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# Translation and linguistic validation of the Bronchiectasis Health Questionnaire (BHQ) into Danish

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## ABSTRACT

**INTRODUCTION:** Patients with bronchiectasis suffer from breathlessness, cough and sputum production, which impairs quality of life. The Bronchiectasis Health Questionnaire (BHQ), a short and disease-specific questionnaire, has previously been developed and validated in English. The aim of this study was to translate and validate the BHQ in Danish, using established cross-cultural validation methods.

**METHODS:** To create a Danish version of the questionnaire, this study used linguistic validation, a pilot study in 17 patients and forward-backward translation. Thereafter, 111 patients with bronchiectasis were asked to complete the BHQ (BHQ<sub>1</sub>) as well as the St George Respiratory Questionnaire (SGRQ), and one in three patients were asked to repeat the BHQ after two weeks had passed (BHQ<sub>2</sub>).

**RESULTS:** There was a significant convergent validity between the BHQ<sub>1</sub> and the SGRQ ( $\rho = -0.826$ ,  $p = 0.0001$ ), a satisfactory correlation coefficient between the BHQ<sub>1</sub> and the BHQ<sub>2</sub> (0.739) and a lower limit of agreement of -15.96 and 20.56 in the Bland Altman plot.

**CONCLUSIONS:** The BHQ is translated and validated in Danish and retains good validity properties. This questionnaire is ready for use in daily clinical practice among Danish-speaking patients.

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**TRIAL REGISTRATION:** not relevant.

Bronchiectasis is a persistent, potentially progressive, condition, characterised by dilated bronchi [1]. The clinical presentation of bronchiectasis includes breathlessness, cough, sputum production and haemoptysis. The severity of bronchiectasis can be assessed using composite scores like the Bronchiectasis Severity Index and the FACED score [2-4], which combines physiological and radiological measures. However, the complex patient-perceived sense of well-being is not truly captured by physiological measures only. Health-related quality of life (HRQoL), defined as “the perception of the impact of health on an individual’s contentment or satisfaction with life in areas they consider important” [5], is a relatively simple way to achieve a comprehensive measure of this otherwise diffuse dimension. In bronchiectasis, HRQoL has been shown to be nega-

tively associated with mortality and with the number of disease comorbidities [6, 7].

A number of HrQoL questionnaires are available in respiratory medicine. However, it has been well known for many years that the development of disease-specific questionnaires is important to capture the patient-perceived quality of life correctly [8]. Recently, the Bronchiectasis Health Questionnaire (BHQ) was developed and validated in English. It is a brief questionnaire with ten items, each with a seven-point scoring range, that describes symptoms from the patient’s perspective and can be used in daily clinical practice [9]. The convergent validity of the BHQ score with the St George Respiratory Questionnaire (SGRQ) is high [9]. Furthermore, a clinical validation of the score was also undertaken in an English as well as an Asian population. This validation found a significant association between the BHQ and disease exacerbations, hospital admissions, computed tomography scan bronchiectatic lobes and presence of bacterial colonisation [9]. Compared with previous HRQoL questionnaires, the BHQ has potential advantages as it is brief and provides a single score, although clinical experience with the BHQ still is limited. The BHQ has so far been translated and validated in eleven other languages [10], but not in Nordic languages.

The aim of this study was to translate and validate the BHQ in Danish (BHQ<sub>D</sub>), using established cross-validation methods.

## METHODS

### Translation

The BHQ was translated from English into Danish. First, an in-depth analysis of the original BHQ English version (BHQ<sub>E</sub>), (i.e., concept definition) was conducted by two independent translators. This included suggestions of translation alternatives in Danish and a subsequent consensus between the two translators of the preliminary wording for the translation. Second, a pilot study was conducted. In the pilot, after completing the questionnaire, patients with bronchiectasis were interviewed about their understanding of the individual BHQ questions. A pre-defined interview guide was used for this purpose. Following this, a re-evalu-

## ORIGINAL ARTICLE

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**TABLE 1 /** The final statements in the Danish Bronchiectasis Health Questionnaire.

