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EXPLANATORY MODELS OF HYPERTENSION AMONG NIGERIAN PATIENTS AT A UNIVERSITY TEACHING HOSPITAL

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Abstract

Objective—To elicit the explanatory models (EM) of hypertension among patients in a hospital-based primary care practice in Nigeria.

Design—Semi-structured in-depth individual interviews and focus groups were conducted with 62 hypertensive patients. Interviews and focus groups were audio-taped and transcribed verbatim. Data analysis was guided by phenomenology and content analysis using qualitative research software ATLAS.ti 5.0.

Results—Patients expressed four categories of EM of hypertension: 1) perceptions of hypertension, 2) consequences, 3) effect on daily life, and 4) perception of treatment. Focus group discussions and key informant interviews yielded a wide range of insights into the social and cultural factors influencing patients' beliefs and health behavior. Participants were aware of the risks of hypertension. There was disagreement between participants' own understanding of the serious nature of hypertension, the need for long-term treatment, and the desire to take medication long-term. Participants acknowledged the use of traditional medicine (e.g. teas and herbs) and healers. Different themes emerged for men versus women such that women often focused on family issues while men tended to discuss external stressors stemming from work as a cause of hypertension. Men were concerned with frequent urination, decreased libido and erectile dysfunction.

Conclusion—Knowledge gained will inform development of patient-centered treatment plans and targeted behavioral and educational interventions.

Keywords

Hypertension; Nigerians; Explanatory models; illness representations; sub- Saharan Africa; Qualitative Study

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1. Introduction

More than a fourth of the world's adult population (nearly one billion) had hypertension (HTN) in 2000, and this proportion will increase to nearly one-third (1.56 billion) by 2025, with economically developing countries bearing the largest burden of the illness (639 million compared to only 333 million in developed countries) (Kearney *et al.* 2005). Not only does HTN affect more people in economically developing than developed countries, but onset of cardiovascular disease is also at an earlier age in developing countries (Pearson 1999). In two studies in southeastern Nigeria, prevalence rates of 32.8% in rural and semi-urban populations and 42.2% among a market population were reported (Ulasi *et al.* 2010, 2011). Blood pressure (BP) control in African populations is less than half of industrialized nations (only 5–10% compared to 20%; BP <140/90 mmhg). These low rates of BP control may explain the relatively large burden of cardiovascular disease in developing countries (Belue *et al.* 2009). For example, in 1990, the proportion of deaths from cardiovascular disease before age 70 years was 46.7% in economically developing countries compared with 26.5% in developed countries (Seedat 2000). Thus there is a rather urgent need to develop interventions targeted at HTNcontrol and subsequent reduction in CVD risks and mortality.

A major determinant of BP control is adequate medication adherence which is abysmally low. For example, in the Gambia and the Seychelles, only 26 – 27% of patients with HTN adhere to their antihypertensive medication regimen (Bovet *et al.* 2002, van der Sande *et al.* 2000). Several factors have been proposed as important predictors of medication adherence, but there is no data on the predictors of adherence to antihypertensive medications among patients in sub-Saharan Africa (SSA). Considering that in many countries poorly controlled BP represents a serious economic burden, improving adherence could represent for them an important potential source of health and economic improvement, from the societal, institutional and employers' point of view (WHO 2003).

There is increasing evidence that patient beliefs are important determinants of health outcomes (Beune *et al.* 2006). Specifically, explanatory models (EM) of illness refer to people's beliefs about the etiology of an illness, its course, the timing of symptoms, the meaning of sickness, its diagnosis, and methods of treatment (Kleinman *et al.* 1978). The provider and patient have EMs. A provider's EM is how practitioners understand and treat diseases and is often grounded in their medical training. A patient's EM is how they understand illnesses and how they choose and evaluate preventive or therapeutic recommendations and are rooted more in the experience of their social networks, their families, ethnicity and culture (Fitzpatrick 1984, Helman 1989). Hence, health care providers and patients often possess different EMs of the etiology, onset and progression of a given disease. Concordance between the EMs of patients and their providers has been shown to positively impact on patient outcomes (Weiss 1997). Discordant views may result in misunderstandings, conflict, poor adherence to medical recommendations, or other negative outcomes. .

