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Qualitative interview study of patient-reported symptoms, impacts and treatment goals of patients with obstructive hypertrophic cardiomyopathy

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ABSTRACT

Objective Hypertrophic cardiomyopathy (HCM), including obstructive HCM (oHCM), is the most common inherited cardiomyopathy causing lifestyle-limiting symptoms. Data are lacking about patients' perspectives on the daily impact of their symptoms. This qualitative interview study was conducted to better understand patients' experiences with oHCM.

Methods In October 2019, telephone interviews were conducted with 20 US adults with oHCM identified by the Hypertrophic Cardiomyopathy Association. Using a semi-structured interview guide, key symptoms, impacts of oHCM and oHCM treatment goals were discussed.

Results Median age was 54 years (range 29–78), 55% were women, 85% were white and 15% were Hispanic or Latino. Median time since diagnosis was 3 years. Symptoms included shortness of breath, dizziness/light-headedness, heart palpitations/fluttering (all 95%), fatigue (90%) and chest pain/pressure (80%). All participants reported limitations in physical functioning/activities; most reported additional impacts (emotional stress (80%), fear of dying (55%)). Shortness of breath and fatigue were among their most bothersome symptoms; an effective oHCM treatment would need to improve ≥1 of these symptoms (allowing increased physical/social activity).

Conclusions Patients with oHCM experience a high symptom burden and psychosocial impacts, affecting health status. Improved shortness of breath, fatigue and physical functioning are highly valued by patients and represent important treatment goals.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ This study is one of the first to report patient experiences with obstructive hypertrophic cardiomyopathy using semi-structured, qualitative interview techniques.
⇒ The standardised, semi-structured interview guide provided patients with the opportunity to provide open-ended feedback and broaden our findings, while still ensuring consistency across interviews.
⇒ By using both a thematic analysis approach and descriptive statistics, we were able to capture both qualitative findings and quantitative data to support our conclusions.
⇒ Our sample size achieved thematic saturation and was appropriate for conducting detailed qualitative inquiries; however, it may limit the generalisability of the results.

INTRODUCTION

Hypertrophic cardiomyopathy (HCM) is characterised by left ventricular hypertrophy and is associated with lifestyle-limiting symptoms. HCM is the most common inherited cardiomyopathy, with an estimated prevalence of between 1 in 200 and 1 in 500.[1 2] The main types of HCM are obstructive and non-obstructive HCM. Around 70% of patients have obstructive HCM (oHCM), which is characterised by resting or dynamic left ventricular outflow tract obstruction.[3]

Although oHCM is the most common inherited cardiomyopathy, patient experience with the disease is not well documented. As hard endpoints such as cardiovascular death and hospitalisations are infrequent among patients with oHCM, primary endpoints in clinical trials have included objective and subjective measures of functional capacity that are incomplete measures of health status.[4–9] For example, the HCM Symptom Questionnaire assesses oHCM symptoms but does not impact health status[10]; the Kansas City Cardiomyopathy Questionnaire was developed for heart failure and does not account for symptoms unique to oHCM (eg, chest pain and dizziness/light-headedness)[11]; and the New York Heart Association classification is not only ascertained by physicians rather than patients but comprises only four categories. Furthermore, the daily variability of symptoms in oHCM is difficult to capture with existing tools. Therefore, there is a need to develop additional tools to strengthen

health status assessment for patients with oHCM in clinical trials and real-world studies.

The first step in developing a sensitive measure of treatment effect on health status, to benefit the development and refinement of new therapies, is to obtain patients' input on how oHCM impacts their lives. Understanding patients' experiences with oHCM will also help inform which components need to be captured in standardised clinical history taking, help tailor treatment plans to specific patient needs and help identify system-level interventions that may be beneficial. Accordingly, our study team conducted a qualitative interview study aimed at characterising the symptoms, impacts and treatment goals of patients with oHCM.

