

Original Article

The Psychometric Properties and Test-Retest Reliability of the Bristol COPD Knowledge Questionnaire when Adapted in a Sample of Greek Nurses

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Abstract

Objectives: Nurses are among the health professional who provide health education of patients with COPD.

The aim of this study was to assess the test-retest reliability and the psychometric properties of the Bristol COPD Knowledge Questionnaire when adapted in a sample of 39 nurses who work in several hospital settings.

Methods: The Bristol COPD Knowledge Questionnaire has been translated into Greek language

Results: The excellent Pearson correlation coefficient for the test-retest of the scale as well as the Cronbach's alpha reliability coefficient (0.91 for the test and 0.94 for the retest) suggest that any repetition of the scale would be likely to render the same results over the time. Nurses' overall level of knowledge was poor suggesting the need for further assessment of nurses' knowledge in a larger sample.

Conclusion: Bristol COPD Knowledge Questionnaire could be used also as a screening tool to detect the gaps of nurses' knowledge in order to develop an integrated training program for health professionals who provide nursing care to COPD patients.

Key Words: COPD, nurses, Bristol COPD Knowledge Questionnaire.

Introduction

COPD is a chronic illness and its clinical management involves patient's participation to care and self management of the symptoms. For a successful self-management plan, the patients themselves need a clear and up to date knowledge of the disease, its symptoms and its treatment strategy. Bristol COPD Knowledge Questionnaire is a questionnaire that has been developed to measure the knowledge of COPD patients and has been used in several studies to assess the results of health education (White et al, 2006; Hill et al, 2010; Lee et al, 2014; Wong et al, 2016). Health education involves a

multidisciplinary approach to facilitate self management of the disease. In order to achieve that goal healthcare professional should have a deep disease-specific knowledge.

A review of the literature on PubMed by using Bristol COPD Knowledge Questionnaire as keyword did not reveal any study to assess the knowledge of healthcare professional regarding COPD.

The aim of this study was to assess the test-retest reliability and the psychometric properties of the Bristol COPD Knowledge Questionnaire in a sample of nurses who work in several hospital settings.

Methods

Design

The COPD Knowledge Questionnaire is a valid a reliable instrument that includes 13 subscales: (1) epidemiology, (2) aetiology, (3) symptom, (4) breathlessness, (5) phlegm, (6) infections, (7) exercise, (8) smoking, (9) vaccination, (10) inhaled bronchodilators, (11) antibiotics, (12) oral steroids, and (13) inhaled steroids. Each factor contains five items. The total score of the scale ranges from 0 (no knowledge) to 65 (high level of disease knowledge).

The translation of the COPD Knowledge Questionnaire into Greek included the following steps: forward and back translation, and expert panel review. Three bilingual researchers translated the English version of the Bristol COPD Knowledge Questionnaire into Greek language. These three translations were reviewed by a panel of experts to determine the final version, and this was subsequently back translated into English. To assess expert validity that is a form of content validity, a panel of four experts with an expertise in COPD reviewed the content of the instrument for clarity and offered relevant feedback. This panel of experts reviewed also the back-translated version of the Bristol COPD Knowledge Questionnaire, and their comments were evaluated to ensure exact replication of the original instrument. Minor corrections were agreed by the reviewers, concerning the periphrastic yield of certain words from English into Greek, without essential alteration of the meaning of sentences or the meaning of the instrument as a whole.

A pilot study was carried out to check the clarity or ambiguity of the meaning of the questions, whether the questions were culturally acceptable, whether the wording was appropriate, and how easy or difficult it was to understand the language used.

Participants

Potential subjects meeting the following inclusion criteria were selected to participate in the study: (1) willing to participate, (2) being a registered nurse (3) working in the hospital. The participants received a brief explanation of the purpose and the aim of the study. An informed consent was obtained from those who agreed to

participate and they were asked to complete the questionnaire. A total of 39 nurses have been approached.

