

Online Supplement - Appendix 1

The development and validation of the Bronchiectasis Health Questionnaire (BHQ)

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Table e1. Demographics and clinical characteristics of patients participating in interviews for item generation (n=12).

	Interview patients
Age, years	58.0 ± 13.5
Female (%)	75.0
BMI kg/m ²	23.8 ± 3.6
Smoking status %	
Current	0
Ex	25
Never	75
Aetiology of bronchiectasis (%)	
Idiopathic	42
Post-infective	25
Disorders of ciliary function	17
Immunodeficiency	10
Other [#]	6
Spirometry	
FEV ₁ % pred.	68.0 ± 32.0
FVC % pred.	100.8 ± 5.8
FEV ₁ /FVC	55.0 ± 24.5
Sputum colonisation with micro-organisms	
<i>Pseudomonas aeruginosa</i>	33
Other	25
None	52
Comorbidities %	
Asthma	16
Rhinosinusitis	25
COPD	1
Cardiovascular	1
Diabetes mellitus	1
Malignancy	1

Data presented as mean ±SD.

[#]: Other aetiologies consist of Kartagener's syndrome.

^{\$}: Chronic infection status does not add up to 100% as participants could be chronically infected with *Pseudomonas aeruginosa* and other micro-organisms.

BMI: body mass index, FEV1: forced expiratory volume in the first second, FVC: forced vital capacity.

Table e2. Saturation table for disease-related topics mentioned by patients with bronchiectasis during interviews.

Topic	Participant ID Number												Total
	1	2	3	4	5	6	7	8	9	10	11	12	
Feel tired	1	0	1	0	1	0	0	1	0	1	1	1	7
Short of breath	1	1	0	1	1	0	0	1	1	1	0	0	7
Slower than others	1	1	1	0	1	0	0	1	0	1	0	0	6
Lack of energy	1	0	1	0	1	0	0	1	0	1	0	1	6
Affected ability to work, housework, other	1	0	1	1	0	1	0	0	1	0	1	0	6
Embarrassed because of phlegm	1	1	0	0	0	1	1	0	0	1	0	0	5
Had antibiotics for chest infection	1	0	1	1	0	1	0	0	0	0	1	0	5
Difficult in planning tasks	1	0	0	0	0	1	1	1	0	0	1	0	5
Wheeze	1	1	0	1	0	1	1	0	0	0	0	0	5
Limits social activities	1	1	1	0	0	0	0	0	1	0	0	0	4
In control of condition	1	0	0	1	0	0	0	0	1	0	1	0	4
Confident in managing condition	1	0	1	0	0	0	0	0	0	0	1	1	4
Treatment has helped	1	0	0	1	0	0	0	0	1	0	0	1	4
GP visits	1	0	1	1	0	1	0	0	0	0	0	0	4
Coughing bouts	1	0	0	0	1	0	1	0	0	0	0	0	3
Phlegm most days	1	0	0	0	0	0	1	0	0	0	1	0	3
Time taking treatment	1	0	0	1	0	0	1	0	0	0	0	0	3
Avoided coughing up phlegm	1	1	0	0	0	0	0	0	0	0	1	0	3
Tired because of cough	1	0	0	0	0	1	1	0	0	0	0	0	3
Avoided public because of cough	1	1	0	0	0	0	1	0	0	0	0	0	3
Blocked nose	1	0	0	0	1	0	0	1	0	0	0	0	3
Chest pain during cough	1	1	0	0	0	0	0	0	0	0	0	0	2
Side effects from medications	1	0	0	1	0	0	0	0	0	0	0	0	2
Affected financially	1	0	0	0	0	1	0	0	0	0	0	0	2
Fed up because of cough	1	0	0	0	0	0	1	0	0	0	0	0	2
Cough interrupted conversation	1	0	0	0	0	0	1	0	0	0	0	0	2
Phlegm contained blood	1	0	0	0	0	0	0	1	0	0	0	0	2
Difficult to cough up phlegm	1	0	0	1	0	0	0	0	0	0	0	0	2
Breathless during or after activities	0	1	1	1	1	0	0	0	1	0	0	0	5
Avoid others due to fear infection	0	1	1	0	0	1	0	1	0	0	0	0	4
Avoided outdoor activities	0	1	1	0	1	0	0	0	1	0	0	0	4
Frustrated	0	1	1	0	0	0	0	0	1	1	0	0	4