Researchers have used common sense models and illness representations (Hekler *et al.* 2008), concepts similar to Kleinman's Explanatory Models (1977), to explore patient's beliefs about HTN and medication adherence. However, little is known about whether African and particularly Nigerian patients' explanatory models of HTN are different from what has been found in previous research. No studies have applied the Kleinman Explanatory Model or related models to Nigerians. . Studies that have used these models demonstrated the patients had explanatory models of HTN that differ from the traditional biomedical model (Beune *et al.* 2006, Blumhagen 1990, Boutin-Foster *et al.* 2007, Heurtin-Roberts and Reisin 1992). Studies of ethnic minorities have found that people belonging to different cultural groups (i.e. those sharing a similar set of values, beliefs, norms and

traditions) differ in their cultural views of HTN. This was found in a study of HTN between African Americans and those of European decent where differences, particularly regarding knowledge, attitudes and expectations regarding consequences of HTN (Snow 1983). , This study is an important first step in illuminating the EM in this African population. .

The objective of this study was to elicit the explanatory models of HTN among patients followed in a hospital-based primary care practice in Nigeria. Specifically, patients' beliefs regarding the meaning, causes, symptoms and treatment of HTN were elicited. This study fills a gap by generating knowledge that can aid the development of culturally appropriate treatment plans and behavioral and educational interventions targeted at developing countries.

2. Methods

Study setting and participants

Semi-structured in-depth individual interviews and focus groups addressing explanatory models of HTN were conducted with eligible patients, who were recruited from the Lagos State University Teaching Hospital medical outpatient department - the primary care and general medicine practice of the hospital. The department is located in the center of the hospital for easy access to patients. Amongst its staff were thirteen consultants (attending physicians) including the head of department, and several house staff/medical residents. This hospital-based practice serves most patients who need primary care service in the Ikeja metropolis and in 2003 alone, over 250,000 visits were made by patients from all over the region and representing a wide range of socioeconomic status. All individual interviews and focus groups were conducted on site. Patients were recruited between August and September 2006. Purposive sampling techniques were used to recruit patients who met the following eligibility criteria: age ≥18 years, diagnosis of uncontrolled HTN as defined as blood pressure ≥140/90 mm Hg or taking at least one antihypertensive medication, and fluency in English as English is the official language of Nigeria and the study proposal required that participants be able to provide consent in English

Data Collection

Potentially eligible patients were identified via chart reviews and referrals from their physicians. Interviews were conducted by a trained interviewer (KT) experienced in qualitative research methods, along with the assistance of several research assistants (RA). All interviews were conducted in English, however bilingual research assistants aided in interpreting any colloquialisms during the interviews and focus groups. Individual interviews lasted between 30 and 45 minutes and focus groups between 45 minutes and 90 minutes. The standard interview protocol composed of nine questions was adapted from Kleinman and Weiss' Explanatory Model Interview Catalogue (Weiss 1997). The interviews were introduced as follows, "*While doctors have special ways of understanding illness, people like you also have their own ideas, which may be different from what doctors think. It will help us to help people with HTN by understanding how it has affected you, what it means to you, and what you do to get help for it.*". Patients were then asked the series of nine open-ended questions:

1. What do you call your illness?
2. When did you first notice this illness?
3. What does this illness do to you? How does it affect your body?
4. What do you fear most about this illness?
5. Do you think this is a serious illness?

6. People explain their illnesses in many different ways, sometimes ways that are different from what their doctors think. What do you think has caused this illness?
7. What are the major problems this illness has caused you? Personally, in your home and at work?
8. What treatment is available for this illness?
9. What kind of treatment do you think you should receive? What are the most important results you expect from the treatment?

