The illness burden of severe asthma contrasted to people with mild-to-moderate asthma: a qualitative study

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Symptom burden in people with severe asthma is high, with poor quality of life compared to people with mild-to-moderate asthma. Understanding the patient's experience living with severe asthma could assist in enhancing the patient–clinician partnership. https://bit.ly/3uydoUj

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Abstract

Background Disabling symptoms of asthma including breathlessness, cough, wheeze and chest tightness largely impact quality of life; however, how these symptoms impact people with asthma of different severity levels remains unknown. This study aimed to compare and characterise patients' symptom experience and the burden caused, their quality of life, and the medication preferences of people with severe asthma against those of people with mild-to-moderate asthma.

Methods This was a multisite qualitative study involving two focus groups and semistructured interviews of adults with severe asthma undertaken in Australia and UK. Interviews were also undertaken in people with mild-to-moderate asthma. Audio recordings were transcribed and analysed thematically.

Results Participants in both severe asthma and mild-to-moderate asthma groups had a mean±SD age of 57±12 years. Between the severe asthma and mild-to-moderate asthma groups, 62% of participants were female and 86% lived with family. Themes were identified: 1) what is asthma and most bothersome symptoms: both groups reported breathlessness as the most bothersome symptom; 2) impacts on life: disease-related impact differed as people with severe asthma reported significant burden in their quality of life, which encompassed emotional, physical, social and financial wellbeing; and 3) personalised and responsive care: severe asthma interviewees preferred injectable biological therapy as a mode of treatment administration.

Conclusions People with asthma are burdened by breathlessness and cough and other disabling symptoms resulting in impaired quality of life. Understanding the experiences of people with asthma of different severities can improve the patient–clinician partnership.

Introduction

People with severe asthma experience a wide range of debilitating symptoms impairing their daily life and functioning, leading to substantial individual and societal burden [1, 2]. In addition to the emotional burden [3], people with severe asthma experience escalating and persistent physical symptoms [4]. Disabling common asthma symptoms include breathlessness, cough, wheeze and chest tightness [5].

Unlike people with mild-to-moderate asthma who experience fewer and less severe symptoms, severe asthma is characterised by a continuous burdensome symptom profile, frequent asthma attacks and many comorbidities [6–8].

Asthma control and quality of life are assessed using asthma patient-reported outcome measures (PROMs), which have largely been developed for the general asthma population and many were developed without patient input. These measures may not capture the burden that people with severe asthma experience. Incorporating patient perspectives and priorities is important when managing severe asthma [9, 10], as patient priorities frequently differ from those of their clinicians [11, 12]. Failure to account for patient priorities may decrease patient satisfaction with treatment and adherence to prescribed therapy. Furthermore, treatments may be ineffective if it they not targeted to the underlying cause of the symptoms [12, 13].

This multisite comparative descriptive study aimed to capture the patient's experience of severe asthma to inform the development of PROMs in severe asthma, and characterise the symptom burden, quality of life impact and medication preferences of people with severe asthma against those of people with mild-to-moderate asthma.

Methods

Design

This study used a multisite cross-sectional qualitative approach with semistructured interviews and focus groups carried out in Manchester, UK and Newcastle, Australia. Ethics approval was obtained from the Hunter New England Research and Ethics Committee (16/05/8/5.02) and the UK Health Research Authority (16/SC/0230). The consolidated criteria for reporting qualitative research (COREQ) [14] guided the reporting (supplementary box S1).

Participants and recruitment

Inclusion and exclusion criteria are presented in table 1. People with severe asthma were recruited by their treating respiratory clinicians, and through the research database and clinics of the Department of Respiratory and Sleep Medicine at John Hunter Hospital (JHH), Newcastle, Australia and the Severe Asthma Clinic of the University Hospital of South Manchester, Manchester, UK.

TABLE 1 Inclusion and exclusion criteria

	Severe asthma		Mild-to-moderate asthma	
	Inclusion	**Exclusion**	**Inclusion**	**Exclusion**
Participant criteria	⩾18 years of age Confirmed doctor diagnosis of severe asthma Satisfactory English language skills Able to provide written/digital consent	<18 years of age Non-English speaking Inability to attend study visits	⩾18 years of age Confirmed doctor diagnosis of mild or moderate asthma Satisfactory English language skills Able to provide written/digital consent	<18 years of age Non-English speaking Inability to attend study visits
Severe asthma criteria	High-dose inhaled ICS and second controller OR Frequent OCS OR ACQ >1.5 OR Exacerbation requiring OCS in the past year		Past evidence of FEV_1 or FVC post-bronchodilator response ⩾12% and 200 mL OR Past evidence of AHR OR Diurnal variation in peak flow ⩾15% or >50 mL, but did not meet the criteria for severe asthma	
Further requirements to support severe asthma criteria	Presence of a post-β_2-agonist FEV_1 <80% or FEV_1/FVC <70% OR Past evidence of confirmed asthma was also required, *i.e.* FEV_1 or FVC post-bronchodilator response >12% and 200 mL OR Evidence of AHR or diurnal variation in peak flow >15% or >50 mL			

ICS: inhaled corticosteroid; OCS: oral corticosteroid; ACQ: Asthma Control Questionnaire; FEV_1: forced expiratory volume in 1 s; FVC: forced vital capacity; AHR: airway hyperresponsiveness.