Item no.	Statement
1	De sidste 14 dage har jeg været træt
2	De sidste 14 dage har jeg været meget langsommere end mine jævnaldrende
3	Inden for de sidste 14 dage har jeg følt mig ængstelig
4	Indenfor de sidste 14 dage har jeg følt slim i brystet
5	Inden for de sidste 14 dage har jeg følt mig fløv på grund af hoste og opspyt
6	Inden for de sidste 14 dage har jeg haft åndenød
7	Inden for de sidste 14 dage har symptomerne fra mine bronkiectasier forstyrret min søvn
8	Inden for de sidste 14 dage har jeg haft hosteanfald
9	Inden for de sidste 14 dage har jeg haft blod i opspytet
10	Inden for de sidste 12 måneder har jeg fået antibiotika for lungeinfektion

ation of the initial Danish version was made, and this version was reviewed by a clinician. Lastly, the revised version of the Danish BHQ questionnaire underwent forward/backward translation by a third translator.

**Validation**

Patients participating in the validation study of the BHQ<sub>D</sub> were identified by specialist nurses from two specialised bronchiectasis clinics at a regional and a university hospital in the Central and North Denmark Re-

gions. Patients included had previously been diagnosed with bronchiectasis with a diagnosis verified by high resolution computed tomography scans and clinical symptoms in terms of cough, sputum and recurrent lower airway infections. Only patients in stable state (i.e., no exacerbations six weeks prior to inclusion) were included in this study, and patients with ongoing non-tuberculous mycobacteria and fungal infections were not included. All patients were anonymised at baseline and asked to complete the BHQ<sub>D</sub> (BHQ<sub>D</sub>1) and SGRQ [11]. Every third patient was asked to perform the BHQ<sub>D</sub> again after two weeks (BHQ<sub>D</sub>2) and return it by mail. The BHQ<sub>D</sub>2 was handed out to the patients in a stamped envelope, and the questionnaire was marked with their specific anonymised participant number.

Using IBM SPSS software, the convergent validity between the BHQ<sub>D</sub>1 and the Danish St George’s Respiratory Questionnaire (SGRQ) [12] was investigated with Spearman’s correlation coefficient. The internal consistency between BHQ<sub>D</sub>1 and BHQ<sub>D</sub>2 was tested with Cronbach’s alpha [13]. Agreement between the BHQ<sub>D</sub>1 and the BHQ<sub>D</sub>2 was assessed with a Bland-Altman plot.

The study was presented to the local ethical committee, which found no need for ethical approval.

*Trial registration:* not relevant.

**RESULTS**

**Translation**

The in-depth analysis revealed no significant linguistic or cultural issues. The main difficulties consisted in finding conceptual equivalents in specific words, i.e. “anxiety”. Translators ensured that the continuity of time was kept between all versions using either adverbs or synonyms (e.g., “hele tiden” for “all of the time”).

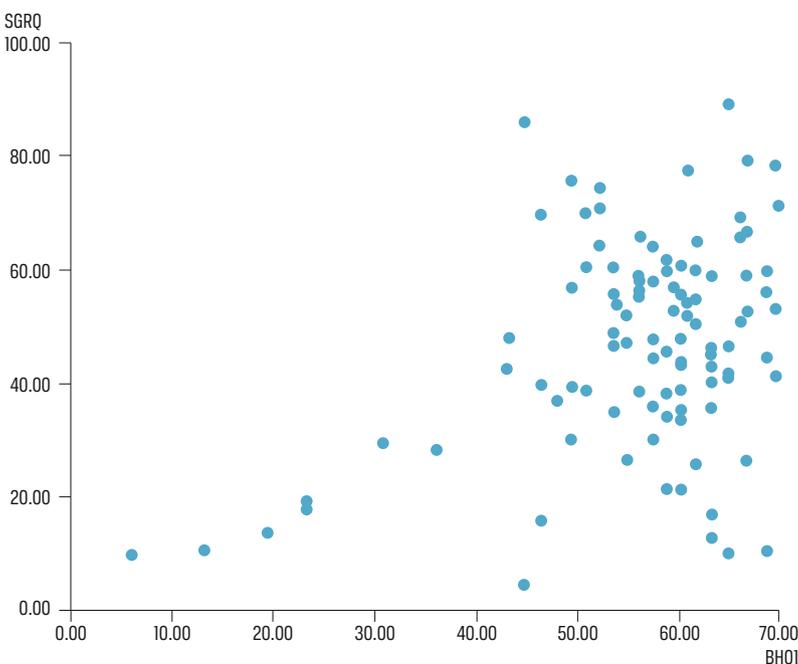
The pilot study on the initial version of the BHQ<sub>D</sub> included 17 patients with bronchiectasis. Based on the feedback from the interviews with the patients, items three and four were the most commonly debated for idiomatic or syntactic reasons. The re-evaluation proved useful to clarify the concept of “anxiety” in item three and led to changes in the wording. The forward/backward translation revealed no discrepancies from the original version of the BHQ<sub>E</sub>, and the final product of the linguistic validation was accepted as the BHQ<sub>D</sub>. The final statements in the BHQ<sub>D</sub> are demonstrated in **Table 1**.