METHODS

Study design

In October 2019, RTI Health Solutions conducted in-depth, semi-structured, qualitative, one-on-one telephone interviews with 20 adults with oHCM. These interviews were designed to elicit a comprehensive set of oHCM symptoms and to explore how symptoms impact patients' lives. The study sponsor, in collaboration with RTI Health Solutions, designed the interviews. RTI Health Solutions collected, analysed and interpreted the data.

Study population

The target study population comprised English-speaking adults with oHCM who were aged 18–65 years and resided in the USA. Inclusion criteria were left ventricular outflow tract (LVOT) peak pressure gradient ≥30 mm Hg at rest or with a provocation on echocardiogram; receiving treatment at a Hypertrophic Cardiomyopathy Association (HCMA)–designated HCM centre of excellence; and had at any time experienced at least one of the following prespecified symptoms: resting or exertional shortness of breath, heart palpitations or fluttering, dizziness or lightheadedness, chest pain or pressure, fainting, weakness, fatigue and/or swelling in lower extremities. Exclusion criteria were prior septal reduction therapy (surgical myectomy or percutaneous alcohol septal ablation), coronary artery disease, persistent atrial fibrillation, chronic obstructive pulmonary disease, asthma or active malignancy for which they were receiving treatment.

Participant recruitment

Patients with oHCM who met enrolment criteria were identified by the HCMA. After reviewing their membership database, the HCMA invited 150 potential participants to undertake a screening survey to further evaluate eligibility. At this time, patient permission was also sought by the HCMA to share specific demographic information, clinical characteristics and contact information (name, telephone number, email) with RTI Health Solutions to facilitate interview scheduling. After reviewing the screening survey responses, the HCMA identified 20 adults with oHCM who met all inclusion and exclusion criteria using purposive, maximum variation sampling. Purposive sampling is a type of non-probability sampling where individuals meeting certain criteria are eligible for enrolment. Maximum variation is a type of purposive sampling where individuals differing in demographic and clinical characteristics are recruited to obtain varying perspectives.[12] A sample size of 20 was prespecified to achieve thematic saturation (the point at which new themes are no longer reported and the same themes appear repeatedly) based on the concept of information power (the more information the sample holds relevant to the study, the fewer participants are needed) and on experience with prior qualitative, concept elicitation studies in other chronic diseases.[13 14]

Interview process and data collection

A standardised, semi-structured interview guide was used to ensure consistency across interviews (online supplemental table S1). The interview guide comprised an initial, open-ended, concept elicitation phase where participants were asked to describe their oHCM symptoms in detail and how they impacted their lives. Participants were then asked more targeted questions (probes; online supplemental table S2) to ensure the capture of a comprehensive set of symptoms and functional impacts, as well as identification of the relative importance of these symptoms and impacts (eg, most bothersome symptoms). Participants were also asked to describe variability in symptoms and the extent of improvement they would need to experience before concluding that a therapy was effective.

Each 60 min interview was conducted by two experienced qualitative researchers from RTI Health Solutions, with one researcher leading the discussion and the other taking field notes and ensuring coverage of all topics. Audio recordings were made of the interviews, and these were transcribed verbatim and de-identified for analysis. Participants received a US$100 gift card in appreciation for their time.

Qualitative data analysis

A thematic analysis approach[15] was used to analyse the results of the interviews, aided by field notes (in Excel, Office 365 version) and interview transcripts. Specifically, dominant themes were identified in each interview and compared across interviews to identify trends in the way participants described their experiences with oHCM (symptoms and impacts), as well as in the types of improvements they said they need to see before concluding that a treatment was effective. Additionally, descriptive statistics pertaining to demographic and clinical information were computed using Excel, Office 365 version. Both the qualitative and quantitative data were analysed and summarised in aggregate for the overall sample. No separate analyses by sex or gender were conducted.

