In-person and online application of the Bronchiectasis Health Questionnaire: are they interchangeable?

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TO THE EDITOR,

Health-related quality of life questionnaires are patient-reported outcome measures that are widely used to evaluate the health status of patients with bronchiectasis. The Bronchiectasis Health Questionnaire (BHQ) was developed to assess health status using general and simple scoring systems to facilitate clinical use.[1] Aside from evaluating symptoms of patients with bronchiectasis, this simplified questionnaire eases the communication between patients and the multi-professional team by guiding specific conduct and assessing the efficacy of different interventions.[1] The validation of the BHQ was carried out in an in-person manner. However, testing its application in the online format is mandatory, mainly due to challenges related to in-person administration, such as the busy routine of patients, transportation barriers, and the lack of family support. In addition, remote administration is preferable during the COVID-19 pandemic because it contributes to social distancing and helps prevent the spread of the coronavirus.

The objective of the present study was to compare the in-person and online applications of the BHQ and evaluate which format is preferred by patients with bronchiectasis. The human research ethics committee of the two institutions where the study was carried out approved the study (Nove de Julho University, Protocol No.: 2,532,903 and University of São Paulo, Protocol No.: 2,574,759).

Bronchiectasis patients were recruited between October 2017 and December 2018 from a tertiary referral university hospital in São Paulo. The inclusion criteria were (1) clinical and tomographic diagnosis of bronchiectasis, (2) age ≥ 18 years old, and (3) clinical stability (*i.e.*, no coughing, high volume or thick consistency of pulmonary secretion, purulent pulmonary secretion, increased dyspnea, exercise intolerance, fatigue, or malaise in the four weeks prior to the study). As for exclusion criteria, the following were considered: (1) smoking or tobacco smoke loads > 10 pack-years, (2) associated pulmonary disease (asthma, chronic obstructive pulmonary disease, interstitial lung disease, or cystic fibrosis), (3) associated cardiovascular diseases, or (4) the inability to answer questionnaires. The sample size followed COSMIN standards, which consider a minimum sample of 50 participants optimal for reliability studies.[2]

After assessing the eligibility criteria, the participants completed a paper-based BHQ[1] and were submitted to the modified Medical Research Council[3] dyspnea scale in an in-person interview format during a routine medical appointment. After 14 days, the participants completed the BHQ online via the Google Forms platform sent by WhatsApp. Bronchiectasis severity was classified according to the E-FACED index and the Bronchiectasis Severity Index.[4-5]

Data were analyzed using the SPSS 22.0 software (IBM Corp., Chicago, IL, USA), and the Shapiro-Wilk test was used to assess data normality. The data were presented as mean ± standard deviation. The paired *t*-test was applied to compare the BHQ scores in the in-person and online applications, whereas the unpaired *t*-test compared basal characteristics among the included participants and those who were included but failed to participate due to technological issues. The in-person and online application reliability was analyzed using the intraclass correlation coefficient (ICC) model 2:1, adopting a 95% confidence interval (95%CI). ICC data was classified as poor (< 0.4), moderate (0.4 to 0.75), substantial (0.75 to 0.90), and excellent (> 0.90).[6] Cronbach's alpha was used to analyze internal consistency, and values between 0.75 and 0.95 were considered adequate. Ceiling or floor effects were present if ≥ 15% of the participants scored the minimum or maximum in the questionnaires.[6] The standard error of measurement (SEM) analyzed the level of agreement between the in-person and online administration formats. Significance was set at $p < 0.05$.

Thirteen out of 63 patients with bronchiectasis were excluded due to difficulties accessing the Google Forms platform. Therefore, the final sample consisted of 50 individuals (22 women). The clinical and functional characteristics of the excluded participants were similar to those of the included individuals (Table 1).

The BHQ scores obtained from the in-person and online application formats did not present significant differences. Reliability was considered substantial (ICC = 0.89; 95%CI: 0.82–0.94) and internal consistency was adequate (Cronbach's alpha = 0.94). The standard error of measurement was small (1.77 points), and no ceiling or floor effects were observed in either form of application.