Probes were used when as needed to increase the richness and depth of responses, and give cues to the interviewee about the level of response that is desired (Patton 2002).

Three BP readings using the BpTRU device (VSM MedTech Ltd, Vancouver, Canada) were taken prior to the interview or focus group using a validated automated blood pressure monitor and following standard guidelines. BpTRU device is an oscillometric monitor, which can take a series of readings while the patient is seated quietly, and then prints them out or downloads them into a computer. The device takes an initial reading while the clinician is present, and then with the patient alone in the room, proceeds to take 5 more measurements at intervals of 1–5 minutes and then provides an average of these five readings. Baseline blood pressure was taken as the average of three blood pressure readings. Informed consent was obtained before each interview and focus group. All interviews and focus groups were audiotaped. Patients were given a monetary token for their time to participate in the study. Interview procedures were approved by the IRB of Columbia University School of Medicine and Lagos State University Teaching Hospital.

Data analysis

Participants were interviewed via individual interviews and focus groups until information reached saturation (i.e. redundant). This was determined through ongoing data analysis. The rationale and integration of focus group and individual interview data made three main contributions: a productive iterative process whereby an initial model of the phenomenon guided the exploration of individual accounts and successive individual data further enriched the conceptualization of the phenomenon; identification of the individual and contextual circumstances surrounding the phenomenon, which added to the interpretation of the structure of the phenomenon; and convergence of the central characteristics of the phenomenon across focus groups and individual interviews, which enhanced trustworthiness of findings (Lambert and Loiselle, 2008) . Interviews and focus groups were transcribed verbatim and content analyzed using ethnographic analytic procedures described by Kirk and Miller (1990). Content analysis was used to reduce the text into key content or thematic categories with similar meaning (Patton 2002). Both a priori and emerging themes and domains were identified that succinctly summarized the responses to the 9 questions. Transcripts were analyzed: 1) pooled focus groups and individual interviews and 2) pooled by gender. ATLAS.ti 5.0 (2004) software for qualitative data was used to analyze the transcripts.

The method of phenomenology was used to generate domains of illness representations of HTN. This has been shown to be a highly reliable method when seeking to understand and elicit meaning of a given phenomenon, in this case HTN. Text was further catalogued by descriptive codes based upon themes. Text was annotated by, for example, illness representation “cause”, subheading, “thinking or thinking too much”. Data were arranged according to themes, maintaining a reference to their original interview or focus group transcript using codes and primary documents in ATLAS.ti. For example, all participants who identified “thinking too much” were grouped. Text was examined line by line, underlining phrases and assigning tentative category labels and finally grouped. Methods for

examining trustworthiness were based on Lincoln and Guba (Lincoln and Guba 1985). Member checking was accomplished by clarification during the interviews by the locally trained researchers. During the interviewers the researchers summarized the information and discussed it with the participant to confirm accuracy. Credibility was established by using the research team and as peer debriefers. Members of the team not involved with the analysis as well as one external researcher not involved with the study reviewed the transcripts, methodology and analysis to confirm validity and provide feedback. Confirmability and dependability were addressed by the use of an audit trail which included transcripts, a record of coding from ATLAS.ti, and notes taken by the interview team following the interviews and focus groups. The initial round of thematic coding was done by one interviewer. The principle investigator coded transcripts as well and the two compared results and came to consensus on themes. Examples of quotations are reported to exemplify and substantiate interpretations. Quotes are labeled according to the ATLAS.ti primary document number (P#), line number, interview (I) or focus group (FG), and gender (f=female, m=male), for example (P2:018:I:f).