The participants completed the questionnaire twice: once at the time they were recruited at the research and then after four weeks. During that time they had not to seek or to receive any further information about COPD.

Statistical analysis

Total scores were calculated for each subject. Each question was scored with 1 for the “true” answer, 2 and 3 for the “false” and “I do not know” answer respectively. The internal consistency of the questionnaire was calculated under this scoring scheme taking by using Cronbach’s alpha reliability coefficient (Bartko & Carpenter, 1976). The test–retest reliability of the questionnaire was assessed by using Pearson’s correlation coefficient as an index of correlation and the intra-class correlation coefficient as an index of reproducibility and agreement. In order to quantify the knowledge level in a total score scale, the correct responses were scored 1 and 0 otherwise. Paired samples t-test was used to test the scores equality of the two questionnaires completion times (Altman, 1991; Huck & Cormier, 2001).

Ethics approval

The Primary Care Master Program of the University of Thessaly, acting as an ethics committee, granted written ethical approval for this study. Permission to carry out the study in the healthcare settings was provided by the Scientific Councils of the Public Hospital in which the participants worked for.

Results

In the test-retest analysis 39 subjects (35 females) were recruited. The mean age of the sample was 43.9 ± 6.48 years, range 32-55 years and median 45 years. Twenty subjects (51.28%) were working in the kidney filtration unit, 14 (35.9%) in the surgical department, 3 (7.69%) in the internal medicine department and 2 (5.13%) in the emergency department. The vast majority of the subjects ($n=35$, 89.74%) were hospital unit nurses, two (5.13%) were nursing researchers while two (5.13%) were nursing assistants. More than two thirds of the participants ($n=33$, 84.62%) were graduates of a Technological

Educational Institution, 2 (5.13%) graduates of a University and 4 (10.26%) were of secondary education. The mean working experience was 17.1 ± 8.7 years, range 0-32 years, median 15 years. Additionally the mean working experience in the current department was 8.13 ± 6.7 years, range 0-24 years, median 6 years.

The Cronbach's alpha reliability coefficient for the test was 0.91 whilst for the retest was 0.94.

Pearson's correlation coefficient showed a strong inter-correlation between test-retest ($r=0.87$; $p<0.001$). Intra-class correlation coefficient ($r=0.96$; $p<0.001$) also showed a strong degree of intra-correlation. The total Knowledge score for the test was found to be 33.74 ± 6.76 (mean percentage of correct answer $51.91 \pm 10.4\%$), a range 22-48 while that for retest was 33.82 ± 10.12 (mean percentage of correct answer $52.03 \pm 15.6\%$), range 14-48 for the two following evaluation times of the questionnaire respectively (paired t-test= -0.0855 , $p=0.9323$).

Pearson's correlation coefficient for the Knowledge level score showed a strong inter-correlation between test-retest ($r=0.85$; $p<0.001$).

Analysis of individual questions showed that some topics were consistently scored highly whereas in others there was poor level of knowledge and beliefs (table 1). Ninety five percent of the respondents were correct, in both times of questionnaire completion, as they answered that that there is usually gradual worsening in COPD over time (1c).

On the other hand there was a false knowledge regarding the oxygen levels in blood (1d) as this item was answered mostly wrong since correct answers were found to be in low levels (test-retest: 15.4% and 10.3% respectively). Longstanding asthma (2c) was answered correctly (94.9% and 89.7% respectively) as long as fatigue (3b: 100% and 94.9% respectively) and wheezing (3c: 92.3% and 89.7% respectively), whilst crushing chest pain (3d) was not mostly answered correctly (10.3% and 25.6% respectively). Breathlessness is a normal response to exercise (4d) was answered correctly (94.9% and 100% respectively), whilst severe breathlessness prevents travel by air (4a: 5.1% and 0% respectively) and breathlessness means that your oxygen levels are low (4c: 10.3% in

