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The role of comorbidities in patients' hypertension self-management

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Abstract

Objective: We sought to understand barriers to hypertension self-management in patients with hypertension and comorbidities.

Methods: We conducted semi-structured, qualitative interviews with 48 patients with uncontrolled hypertension and at least one comorbidity to learn about beliefs and behaviors that might affect hypertension self-management. Using a grounded theory strategy, we analyzed interview transcripts detailing patients' hypertension self-management behaviors vis-à-vis a framework including *Explanatory Models*—a patient's understanding of the pathophysiology, cause, course, treatment, and severity of an illness, such as hypertension.

Results: We identified four factors that interfered with hypertension self-management. (1) Interdependence: Participants saw hypertension as interconnected to their comorbidities and subsequently had difficulty separating information about their illnesses. (2) Low priority: Compared to other conditions, participants assigned hypertension a lower priority. (3) Conflicts: Participants struggled with conflicts between hypertension self-management practices and those

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for comorbidities. (4) Managing multiple medications: Polypharmacy led to patients' confusion and concern about taking medications as prescribed.

Discussion: Participants did not experience hypertension as a discreet clinical condition; rather, they self-managed hypertension concurrently with other conditions, leading to a breakdown in hypertension self-management. We provide strategies to address each of the four barriers to better equip providers in addressing their clinically salient concerns.

Keywords

Hypertension; qualitative; patient adherence; comorbidity; self-management

Introduction

Twenty-nine percent of US adults have hypertension,¹ but only half of those prescribed medication are controlled.² Control rates are substantially worse for the 70% of hypertensive adults with comorbidities³⁻⁶; less than half of patients with hypertension and dyslipidemia (49.3%), congestive heart failure (48.8%), chronic kidney disease (42.2%), or stroke (34.9%) have controlled hypertension.⁵ Comorbidities are associated with worse health outcomes⁷ including poorer health-related quality of life⁸ and higher mortality.⁹ Thus, approaches to addressing poor hypertension control in patients with hypertension and additional comorbidities are needed.

Patients' adherence to recommended therapies affects hypertension control. Adherence is thought to be due, in part, to patient understandings of hypertension,¹⁰ including non-biomedical beliefs,¹¹ such as the perception that hypertension has symptoms.^{12,13} We are starting to learn how these beliefs influence hypertension self-management behaviors.¹⁴ However, prior work has not considered how hypertensive patients with comorbidities think about their hypertension, adhere to recommendations, and self-manage their illness.

Patients with comorbidities have unique self-management challenges, and there is limited understanding of how comorbidities may interfere with hypertension control.¹⁵ Importantly, we do not know what role, if any, comorbidities play in patient beliefs about hypertension, and subsequently hypertension self-management. Therefore, we examined patient beliefs and experiences surrounding hypertension self-management among patients with comorbidities to understand how these beliefs and experiences might affect adherence to antihypertensive medications and lead to poor hypertension control.

Methods

Design

We used a qualitative study design to explore patient experiences managing hypertension relative to comorbidities. This was part of a larger study examining the role of *Explanatory Models* in hypertension control.¹⁴ Explanatory Models, a theoretical framework developed by Kleinman et al.¹⁶ for understanding beliefs about disease pathophysiology, cause, course, treatment, and symptoms, were used to explore patient beliefs about hypertension. Explanatory Models are thought to influence patient behaviors^{11,17-19} and therefore may

contribute to low adherence and poor hypertension control and to provide a framework to explore how people make sense of their health and illness in their daily lives. This study was not designed a priori to examine beliefs about comorbidities; however, comorbidities emerged as a salient factor. Our analysis explores the relationship between hypertension self-management and comorbidities.

Participants

Participants were recruited from two large, urban Veteran Affairs (VA) medical centers serving U.S. military Veterans. Participants were a purposive sample of patients with uncontrolled hypertension, defined as having a diagnosis of hypertension, and at least two blood pressure (BP) readings of >140/90, or >130/80 for patients with diabetes, in the preceding year. Additionally, participants had to have had an uncontrolled reading when recruited. Participants were not screened for comorbidities prior to enrollment. For the interview, participants received a \$20 gift card. The study sites' Institutional Review Boards approved these procedures. All procedures were in accordance with their ethical standards.

