Wit FW, Roos MT, Brewster LM, Akande TM, et al. (2012) Hypertension in sub-Saharan Africa: cross-sectional surveys in four rural and urban communities. *PLoS One* 7: e32638. [Crossref]

16. World Health Organization (2016) Pocket guidelines for assessment and management of cardiovascular risk.

17. Hendriks M, Brewster L, Wit F, Bolarinwa OA, Odusola AO, Redekop W, et al. (2011) Cardiovascular disease prevention in rural Nigeria in the context of a community based health insurance scheme: QUality Improvement Cardiovascular care Kwara-I (QUICK-I). *BMC Public Health* 11: 186. [Crossref]

18. Odusola AO, Hendriks M, Schultsz C, Stronks K, Lange J, et al. (2011) Development and evaluation of a patient centered cardiovascular health education program for insured patients in rural Nigeria (QUICK-II). *BMC Public Health* 11: 171. [Crossref]

19. Leventhal H, Diefenbach M, Leventhal EA (1992) Illness cognition: using common sense to understand treatment adherence and affect cognition interactions. *Cogn Ther Res* 16: 143-163.

20. Kleinman A, Eisenberg L, Good B (2006) Culture, illness, and care: clinical lessons from anthropologic and cross-cultural research. FOCUS J. Lifelong Learn. *Psychiatry* 4: 140-149.

21. Khatib R, Schwalm JD, Yusuf S, Haynes RB, McKee M, et al. (2014) Patient and Healthcare Provider Barriers to Hypertension Awareness, Treatment and Follow Up: A Systematic Review and Meta-Analysis of Qualitative and Quantitative Studies. *PloS One* 9: e84238.

22. Marshall IJ, Wolfe CD, McKevitt C (2012) Lay perspectives on hypertension and drug adherence: systematic review of qualitative research. *BMJ* 345: e3953. [Crossref]

23. Boulware LE, Daumit GL, Frick KD, Minkovitz CS, Lawrence RS, et al. (2001) An evidence-based review of patient-centered behavioral interventions for hypertension1 1The full text of this review article is available via AJPM Online at www.elsevier.com/locate/ajpmonline. *Am J Prev Med* 21: 221-232.

24. Greenhalgh J, Meadows K (1999) The effectiveness of the use of patient-based measures of health in routine practice in improving the process and outcomes of patient care: a literature review. *J Eval Clin Pract* 5: 401-416. [Crossref]

25. Netto G, Bhopal R, Lederle N, Khatoon J, Jackson A (2010) How can health promotion interventions be adapted for minority ethnic communities? Five principles for guiding the development of behavioural interventions. *Health Promot Int* 25: 248-257.

26. Resnicow K, Baranowski T, Ahluwalia JS, Braithwaite RL (1999) Cultural sensitivity in public health: defined and demystified. *Ethn Dis* 9: 10-21. [Crossref]

27. Beaune G, Stirbat TV, Khalifat N, Olivier CE, Garcia S, et al. (2014) How cells flow in the spreading of cellular aggregates. *PNAS* 111: 22.

28. Odusola AO, Hendriks M, Schultsz C, Bolarinwa OA, Akande T, et al. (2014) Perceptions of inhibitors and facilitators for adhering to hypertension treatment among insured patients in rural Nigeria: a qualitative study. *BMC Health Serv Res* 14: 624. [Crossref]

29. Odusola AO, Stronks K, Hendriks ME, Schultsz C, Akande T, et al. (2016) Enablers and barriers for implementing high-quality hypertension care in a rural primary care setting in Nigeria: perspectives of primary care staff and health insurance managers. *Glob Health Action* 9: 29041. [Crossref]

30. Osamor PE, Owumi BE (2011) Factors associated with treatment compliance in hypertension in southwest Nigeria. *J Health Popul Nutr* 29: 619-628. [Crossref]

31. Taylor KD, Adedokun A, Awobusuyi O, Adeniran P, Onyia E, et al. (2012) Explanatory models of hypertension among Nigerian patients at a University Teaching Hospital. *Ethn Health* 17: 615-629. [Crossref]

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