**Validation**

A total of 111 patients completed the BHQ at baseline (BHQ<sub>D</sub>1). One third of those, 37 patients, were asked to complete the BHQ again after a fortnight (BHQ<sub>D</sub>2), and 22 patients returned a completed questionnaire.

A scatter plot of the correlation between the BHQ<sub>D</sub>1

**FIGURE 1 /** Association between the St George Respiratory Questionnaire (SGRQ) score and the Bronchiectasis Health Questionnaire score at baseline (BHQ1).



and the SGRQ is presented in **Figure 1**. Convergent validity between the BHQ<sub>D1</sub> and the SGRQ was high, Spearman's correlation was  $-0,826$  ( $p = 0.0001$ ). Test-retest reliability (repeatability) between the BHQ<sub>D1</sub> and the BHQ<sub>D2</sub> was satisfactory [13], Cronbach's alpha was  $0,739$ . A mean difference of  $2.30$  was seen in the Bland-Altman plot with upper and lower limits of agreement of  $-15,96$  and  $20,56$ , respectively; and  $\beta = -3,749$  ( $p = 0.799$ ), demonstrated in **Figure 2**.

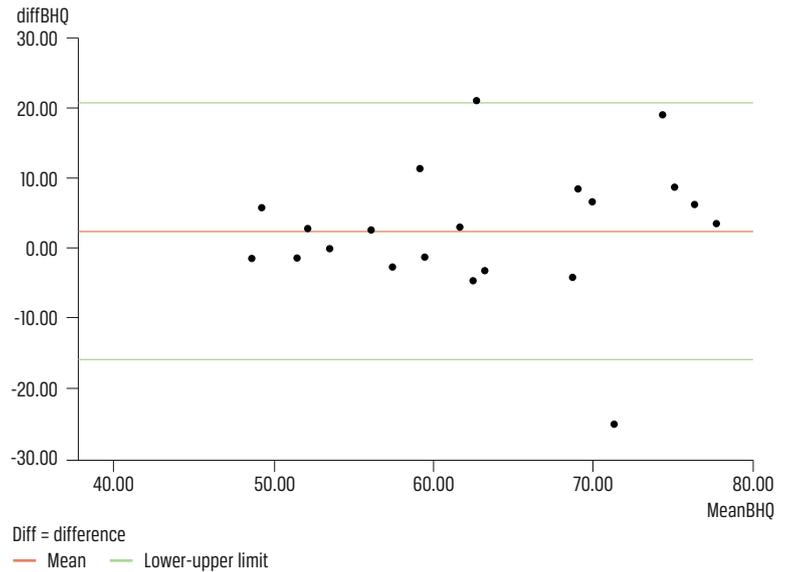
## DISCUSSION

HRQoL is significantly impaired in bronchiectasis. The BHQ has proved to be a brief, simple-to-use, disease-specific health status measure providing a point-in-time picture of the patients' quality of life. In addition, the BHQ guides the clinician in addressing the health-related problems that the patient may experience at a given point of time. The aim of this study was to translate and validate the BHQ in Danish, the first Nordic version of this questionnaire.