Topic	Participant ID Number												Total
	1	2	3	4	5	6	7	8	9	10	11	12	
Throat clearing	0	1	0	0	0	0	1	0	0	1	1	0	4
Anxious	0	1	0	0	0	1	0	1	0	0	0	0	3
Affected enjoyment	0	1	1	0	0	0	0	0	0	1	0	0	3
Avoided activity due to dyspnoea	0	1	1	0	1	0	0	0	0	0	0	0	3
Stopped activities	0	1	1	0	1	0	0	0	0	0	0	0	3
Climbing incline or stairs	0	1	0	0	0	0	1	0	1	0	0	0	3
Chest feels tight	0	1	0	0	1	0	0	0	0	0	0	0	2
Difficulty walking	0	1	0	0	0	0	0	0	1	0	0	0	2
Difficulty in carrying things	0	1	0	0	0	0	0	0	1	0	0	0	2
Throat irritation	0	1	0	0	0	0	0	0	1	0	0	0	2
Sleep disruption	0	0	1	1	1	0	0	1	0	0	0	1	5
Embarrassed to use medications	0	0	1	0	0	0	0	0	1	1	0	0	3
Chest clear	0	0	0	1	0	0	0	0	1	0	0	1	3
Fed up by chest physiotherapy	0	0	0	1	0	0	1	0	0	0	0	0	2
Medications have helped	0	0	0	1	0	0	0	0	0	0	0	1	2
Admitted to hospital for chest infection	0	0	0	1	0	1	0	0	0	0	0	0	2
Smell of phlegm	0	0	0	1	0	0	0	0	0	0	0	0	1
Runny nose	0	0	0	0	1	0	0	1	0	0	0	1	3
Able to control dyspnoea	0	0	0	0	1	0	0	1	0	0	0	0	2
Intimacy / sex life	0	0	0	0	1	0	0	0	0	1	0	0	2
Difficult to concentrate	0	0	0	0	0	1	1	0	0	0	0	0	2
Depressed	0	0	0	0	0	1	0	0	0	1	0	0	2
Worried bronchiectasis is getting worse	0	0	0	0	0	1	0	0	0	0	0	0	1
Worried about sputum colour	0	0	0	0	0	0	0	1	0	0	0	0	1
Vomit/sick from cough	0	0	0	0	0	0	0	1	0	0	0	0	1
Affected my relationships	0	0	0	0	0	0	0	0	1	0	0	0	1
Worried what others think	0	0	0	0	0	0	0	0	1	0	0	0	1

Total: number of participants who mentioned the topic.

Table e3. Preliminary Bronchiectasis Health Questionnaire items with item elimination reasons.

Item	Reason
In the last 2 weeks...	
1 I have been feeling full of energy	Rasch
2 I have been tired	BHQ
3 I have found it difficult to concentrate	Rasch
4 I have been much slower at doing things than other people of my age	BHQ
5 I had to stop an activity	Rasch
6 I had difficulty walking outside on the level	Floor
7 I have had difficulty walking up a hill, incline or stairs	Q8
8 I have had difficulty carrying things	Q4
9 I have limited my social activities	Q11, Q13
10 I have felt lonely	Floor
11 I have avoided out-door activities	Floor
12 I have worried about being in close contact with others that have a cough, cold or flu	Rasch
13 My bronchiectasis has interfered with my work, housework or other daily activities	Q9
14 My bronchiectasis has affected my sex life	Missing
15 I have felt in control of my bronchiectasis	Rasch
16 I have felt frustrated	Rasch
17 I have felt anxious	BHQ
18 I have felt depressed	Rasch
19 I have been fed up because of my cough	Rasch
20 Cough has interrupted my conversation	Rasch

Item	Reason
In the last 2 weeks...	
21 I have avoided a public place because of my cough	Floor
22 I have had to clear my throat	Rasch
23 I have been annoyed by an irritation, such as a tickle or itch in my throat	Rasch
24 I have been tired because of my cough	Rasch
25 I have had chest pain during coughing	Floor
26 I have vomited or felt sick from coughing	Floor
27 My chest has felt clear	BHQ
28 I have found it difficult to cough up phlegm (sputum)	Rasch
29 I have been worried about the colour of my phlegm (sputum)	Floor
30 I have been embarrassed because of my phlegm (sputum)	BHQ
31 I have avoided coughing up phlegm (sputum)	Floor
32 I have had a hoarse voice	Floor
33 I have been wheezing (whistle like sounds) from my chest	Rasch
34 I have had a blocked nose	Rasch
35 I have had a runny nose	Rasch
36 I have felt short of breath	BHQ
37 My chest has felt tight	Rasch
38 I have avoided an activity because I did not want to feel breathless	Rasch
39 I have been able to control my breathlessness	Missing
40 I have been incontinent of urine (wet my underwear) during coughing	Floor
41 I have felt that my bronchiectasis treatments have helped me	Ceiling
42 My bronchiectasis treatments have interfered with my daily life	Rasch
43 I have been confident that I can manage bronchiectasis	Ceiling