Data collection procedures

Participants were identified through medical record review. A research assistant (RA) called patients prior to their primary care appointments to invite participation. During the appointment, the RA obtained written informed consent, administered eligibility screenings, asked demographic questions, and took BP readings. Of 241 patients, we screened 204; 149 were ineligible, primarily because their BP was controlled on the day of their appointment; 37 declined participation. We enrolled 55 participants; seven were lost to follow-up, resulting in 48 interviews. Data were collected between February 2007 and June 2008.

Trained RAs experienced in qualitative interviewing conducted 1-h semi-structured, in-depth interviews. Participants were asked about hypertension management behaviors, their daily lives, and questions related to their Explanatory Models, such as beliefs about the pathophysiology, cause, course, treatment, and symptoms of their hypertension. Notably, the interview guide did not specifically have questions about comorbidities, and yet as participants discussed hypertension, they repeatedly discussed their overall health and comorbidities.

Analysis

The interviews were transcribed verbatim and entered into the qualitative data management software, NVivo.²⁰ Our team of five social scientists discussed personal perspectives and biases before beginning analysis. We thematically coded the transcripts using tenets of grounded theory.^{21,22} First, five transcripts were open-coded to identify codes related to the management of hypertension, Explanatory Models, and patients' daily lives. From this, we generated a coding dictionary by collapsing broad categories, informed by both the data and components of Explanatory Models. We continued this iterative process until we saw repetitive themes. Thereafter, two coders reviewed each transcript, created a summary template to organize the coded data, and then shared interpretations with the team. Templates were used to systematically organize the data in theoretically relevant ways.²³ Templates contained information about each patient's hypertension self-

management behaviors, Explanatory Model, social context, and his/her primary barrier to hypertension control. The team discussed the transcripts and templates, until consensus was reached. Comorbidities were identified both through medical record review and interviews wherein patients discussed other conditions in relation to hypertension.

Results

All 48 participants (Table 1) had at least one comorbidity. Despite not being directly asked about other health conditions, participants referred to their comorbidities during the interview. From these descriptions, we identified four themes whereby patients related their hypertension management to another condition: (1) *Interdependence* was an overarching theme, where participants saw hypertension as interconnected to their comorbidities. Because of this, participants had difficulty separating information among their conditions. (2) Compared to other conditions, participants assigned hypertension a *low priority*. (3) They struggled with *conflicts* between hypertension self-management practices and those for comorbidities. (4) *Managing multiple medications* led to confusion and concern about potential interactions. We discuss each theme below.

Theme 1: Interdependence

Participants viewed hypertension as intrinsically intertwined with their comorbidities. When asked about the pathophysiology, cause, course, treatment, and symptoms of their hypertension, they replied with information about their comorbidities and identified links between them and hypertension.

Participants gave elaborate accounts interweaving hypertension into their medical and life history. One participant recounted a detailed story revolving around his work history, medical problems, and hypertension. He saw his illnesses as interrelated—with hypertension as one part—culminating to a point when he became “sick.”

Participant [P] I was in the hospital and I had an operation. So, I worked until 1998. Then I had an operation. Then I had a prostate operation. I had a hernia operation first because of the heavy lifting and all. So, well, I’m not able to work anymore. So, right now, I get Social Security.

Interviewer [I] :...so when did the blood pressure become an issue?

P I don’t know. When I went to the hospital, I went in like a program. You know, I used to drink quite often. And then I had to get in a program because it was affecting me with the lifting and all. That’s when I had the operation. So, then I found out I had diabetes. This was after I had the operation, and that’s when I found out I had—all the sickness, it all happened at once. I’d never been sick before until about ‘97, 1997.

“George,” 72; diabetes, prostate problems* *Condition list includes both patient interview accounts of comorbidities and clinical diagnoses documented in patient medical records.