Patient and public involvement

Patients were involved in the conduct of this study, and dissemination of study results. A patient-led organisation, the HCMA, conducted participant recruitment; and patients were able to provide input on interview content, due to the semi-structured nature of the interviews. The involvement of a patient author in the preparation of this manuscript enabled patient involvement in the dissemination of study findings. Results from this study will be used to develop a unique patient experience programme to capture data on all domains of quality of life—disease burden, treatment burden, psychological and emotional aspects, physical limitations and impact on work, social life and lifestyle.

Verbal informed consent was obtained prior to all telephone interviews.

RESULTS

Baseline characteristics

Among the 20 participants, 11 (55%) were women. Median age was 54 years (range 29–78), and 17 (85%) participants were white (online supplemental table S3). Participants were distributed across the USA (Northeast (30%), Midwest (10%), South (45%) and West (15%)). Median time since oHCM diagnosis was 3 years (range 0.6–22).

Symptoms of oHCM

During screening, all participants (N=20) reported fatigue at rest and shortness of breath with activity (online supplemental figure S1). Other commonly reported symptoms included heart palpitations or fluttering, dizziness or light-headedness and weakness.

During the interview, nearly all participants reported experiencing shortness of breath, dizziness or light-headedness and heart palpitations or fluttering (n=19 (95%) for each; figure 1, table 1). Other common symptoms included fatigue (n=18 (90%)), chest pain or pressure (n=16 (80%)), swelling in lower extremities (n=10 (50%)), weakness (n=10 (50%)) and fainting (n=6 (30%)). Although not symptoms of oHCM, atrial fibrillation was spontaneously reported by seven participants and premature ventricular complexes by one participant. Shortness of breath (n=8) and fatigue (n=6) were most commonly included among participants' most bothersome symptoms. Fewer participants reported dizziness or light-headedness (n=3), heart palpitations or fluttering (n=2), chest pain or pressure (n=2) or fainting (n=1) as one of their most bothersome symptoms.

Although half of the participants reported that their symptoms were generally consistent from day-to-day, others reported that they were variable. One participant stated, 'It changes based on diet, alcohol, sleep, the weather; any number of factors will change how I feel on a given day. I know when I'm doing something that I [will] pay the price [for]. If I really need to feel good … I know what to stay away from'.

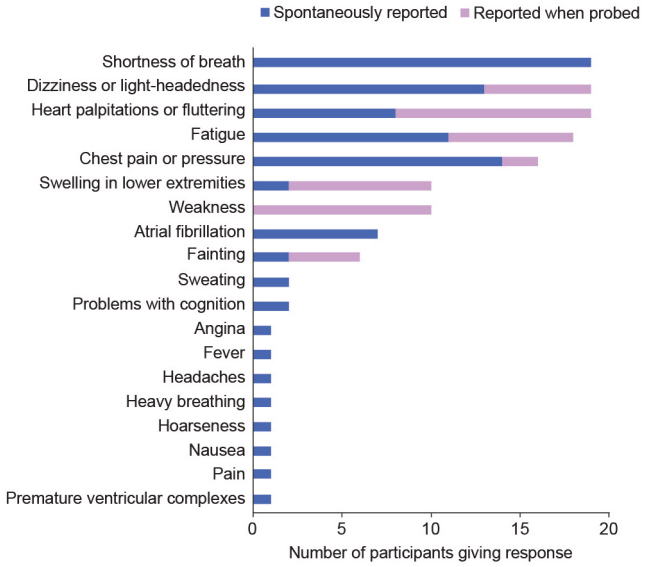

Figure 1 (Visual summary) All patient-reported symptoms and conditions mentioned during participants' interviews (N=20). 'Pain' included pain in arms, jaw, neck and back. 'Problems with cognition' included difficulty concentrating or remembering things.

Impact of oHCM on health status

Most participants mentioned physical limitations, with the most common being walking (n=18), climbing stairs (n=15) and lifting (n=10) (table 2). The severity of physical limitations varied among participants; for example, although a few reported that they were unable to walk as far as they would like, some had difficulty walking even short distances. Participants commonly reported limitations in their daily activities due to symptoms of oHCM, such as household chores (n=18), recreational activities (n=18), social activities (n=13), eating (n=11), exercise (n=11) and working (n=9).