3. Results

Participant characteristics

A total of 70 patients participated in the study including twenty semi-structured in-depth individual interviews and six focus groups of 6–8 participants. Eight interviews were discarded due to poor quality of the information and corrupted audiotapes resulting in a final sample of 62 participants (12 individual interviews and 50 focus group participants). Focus group and individual interview data are reported together. Participant characteristics are shown in Table 1. There were more women than men and most participants reported their ethnicity as Yoruba (72.6%). On average, men were older than women with an average age of women of 53 years of age and men 59. The participants were educationally diverse with most having an elementary (primary) education (33.9%). Most participants were married and employed. An overwhelming majority paid for their medical care (88.7%) with their own money and had an uncontrolled blood pressure (71%).

Explanatory models of HTN—When asked to describe their illness, patients were generally able to accurately describe it as HTN, high blood pressure, or high BP. Their understanding of the terms was synonymous. The variability in meaning was noted in their understanding of the severity of their illness as indicated in the quotes below:

> "*All I know is that doctor told me that I have been…that my eh… BP is high.…I still believe that it is my BP is still high, but I don't know if whether it has run to hypertension"* (P8:210:I:f).

> "*…the only difference I could think of is probably, it's a little more serious than blood pressure, but it's a graduation of blood pressure"* (P30:011:I:m).

> "*I think high blood pressure is higher than…because it's when it has been established, you may be hypertensive but it's not ongoing. Your BP is not going up, but high blood pressure, you are already in it….."* (P4:033:I:f)

Although the patients described the name of their illness uniformly as HTN, high blood pressure or high BP, the use of lay term versus medical jargon varied as illustrated by the following quote:

> "*Eh…it's high blood pressure but eh…eh…medical term for it is hypertension as I understand"* (P37:019:FG:m)

They seem to think that high blood pressure and HTN are separate constructs as indicated in the quote below:

> "*Yes, high, high blood em…pressure is…is BP... Ehn hypertension is…the thinking"* (P9:023;031:I:f).

In response to the question: *"When did you first notice this illness?,"* patients described being first diagnosed with HTN after being taken to the hospital for symptoms of dizziness, weakness or headache.

> "*I was having dizziness; I was in fact, no strength…nothing. In fact, I don't know, I don't know…so when they checked my BP, it was high, very high…so they gave me some drugs to knock it down…so that is when I first noticed that"*(P4:151:I:f).

The analysis yielded the following four overarching explanatory models as shown in Table 2: (1) perceptions of HTN, (2) consequences, (3) effect on daily life, and (4) perception of treatment. The taxonomy used here is similar to that in a study by Boutin-Foster et al (2007) among hypertensive African Americans.

Perceptions of hypertension were summarized by four subcategories including stress-related issues and what patients colloquially termed as "thinking" or "thinking too much", environmentally mediated, behaviorally mediated, and issues of management vs. cure. The concept of "thinking" or "thinking too much" encompassed ideas such as frustration and rumination about life issues and was one of the more prominent responses endorsed by patients as a cause of HTN in Nigeria.

> "*Yeah, thinking, if, if, if your brain is too loaded, with so many things, thinking of it, it can cause it* [HTN]" (P7:180:I:f).

Environmentally mediated issues included circumstances that patients attributed to life in Nigeria such as poverty..

> "*I quite know that environment in Nigeria does not make it possible for somebody to…of eh…our…somebody of our age to have normal pressure"* (P37:216:FG:m).

> "*environment… the environment you live in can cause…even with… you know… ok…. You know……in Nigeria…(inaudible) of the population are poor people, as in ehmmm…now that alone… can cause hypertension… ehen…, and maybe…if you are in school, you don't have so many things and stress…(inaudible) tension… but then I was not in school, I was at home with my parents, so that was what surprised me….."*(P3:167:I:f).

> *"I think the biggest thing is eh… the…the social infrastructures that are not there. That we worry unnecessarily, which we ought not to. One of the …for example, let us take eh…this go-slow [traffic] as an example. You stay in a go-slow [traffic] for three hours doing nothing. And staying there alone will give you an anxiety and those social infrastructure that are lacking in our environment…"*(P37:706:FG:m).