Some participant's descriptions of hypertension reflected clinically appropriate understandings, such as relating hypertension to diabetes or cardiovascular disease. Others went further and discussed causality, attributing their hypertension to another condition. In the following example, the participant related her hypertension to a sleep disorder, which she continually mentioned during her interview. When the interviewer asked how concerned she was about her hypertension, she responded:

[The doctors] can't do anything. They don't know what's causing it. That's why the sleep study would figure that out, you know?

"Mary," 53; angina, diabetes, high cholesterol, renal cancer, sleep problems

For her, a sleep disorder led to hypertension. While for others, hypertension caused comorbidities.

I ...could you tell me what it is like having high blood pressure?

P ... And then the high blood pressure usually brings on the diabetes, hypertension and all these other things. You have to watch it so you don't overexert yourself and cause yourself to have heart problems or just get generally sick. So I try to watch what I do. Try to watch my weight... Can't walk too far because my legs hurt... You don't want to overexert yourself, but you can't just go sit down. High blood pressure even worse, affects your eyes. It affects – I think it affects every part of your body and even in some ways into your spiritual well-being.

"Michael," 64; COPD, heart problems, insomnia, leg problems

Notably, this participant differentiates high BP and hypertension, with high BP causing his hypertension.

Additionally, participants had trouble separating information among conditions. Because patients viewed their health as a single experience, they had difficulty parsing clinical information about each of their conditions and subsequently conflated information about their hypertension with clinical information about comorbidities. Participants confused medications; one participant, when asked about his BP medication, went on to discuss glyburide, a diabetes medication. Another made a similar mistake, bringing up his diabetes in response to a question about hypertension. He confused the numbers used to track both conditions and conflated his BP with the hemoglobin A1c/blood sugar levels for his diabetes.

I ... So, when you got into the hospital, they took your blood pressure and they were like, "Ooh, you have high blood pressure."

P Yeah, right. My biggest thing was about 700s or 8, I know it was high. I went in and I was lucky I didn't fall dead in the street or something, because, you know, it was out of hand.

I Yeah, this was the diabetes?...but what about the blood pressure? What was—do you remember the reading when you first took it?

“George,” 72; diabetes, prostate problems

When the interviewer clarified that that number referred to his diabetes and asked again about his hypertension, he replied, “everything was out of whack.” This participant’s response that he was having problems with everything simultaneously demonstrates the difficulties patients had separating information among comorbidities.

Theme 2: Low priority

In response to questions about hypertension self-management, participants consistently noted other illnesses as important; managing diabetes, cancer, or HIV took precedence. Participants assigned lower priority to hypertension. When asked how concerned he was about his hypertension, a participant who also had prostate cancer and diabetes gave a typical response:

I ...don’t dwell on it. I’ve got more important things than high blood pressure.

“David,” 72; diabetes, prostate cancer.

Similarly, another participant, in response to a question about receiving a hypertension diagnosis, responded:

It just didn’t bother me because at that time, I already had HIV and diabetes. So the high blood pressure was just another... It wasn’t something I was going to worry about.

“Robert,” 67; bipolar disorder, diabetes, former crack-addict, heart problems, HIV, spine and ankle problems, history of alcoholism

When asked to rank his high BP on a scale of 1–10, another participant responded he would give his hypertension,

...a good two and a half, a three. It’s not up there like it should be. ... Because right now the only thing that overwhelms my whole self is the weight. And that just overwhelms me, my thoughts and my everything.

“Rafael,” 39; depression, obesity, shoulder surgery, sleep apnea

Others similarly focused on comorbidities, such as the following participant who responded to the question, “What do you think hypertension is?” by saying:

Well, I wish I could tell you what it is, but I can’t. I just know it’s something to do with your body chemistry or something like that. I really try not to think about it. And that’s the God’s honest truth, because I have other problems, other issues. ...they want me to go in for laser surgery on my prostate because I have a prostate issue. And I think it was Monday I was told by the ENT doctor– they’d already taken one biopsy. They are going to wind up taking another one, and if they find the same thing, which they can’t tell if it’s cancerous or not. The lab tests come back negative, but whatever it is, it’s still growing in my throat or my vocal cords. You know, and I’ve got that problem. I suffer with sleep apnea. ... And asthma on top of that. So, I’ve got asthma on top of that, so I’ve got a few issues here.