both cases) were mostly answered wrong. With chest infections phlegm usually becomes colored (6b) was answered correctly (89.7% and 94.9% respectively), whilst steroid tablets use (6e: 0% and 5.1% respectively) was answered wrong. Exercise helps relieve depression (7d) was in the right way (94.9% and 89.7% respectively), whilst avoiding exercise as it strains the lungs (7b: 15.4% and 0% respectively) and should be stopped if it makes you breathless (7e: 5.1% and 0% respectively) were not answered correctly. Stopping smoking will reduce the risk of heart disease (8a: 94.9% in both cases), will slow down further lung damage (8b: 89.7% and 84.6% respectively) and is pointless as the damage is done (8c: 89.7% and 84.6% respectively) were mostly answered on the right way, while regarding lung function (8d: 5.1% and 0% respectively) there was found the reverted results. Flu jab recommendation (9a: 100% and 94.9% respectively) and getting flu only if you are >65 (9c: 100% and 94.9% respectively) were answered in the same correct manner, whilst getting flu from having a flu jab (9b: 0% in both cases) was at the opposite side of answer. Excessive use of antibiotics can cause resistant bacteria (11b: 94.9% in both cases) and seeking advice if antibiotics cause severe diarrhea (11e: 94.9% and 100% respectively) were correctly answered, while the 10 day course (11a: 5.1% in both cases) and steroid inhalers use and improve lung function (13b and 13e: 0% in all cases) were completely mistaken.

Apart from the correct answers all questions were also evaluated for their stability in each answer (Table 2). Constant (C) was considered whenever the participant gave the same answer in the two completion times. "Don't know to Correct" or "Wrong" change and vice versa (D.C.W.) classify the answers with opinion change from the "I don't know" choice to the "true" or "false" choice and the "true" or "false" choice to the "I do not know" choice. In case the answer was completely changed from a true choice of answer followed the false choice and vice versa, the classification was marked as C.W. Constant answers in average were 79.5%, whilst total change of answer was found in 6.2% of the subjects. the scale ($r= .775$, $p<0.001$; $t: .781$, $p: .439$) (Table 2).

Table 1. Correct answers in the two repeated measurements

Question	Test	Retest	Question	Test	Retest
	N(%)	N(%)		N(%)	N(%)
BR1a	10 (25.6)	11 (28.2)	BR7d	37 (94.9)	35 (89.7)
BR1b	27 (69.2)	24 (61.5)	BR7e	2 (5.1)	0 (100)
BR1c	37 (94.9)	37 (94.9)	BR8a	37 (94.9)	37 (94.9)
BR1d	6 (15.4)	4 (10.3)	BR8b	35 (89.7)	33 (84.6)
BR1e	19 (48.7)	11 (28.2)	BR8c	35 (89.7)	33 (84.6)
BR2a	25 (64.1)	25 (64.1)	BR8d	2 (5.1)	0 (0)
BR2b	29 (74.4)	31 (79.5)	BR8e	23 (59)	21 (53.9)
BR2c	37 (94.9)	35 (89.7)	BR9a	39 (100)	37 (94.9)
BR2d	25 (64.1)	31 (79.5)	BR9b	0 (0)	0 (0)
BR2e	25 (64.1)	27 (69.2)	BR9c	39 (100)	37 (94.9)
BR3a	11 (28.2)	13 (33.3)	BR9d	33 (84.6)	31 (79.5)
BR3b	39 (100)	37 (94.9)	BR9e	4 (10.3)	7 (18)
BR3c	36 (92.3)	35 (89.7)	BR10a	6 (15.4)	8 (20.5)
BR3d	4 (10.3)	10 (25.6)	BR10b	17 (43.6)	19 (48.7)
BR3e	25 (64.1)	25 (64.1)	BR10c	2 (5.1)	10 (25.6)
BR4a	2 (5.1)	0 (0)	BR10d	26 (66.7)	29 (74.4)
BR4b	29 (74.4)	29 (74.4)	BR10e	33 (84.6)	31 (79.5)
BR4c	4 (10.3)	4 (10.3)	BR11a	2 (5.1)	2 (5.1)
BR4d	37 (94.9)	39 (100)	BR11b	37 (94.9)	37 (94.9)
BR4e	21 (53.9)	17 (43.6)	BR11c	27 (69.2)	27 (69.2)
BR5a	9 (23.1)	13 (33.3)	BR11d	12 (30.8)	21 (53.9)
BR5b	31 (79.5)	35 (89.7)	BR11e	37 (94.9)	39 (100)
BR5c	39 (100)	39 (100)	BR12a	11 (28.2)	8 (20.5)
BR5d	15 (38.5)	19 (48.7)	BR12b	8 (20.5)	12 (30.8)
BR5e	37 (94.9)	37 (94.9)	BR12c	13 (33.3)	17 (43.6)
BR6a	15 (38.5)	19 (48.7)	BR12d	17 (43.6)	11 (28.2)
BR6b	35 (89.7)	37 (94.9)	BR12e	27 (69.2)	27 (69.2)
BR6c	27 (69.2)	23 (59)	BR13a	10 (25.6)	11 (28.2)
BR6d	21 (53.9)	15 (38.5)	BR13b	0 (0)	0 (0)
BR6e	0 (0)	2 (5.1)	BR13c	10 (25.6)	12 (30.8)
BR7a	10 (25.6)	11 (28.2)	BR13d	15 (38.5)	9 (23.1)
BR7b	6 (15.4)	0 (0)	BR13e	0 (0)	0 (0)
BR7c	27 (69.2)	23 (59)	Average	20.25 (51.91)	20.29 (52.03)