The European Bronchiectasis Registry suggests use of the SGRQ in the evaluation of HrQoL in patients with bronchiectasis [14], and the SGRQ is also the most commonly used questionnaire in bronchiectasis patients [15]. In the present study, the BHQ was validated against the SGRQ, and a highly significant convergent validity was demonstrated. Even though the SGRQ is well validated, widely used and specific for patients with pulmonary diseases, it is not disease specific. In the BHQ<sub>E</sub>, a significant correlation with core symptoms in bronchiectasis was found. In other diseases, disease-specific HRQoL questionnaires have been more sensitive in detecting disease changes, for better and for worse, and are more precise than generic HRQoL questionnaires [16, 17]. This still needs to be shown for the BHQ. However, the BHQ is brief and valid, so even as an equal to the SGRQ this may favour its use in daily clinical practice.

The BHQ has previously been translated into 11 languages using standardised methodology [10]. In contrast to previous BHQ translations, where items two, five and ten generated most discussion, items three and four were debated in the translational process into Danish, for idiomatic or syntactic reasons. Item 3, in particular, was reconsidered several times and changed in the final version after the pilot study in 17 patients. Danish and English are both Indo-European languages and both belong to the Germanic language family. Therefore, it may not be surprising that translation from English into Danish meets fewer language barriers than for example translation from English into Mandarin. In item three, it was mainly the word "anxiety" that posed a translational problem. A previous study by Van Goozen et al. has, however, demonstrated that even within language families, emotion words do

**FIGURE 2 /** Bland Altman plot used for the validation of the Danish Bronchiectasis Health Questionnaire (BHQ), answered initially and after two weeks.



not translate easily [18]. Moreover, a recent semantic thesis debated that within the Indo-European languages, there are emotion words that do not translate at all [19]. It may therefore be surprising that item three has not previously been debated in the translational process.

The BHQ<sub>D</sub> obtained a satisfactory repeatability. In the development of the BHQ<sub>E</sub>, the questionnaire was highly repeatable after two weeks [9]. This brings us to the discussion of one of the limitations of this study, the relatively low return rate (60%) of the questionnaire after two weeks. This may have introduced some bias in our results. Hence, with a reduction in the number of participants, there is inevitably a loss of power in the analysis. Secondly, there is a risk that those who returned the second questionnaire were the symptomatic patients. A change in symptoms could explain the satisfactory repeatability. This may explain why repeatability reached only a "satisfactory" and not the highest level. This hypothesis could also be supported by the Bland Altman analysis shown in Figure 2, which demonstrates that three patients deviate considerably in agreement. In a small population, this may influence the results, not only of the repeatability but also the agreement between BHQ<sub>D1</sub> and BHQ<sub>D2</sub>. However; a satisfactory repeatability is acceptable and as the internal validity of the BHQ<sub>D</sub> is also good, this allows for use of the questionnaire in daily clinical practice.

This study only performed linguistic validation of the BHQ. This may, of course, be a concern in relation to implementing the questionnaire in daily clinical practice. However, the BHQ has been developed and

validated in a British population very similar to the Danish population, and furthermore validated in an Asian population very different from the initial cohort. Therefore, the BHQ is considered to be clinically implacable in a Danish population when linguistically validated. However, it is important to underline that the BHQ is a tool to guide the health professionals in their contact with bronchiectasis patients and should not a substitute for doctor-patient contact.

Although the BHQ is clinically favourable compared to other HRQoL questionnaires, owing to its brevity and its disease specificity, which will highlight the patients' perspective of the disease, it also has some shortcomings, not least due to its novelty. As such, no minimal clinically important difference (MCID) has been established. The simplicity of the BHQ may be a drawback, and large numbers will be needed when the MCID is to be established. However, if, in future, the inventors of the score choose to establish an electronic version, the translation into several languages will be helpful in that respect. Furthermore, the BHQ has not been validated specifically in patients with severe chronic infections, and caution is therefore warranted if clinicians choose to use the BHQ in these patient subgroups.

In conclusion, this study was the first translation and validation of the BHQ into Danish. The questionnaire has a highly convergent validity with the SGRQ which is recommended for use in bronchiectasis; however, the brevity of the BHQ may favour its use in daily clinical practice.

For the full version of the BHQ<sub>D</sub>, please contact the developers of the English version [9].

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