Behaviorally mediated issues included lifestyle choices including diet, physical activity, and alcohol that lead to HTN. One patient responded,

> *"I just changed my lifestyle so I stopped drinking, I didn't…it didn't end with that I started jogging in parks doing many things to shed off my weight and when I came down, I haven't stopped"* (P37:392:FG:m).

Uncertainty of whether HTN could be managed versus cured was prevalent in this sample. There is question as to whether patients were clear about the terms "manage" and "cure" because patients would state that it could be cured regardless of whether they take their

medications. For example, when patients were asked whether the HTN will return if they stopped taking their medications, they responded:

> *No, it won't come back by the Grace of God* (P34:402:FG:f)

> *Ah, Ah it can't come back again* (P9:198:I:f)

Some patients did state that they thought it could only be controlled and not cured as illustrated by the following quotes:

> *"I don't know if it can be cured, but I believe it can be controlled. Because I've never been told that it can be cured in an individual. I've always been told it can be suppressed or controlled"* (P28:153:I:m).

> *"It's for the rest of life…I don't know what to say, usually many people stay with it, and I think its only control that we have…when doctors are giving you medicine, and you take it as you should take it…I don't think there is a cure; at least for now I don't think there is any cure"* (P15:144:I:f).

Interestingly, the patients who confidently stated that it can be managed and not cured had received treatment for HTN abroad at some point. This could indicate that those who had exposure to treatment for HTN outside of Nigeria had been better informed about HTN by their providers.

Belief in God was central for this group of patients. Patient's believed that the outcome of their illness was in God's control as evidenced by the following quotes: In response to the question of whether it can be cured women in a focus group stated in unison,

> *"by the grace of God"* (P34:348-349:FG:f).

Another example of the centrality of the role God played in the outcome of their illness,

> "*we use our medicine from the doctor, pray, and go"* (P34:367:FG:f).

The etiology of the stressors was often different for women and men. Women tended to cite familial issues such as shock from death of a loved one whereas men more frequently cited external stressors stemming from work-related issues.

> *I don't get hypertension before…one of my pickin [children] come die…so that's why* (P34:111:FG:f).

A gentleman stated his HTN began when his boss was arrested,

> *"he was arrested by the federal government, so I was…. I was just met myself at the hospital…with a high blood pressure… that's how it started…"* (P18:059:I:m).

Consequences—Consequences were grouped into three subcategories, death, comorbid conditions and symptoms. Many patients feared death or were concerned about death. Several referred to it as the "silent killer". Stroke or paralysis as a result of HTN was a serious worry for most patients. Diabetes was reported as a common comorbid condition and patients were concerned about treatment for diabetes.

[HTN is serious] *It is because it can lead to diabetes* (P33:125:FG:f). Another patient stated,

> *Emm-that hypertension I cannot explain much but I can explain on the diabetes. Eh, but what I know that eh…if somebody have eh diabetes he can have hypertension because they are working together* (P24:043:I:m).

Symptoms were a sign that patients had HTN and that blood pressure was elevated. Patients commonly cited pain in the body, particularly the chest, legs and arms as signs of HTN.

Patients frequently said that signs that their blood pressure was high were headache, dizziness, sleeplessness and weakness. One patient stated,

> *"I'm having dizziness, pain…my one side of my body, both leg and my hands"* (P25:032:I:m).

Gender specific differences existed in the area of effects. When asked about the effects of HTN, men cited frequent urination and were concerned about erectile dysfunction and low libido or sexual desire.

> *"My fear is also that eh…it can cause stroke and eh…eh…at times…by extension, loss of libido…"* (P37:664:FG:m).

Effects on daily life—Patients discussed lifestyle changes that were necessary as a result of having HTN particularly around diet and moderate exercise, for example,

> *"he told ehnn his wife that she should not…she should prepare my food, separate… so she should not put maggi, and salt"* (P38:262:I:f).