People with mild-to-moderate asthma were recruited from the research database (JHH) in Australia only. Purposive sampling was used to achieve participant diversity, ethnicity and socioeconomic status. Participants were approached by letter enclosing written study information and a consent form; participants contacted the study coordinator of each site to indicate their interest. Written informed consent was obtained from all participants before the interviews or focus groups.

Data collection

Focus groups and semistructured interviews were undertaken between February 2017 and January 2018 by V.M. and A.S. in Australia and a trained research assistant in the UK. Each site used the same interview guide (supplementary box S2), developed around the study aims and available literature [15–17]. However, the guide was modified iteratively as initial themes and concepts emerged. Two focus groups (participants n=4 (Australia) and n=5 (UK)) and 18 semistructured interviews (n=10 (Australia) and n=8 (UK)) were conducted. In the Australia site, semistructured interviews (n=10) with people with mild-to-moderate asthma were conducted as a comparator group. All participants completed a demographic questionnaire prior to the interviews or focus groups. Data collection took place in a private office at the Hunter Medical Research Institute in Australia and in a quiet room at the hospital recruiting site in Manchester in the UK. All interviews were digitally recorded after consent was obtained and field notes were taken. The two focus group were 92–132 min (mean±SD 112±28 min) in length. Interview duration was 27–106 min (mean ±SD 60±20 min) in the severe asthma group and 28–63 min (mean±SD 44±11 min) in the mild-to-moderate comparator group. As some of the participants were previously known to the interviewer, self-reflexivity was encouraged. No incentives were given nor repeat interviews undertaken. The interviews continued until data saturation was achieved (the point at which no new themes were emerging). The interview quotes were labelled using pseudonyms, age and gender.

Data analysis

All de-identified audio recordings were transcribed verbatim and were checked for accuracy against the original sound file by the research team. Data were exported to NVivo Pro version 12.0 (lumivero.com/products/nvivo). Data analysis followed an inductive thematic approach [18] in which texts were coded, re-coded and categorised accordingly by one author (E.C.M.) to identify recurring themes and to elucidate common patterns within the data. Using the modified within-between-within strategy (figure 1) [19], E.C.M. familiarised herself with the data obtained from each site to detect similarities and differences within sites. Data from the comparator group were independently analysed and compared with data from the severe asthma group using the constant comparative technique [20]. E.C.M. coded all the data independently. To ensure consistency of themes transcripts were frequently revisited. Any conflicting elements on the interpretation and analysis of the data were discussed until agreement was reached with E.C.M., V.M.M. and V.L.C. All co-authors reviewed the final subthemes and themes.

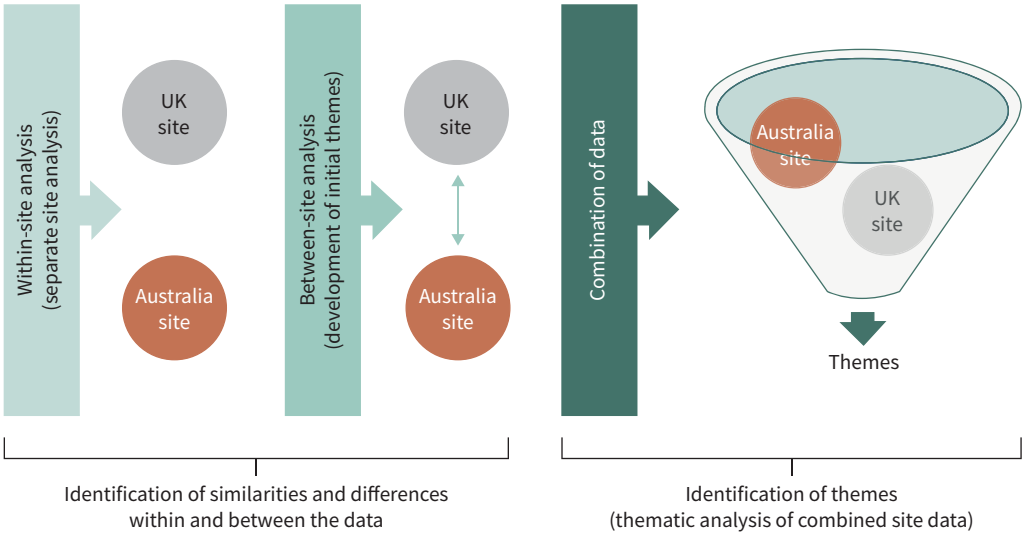

FIGURE 1 Modified multisite qualitative analysis approach.

Results

A similar age of 57±12 *versus* 57±19 years was found between the severe asthma group and the mild-to-moderate asthma comparator group (table 2). Participants in the two severe asthma sites were mostly female and lived with family/support. A higher daily inhaled corticosteroid (ICS) dose was recorded in the severe asthma group (1193±689 μg·day^{-1}) compared with their counterparts (260±192 μg·day^{-1}). Three interconnected themes were identified: 1) what is asthma and most bothersome symptoms, 2) impacts on life and 3) personalised and responsive care, which are discussed with supporting illustrative quotations (tables 3–7).

Theme 1: what is asthma and most bothersome symptoms

The perceived meaning of asthma and severe asthma and bothersome asthma symptoms are described in two subthemes.

Asthma versus severe asthma

The perception of asthma as an airway disease triggering breathing problems was similar within and between the severe asthma groups and within the mild-to-moderate group (table 3). Both groups associated the word asthma as debilitating and a nuisance in one's life. Some participants in the severe asthma group used the terms "restriction" and "unpredictable".