Item	Reason
In the last 2 weeks...	
44 I have been worried that my bronchiectasis is getting worse	Rasch
45 I have found it difficult to plan future activities such as holidays, engagements or appointments	Floor
46 My sleep has been disrupted because of my bronchiectasis	BHQ
47 I have had coughing bouts	BHQ
48 My phlegm (sputum) contained blood	BHQ
49 I have been breathless during or after activities	Q36
50 My bronchiectasis has adversely affected my relationship with others	Floor
51 I have worried about what others think of my bronchiectasis	Floor
52 My bronchiectasis has affected my enjoyment of life	Rasch
53 My cough has annoyed people around me	Floor
54 I have been worried about the smell of my phlegm (sputum)	Floor
55 I have been bringing up phlegm (sputum) most days	Rasch
56 I have had hearing or ear problems because of my bronchiectasis medications	Floor
57 My medications (such as antibiotics, tablets, nebulisers, or inhalers) have helped my bronchiectasis	Ceiling
58 I have felt embarrassed to use my medications in front of others	Floor
59 I have felt that my treatments such as physiotherapy, nebulisers or inhalers have taken up too much of my time	Rasch
60 I have had side effects from medications for my bronchiectasis	Rasch
61 I have been fed up doing chest physiotherapy	Rasch

Item	Reason
In the last <u>1 year</u>...	
62 My bronchiectasis has adversely affected my finance	Floor
63 I have visited my General Practitioner (doctor) for my bronchiectasis	Rasch
64 I have taken courses of antibiotics for a chest infection	BHQ
65 I have been admitted to the hospital for a chest infection	Floor

Items eliminated if there were significant missing responses (n=2), floor effect (n=19), ceiling effect (n=3), significant inter-item correlations (n=5) and Rasch analysis (n=26).

BHQ: item included in the final 10-item version of the BHQ.

Q: Item with which there was a high inter-item correlation.

Table e4. Demographics and clinical characteristics of patients recruited from a single centre in China.

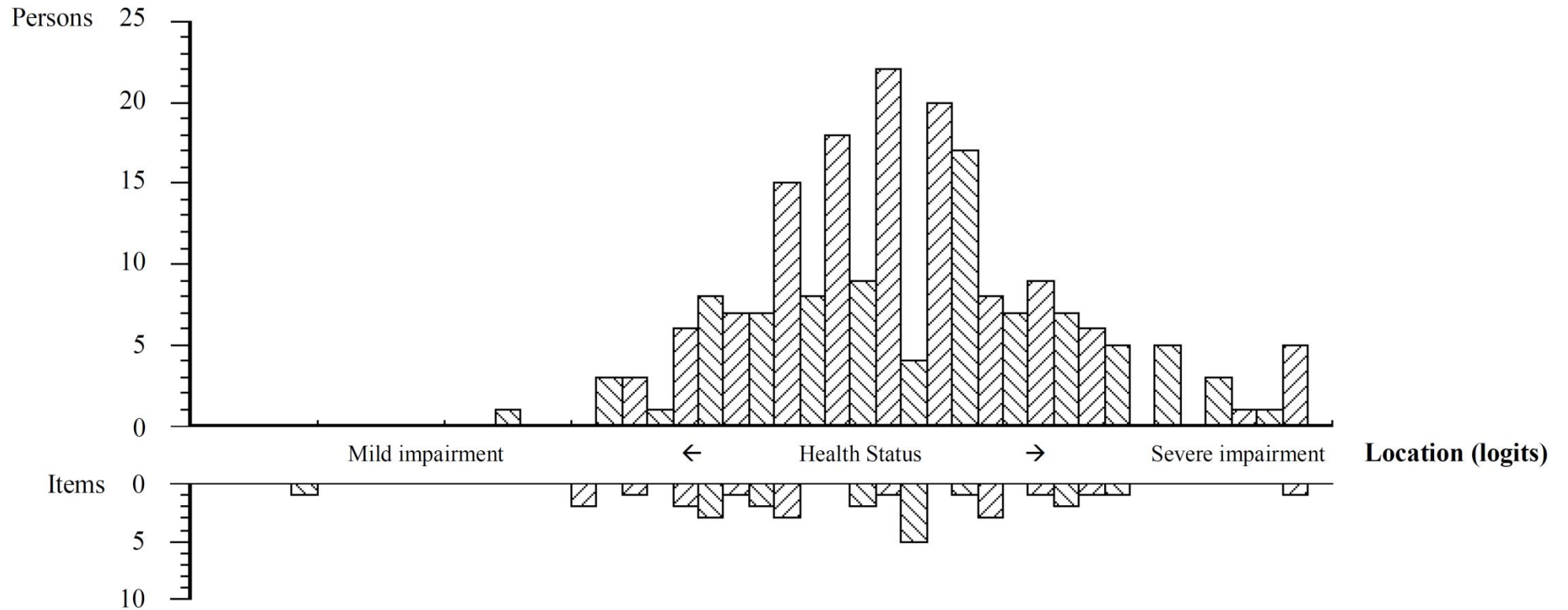
	Interview patients
Age, years	55.4 ± 14.5
Female (%)	55.4
BMI kg/m ²	20.3 ± 3.5
Smoking status %	
Current	0
Ex/never	8.9
Never	90.1
Aetiology of bronchiectasis (%)	
Idiopathic	53
Post-infective	31
Immunodeficiency	8
Other [#]	8
Spirometry	
FEV ₁ % pred.	61.3 ± 21.1
Sputum colonisation with micro-organisms	
<i>Pseudomonas aeruginosa</i>	32
Other	13
None	55
Exacerbations/12 months (%)	
0	30
1	36
2	14
3	12
4	2
5	4
>5	2
Hospitalisations/12 months (%)	
0	57
1	34
2	5
3	2
4	2
5	0
>5	0