Patients wanted a cure so that they could go back to life as they had before HTN. Patients consistently responded that HTN has affected their mobility, inability to work and negatively impacted their ability to earn money. This was described as a feeling of "weakness" or not being "strong" which kept them from their duties.

> "*Eh. due to it I have to…I have to leave my normal duty so that I will not be going far. So I have to find something doing nearby*" (P25:231:I:m). Patients stated that the effects of HTN resulted in limitations or the

Patients also stated that having HTN limited their social activities.

> "*For sure you relationship with people will be affected because with hypertension you cannot be out going…. You want me to come to a function in your house, because I am sick I cannot come. You put a call to me, say, oh I cannot come. Over time, relationship will drop and you find yourself just manning your house*" (P37:752, 756:FG:m).

Patient barriers to taking medication included the prohibitive cost of medication, availability of drugs and personal factors. Patients universally commented that medication was expensive and tradeoffs between buying drugs and food sometimes were a real choice.

> *Economical relief and seeing money to buy drugs, all the time to take* (P27:172:I:m).

> *The money to eat, I spend on drugs. Not even much money to eat again what you supposed to eat. Balanced diet…buying drugs* (P27:233:I:m).

It was not uncommon for patients to comment that they inconsistently took their medications. Patients stated that availability of drugs in Nigeria was an issue.

> *It's not! In…in the pharmacy, they wrote me one medicine yesterday, I went to Juli (pharmacy) over there, because it has a name as a big pharmacy,* (P15:199:I:f)

> *they don't get it…they don't have it! In Nigeria they don't have it* (P15:215:I:f).

Personal factors also inhibited adherence to medication regimens. The daily hassle of taking drugs was a factor for patients. These patient's responses well-captured the array of issues patients had with adherence to medication,

> *"First, I don't fear about it because with God, all things are possible. I don't fear about it. I know God can heal. I think you understand? I don't…I don't think am…*

> *much about it. But what I know is that eh…my drugs, I take it. When I get money I buy it and take it, not always oh. I don't take it every time.* (P:11:089:I:f)

> *"At times it's laziness oh. I think you understand? At times, I go feel this thing is too much, drugs every time. I don tire.* 105 *Ehm by the grace of God, I buy…I bo…I bought it as when the money comes in, but when there is no money, I left it until I get the money to buy it"* (P11:109:I:f).

> *…I don't want to use drug all my life. So most of the time I don't take it. So it's when I notice that headache or that heartbeat, I will say maybe in the evening I will go and take drugs. So I don't like that aspect of it, they have not been able to find treatment. There is no sickness that I mean…I mean…, I don't know maybe it's spiritual, maybe one have to…you have to pray. You researchers or scientists or doctors, there should be a cure* (P17:086:I:m).

Perceptions of treatment—Patients perception of treatment was variable with regard to medication. Many patients felt that orthodox medicine was best and traditional medications could be beneficial. All patients reported that they would take the medication the doctor prescribed. Almost all reported that they heard of traditional treatments and many had tried traditional therapies. Several reported that more research should be conducted on traditional medicines. Responses regarding the uses of traditional medicine varied from patients never using traditional medicine, using it in conjunction with orthodox medicine, trying it and it did not work, and trying it and not certain if it worked. One patient reported,

> *"…mix it together then we begin to drink, we call it Agbo in Yoruba area here. Yes…that means concoction…mixtures of some leaves, then all those things we mix it together. Then cook it, then we drink it. A times it work, a times when it a very hard thing, then we turn to the orthodox doctors"* (P6:122, 126:I:f).

Another commented,

"*it can work, it can work…but I haven't attended to any of them"* (P22:265:I:m) Medical decision making was an area where patients deferred involvement to their physician. Patients believed the doctor knew what was best for their care and appeared to lack the desire to be active participants in their health care decisions. Patients commonly made statements of the nature,

> *Doctor can do what he wish for me, please…*(P2:201:I:f). *Whatever they gave to me, when I take it and it is good for me. I will start taking it. I don't know…I don't know drugs because I'm not a specialist on it. It's what you people give to us is what I'm going to take. When it work for me, ehen…I continue with it* (P13:389:I:f).