Many participants reported emotional burden related to associated stress, anxiety and a sense of isolation due to their oHCM (n=16). More than half (n=11) declared they fear dying, and half (n=10) reported they have difficulty keeping or nurturing relationships with family and friends. Limitations in physical functioning or activities (n=8) and emotional impact (n=5) were cited as having the most negative impact on participants' overall quality of life. Participants also reported that having specific symptoms (n=6) or the ability to maintain social relationships (n=4) greatly affected their quality of life.

Expectations of treatment

When asked what would make them consider a new oHCM treatment to be effective, almost all participants (n=18) stated they would need to see an improvement in shortness of breath and more than half (n=11) would have to experience improvement in fatigue (figure 2, table 3). Fewer participants reported a need for improvements in dizziness or light-headedness (n=4), chest pain or pressure (n=3) or heart palpitations or fluttering (n=3) for a treatment to be considered effective. In addition, some

Table 1 Obstructive hypertrophic cardiomyopathy symptoms as reported by more than two interview participants, with representative quotes (N=20)

Symptom	Frequency, n (%), n spontaneously reported	Participant description
Shortness of breath	19 (95), 19	'Mostly shortness of breath with activities … something as simple as going upstairs …(I)feel like … I was running around the block a few times. There are times [when] it feels like I forgot to breathe, and it's like. 'Oh, my God.' [Going up one flight of stairs] from my living room to my bedroom is tough, doing laundry is even worse. Going up to the second floor of my house with the hamper, that's the worst. Usually, I'll take a break on the sofa, catch my breath, and then do the second flight.' '(The most bothersome symptom is] shortness of breath [because it is] the first symptom I have that's telling me I'm going to have to stop. It's so profound and so overwhelming at times. I just wish that would go away.'
Dizziness or light-headedness	19 (95), 13	'(Dizziness or light-headedness)is easily a daily occurrence, sadly probably multiple times a day. Most commonly happens if I stand up too quickly or if I bend over my waist or my head drops below my waistline, tying your shoes, picking something up off the floor. Those are the most common times I get super dizzy and almost feel the tunnel of darkness … You're like on the brink of passing out and hopefully there's something nearby that you can steady yourself on. Take a few deep breaths, and it subsides pretty quick.'
Heart palpitations or fluttering	19 (95), 8	'I call it thumping. If I sleep on my left side, it'll sometimes wake me up at night. When I'm trying to go to sleep,(I)feel my heart skip beats and pound in my chest, and it feels very uncomfortable, and I have to sit up, and I just kind of wait until it stops, and on my right side, it seems to alleviate it. If I'm going hiking, or I am exerting myself, occasionally I'll feel it; but, for the most part, I'm able to keep up. [If] there's stairs or hills … usually I try not to have large meals [because] having a large meal or eating too much [or] salty foods … get those palpitations going…'
Fatigue	18 (90), 11	'There are things that are difficult to do because I'm so fatigued … and then the other thing is, should I even plan that activity because I know it will make me so tired and am I going to be too tired to even do it? It's ridiculous. I think [should I bother going] to my PCP [primary care provider] if I have a medical concern … do I have enough energy to even go see my doctor? … I try to make most of my appointments towards the end of the week and … not plan anything for the week leading up to it so I still have enough energy by the end of the week to do the thing … and then I know I have at least the weekend to recover.(Another example,)… what could I have for dinner? Oh, a salad. Oh wait, I don't even have the energy to chop celery. [If] I need to go to the store, I say, 'Oh no, I can't,' [because] the process of going to the store … is just overwhelming to think [about.)' 'I've got a couple [symptoms] that are the most bothersome. The fatigue, absolutely, [because I am] not … able to do daily activities, … and not being able to walk, [that is] the shortness of breath, that's … debilitating.'
Chest pain or pressure	16 (80), 14	'I wanted to say [chest] pain [but it is more like] a tightness. [It happens] more if I eat a meal and … walk home, and(I)have to stop after a few blocks. It's usually prompted by … eating, maybe alcohol, or … dehydration'
Swelling in lower extremities	10 (50), 2	'Basically, I'm stuck with the edema … if I eat something that contains a lot of salt, I'll notice it blow up. As long as I keep my diet and exercise pretty much what I'm supposed to be doing, then the swelling will stay down. (However,)like I said, it's pretty much always going to be my normal, so my legs are always going to appear bigger than they have been.'
Weakness	10 (50), 0	'Oh, yeah. I was weak, tired. I felt half dead to tell you the truth. I mean, I'm only 34, [and] I felt like an old, like hospice person. I felt that I couldn't do anything.'
Fainting	6 (30), 2	'Two, too many. I was on a treadmill the first time. The other time I was riding my bike. I'd say [it was] 90 degrees outside, [and I was] riding my bike on a dirt trail with my son, and my chest started hurting, and then I started getting dizzy, so I got off my bike, started kind of walking, and then all of a sudden, I collapsed. He said I was out for 2 minutes.'

