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Development, pilot testing and psychometric validation of a short version of the coronary artery disease education questionnaire: The CADE-Q SV

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ABSTRACT

Objective: To develop, pilot test and psychometrically validate a shorter version of the coronary artery disease education questionnaire (CADE-Q), called CADE-Q SV.
Methods: Based on previous versions of the CADE-Q, cardiac rehabilitation (CR) experts developed 20 items divided into 5 knowledge domains to comprise the first version of the CADE-Q SV. To establish content validity, they were reviewed by an expert panel ($N = 12$). Refined items were pilot-tested in 20 patients, in which clarity was provided. A final version was generated and psychometrically-tested in 132CR patients. Test-retest reliability was assessed via the intraclass correlation coefficient (ICC), the internal consistency using Cronbach's alpha, and criterion validity with regard to patients' education and duration in CR.
Results: All ICC coefficients meet the minimum recommended standard. All domains were considered internally consistent ($\alpha > 0.7$). Criterion validity was supported by significant differences in mean scores by educational level ($p < 0.01$) and duration in CR ($p < 0.05$). Knowledge about exercise and nutrition was higher than knowledge about medical condition.
Conclusion: The CADE-Q SV was demonstrated to have good reliability and validity.
Practice Implications: This is a short, quick and appropriate tool for application in clinical and research settings, assessing patients' knowledge during CR and as part of education programming.

1. Introduction

Cardiovascular diseases (CVDs) are the leading cause of mortality worldwide, and are a significant contributor to morbidity and health-related costs [1]. For persons with coronary artery disease (CAD), secondary prevention strategies (e.g. cardiac rehabilitation; CR) are highly effective to promote behavior change, but multi-factorial, necessitating patient awareness and adherence to optimize health outcomes [2–5]. Thus, the long-term success of CR rests in part on the patient's ability to maintain health behaviors, including participation in regular physical activity, following the end of the program [6,7]. Therefore, patient education is an essential part of the rehabilitation of CAD patients targeting self-management behavior to reduce risk factors and subsequent cardiac events [5].

Patient education has been formally defined as "the process by which health professionals and others impart information to patients that will alter their health behaviours or improve their health status" [8]. American and Canadian Cardiovascular Societies include patient education as a quality indicator of CR [9,10]. Findings from meta-analysis provide evidence of the effectiveness of patient education in CAD patients, in improving self-management behaviors [6,7,11], health-related quality of life, and potentially reducing healthcare costs [12] and recurrence of acute events [11]. Thus, a recent systematic review demonstrates the benefits of educational intervention in CHD, through increase in patients' knowledge and behavior change (physical activity, dietary habits, and smoking cessation) [5].

In this context, the coronary artery disease education questionnaire (CADE-Q) was previously developed and psychometrically validated to assess patients' knowledge about CAD in Brazilian CR patients [13]. It was later translated, cross-culturally adapted, and psychometrically validated to English [14]. It has also being used to

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compare knowledge between a developed and a developing country [15]. Although both versions demonstrated good reliability and validity, the CADE-Q presented lack of detailed assessment of all core components of cardiac rehabilitation (CR), such as nutrition and psychosocial risk. Therefore, a second version (CADE-Q II) was developed and validated in English [16]. However, both tools take around 20 min to complete and there was a need for a short and quick instrument to assess CR patients' knowledge easier in clinical practice.

The aim of this study was to develop, pilot test and psychometrically validate a shorter version of the CADE-Q, called CADE-Q SV.

2. Methods

2.1. Design and procedure

This study was reviewed and approved by the University Health Network Ethics Board. The design consisted of a series of cross-sectional, observational studies.

First, based on previous versions of CADE-Q [13,14,16] a first version of the questionnaire was developed. This phase involved experts in each one of the 5 knowledge domains that the tool was structured around. A committee of 12 health providers and researchers who were experts in CR then reviewed this first version. They performed a content analysis, verifying if the new instrument was appropriate for administration in a CR population. Items were refined based on this review.

Second was a pilot study to verify the applicability of the CADE-Q SV, and to evaluate patient understanding of the items (clarity). Here a convenience sample of coronary patients that finished their CR programs and had previously-agreed to be contacted about research opportunities were recruited. Results were used to further refine the questionnaire.