When asked what type of treatment she should receive,

> *I can't say... I can't say all that… it's the doctor that will say: this is the type of the drug that you are going to take…because I'm not a doctor…* (P7:281, 285:I:f).

4. Discussion

In this study we elicited the explanatory models of HTN among patients followed in a hospital-based primary care practice in Nigeria. Patients expressed four major categories of explanatory models of HTN: 1) perceptions of HTN, 2) consequences, 3) effect on daily life, and 4) perception of treatment. Focus group discussions and interviews yielded a wide range of insights into the social and cultural factors influencing patients' beliefs and health behavior. An interesting finding was that although these participants exhibited an adequate knowledge about treatment and relevant risk factors as well as consequences of HTN, their

awareness did not translate into consistently following treatment recommendations. Additionally, many patients considered issues of BP control to be the doctor's responsibility and placed a high degree of the outcome for their health in the hands of God. There was discordance between the understandings of the serious nature of HTN, the need for long-term treatment, and the desire to take medication long-term. Although participants clearly stated that HTN was a serious illness with deadly outcomes, they would also state that they did not consistently follow their doctors' recommendations including consistently taking medication. Participants make rationalize (e.g. I feel fine) why they do not follow doctors' recommendations regarding their HTN despite knowing the consequences, known as cognitive dissonance. According to cognitive dissonance theory individuals seek consistency among their cognitions (i.e. their beliefs, opinions). When there is inconsistency between attitudes and behaviors, dissonance occurs (Festinger 1957), and this was a common theme from participants in this study. Other studies have found similar instances of dissonance. In a study by Bane et al. (2007) it was reported that this dissonance was evident in patients between the chronic nature of HTN, the need for long-term treatment, and its asymptomatic presentation.

Overall, patients were clear that lifestyle, such as diet, alcohol and exercise impacted outcomes related to HTN. There was agreement that medication and attention to diet and moderate exercise was important. Several referred to doctor recommendations and modifications they made as a result of being diagnosed with HTN. Participants acknowledged the use of traditional medicine (e.g. teas and herbs) and native doctors and healers. An interesting point is that although patients noted family history and some even endorsed heredity as a possible cause of HTN no one gave it a strong endorsement of its role in the development of HTN in them. In studies of explanatory models of African-American patients, heredity was a key factor (Boutin-Foster *et al.* 2007, Heurtin-Roberts and Reisin 1992). Even though ideas and perceptions about HTN were similar to African American patients in the study by Boutin-Foster et al. (2007), the Nigerian patients attributed their HTN status to the degree and level of thinking rather than just the effects of stress or situational factors like poverty on the brain. Unlike other studies, the phrase "thinking too much" is very prevalent belief as a cause of HTN in Nigeria. We believe that this distinction is important because educational programs targeted at management of HTN in Nigeria should address this misperception.

An effect on daily life was the commonest area that related to medication adherence. Issues such as the prohibitive cost of medication and availability of drugs were common barriers to adherence. Many participants stated that medication was expensive and they often had to make tradeoffs between buying drugs and food. The daily hassles of taking drugs were also a real barrier.

There was variability across gender in the perceptions of HTN, especially with regards to patients' perceptions of stress and symptoms. Women often focused on family issues while men tended to discuss external stressors stemming from work. There was little variability in the knowledge of symptoms, but there were gender differences in the importance attributed to the stated symptoms. Men were concerned with frequent urination, decreased libido and erectile dysfunction.

The strength of the qualitative methods used in this study is that it can directly elicit participants' perceptions, attitudes and experiences. However, we are limited by the number of participants we can include and the diversity of the participants' backgrounds. Our study was limited to English speaking Nigerian's living in a large metropolitan area that are patients of a teaching hospital and who volunteered to participate. Each of these factors is a potential source of bias and therefore caution should be exercised in generalizing the results.