Regarding the participants' preference regarding the mode of questionnaire administration, 26% reported no preference, whereas 74% stated that the online format was much better.

Our results show that both formats of the BHQ are valid and equivalent to assess the quality of life and symptoms of patients with bronchiectasis.

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Table 1. Characteristics of the included and excluded study participants.

Characteristics	Included (n = 50 / 28 women)	Excluded (n = 13 / 9 women)	p-value
Age, years old, mean (SD)	47.0 (14.0)	51.0 (13.0)	0.18
BMI, kg/m^2, mean (SD)	24.0 (4.0)	22.0 (5.0)	0.15
FVC, L, / mean (SD)	2.4 (0.9)	2.3 (0.8)	0.68
FVC % pred., mean (SD)	64.0 (17.0)	64.0 (18.0)	0.98
FEV_1, L, mean (SD)	1.4 (0.6)	1.4 (0.6)	0.93
FEV_1, % pred., mean (SD)	59.0 (14.0)	61.0 (12.0)	0.90
FEV_1/FVC, mean (SD)	60.0 (14.0)	61.0 (12.0)	0.68
O_2-dependent, n (%)	11 (10.9)	2 (15.3)	
Number of exacerbations/year, mean (SD)	1 (0.47)	1.2 (0.49)	0.20
mMRC, mean (SD)	2 (1.0)	1.7 (0.92)	0.19
E-FACED, mean (SD)	2.5 (1.8)	3.0 (1.4)	0.12
n per score mild/moderate/severe	34/10/2*	6/7/0	
BSI, mean (SD)	6.5 (4.0)	8.0 (4.0)	0.13
n per score low/intermediate/severe	15/21/10*	2/4/7	

SD: standard deviation, BMI: body mass index; kg/m^2: kilograms per square meter; FVC: forced vital capacity; FEV_1: forced expiratory volume in first second; L: liters; %: percentage; pred.: predicted value; n: number of patients; mMRC: modified Medical Research Council dyspnea scale; E-FACED: exacerbations, forced expiratory volume in first second, age, chronic colonization by *Pseudomonas aeruginosa*; BSI: Bronchiectasis Severity Index; BHQ: Bronchiectasis Health Questionnaire. *Four participants were not classified according to the BSI and E-FACED scores because they underwent a lobectomy.

These findings are in line with a study that compared the in-person and online application of the COPD Assessment Test (CAT) and the Clinical COPD Questionnaire (CCQ) in patients with COPD, showing adequate internal consistency and substantial reliability.[7] In our study, the SEM was used to evaluate the agreement between the two BHQ administration formats, and we found a narrow variation for this measure. In another study conducted with COPD patients, the authors observed good correlation, agreement, and reliability between in-person and online administration formats of CAT.[8] However, CAT scores were significantly higher in the face-to-face application (10.0 ± 7.4) than in the online format (8.6 ± 7.8). The assumption for this difference is that the online format was completed without supervision at the participants' homes, whereas the in-person format was filled out under supervision at the outpatient clinic.[8] A comparison performed between the in-person and online administration of the Asthma Quality of Life Questionnaire and Pediatric Asthma Quality of Life Questionnaire in patients with asthma showed that the online administration format was acceptable. Similar to our findings, the participants from these studies preferred the online over the in-person format.[9-10]

No ceiling or floor effects were found in the in-person or online administration formats, indicating that the online administration of the BHQ can also assess different responses to pulmonary rehabilitation or pharmacological interventions. The online BHQ format allows evaluating patients in their homes, with no need for displacement to medical offices or rehabilitation clinics.

This study had some limitations. The individuals were recruited from a single referral center for bronchiectasis in São Paulo. However, it receives patients from different regions of São Paulo and Brazil. Since this is a secondary study, randomization was not possible. Nonetheless, it was also not performed in other studies with COPD and asthma, and the results from previous studies were similar to those found herein.[7,9]

In conclusion, the in-person and online administration formats of the BHQ are equivalent and interchangeable. Both versions can be used to assess the quality of life of patients with bronchiectasis.