Table 2 Impact of obstructive hypertrophic cardiomyopathy on patient-reported health-related quality of life, as described by interview participants (N=20)

HRQoL domain	Frequency, n (%)	Participant experiences
Physical limitations	20 (100)	
Walking	18 (90)	'Well, I guess I have to think about it, but I can remember going to a football game a couple of years ago, and we ended up parking so dang far away, and it was like, 'Holy cow.' We just kept walking and walking and walking, and I'm like, 'Oh, man.' I got through it. I did it, but I was like, 'Man, I don't want to do this again.'
Climbing stairs	15 (75)	'Stairs are my enemy. I avoid stairs if at all possible. Climbing stairs are a nightmare for me. Caught climbing an incline is a nightmare. I avoid steps, yes. I stay away if at [all] possible.'
Lifting	10 (50)	'I think if I'm carrying something heavy for sure(I get shortness of breath, like)six grocery bags filled with one or two gallons. I don't know what it was I carried yesterday, and it was hard. I guess it's very hard if something … is over 30 pounds.'
Bending over	9 (45)	'Bending over cuts off my breath, so I really can't bend over at all.'
Walking an incline	8 (40)	'I can't do a lot of things that other people can do. I can't go walking around. I can't do inclines. I can't … go with the guys [to] a football game. Well, there's no way I can climb up 30 rows of seats and go sit down. I can't [do] inclines whatsoever. I can't. I'm limited on a lot of things. It's really a crazy disease.'
Standing from lying or seated position	8 (40)	'…if I [am] on my couch watching TV, [with] my feet up and … then I get up quickly. I have to kind of steady myself before I do anything. If … my doorbell rings, and I get up and go there too quick, I can get very dizzy … I would like almost have to lean against a wall or find a table and hold myself up.'
Standing for a period of time	6 (30)	'Well, I have to say … the shortness of breath and not being able to walk … makes me think twice about where I'm going, what I'm doing … anything where I'm going to be standing for a long period of time.'
Functional limitations	20 (100)	
Household chores	18 (90)	'Well, I have a difficult time just doing normal household things. I live in a fairly small apartment, and there is very little that I can do … I can't do the whole thing in one day. I'll vacuum the living room and then either have a great wait period or vacuum the bedroom the next day because it just tires me out so much to vacuum that space.'
Recreational activities	18 (90)	'(Having oHCM] has also been something that's not allowed me to do many things that I've always wanted to do in my life. I see people my age able to … I can't do any competitive sports … [or] activity. For example, my wife went skydiving … I can't do that stuff and that sucks. When I … play with my kids … my daughter loves soccer … I've kicked the soccer ball around, but … I'm [not] running [around). As a father … you want to … keep up … it kind of sucks to not be able to be as engaged … at 40 years old, that stinks.'
Social activities	13 (65)	'I'd like to be able to … go shopping with my sisters, [but] any kind of walking of any kind of distance, I avoid like the plague.'
Exercising	11 (55)	'It's been about a year [since] my symptoms have really been bad. Before that, I was able to go work out. I was a swimmer at the Y. I would go on hikes in the woods. I would walk a treadmill, and I was getting to where I could run. I'm not able to do that now. I've become more sedentary when I'm not at work.'
Eating	11 (55)	'…(eating] meals with high carbohydrates or a lot of food … will bring … shortness of breath … I feel like [an] elephant [is] sitting on my chest, and someone has their hands around my throat. You kind of learn portion control and [that] certain foods … may trigger your symptoms. Obviously, we try to stay away from [high carbohydrates] or … eat [them] in moderation. I found myself eating a lot more salads … I can eat as much salad as I want [because] it doesn't do anything to my symptoms. What American doesn't love pizza and not have two or three pieces and man, it sends me for a loop almost every time, so it's just not worth it.'
Sleeping	11 (55)	'Sleep comes and goes. There's many nights where I'm just up, and I don't know why. Not really insomnia, it's just basically a really, choppy sleep schedule. Sometimes I'll get exhausted during the day, and because I nap during the day, I can't go back down at night.'