5. Conclusion

Behavioral and cognitive models do not adequately account for the social and cultural variations in health behaviors. A strength of this methodology is that it can elicit an understanding of patient's views that are critical to improving sustained treatment adherence. Explanatory models of illness are significant for patient care for two reasons: (a) Understanding patients' explanatory models of illness can lead to the development of culturally appropriate treatment plans addressing lifestyles, illness concerns and patients' priorities in the context of their daily lives (McSweeney *et al.* 1997). This may in turn help in motivating patients' adherence to medical recommendations (Garrity 1981) and; (b) Explanatory models of illness may shed light on patients' cultural beliefs with subsequent improvement in the doctor-patient communication and relationship, (Dula 1994) because discordance between patients and their physicians in belief systems may be the reasons for poor communication (Betancourt *et al.* 1999). An individual's explanatory models are subjective and personally created constructs of their environment, culture, and interpretations. These explanatory models are therefore potentially modifiable with exposure to new knowledge. Information from this study can be used to develop better patient-centered education materials that would address the misconceptions about HTN (e.g. it can be cured with traditional medicine) and its treatment. Easily accessible information on early detection, risk factors, and treatment is lacking. Health education directed at behavior change requires a thorough understanding of HTN beliefs and practices of the target population. To optimize treatment and self management strategies, intervention efforts must be congruent with the individual's conceptualization of his/her illness.

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Key messages

1. Knowledge of impacts of HTN may not translate into consistently following treatment recommendations.
2. Developing interventions that address the impact of HTN on daily life may increase medication adherence.
3. To adequately control HTN it is important to develop patient-centered and socio-culturally appropriate interventions that will educate patients on the importance of controlling the disease.

TABLE 1

Characteristics of Participants (N= 62)

	N(%)
Gender (% male)	25 (41%)
Age (average)	
Men	59.4
Women	53.0
Religion	
Christian	48 (77.4%)
Islamic	13 (21.0%)
Ethnicity	
Ibo	9 (14.5%)
Yoruba	45 (72.6%)
Other	7 (11.2%)
Education	
Primary	21 (33.9%)
Secondary	13 (20.9%)
Associates Degree	12 (19.4%)
College or Graduate Education	13 (20.9%)
Marital Status	
Married	46 (63.9%)
Widowed	11 (15.9%)
Separated	1 (1.4%)
Single/never married	3 (4.2%)
Employed	
Yes	37 59.7%
No	24 38.7%
Housing (rent vs. own)	
Rent	29 (46.8%)
Own	29 (46.8%)
How do you pay for medical care	
Others	6 (9.7%)
Self	55 (88.7%)
Blood Pressure	
Controlled	27.4%
Uncontrolled	71.0%

TABLE 2

Taxonomy of patients' descriptions of hypertension (HTN)

Explanatory Model	Subcategories	Concepts
Perceptions of hypertension	Thinking (too much)	HTN is brought on by stress or rumination
		HTN is a result of environmental factors
	Environmentally mediated Behaviorally mediated	HTN is a result of lifestyle choices, e.g. poor diet
	Management vs. cure	It is unclear if hypertension can be managed or cured and God is a determining factor in that outcome
Consequences	Death	HTN causes death or results in conditions that can cause death
	Comorbid health conditions	HTN causes other serious health conditions
	Symptoms	Certain symptoms may indicate that you have hypertension and/or that blood pressure is elevated
Effect on daily life	Limitations	HTN is a condition that results in lifestyle modifications and/or restrictions
	Medication	Medication for hypertension creates problems for adherence due to cost, side effects, availability and personal issues
Perception of treatment	Medication	HTN can be treated by a combination of orthodox and traditional medicines
	Medical decision making	Doctors are experts and know what is best for my treatment