Within the mild-to-moderate group asthma was described as almost a "manageable disease" and they were able to get on with their lives with minimal disruption (table 3).

However, a strong emotive reaction to severe asthma was noted within and between the severe asthma groups and within the mild-to-moderate asthma group. Severe asthma was almost uniformly seen as an invisible, variable and distinct form of asthma that could leave someone severely incapacitated (table 3). Asthma's unpredictable nature left most participants in both sites feeling constantly tossed in the sea of uncertainties. A few participants in both groups viewed severe disease as a constant recurrence of asthma requiring constant medications whilst other participants from both groups associated severe asthma with death.

TABLE 2 Characteristic of participants between groups

	Total severe asthma	Focus group severe asthma		Individual severe asthma		Mild-to-moderate asthma[#]
		UK	Australia	UK	Australia	
Participants	27	5	4	8	10	10
Age, year	57.22±12.08					56.63±19.13
Gender						
Female	19 (70)	4 (80)	3 (75)	7 (88)	5 (50)	4 (40)
Male	7 (26)		1 (25)	1 (12)	5 (50)	6 (60)
Other	1 (4)	1				
Ethnicity						
White	26 (96)	4 (80)	4 (100)	8 (100)	10 (100)	10 (100)
Asian	1 (4)	1 (20)				
Living arrangements						
Living with family/support	22 (81)	4 (80)	3 (75)	8 (100)	7 (70)	10 (100)
Living alone	5 (19)	1 (20)	1 (25)		3 (30)	
Employment status						
Working full or part time	7 (26)	1 (20)	2 (50)	1 (12)	3 (30)	3 (30)
Not studying or working due to health condition	9 (33)	3 (60)	1 (25)	3 (38)	2 (20)	1 (10)
Studying						1 (10)
Not working for other reasons/retired	11 (41)	1 (20)	1 (25)	4 (50)	5 (50)	5 (50)
ICS, μg·day^{-1} fluticasone equivalent	1193±689					260±192
OCS daily dose, mg	11±15	18±25	6±13	14±14	4±8	0
ACQ-6 score					1.90	0.62
Prescribed monoclonal antibody therapy			4 (100)		10 (100)	

Data are presented as n, mean±SD or n (%). ICS: inhaled corticosteroid; OCS: oral corticosteroid; ACQ: Asthma Control Questionnaire. [#]: Australia site only (semistructured interviews; comparator group).

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TABLE 3 Comparative illustrative quotes between severe asthma and mild-to-moderate asthma groups for theme 1, subtheme what is asthma

What is asthma	Severe asthma group		Mild-to-moderate asthma group
	UK	Australia	
Asthma			
Breathing problem	Breathing problems … you become breathless, and your energy level basically goes down. *Aubrey, 58 years, female*	Asthma means to me that I have trouble breathing, so breathing out. *Melanie, 48 years, female*	Problems with breathing. *Chris, 70 years, male*
Restricting and debilitating	I love walking but it "asthma" has restricted me in that way. *Leah, 68 years, female*	It means – basically it's a pain in the arse. It means I'm restricted in certain physical activity obviously and [plays a big] part [of] your life. It – you're sick quite often. Hard to breathe. It's a bit of a cross to bear. *Tim, 71 years, male*	Well the definition of asthma is lung problems that is pretty much debilitating I think. *Ian, 67 years, male*
Unpredictable	I think with myself, I mean, it's the unpredictability of it. One day I can be fine and the next day I just can't breathe. *Daisy, 36 years, female*	It means having to be consciously aware of the environment all the time and the activities that you're doing and what's going to affect you and always being prepared for the event of an asthma attack. *Claire, 71 years, female*	Not discussed
Manageable	Not discussed	I suppose what I would think would be [asthma] for a lot of people would be a manageable disease, where they get on with their life and it doesn't really interfere too much. *Chloe, 60 years, female*	It no longer worries me. No, I just manage it. It's just something you've got, you know … you work around. *Ian, 67 years, male*
Severe asthma			
Not the same	Awful. People know what asthma is. You know, you get out of breath and you take inhalers. Like I say mine's a bit more than that because I'm on steroids. *Ann, 53 years, female*	No, it's when you get to the ED and the doctors go through their rote-learned program of what they do for asthmatics, and they look at each other and say, well, we've run out of ideas. *Vivian, 57 years, female*	Severe asthma would be people whose medications perhaps don't give them any relief. They might need to go to hospital more often than other people and it might severely limit what they can do day to day. *Valerie, 40 years, female*
Constant asthma	I just want to keep it under control. I really do. *Rachel, 61 years, female*	I think severe, well my interpretation of severe is constant reoccurrence of asthma and the attacks are severe enough to mean that you've got to go on your asthma plan and maybe hospitalised. Constant asthma … *Dylan, 71 years, male*	Severe asthma limits your daily activities. You have to – constant medication, preventatives and Ventolin and things like that. You can end up hospitalised. *Priscilla, 33 years, female*
Severely incapacitated	I suppose you feel, like, disabled. I mean, I do have a blue badge because I can't walk that far. *Lily, 67 years, female*	It would be when you're virtually totally incapacitated, when you'd be either chair or bedridden and you need oxygen. *Tim. 71 years, male*	Severely incapacitated. *Daniel, 62 years, male*
Death and uncertainty	A lot of the times it's not good days and bad days, it's hour by hour. I can be absolutely fine, and then it can kick off very quickly, and I think that's the hardest thing with it, it's the uncertainty of it. *Phoebe, 58 years, female* Well, there's a few times I've felt as if that's it, "dying" you're not going to get out of bed. *Ann, 53 years, female*	I feel from one day to the next, life's different. I felt like I was dying, I was, I took out life insurance. *Jade, 33 years, female*	Severe to me is like potentially dying. *Robert, 64 years, male*
Invisible disease	I saw a sign the other week, it said, disability is invisible, isn't it? And that's just how I feel about that [asthma]. *Lily, 67 years, female*	It is a bit of an invisible sort of disease. *Chloe, 60 years, female*	Not discussed

ED: emergency department.