ETHICAL APPROVAL

All procedures followed the ethical standards of the institutional and national research committee and adopted the Declaration of Helsinki (1964) and its later amendments or comparable ethical standards. Informed consent was obtained from all individuals included in the study (Certification No: 2,532,903 and 2,574,759).

DECLARATION OF CONFLICTS OF INTEREST

The authors have no conflicts of interest to declare.

REFERENCES

1. Luppo A, de Camargo CO, Birring SS, Lunardi AC, Rached SZ, Athanazio RA et al. A study of the psychometric properties of the Brazilian–Portuguese version of Bronchiectasis Health Questionnaire. Pulmonology. 2020 Dec. 29:S2531-0437(20)30244-0. http://doi.org/10.1016/j.pulmoe.2020.10.012.
2. Terwee CB, Mokkink LB, Knol DL, Ostelo RW, Bouter LM, de Vet HC. Rating the methodological quality in systematic reviews of studies on measurement properties: a scoring system for the

COSMIN checklist. Qual Life Res. 2012;21(4):651–657. http://doi.org/10.1007/s11136-011-9960-1.

3. Kovelis D, Segretti NO, Probst VS, Lareau SC, Brunetto AF, Pitta F. Validation of the Modified Pulmonary Functional Status and Dyspnea Questionnaire and the Medical Research Council scale for use in Brazilian patients with chronic obstructive pulmonary disease. J Bras Pneumol. 2008; 34(12):1008–1018. http://doi.org/10.1590/s1806-37132008001200005.
4. Martinez-Garcia MA, Athanazio RA, Girón R, Máiz-Carro L, de la Rosa D, Olveira C et al. Predicting high risk of exacerbations in bronchiectasis: the E-FACED score. Int J Chron Obstruct Pulmon Dis. 2017;12:275–284. http://doi.org/10.2147/COPD.S121943.
5. Chalmers JD, Goeminne P, Aliberti S, McDonnell MJ, Lonni S, Davidson J et al. The bronchiectasis severity index. An international derivation and validation study. Am J Respir Crit Care Med. 2014;189(5):576–585. http://doi.org/10.1164/rccm.201309-1575OC.
6. de Vet HCW, Terwee CB, Mokkink LB, Knol DL. Reliability. In: de Vet HCW, Caroline B, Mokkink LB, Knol DL et al. (eds) Measurement in medicine. 1st Ed. New York: Cambridge University Press, 2011, pp.96–149.
7. Kocks JWH, Blom CMG, Kasteleyn MJ, Oosterom W, Kollen BJ, Van der Molen T et al. Feasibility and applicability of the paper and electronic COPD assessment test (CAT) and the clinical COPD questionnaire (CCQ) in primary care: a clinimetric study. NPJ Prim Care Respir Med. 2017;27(1):20. http://doi.org/10.1038/s41533-017-0023-0.
8. Nishimura K, Kusunose M, Sanda R, Tsuji Y, Hasegawa Y, Oga T. Comparison between electronic and paper versions of patient-reported outcome measures in subjects with chronic obstructive pulmonary disease: an observational study with a cross-over administration. BMJ Open. 2019;9(12):e032767. http://doi.org/10.1136/bmjopen-2019-032767.
9. Caro JJ Sr, Caro I, Caro J, Wouters F, Juniper EF. Does electronic implementation of questionnaires used in asthma alter responses compared to paper implementation? Qual Life Res. 2001; 10(8):683–91. http://doi.org/10.1023/a:1013811109820.
10. Bushnell DM, Martin ML, Parasuraman B. Electronic versus paper questionnaires: a further comparison in persons with asthma. J Asthma. 2003; 40(7):751–62. http://doi.org/10.1081/jas-120023501.