“Henry,” 64; asthma, diabetes, history of heart attacks, insomnia, knee replacement, possible laryngeal cancer, prostate problems, sleep apnea

Participants consistently and repeatedly brought up comorbidities as being more important than hypertension.

Theme 3: Conflicts

Participants raised aspects of comorbidities that conflicted with BP self-management. They discussed difficulties with seemingly contradictory self-management regimens and struggled with incompatible health recommendations. Some spoke of difficulty finding foods that were compatible with both a diabetic and low sodium diet. One described eating to counteract radiation side effects:

And when I went for radiation, I was like 15 to 20 pounds lighter. ...my digestion started being screwed up. So they told me to start eating – I had to start eating a lot of starches. So I’d eat pasta and rice and potatoes. And I loved every bit of it, and it did make my stomach feel good. Then I put on an extra 15 or 20 pounds and haven’t been able to take it off since. It’s been almost – it’s going to be a year and a half and I can’t take it off anymore.

“David” Male, 72; diabetes, prostate cancer

For those with conditions that limited mobility, exercise was challenging, while others had problems adhering to their BP medications.

Participants understood the recommendations for and benefits of exercise, but then described how conditions such as multiple surgeries, limited lung function, or like the following participant, with Parkinson’s and a bad knee, impeded their abilities. When asked if the doctor ever spoke with him about exercise, the following participant responded:

P I try to [exercise] regularly. Oh, yeah. I got—the knee is bad, too. I used to walk. I need [to walk] more... I can’t walk on grass. It’s got to be solid.

I It’s got to be solid ground.

P That’s the only thing that bothers me. I can’t walk any more.

“Franklin,” 78; Parkinson’s, diabetes, depression, bad knee

Another participant complained that his asthma interfered with his ability to exercise:

I can’t do but just so much of an exercise, because like I said, I have asthma. ...it’s very hard for me to breathe. I don’t know if you know how hot the temperature is in the city right now.

“Henry,” 64; asthma, diabetes, history of heart attacks, insomnia, knee replacement, possible laryngeal cancer, prostate problems, sleep apnea

In addition to asthma making it difficult to exercise, in a more circuitous way, he linked his asthma to not taking his hypertension medications. He went on to explain how hot weather contributed to his asthma, which also made it difficult to sleep, which then caused insomnia.

He then attributed his asthma and insomnia to not taking his hypertension medications because the medications made him tired while running errands. On one occasion when he took his BP medication, he fell asleep on public transportation. Therefore, he would skip his hypertension medications to stay awake while out. For this participant, having asthma conflicted both directly and indirectly with his ability to self-manage hypertension; it prevented him from exercising and also interfered with his sleep, which contributed to not taking his medications.

Theme 4: Managing multiple medications

Participants spoke about problems managing multiple prescriptions. Some had difficulties with complex schedules, while others expressed concern about possible medication interactions. Participants talked about difficulties keeping track of the order in which they were supposed to take their medications. To remedy this, one participant devised what he felt was a less complicated medication taking strategy, based on numbers instead of prescription names.

I used to know all my medications by their names and everything. But now I got so many of them...I take about 10 pills a day, 12 pills a day. So this time when I got all my medications, I label them by numbers, you see? So when [the doctor] tells me, "What was the medication now?" it's very hard for me to understand which one it is because I brought a schedule of my numbers. So when I get up in the morning, I know that I have to take number 1, 2, 3, 4, 6, 7. You know, I remember my numbers. So when she tells me, "Do you need some medication?" I get stuck. I said, "Omigod, I forgot, what number could that be?"

"Steven," 61; arrhythmia, diabetes, heart disease

While seeking to simplify his medications, he could not recall any medication names, only numbers and therefore discussion about medications with his provider was compromised.