TABLE 4 Comparative illustrative quotes between severe asthma and mild-to-moderate asthma groups for theme 1, subtheme most bothersome symptoms

Most bothersome symptoms	n (%)	Severe asthma group	n (%)	Mild-to-moderate asthma group
Breathlessness	13 (48)	The breathlessness for me. I get breathless at night so it wakes me at night. It's the breathlessness that's the issue because I don't ever seem to be able to manage that at the moment anyway. *Heart, 57 years, female*	4 (40)	… shortness of breath occasionally. That would be the most worrying thing, in case it got gradually worse and whatever. *Chris, 70 years, male*
Cough	6 (22)	The burdensome is probably the cough [sic]. Because it frustrates other people around me. *Dylan, 71 years, male*	1 (10)	… most burdensome might be the coughing because it aggravates – irritates them on a daily basis. *Ian, 67 years, male*
Wheeze	4 (15)	The wheezing, because people hear it and that's something and people are – they look at you. They sort of – might look – you might be just sitting down on the bus or something, but then people hear you and – yeah. *Chloe, 60 years, female*	1 (10)	When I start to wheeze I worry some more. *Patrice, 45 years, female*
Chest infection	3 (11)	So that's always a worry really sometimes when you're having a really bad chest infection and that and you think you're never going to get back up and back to normal, because, as I said, they're limited on drugs what they can give me. *Susan, 66 years, female*	1 (10)	The only time it's ever of concern, if I get a bad cold or a chest infection or something, then obviously that will aggravate it. *Ian, 67 years, male*
Chest tightness	3 (11)	Probably the tightness in my chest because you just feel that everything's restricting up. *Melanie, 48 years, female*	0 (0)	Not discussed
Chest pain	3 (11)	Pain. It feels like you're having a heart attack and you know you're not having a heart attack, although it may be so. *Claire, 71 years, female*	0 (0)	Not discussed
Chest congestion	0 (0)	Not discussed	1 (10)	I'd say the chest congestion because it was just a cough on your chest and you'd be constantly coughing and harking. *Patrick, 24 years, male*

n: number of participants who specifically mention the topic.

Most bothersome symptoms

Compared to the comparator group, the majority of severe asthma participants within and between sites reported a constellation of symptoms as the most bothersome.

Breathlessness emerged as the most common bothersome symptom across groups (figure 2a). Between the severe asthma groups participants described breathlessness as the main stressor affecting daily living (table 4). For some, breathlessness brought excessive self-conscious emotions. Severe asthma participants within and between sites reported a greater frequency of cough followed by wheeze compared to mild-to-moderate participants. Cough was a source of frustration (sleep disruption, discomfort and relationships adversely impacted due to the thought of bothering other people).

Theme 2: impacts on life

Four subthemes were identified encompassing the impact of symptoms of severe asthma on quality of life.

Thieves of joy

Many reported feeling robbed as severe asthma slowly took away their job, social activities and relationships (table 5), compared to those with mild-to-moderate asthma. Some felt betrayed by their own body, particularly when none of the prescribed medication seems to work, leading to frustration. The depth of frustration was also recognised during constant recurrence of asthma attacks despite self-reporting adherence to medications and/or minimising trigger exposure. This was compounded by the challenges associated with adverse medication effects (oral corticosteroids) which left some participants even more physically challenged. Being a spectator on their own restricted lives left some participants anxious and depressed. Parental self-blame due to passing asthma to a child or abandoning the desire to have offspring (fear the child would inherit the disease) was reported by a few severe asthma participants. Whilst fear is not at the forefront for most participants with mild-to-moderate asthma, a participant reported being haunted with past childhood memories related to asthma emergency presentations. Despite being physically or emotionally challenged by severe asthma, they described some strategies (emotional, practical, social and problem solving) they used to rise again following adversity.

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TABLE 5 Comparative illustrative quotes between severe asthma and mild-to-moderate asthma groups for theme 2: impacts on life