Third, a psychometric validation was performed. The refined tool was administered to a larger sample of current CR participants. The questionnaire was re-administered two weeks after the first application in 50 randomly selected participants to assess test-retest reliability. Data were collected between July and August of 2015.

2.2. Participants

For the pilot test, graduates of the Toronto Rehabilitation Institute CR program (Toronto, Canada) were surveyed. For the psychometric-validation, a convenience sample of current CR patients from the same institution was recruited. This program is 6 months in duration and patients were recruited from all classes. The sample size calculation for the psychometric analysis was based on Hair & Anderson [17] recommendation of a sample size of 5 subjects per item, and/or at least 100 participants. The inclusion criteria were the following: confirmed coronary artery disease diagnosis or multiple cardiovascular risk factors (such as hypertension and diabetes). The exclusion criteria were the following: younger than 18 years old, lack of English-language proficiency, any significant visual or cognitive condition or serious mental illness which would preclude the participant's ability to answer the questionnaire.

2.3. Measures

To assess clarity, pilot study patients were asked to rate each item on a Likert-type scale [18] ranging from 1 (not clear) to 10 (very clear). Time to complete the questionnaire was also assessed during this phase of the study.

CR participants from the psychometric-validation were characterized according to sex, age, educational level, comorbidities, cardiac risk factors and history, and duration of participation in CR. All characteristics were self-reported.

2.4. Statistical analyses

SPSS Version 22.0 (IBM Inc 2013, NYC) was used for entering, cleaning and analyzing the data and the level of significance was set at 0.05 for all tests. Where more than 10% of the items were missing, the data were excluded from further analysis.

To test the psychometric properties of the new tool, we investigated reliable measures of each one of the knowledge domains. The first analysis was test-retest reliability, assessed through the intraclass correlation coefficient (ICC). If bad items were found they were eliminated [19]. We then proceed to internal consistency analysis of each area by Cronbach's alpha. For this analysis, values higher than 0.70 were considered acceptable, reflecting the internal correlation between items of the same area [17]. The factor structure was an option of assessment if the internal correlation between items in the areas was not confirmed.

Criterion validity was also assessed by comparing CADE-Q SV total scores by participant's level of education and duration in CR, using *t*-tests and Pearson's correlation respectively. Item completion rates were also described.

Finally, a descriptive analysis of the CADE-Q SV was performed. A mean total score was computed to reflect total knowledge. *T*-tests, one-way analysis of variance and chi-square tests were used as appropriate to assess differences in total knowledge based on patient's socio-demographic and clinical characteristics.

3. Results

3.1. Participants characteristics

For the first phase (expert's review), there were 10 (85%) clinicians, and 2 (15%) researchers who reviewed the items. For the pilot test, 30CR graduates who agreed to be contacted were contacted. Twenty (67%) responded, of which 8 (40%) were female, with a mean age of 66.7 ± 3.4 years old.

For the psychometric validation study, 200 coronary patients participating in CR (representing approximately 20% of total annual CR patients) were approached to participate in this study during the recruitment phase. One hundred and thirty two (66%) participants signed the consent form and completed the CADE-Q SV. The characteristics of these participants are presented in Table 1. To assess test-retest reliability, 50 of these participants were randomly selected and asked to complete the CADE-Q SV twice, in an interval of 2 weeks.

3.2. Development of the tool

Based on previous versions of CADE-Q [13,14,16] the first version of the CADE-Q SV was developed. Experts in each area of knowledge—medical condition, risk factors, exercise, nutrition, and psychosocial risk—reviewed each area and defined the questions that should be included based on patients' information needs, importance and education guidelines. Overall, all statements were based on the CADE-Q II. The CADE-Q SV was designed to be a true/false/I do not know questionnaire, with 20 items (4 in each domain). Each correct answer equals to 1 point; therefore, the maximum score possible is 20 overall, 4 by domain, and 1 per item. The first version was reviewed by a committee of CR experts, who concluded that all items were appropriate for administration in a CR population and no changes were made in the scale at this phase.