In addition to being complicated, taking multiple prescriptions was worrisome, raising concerns about interactions:

I get nervous if I have to take a couple different medications at the same time, because – Mind over matter, I guess. I think that when you take too many medications, it does something to you.

"Sheila," 51; bulging disks, high cholesterol, knee problems, pinched nerve

Another participant, citing recent media coverage of her diabetes medication, wondered how much doctors still did not know about possible medication interactions:

If I go to the doctor and the doctor wants to start another drug, and then I decide, "I don't think I want to take the drug," I'm not going to take it. I think there they've got, you know, so many different ones. Have they figured out what the interaction is between the drugs? No. I have one drug that says, well, you shouldn't take this drug – what was it? – Avandia? I was also on Avandia for my diabetes. You shouldn't take Avandia with this one or Avandia will affect your blood [pressure].

"Mary," 53; angina, diabetes, high cholesterol, renal cancer, sleep problems

These concerns made her resistant to taking her prescribed medications. When her doctor tried to add another prescription she said, “I’m trying to get rid of drugs, not add more.”

Discussion

In this study, we investigated beliefs related to hypertension in patients with uncontrolled BP. We found complex reasons for poor hypertension control in the context of comorbidities. Our participants did not experience hypertension as a discrete clinical condition; rather they viewed it as inextricably intertwined with their other health conditions. They knew what they were supposed to do to self-manage hypertension; however, they struggled to integrate practices, routines, medications, clinical information, and self-management behaviors, while concurrently attempting to keep their conditions discrete, each with its own self-management guidelines. These barriers surrounding co-management of their full range of health conditions then influenced their hypertension self-management behaviors. Participants’ comorbidities interfered with their hypertension control because of the perceived interdependence of hypertension with other conditions, conflicts carrying out recommended self-management behaviors, the lower priority of hypertension, and dilemmas managing multiple medications. Although patients were concerned about the consequences of hypertension, comorbidities overshadowed these concerns.

Medication adherence was a key aspect of hypertension self-management. Polypharmacy, the use of multiple medications, is common in patients with multimorbidity.^{24,25} Our findings support the work of others who found that complex medication regimens and medication concerns are related to poor adherence.^{26,27} Additionally, our findings provide insight into how patients view medication taking, based on concerns about interactions or prioritizing other conditions. Our participants assigned lower priority to hypertension and attended to other conditions at the expense of BP self-management. And, because hypertension has no symptoms, patients likely prioritize and attend more closely to conditions where treatment has a perceptible effect.²⁷

As we saw in our data, problems with health literacy became evident where several participants confused the numbers to track diabetes and hypertension. How patients interpret numbers may be especially problematic in patients with comorbidities. Interpreting BP readings are difficult²⁸ and numbers have little meaning in the patient’s day-to-day health experiences.²⁹ This may be compounded when there are multiple, meaningless numbers to track.

Our study has limitations. First, participants were mostly male; findings may not be representative of women’s experiences. We studied Veterans with uncontrolled hypertension, a population with poorer health and higher rates of comorbidities.³⁰ Additionally, our study was not originally designed to address the role of comorbidities on hypertension self-management; thus, we did not systematically collect interview data on this phenomenon. While many patients with comorbidities have worse hypertension outcomes, some with comorbidities have better BP control, possibly because these patients are already in contact with the medical system or have established self-management routines.^{3,31} Interestingly, despite the fact that all our participants have health insurance and are engaged in primary

care, their BP remained uncontrolled. The role of comorbidities was an emergent finding, a benefit of our qualitative research design. Further investigations into how patients conceptualize the relationships among conditions are needed.

Providers recognize the complexity of managing patients with multimorbidities and worry about patients' abilities to adhere to complicated regimens.³² Our findings have implications for how to best support hypertension self-management in patients with comorbidities and suggest the need for novel approaches addressing patients' complex understanding of hypertension self-management within the context of comorbidities. It is challenging for providers to focus on this asymptomatic condition in light of symptomatic comorbidities. Attending to hypertension as one aspect of individuals' overall health and illness may improve patients' abilities to control their hypertension.