Impacts on life	Severe asthma group		Mild-to-moderate asthma group
	UK	Australia	
Thieves of joy			
Robbed of everything	I feel like the asthma's robbed me of everything. Because it started off by taking my job away from me, which I loved, and then one by one it took all my friends away, I had to make new ones that understood it. And then it took all my activities away. Because I used to like running and I used to like, you know, other sports and stuff, and I can't do any more of those, because obviously my asthma interferes. *Lydia, 33 years, female*	It's been a millstone around my neck my whole life, since I was about a 5-year old. Having asthma all my life, it has affected my whole life and as we said earlier, that it's affected how my life, how my life path has gone. *Dylan, 71 years, male*	No. I'm very used to it. This is just the way my body works. I'm not used to anything else. *Priscila, 33 years, female* I have one memory from childhood and I have that recent one where I went to emergency where I felt scared because of it [asthma]. *Valerie, 40 years, female*
Failure and betrayed	but there are a lot of things I'd like to do and I can't do [because of asthma]. *Rachel, 61 years, female* Your skin's like tissue paper, you're frightened to death of … you know, even if you're in the garden, you get a little scratch or you get a massive, big bruise. *Daisy, 36 years, female* I wouldn't be without them [prednisone], but I hate taking them because my appetite increases. I have a weight problem anyway. If you're on long term, you get this moon face that even with my body isn't in proportion. And I put loads of weight on, and weight is no good for asthma, you know. *Thea, 49 years, female*	It does impact my life. Well I feel like a failure. Sometimes. It sort of makes me feel like that. Like I'm doing all the right things, why can't I breathe properly and why does it flare up and why can't it be controlled sort of thing? *Melanie, 48 years, female* I should have more common sense to avoid situations that I put myself in that can trigger an asthma attack off. *Tyler, 73 years, male* I guess the sad thing is I put my trust in the medication and sometimes it doesn't work. I think that's what I feel like through my whole journey of being an asthmatic. *Jade, 33 years, female* Prednisone has such a huge impact on you – a person – with your moods and weight … it's an awful drug. *All focus group participants*	I don't worry about it. *Robert, 64 years, male*
Frustration	I can't do anything like that anymore, I feel like I'm a bit more of a spectator on life, really, than I would prefer. I can't do that, and I find that very frustrating. *Phoebe, 53 years, female*	I think it's a frustration in life, because they'll be doing – seeing your friends will be doing things and I won't be able to do it, so I get frustrated. *Daniella, 56 years, female*	I don't feel it really impacts my life or whatever. *Patrice, 45 years, female*
Depression	I think it depresses you. I think you can get quite depressed because you want to do [the things you like]. *Mary, 63 years, female*	I have depression and I have to get help for that. I think the fact that you are quite controlled and restricted to what it is you actually want to do, which may shift to depressed. *Jade, 33 years, female* I get very emotional at times with it. It has been a pretty major impact on my life. *Daniella, 56 years, female*	Not discussed
Self-blame	My daughter's me when I was her age, yeah, in and out, and really poorly. It makes you sorry that you ever had children, you know, like you've given them such a burden. *Daisy, 36 years, female*	That's why I didn't have kids. That's why I didn't have kids – because I was told … asthma is hereditary … all our family had asthma. *Ryan, 44 years, male*	Not discussed
Anxiety	It's made me paranoid … like having little [child's name], I say, don't bring him if he's got a cold or like he's got croup at the moment, I don't want to … I pick things up very easily now. *Lily, 67 years, female*	I pinch myself to stay awake all night, because I didn't think I was going to wake up. When I have my attacks. It's a scary thought, *Jade, 33 years, female*	I would get anxious – I have had this – if I don't have my Ventolin with me or something. If I'm going to someone's house and they're like oh, you've got a dog. *Priscilla, 33 years, female*

Continued

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TABLE 5 Continued

Impacts on life	Severe asthma group		Mild-to-moderate asthma group
	UK	Australia	
Struggling to maintain a normal social life			
Social life	I'm not coming to that [event] because I don't want to be in a crowd, I don't feel brilliant, and you're also afraid of picking things up as well … *Leah, 68 years, female*	I don't go to some family things because if I'm coughing it's usually bad enough and embarrassing I don't go. *Aubrey, 58 years, female* I've never really had a social life, because of it. I see the hospital as my social life. I don't really get that far. No, actually, John Hunter consulting is my life. No doubt. That's it. *Ryan, 44 years, male*	No, not really. I do what I want to do. I don't feel limited by it. *Ian, 67 years, male*
Relationships	You're not sexually that much active. *Mary, 63 years, female* I've got a strong marriage, but it does affect my husband. *Lily, 67 years, female*	Even in the bedroom, I haven't been able to perform, because I'm gasping for air … it impacts on my relationship. I've missed out on a lot with the kids. *Jade, 33 years, female*	I don't think that really affects my relationship. That's just part of life really. I don't think it's impacting, no. *Patrice, 45 years, female*
Family	You can't take your kids out, so it's affecting the kids. And it's affecting the kids' friends because they can't go out with their friends, you know. It's just a nightmare. *Thea, 49 years, female*	It affects my mum, she gets very upset about it, and other – probably all the family members. *Daniella, 56 years, female* It had a huge effect on my family. Huge. It does, because when you end up in hospital your family's got to fend for themselves. It turns your life upside down. It turns your kids' lives upside down, particularly when they're young. *Claire, 71 years, female*	I don't think so, no. *Chris, 70 years, male*
Finances and opportunities			
Work	… unable to do my job which is very frustrating. *Heart, 57 years, female*	I had to retire early from teaching, and that has then impacted hugely on sense of self, and income. *Chloe, 60 years, female* I never had a work life. *Ryan, 44 years, male*	I couldn't say that asthma has impacted my work life. *Patrice, 45 years, female*
Medication cost	Not discussed	I'm working 4 days a week, paying a mortgage, the cost of medications, that impacts me. *Melanie, 48 years, female*	It's never really bothered me. It's affordable, it's not out of the way. *Patrick, 64 years, male*
Missed opportunities	But I used to be, like, earning good amount of money, but now I'm sitting at home. *Mary, 63 years, female*	So I wasn't even accepted to do a course, because of my health. *Jade, 33 years, female*	Work-wise, I guess once a year I might get quite unwell and have to take time off work for a few days but otherwise, it doesn't impact on my work life in any other way. *Valerie, 40 years, female*
Run, ride and walk			
Physical restriction	I never have a day where I'm asthma-free, and I'm limited to what exercise and exertion I can do. *Phoebe, 53 years, female*	I used to run, ride a bike… but I'm really restricted now. I can't get any better. *Tim, 71 years, male*	It doesn't stop me from doing anything. *Patrice, 45 years, female*
Activities of daily living	Doing anything was a struggle. Even sitting down was a struggle. I just could not breathe at all and just relying too much on my inhalers. I can't do anything. I'd no quality of life, I didn't. *Ann, 53 years, female*	I would just love to be able vacuum the house. Have 1 day when the house is spotless, but I can't do that all in 1 day. *Vivian, 57 years, female*	Just physically, just – yeah. Strenuous exercise is something that is not necessarily the easiest to do. But apart from that I don't think my asthma limits me generally, because mine is very mild. *Priscila, 33 years, female*
Striving for normality	I want to be as normal as possible and to cope with it, as long as it's safe to do it. *Phoebe, 53 years, female*	You just want to be independent and normal. *Tiffany, 47 years, female*	I'd like to get rid of it. *Daniel, 62 years, male*