Table 2. Average Test–Retest Scores on the Preparedness for Family Care Inventory and Cronbach Alpha Values of the Scale

Question	Frequency (N)	Percent (%)	Question	Frequency (N)	Percent (%)
	C./D.C.W/C.W*	C./D.C.W/C.W*		C./D.C.W/C.W*	C./D.C.W/C.W*
BR1a	32/4/3	82/10.3/7.7	BR7d	37/2/0	94.9/5.1/0
BR1b	28/0/11	71.8/0/28.2	BR7e	33/4/2	84.6/10.3/5.1
BR1c	39/0/0	100/0/0	BR8a	35/4/0	89.7/10.3/0
BR1d	31/6/2	79.5/15.4/5.1	BR8b	33/4/2	84.6/10.3/5.1
BR1e	23/10/6	59/25.6/15.4	BR8c	33/6/0	84.6/15.4/0
BR2a	27/8/4	69.2/20.5/10.3	BR8d	37/0/2	94.9/0/5.1
BR2b	31/6/2	79.5/15.4/5.1	BR8e	31/6/2	79.5/15.4/5.1
BR2c	33/6/0	84.6/15.4/0	BR9a	37/0/2	94.9/0/5.1
BR2d	29/6/4	74.4/15.4/10.3	BR9b	37/2/0	94.9/5.1/0
BR2e	31/6/2	79.5/15.4/5.1	BR9c	37/0/2	94.9/0/5.1
BR3a	31/4/4	79.5/10.3/10.3	BR9d	33/4/2	84.6/10.3/5.1
BR3b	37/2/0	94.9/5.1/0	BR9e	32/6/1	82/15.4/2.6
BR3c	36/3/0	92.3/7.7/0	BR10a	31/4/4	79.5/10.3/10.3
BR3d	25/6/8	64.1/15.4/20.5	BR10b	31/8/0	79.5/20.5/0
BR3e	31/8/0	79.5/20.5/0	BR10c	27/10/2	69.2/25.6/5.1
BR4a	27/12/0	69.2/30.8/0	BR10d	36/3/0	92.3/7.7/0
BR4b	31/6/2	79.5/15.4/5.1	BR10e	33/6/0	84.6/15.4/0
BR4c	33/2/4	84.6/5.1/10.3	BR11a	35/4/0	89.7/10.3/0
BR4d	37/2/0	94.9/5.1/0	BR11b	39/0/0	100/0/0
BR4e	23/12/4	59/30.8/10.3	BR11c	27/10/2	69.2/25.6/5.1
BR5a	23/6/10	59/15.4/25.6	BR11d	24/8/7	61.5/20.5/18
BR5b	31/6/2	79.5/15.4/5.1	BR11e	37/2/0	94.9/5.1/0
BR5c	39/0/0	100/0/0	BR12a	20/14/5	51.3/35.9/12.8
BR5d	27/8/4	69.2/20.5/10.3	BR12b	29/8/2	74.4/20.5/5.1
BR5e	39/0/0	100/0/0	BR12c	29/6/4	74.4/15.4/10.3
BR6a	33/4/2	84.6/10.3/5.1	BR12d	33/6/0	84.6/15.4/0
BR6b	37/2/0	94.9/5.1/0	BR12e	31/6/2	79.5/15.4/5.1
BR6c	27/8/4	69.2/20.5/10.3	BR13a	24/8/7	61.5/20.5/18
BR6d	25/10/4	64.1/25.6/10.3	BR13b	35/4/0	89.7/10.3/0
BR6e	25/12/2	64.1/30.8/5.1	BR13c	27/12/0	69.2/30.8/0
BR7a	22/4/13	56.4/10.3/33.3	BR13d	27/10/2	69.2/25.6/5.1
BR7b	25/10/4	64.1/25.6/10.3	BR13e	31/8/0	79.5/20.5/0
BR7c	27/8/4	69.2/20.5/10.3	Average	31/5.6/2.4	79.5/14.3/6.2