Below, we suggest strategies for primary care providers to address each of the four identified barriers to hypertension self-management in patients with comorbidities.

Barrier 1: Interdependence. Providers can learn about the daily realities of patients' life context within which they make self-management decisions, by using techniques such as building a medical history³³ and eliciting the patient's perspective³⁴ during a clinical encounter to help patients untangle the complexities of managing multiple conditions. By asking about other health conditions to learn about potential barriers to BP self-management, providers may also reduce contextual errors,³⁵ where a clinician misses key information about a patient's context. Using strategies such as these may have helped our participant *Henry's* provider understand how asthma interfered with taking his hypertension medication.

Barrier 2: Conflicts. Healthcare oriented toward each unique patient's needs, with his/her own set of comorbidities, may address poor adherence stemming from patients' perceived self-management conflicts, such as where we saw conflicts among comorbidity self-management guidelines contribute to poor adherence to hypertension self-management behaviors. Collaborative problem solving—where a patient and provider define the problem, and then brainstorm, attempt, and evaluate strategies—is a key component of increasing self-management adherence.³⁶ Comorbidities are a known barrier to self-management; subsequently, patients' goals should be focused on life-challenges and not disease-specific.³⁷

Barrier 3: Prioritization. Understanding how patients prioritize self-management behaviors may help clinicians address clinically salient concerns. When providers frame self-management around patient priorities, patients are more likely to integrate these behaviors.²⁹ To elicit patient priorities, providers could start an encounter by asking, "What is your main problem?"³⁸ Patients and providers can then negotiate strategies that both meet patient needs and follow recommended clinical guidelines.

Barrier 4: Managing multiple medications. Patient concerns about medication interactions are important; however, providers rarely bring them up during clinical encounters. Providers should ask about patient concerns and subsequently provide reassurance that they are taking into account potential problems, such as the possibility of drug interactions, when prescribing medications.

The current medical disease framework may contribute to patients' poor adherence to hypertension self-management recommendations. Our participants lived with all of their comorbidities simultaneously and integrated them into a singular, multifaceted health experience incorporated into one daily lived experience. This is in contrast to a disease-focused medical model where diseases are approached as discrete, compartmentalized entities.^{39,40} Poor patient adherence to hypertension self-management recommendations may stem from divergent conceptualizations of hypertension—physicians viewing it as one of several discrete diseases and patients viewing it as part of their illness embedded in a larger life context.

The medical disease framework fails to adequately address comorbidities. Comorbidities are not well defined, poorly integrated into study designs, and patient perspectives are largely absent.^{41–44} We used the Explanatory Models framework to provide a patient-centered perspective of hypertension, and discovered the key role of comorbidities. This approach yielded a multifaceted conceptualization of hypertension, encompassing the patients' whole illness experience as part of a comprehensive schema of their overall health and well-being. Our participants viewed their health as a singular experience, with hypertension as one small, sometimes inseparable part. Conceptualizing an index condition within the context of other conditions provides patient-centered understanding of comorbidities grounded in the patients' life context. Further investigations into how patients conceptualize the relationships among conditions are needed.

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Table 1.

Participant demographics

Participants	N = 48
Male	43
Age (SD)	60 (10.31)
Education	
8th grade	3
Some high school	2
Completed high school	14
Some college	18
Completed college	8
Graduate school	2
Unknown	1
Annual income (USD)	
<\$15,000	14
\$15,000–20,000	7
\$20,000–40,000	13
\$40,000–60,000	5
>\$80,000	2
Unknown	7

Comorbidities mentioned in the interviews or noted in electronic medical record 2 participants

Anxiety, arthritis, alcoholism, back pain, cancer, cardiovascular disease, COPD, depression, diabetes mellitus, erectile dysfunction, glaucoma, headaches, hyperlipidemia, obesity, Parkinson's disease, post-traumatic stress disorder, sleep apnea