TABLE 6 Comparative illustrative quotes between severe asthma and mild-to-moderate asthma groups for theme 3, subtheme supportive care

Supportive care	Severe asthma group		Mild-to-moderate group
	UK	Australia	
Patient–clinician partnership	I went to see my doctor and he was really nice because he said call me [name] and all basically he was down to earth … he didn't give all these big words, you know what I mean. He…it was just like talking to a friend. *Rachel, 61 years, female*	They were brilliant yeah. They did everything they could and the doctor came around quite a few times and I knew one of the nurses and she was pretty well around all the time. *Aubrey, 58 years, female* So the care has been excellent. *Melanie, 48 years, female*	I've had healthcare providers since then that actually listen to you when you say, this is what's going on and they go, okay let's see what we can do about this. *Priscilla, 33 years, female* Good. Yeah. No problems. They're all – they all know what they're doing. *Daniel, 62 years, male*
Acute care	I actually trust myself a lot more than when I first get to ED. Because I find all those trendy bastards don't know what I'm about. The only thing, they had magnesium. *Mary, 66 years, female*	So sometimes you feel like you're an inconvenience or it's not that urgent. Like you don't think – because you can't see it [wheezing/asthma], you don't think it's an urgent thing sometimes. *Melanie, 48 years, female*	I was probably in emergency for several hours and they tried several different drugs; I can't remember exactly what they gave me, but it took a few different tries of different things for me to actually start to improve, so there was a bit of a, will we admit her or not, and in the end, I wasn't admitted but I was probably there for most of the day. *Valerie, 40 years, female*
Delayed referral	I mean my GP seems to think because I'm at [name of hospital] that everything's dealt with there. *Leah, 66 years, female*	The GP that I had been seeing for a long time, I suppose towards the end I was getting disappointed and a little bit frustrated. Because if you'd pulled up my history, you could see every couple of months these chest infections. It wasn't for a year, it was … 5 to 10 years. So in that way I did feel disappointed that he didn't refer me. Obviously we'd tried a few different puffers and that's fine, I was happy to try different ones. But they weren't doing the job. *Melanie, 48 years, female*	Not discussed

ED: emergency department; GP: general practitioner.

TABLE 7 Illustrative quotes between severe asthma and mild-to-moderate asthma groups for theme 3, subtheme treatment mode preferences[#]

Treatment mode	n (%)	Severe asthma group (n=10)	n (%)	Mild-to-moderate asthma group (n=10)
Injection	8 (80)	I think it's because this is the one that made the most starkest improvement. It's easier to get the injection once a month. *Gabirel, 62 years, male* Injection um because it's a long-term effect, than it is to have my inhaler. *Jade, 33 years, female*	3 (30)	Injections sounds a bit daunting. *Valerie, 40 years, female* I don't really like needles. So I'd probably avoid that unless it was something like you do this and then you don't have to have anything for months and months or something. But if it was something regularly there'd be no way on this earth that I'd be wanting to take a needle. *Patrice, 45 years, female*
Puffer	3 (30)	I'd imagine if you want immediate relief, the puffer is the only thing. *Dylan, 71 years, male*	4 (40)	The puffer works well. Well, they're convenient, they're easy. *Ian, 67 years, male*
Tablet	3 (30)	I can't stick myself with a needle. *Aubrey, 58 years, female* Probably if there was just like one dose per day, like one dose in the morning or one pill that does the four things. The miracle cure. *Melanie, 48 years, female*	6 (60)	A tablet daily. I'd probably take a tablet. I take tablets daily anyway that supplement iron, so throwing another tablet in there wouldn't bother me at all. *Priscilla, 33 years, female*

n: number of participants who specifically mention the topic. [#]: Australia site only.