*C: constant answer / D.C.W: Don't know to Correct or Wrong change and vice versa / C.W: Change answer Correct to Wrong and vice versa.

Discussion

The current study reports the translation of the Bristol COPD Knowledge Questionnaire into Greek, the face and content validity and test-retest reliability. Judging from the results obtained, the Greek version of the Bristol COPD Knowledge Questionnaire proved to have satisfactory psychometric properties for a Greek population of nurses. The excellent Pearson correlation coefficient for the test-retest of the scale suggests that any repetition of the test

would be likely to render the same results over the time.

The tool therefore had a high Cronbach's alpha coefficient. In similar studies that have previously used the same tool, the Cronbach's alpha coefficient ranged from 0.73 to 0.86 (White et al, 2006; Lee et al, 2014) while both inter-correlation and intra-correlation were high (White et al, 2006). In the current research intra-class correlation coefficient for the total scale score

was very high. This is an evidence of cross-cultural test-retest agreement of scale items.

Nurses' overall level of knowledge was poor (52%). It is remarkable that in a similar research in COPD patients the mean score was 54.7% (White et al, 2006) whereas in two other studies it was 48.4% (Khan et al, 2017) and 46% respectively (Zhang et al, 2014). Although this finding should be interpreted carefully because of the small sample size it is therefore a trend that may support the need for a more centered ongoing education of the staff on COPD patients' care provision. The change of answers (C.W) was attributed to the mean low level of knowledge as long as the D.C.W. answers. This finding supports the need for the assessment of nurses' knowledge in a larger sample.

The Greek version of the Bristol COPD Knowledge Questionnaire enables reliable measurement of nurses' disease knowledge.

Implications for clinical practice

The results of this study suggest that COPD Knowledge Questionnaire is very useful to evaluate the knowledge of nurses regarding the provision of care to COPD patients and could be used also as a screening tool to assess the gaps of their knowledge. This could be the first step for the development of an integrated training program for health professionals who provide nursing care.

Study limitation

A limitation of the study was the small sample size in order to generate the result that was beyond the aim of our study.

Conclusion

The COPD Knowledge Questionnaire appears to be a valid and a reliable test-retest measure of nurses' knowledge regarding COPD.

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