Data presented as mean ± SD.

[#]: Other aetiologies consist of Young's syndrome and rheumatoid arthritis.

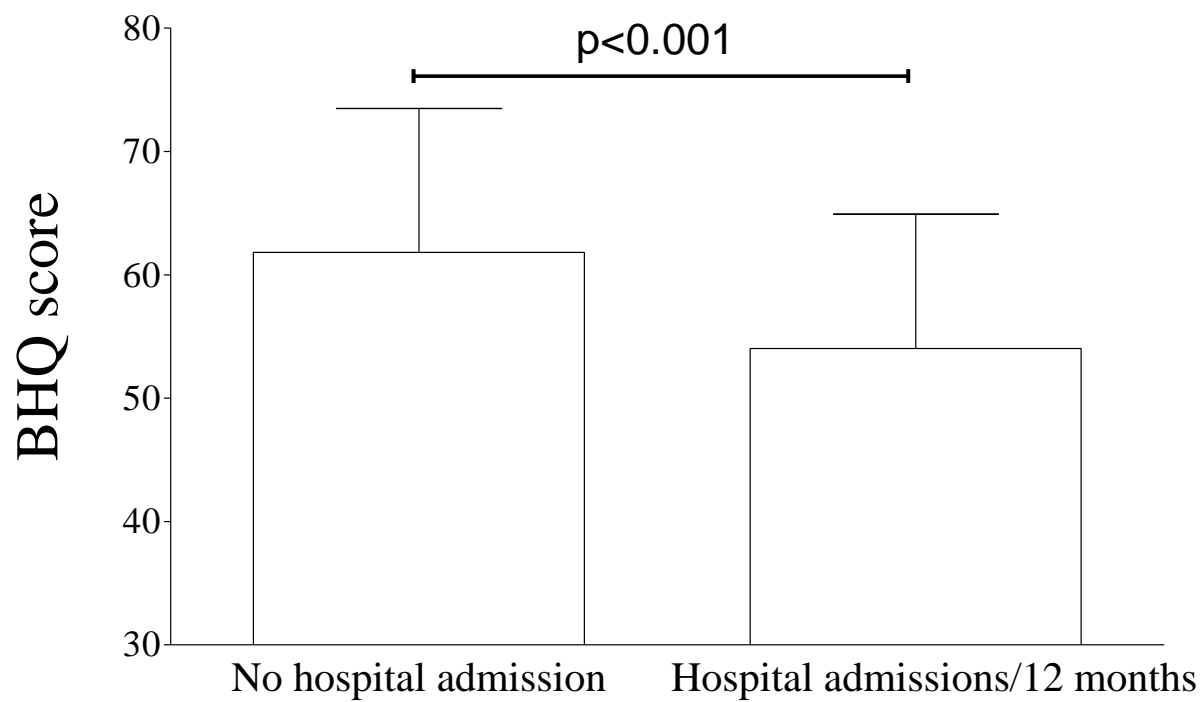
FEV₁: forced expiratory volume in the first second.

Figure e1. Person-item threshold distribution for the Bronchiectasis Health Questionnaire (BHQ) score.



The x-axis represents severity of health status in logits (log transformed units). The item threshold frequency represents the number of item responses that measure the health status at each level of impairment. This figure demonstrates good spread of item threshold across the spectrum of health status.

Figure e2. Bronchiectasis Health Questionnaire (BHQ) scores in patients with previous hospital admissions for bronchiectasis.



Data presented as mean (standard deviation).