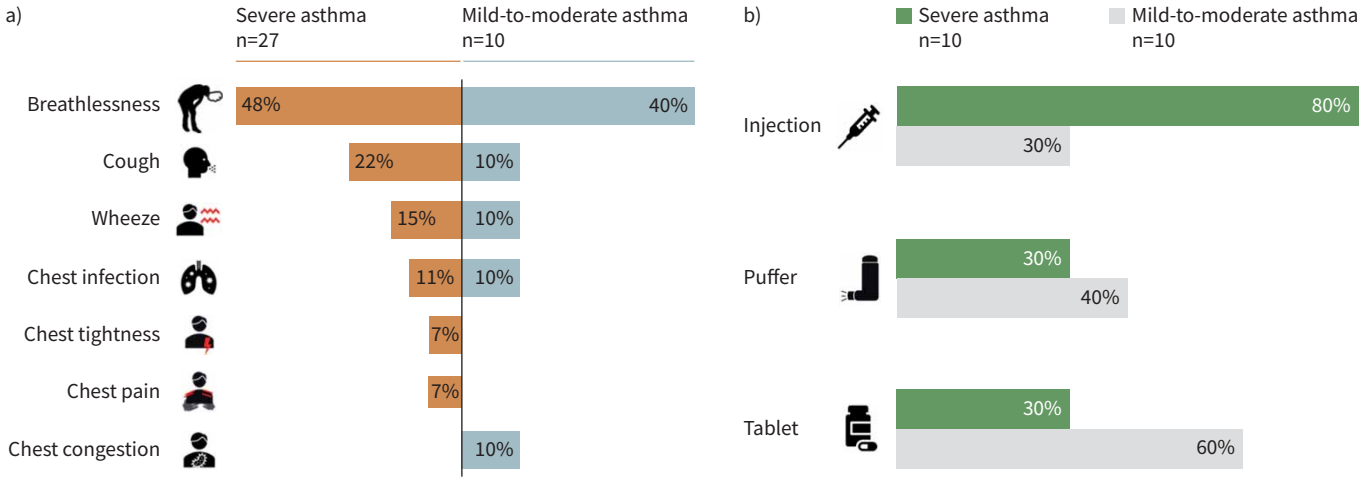

FIGURE 2 a) Comparison of the most frequent bothersome symptoms between severe asthma and mild-to-moderate asthma groups. b) Proportion of preferred medication routes of administration between severe asthma and mild-to-moderate asthma groups (Australia participants only). As participants can state more than one preference, the proportions do not all add up to their respective denominations.

Struggling to maintain a normal social life

Reduced social interaction was apparent within and between sites for most severe asthma participants compared to their counterparts (table 5). Avoiding social gatherings became the norm for some participants who viewed the act as important in reducing exposure to unwanted triggers, leaving some participants feeling socially disconnected. As life revolved around constant specialist visits, a participant within the Australia site perceived the hospital as his social life. Some participants in both sites discussed the sizeable burden severe asthma has on their families, impacting them both physically and mentally. Some participants within and between sites reported diminished physical intimacy (table 5).

Finances and opportunities

Most severe asthma participants in both sites resented being a burden to themselves, driven by the inability to carry out tasks or by decreased productivity at work due to illness. Some participants shared that they had never worked or were forced to give up work completely. For some the sense of purpose and direction is defined by their work, but physical limitations due to severe asthma symptoms deviated life's course (table 5). Job loss, changing careers and excessive absenteeism triggered the chain of adversity from financial to relational or emotional strains. However, low to no impact on their work productivity was reported by most non-severe participants.

Run, ride and walk

Within and between sites, severe asthma participants reported physical limitations; however, the impact varied in level and intensity. Participants in the mild-to-moderate group used the term "very mildly limited" to describe the effect of physical limitations whilst engaging in daily activities. In contrast, severe asthma participants in both sites described physical limitations as a sizeable burden, limiting their performance in simple household chores and engaging in much loved sports, hobbies or leisure (travelling) (table 5). Some mourned for their old robust and healthy life. Physical functional limitations awoke feelings of negative emotions (frustration, irritability, low self-esteem and anger).

Theme 3: personalised and responsive care

This theme describes the importance of person-centred approaches which align with an individual's preferences. When further probed, participants within the Australia site spoke about their preferred mode of therapy.

Supportive care

Across both groups the importance of effective communication and the patient–clinician partnership was perceived as a hallmark of personalised quality care. Both groups described how they felt comfortable and satisfied when clinicians recognised their concerns and preferences and used a tailored approach (table 6). Some reported concerns about the care they receive in acute or primary settings (driven by clinicians' lack of knowledge and expertise about the disease). Some felt dismissed and ignored when seeking urgent care,

attributed to hospital bed shortages and prioritisation of care due to the invisible nature of the severity of asthma symptoms. A severe asthma participant from the Australia site highlighted delays in referral to specialist care following constant chest infections.

Treatment mode preferences (Australia site only)

Injection biological therapy (whether self or clinic) was the preferred mode of treatment administration for severe asthma participants compared with mild-to-moderate participants (80% *versus* 30%) (figure 2b). Participants perceived injected biological therapy as convenient, quick and easy, with longer lasting effects compared to inhaled medications (puffer) (table 7).

A few participants expressed interest in self-injection, although they were hesitant to do it by themselves (due to lack of knowledge or training). By contrast, the comparator group expressed a reduced preference for injection therapy as others found it daunting and would avoid it, particularly on an ongoing treatment basis.

For most participants within the comparator group, oral administration was the preferred regimen (60% *versus* 30%) (figure 2b). They stated that tablets were easy and convenient, unlike inhaled medications (puffer). Within the severe asthma group, some desired a tablet that works as a "miracle cure". Inhaled medication (puffer) was the third preferred medication regimen (40% *versus* 30%) (figure 2b).

Discussion

This study descriptively compared and characterised the burden of symptoms, and the experiences and quality of life impacts of people with severe asthma and people with mild-to-moderate asthma. Our findings showed that both groups are burdened by symptoms. Our data showed the sizeable burden of breathlessness in both groups impacting their physical and psychosocial wellbeing.