Continued

Table 2 Continued

HRQoL domain	Frequency, n (%)	Participant experiences
Shopping	10 (50)	'Grocery shopping. I don't do that by myself either, because I'm scared that something's going to happen.'
Working	9 (45)	'I'm a Realtor, and when I go on the group caravans with other brokers, I plan which homes I'm going to look upstairs in.'
Taking care of child	7 (35)	'Everything changed. I couldn't do anything; even to just get up, get my kids dressed. By the time I was done making breakfast, I was done. And my kids knew something was up…'
Taking care of pets	6 (30)	'I can't even walk my dog around the block anymore. We used to take a couple of really nice walks a day … I can't say it's just one aspect of HCM.'
Travelling	6 (30)	'We would go and do those things, like going to little plantations that have gardens, or [taking] historical [walking] tours. Lots of fun outside stuff that we would do together that I can't do anymore.'
Talking	3 (15)	'Even if I do an extended amount of talking, I can get out of breath.'
Showering	3 (15)	'I dread taking a shower in the morning [because] it wears me out.'
Driving	2 (10)	'I could collapse [while] I'm driving … and that's the thing that scares the crap out of me.'
Psychosocial impact	18 (90)	
Emotional	16 (80)	'It emotionally is hard for me, not to be able to do [things] for myself, and it kind of beats on my self-worth.'
Fear of dying	11 (55)	'Oh!(I'm scared that)I'm going to drop dead. I've actually asked my doctor, 'What are the chances [that] I'm just going to drop dead?' It's not the most pleasant thought. Whether I realize it or not, it's just a part of my everyday thinking.'
Relationships with family and friends	10 (50)	'It makes my husband have to take up so much more of the slack, and he's stressed because he wants to be that person for me; but he can't do it all because it's too much for one person. And my friends and family don't understand why I can't do the things that I used to do, and I think some of my family see me as a burden … they think it's just in my head, or if I eat better, or if I exercise or take vitamins, it'll go away. They just don't get it, and that takes its toll emotionally, as well.'
Intimate relationship	2 (10)	No quotes from these participants.

HRQoL, health-related quality of life; oHCM, obstructive hypertrophic cardiomyopathy.