Consistent with previous studies [21, 22], breathlessness caused significant physical and psychosocial burden for people with asthma irrespective of severity, and breathlessness was a driving cause of their burden [3, 23]. These findings are important as breathlessness itself is infrequently measured as an outcome in asthma clinical trials.

Similar to other studies, we found that cough impacts quality of life [21, 24, 25]. These findings suggest that cough could potentially be an important clinical trait in severe asthma requiring further attention as clinicians may not often recognise its importance. The importance of cough is noteworthy as coughing in asthma would be misinterpreted as being related to coronavirus disease 2019 (COVID-19), awakening fear and anxiety in people with asthma [26]. This also highlights the importance of effective patient–clinician partnerships and ensuring that patients and clinicians are in agreement in terms of the issues that matter most. Ainsworth *et al.* [12] recently examined this in a severe asthma population and found that concordance between patient and clinician responses was poor, with only 29% of the features identified by patients coinciding with those recognised by their attending clinician. Similarly, earlier work by McDonald *et al.* [27] also demonstrated a lack of concordance in terms of the clinical traits that matter most to patients and physicians. Asthma assessment tools to capture symptom control and physical and emotional impacts of asthma are used in asthma studies and practice [28–30]. However, these questionnaires have few cough items and therefore may not fully capture the burden of cough in severe asthma [21, 22, 31].

Another highlight of our study was the themes that emerged as significant in assessing the quality of life in people with severe asthma, which encompassed emotional, physical, social and financial wellbeing. These domains, particularly the fear of surviving future asthma attacks, have been consistently identified and described in previous qualitative studies [3, 17, 21, 24]. Moreover, and similar to the findings of Holmes *et al*. [32], severe asthma impacted the sexual quality of life of people with severe asthma. This aspect of peoples' lives is infrequently captured by current PROMs in asthma. A disease-specific measure is required to capture the impact of severe asthma on sex and intimacy [32].

Whilst the burden of asthma has been previously reported using qualitative data, we sought a wider perspective on experiences from people living with severe asthma from two sites. Our study provides additional evidence to support the impact of severe asthma on overall wellbeing. Given the burden profile of severe asthma, this could mean that whilst evaluating the quality of life is important in both groups, a universal asthma assessment tool may not capture the true burden of people with severe disease [9, 10, 12, 31].

Based on these differences, severe asthma PROMs that are reflective and sensitive to the unique pathogenesis of severe asthma, and the needs and experiences of the population, are important [2]. A

severe asthma questionnaire has been developed by Hyland *et al.* [33] with the intent to capture the burden of severe asthma and oral corticosteroid medication side-effects. However, domains measuring specific symptom burden in severe asthma are not included, such as cough, breathlessness and other related comorbidities [2]. The authors suggest that this tool complements asthma PROMs and recommend the development of PROMs in severe asthma [9, 10, 12].

From the personalised care perspective, we found that injectable monoclonal antibody therapy was the preferred medication delivery regimen for people with severe asthma within the Australia site as opposed to people with mild-to-moderate asthma who preferred oral therapy as a choice for medication regimen. At the time of these interviews 100% (Australia participants only) were prescribed monoclonal antibody therapy, but self-injection was not part of usual practice. As people with mild-to-moderate asthma are not treated with biologics, this could simply mean that participants have a general perspective about injection therapy; therefore, a low preference has been noted compared to people with severe asthma. Although the study intended to characterise the between-group differences of bothersome symptoms and quality of life, we found that participants from both groups highly valued the importance of personalised care. Accounting for individual preferences for prescribed medications or therapy has been shown to increase medication adherence [34, 35].

Strengths of this study are the robust methodology used to gain individuals' perspectives. The combination of focus groups and in-depth interviews conducted in both countries strengthened the representativeness of the findings. Despite similarities and differences in the healthcare systems between the two countries, themes were comparable and demonstrated the impact of severe asthma. Having a comparison group allowed us to understand the extent and similarities between the severe asthma groups, and clarified the nature of symptom burden and quality of life impacts of people with asthma. Self-reflexivity [36, 37] and the audit trails [38] also enhanced the rigour and transparency of our findings.

Limitations include the restriction of non-English speaking participants and of different cultural backgrounds; therefore, experiences and perceptions may vary. Sample sizes may appear small but are consistent with qualitative studies [39]. It is possible that the gender differences may have influenced any comparison outcomes between the groups as mostly 62% of all participants were female. However, this is consistent with the rise in female asthma prevalence. The inclusion of a comparator group in the UK site may have provided deeper insights of patient experience with mild-to-moderate asthma. Future studies exploring the experience for these burdensome symptoms are important. The interviews in two different countries with different healthcare settings potentially influenced the perception and answers of the interviewees. Future studies exploring perspectives from the same or within different healthcare systems may yield different results. However, most of the themes that arose from the analysis represented the lived experience of most people with severe asthma. Additionally, a systematic study that captures patient symptoms and impacts to aggregate important concepts to include for the development of PROMs in severe asthma is required.

Conclusions

People with severe asthma experience disease-related symptoms impairing their quality of life; these differ from the experience of people with mild-to-moderate asthma. The most significant differences were observed in impacts relating to physical, emotional, social and financial burden caused by bothersome asthma symptoms and sudden onset of acute attacks. Accounting the individual's own perspective allowed further understanding of the patient experience which can be used to improve the patient–clinician partnership. These findings provide useful insights to support and develop PROMs in severe asthma.

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