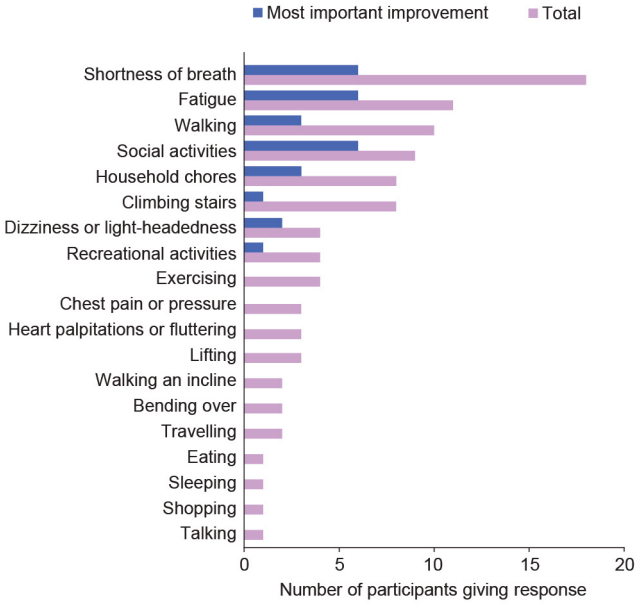

Figure 2 Improvements that indicate effective treatment, as reported by interview participants (N=20).

participants said they would need to see improvements in walking (n=10), climbing stairs (n=8), participating in social activities (n=9) and performing household chores (n=8). Participants consistently explained that improvement in their shortness of breath and fatigue would correlate with enhanced ability to perform these physical and social activities.

DISCUSSION

This study is one of the first to report patient experiences with oHCM using semi-structured, qualitative interview techniques. Three key findings have emerged. First, shortness of breath and fatigue were the most commonly reported symptoms and most frequently identified as participants' most bothersome symptoms. Second, participants commonly described significant impacts on their psychosocial functioning that were not solely due to physical limitations. Finally, participants reported that reductions in their burden of shortness of breath and fatigue, accompanied by improvements in their ability to engage in routine social and physical activities (eg, walking and

Table 3 Patient expectations from therapy for obstructive hypertrophic cardiomyopathy (N=20)

Treatment goal	Frequency, n (%)	Patient expectations as reported
Improvement in symptoms		
Shortness of breath	18 (90)	'For me, it would be the breathing because when you're short of breath, it is scary when you feel like you can't catch that next breath. Any improvement or anything to make my life easier and the symptoms less would be fantastic.'
Fatigue	11 (55)	'Recently I had a baby, being able to do things with her, being able to take part in going out with her and my wife and spending time with them, without feeling totally wiped out.'
Increased ability to engage in activities		
Social activities	9 (45)	'Being able to spend more time with my son and my husband … are the most important. That affects not only my physical well-being but my emotional well-being, and theirs, as well.'
Recreational activities	4 (20)	'The thing I would like the most would be [being able to] leave my apartment. That I have the energy to leave my apartment and do something that I'll enjoy while not destroying the possibility of doing anything else for the rest of the week because I've overdone it.'
Lifting	3 (15)	'They'd all be important, [but] it'd be nice to be able to pick up something that weighs over 25 pounds and not have any symptoms.'

climbing stairs), were necessary for them to consider a treatment effective.

Our study confirms and extends prior reports on the value of improved functional capacity and symptom relief for patients with oHCM or similar conditions. In a similar study, Zaiser *et al* described qualitative health-related experience among patients with oHCM and non-obstructive HCM and revealed the most frequent and most important symptoms were shortness of breath, palpitations, fatigue/tiredness, dizziness/light-headedness and chest pain.[14] Our findings represent a US-based population and extend this previous work by Zaiser *et al* by including a detailed qualitative inquiry into treatment goals from a patient perspective. All participants in our study had oHCM, whereas the study by Zaiser *et al* enrolled patients with oHCM and non-obstructive HCM. As such, the concepts raised in our study represent important treatment goals for patients with oHCM specifically. The importance participants in our study place on improvement in symptoms and function as treatment goals is consistent with a survey of patients with heart failure by the US Food and Drug Administration and Heart Failure Society of America. In this survey, 26.2% of respondents would be willing to risk having less time alive to improve how they feel or function.[4] Our results suggest that, as for patients with heart failure, increasing time alive is not the only treatment goal for patients with oHCM and survival is coupled with the need for symptom reduction and improved quality of life across multiple domains.

Findings from our study underscore the high prevalence of both physical and psychosocial symptoms and the resulting impaired health status of patients with oHCM. This finding may inform the development of tools to measure patient-reported outcomes (PROs) that are specific to oHCM. Participants in our study frequently reported psychosocial impacts, including emotional distress and fear of dying and negative impacts on relationships with family and friends. Accordingly, a thorough evaluation of oHCM impacts should include PRO tools assessing the severity and frequency of shortness of breath, fatigue, chest pain or pressure and dizziness or light-headedness, as well as tools evaluating physical activity, psychosocial and quality-of-life impacts. Future long-term programmes should also be developed to capture a broad range of patient experience data covering all domains of health-related quality of life—disease burden, treatment burden, psychological and emotional aspects, physical limitations and impact on work, social life and lifestyle. Development of improved PRO tools specific for oHCM may support the adoption of symptom relief and improved functional capacity as regulatory endpoints for oHCM treatments, as is already recommended for heart failure treatments in the USA.[16] These assessments could then be implemented in randomised controlled trials of novel therapies, enabling symptom relief and functional benefit to become a focus for drug development.

The results of our study should be considered in light of several limitations. First, the generalisability of results may be limited by the small number of participants and possible selection bias during participant recruitment. The eligibility criteria included patients with resting or exertional shortness of breath, heart palpitations or fluttering, dizziness or light-headedness, chest pain or pressure, fainting, weakness, fatigue and/or swelling in lower extremities and thus resulting in patients reporting symptoms in this study. Additionally, as the prevention of sudden cardiac death has been a priority focus of the HCMA, patients reporting fear of dying could present possible selection bias. To minimise these impacts, we used purposive, maximum variation sampling to ensure diversity in participants' demographic and clinical characteristics. Also, we achieved thematic saturation, and

our estimated sample size is similar to that in previous qualitative and interview studies in the field of cardiac failure.[12 17–20] In addition, the small sample size enabled us to conduct detailed qualitative inquiries.

Second, due to confidentiality requirements, we were unable to capture detailed demographic data and granular clinical data on the severity of oHCM, such as the degree of LVOT gradient elevation, extent of hypertrophy or severity of diastolic dysfunction. However, prior studies have shown symptoms in patients with oHCM do not necessarily correlate with LVOT gradient.[21] The results of this study may also have been impacted by the wide variability in participants' age and time since diagnosis. For example, comorbidities more common with increasing age might confound patient experiences with oHCM symptoms. Alternatively, patients with a longer time since diagnosis may become accustomed to their symptoms over time. Future research could investigate whether the impacts of oHCM on patients varies with age and time since diagnosis and evaluate the differences between patient symptom profiles and LVOT gradients, including those eligible for septal reduction therapy. Finally, we did not conduct any separate analyses by sex or gender; this was due to the small sample size.

In conclusion, patients with oHCM in this study experienced a high burden of symptoms and additional psychosocial impacts that led to poor health status. Improvements in shortness of breath, fatigue and physical functioning would be highly valued by patients with oHCM and represent important treatment goals for emerging HCM medications. The results of this analysis will be used to develop a unique patient experience programme to capture a broad range of data covering all domains of quality of life—disease burden, treatment burden, psychological and emotional aspects, physical limitations and impact on work, social life and lifestyle.

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Patient and public involvement Patients and/or the public were involved in the design, or conduct, or reporting, or dissemination plans of this research. Refer to the Methods section for further details.

Patient consent for publication Not applicable.

Ethics approval Given the low-risk nature of this qualitative study, it was deemed exempt from formal review by RTI Health Solutions' institutional review board. Participants gave informed consent to participate in the study before taking part.

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