Development and Psychometric Properties Evaluation of a Care Needs Questionnaire in Phase 1 Cardiac Rehabilitation for Patients with Coronary Artery Disease: CNCR-Q

Neda Sayadi1, Johanne Alteren2, Eesa Mohammadi3, Kourosh Zarea1*

1Department Nursing and Midwifery, Nursing Care Research Center in Chronic Diseases, Nursing and Midwifery School, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran
2Molde University College, Faculty of Health Sciences and Social Care, Norway
3Department of Nursing, Faculty of Medical Sciences, Tarbiat Modares University, Tehran

Article Info
Article History:
Received: 26 Dec. 2018
Accepted: 27 Aug. 2020
e-Published: 1 Mar. 2021

Keywords:
Questionnaire design, Cardiac rehabilitation, Coronary artery disease, CNCR-Q, Care needs

Abstract
Introduction: Cardiovascular diseases (CVDs) are one of the most common chronic illnesses and the leading cause of mortality worldwide. This study aimed to design and assess the psychometric properties of questionnaire to examine the care needs of patients with coronary artery disease (CAD) in phase 1 of cardiac rehabilitation (CR).

Methods: This sequential exploratory study used a mixed method with two phases. In the first phase, qualitative study was performed by analyzing the concept of Schwartz-Barcott-Kim hybrid model; and in the second phase, quantitative data were obtained and analyzed for the psychometric parameters of the designed tool.

Results: The questionnaire for care needs was based on the indicators of measurement, which was identified in the qualitative phase of the study, as a tool with 40 items. After conducting face validity qualitatively, all tool items were considered important and were retained for the next steps. After completing the steps for determining the content validity ratio (CVR) and content validity index (CVI) of 40 items, they were preserved for decision making at a later stage. The results of exploratory factor analysis revealed four factors; the factor analysis of three items was eliminated and the final version of the questionnaire CNCR-Q (Care Needs Cardiac Rehabilitation-Questionnaire) with 37 items remained.

Conclusion: The findings indicated that the questionnaire with properties, such as simple scoring, reliability and validity, is an appropriate tool for assessing care needs in Iranian patients with CAD. Moreover, the CNCR-Q is an effective instrument for assessing patient needs before discharge.

© 2021 The Author(s). This work is published by Journal of Caring Sciences as an open access article distributed under the terms of the Creative Commons Attribution License (http://creativecommons.org/licenses/by-nc/4.0/). Non-commercial uses of the work are permitted, provided the original work is properly cited.
and culture of societies that these definitions take place in their domain. So, it seems necessary the design of a tool that is appropriate for the culture of Iran, with acceptable validity and reliability and also in accordance with the condition of the patients. Therefore, this study aimed to develop and evaluate psychometric properties of care needs questionnaire in phase 1 of CR in patients with CAD.

**Materials and Methods**

This study was a research project approved by Ahvaz University of Medical Sciences with CDCRC-9412 code and derived from a Ph.D. Nursing dissertation titled “Development and psychometric properties Evaluation of a care needs Questionnaire in phase 1 Cardiac Rehabilitation for patients with Coronary Artery Disease,” with thesis registration number: 115. This is a mixed method (sequential exploratory) study, one of the most popular and appropriate method for developing tools. That involved two phases: (1) Explaining the meaning of care needs and (2) Psychometric of the questionnaire through quantitative study.

**Phase one**

In the first stage of the research, concept analysis study was performed using of Schwartz-Barcott-Kim hybrid model for analyzing the concept of care needs in Phase 1 of CR in patients with CAD in the Islamic Society of Iran. An analysis of the concept of the hybrid model by Schwartz-Barcott and Kim is in three steps: 1. Theoretical review; 2. Work in field (field research) and 3. Analysis. Therefore, in the current study, in theoretical review step, all available valid electronic databases such as Scopus, CINHAL, Medline, PubMed, Elsevier and Web of Science with the keywords: coronary heart disease AND cardiac rehabilitation, coronary heart disease AND care need, self-care need OR post discharge education OR information need OR learning need OR patient teaching in the title and abstract of the articles were searched. A massive search was done without time limit, until September 2016 at the sites. A total of article was found (2378), after reviewing them, 47 related to the concept and 4 textbooks were reviewed. Articles were limited to Persian and English (Figure 1). In the field work step, considering the nature of the concept of care needs and obtaining a comprehensive view of the concept, participants were chosen from patients with acute coronary syndrome (ACS), myocardial infarction and post open heart surgery (given the equal need of care for these patients), and doctors and nurses who were involved in care of patients.

Interviews were conducted with 6 patients, 5 nurses and 1 physician (cardiologist) that were saturated after 4 initial interviews with patients and 3 nurses’ interviews, but to ensure, 2 other interviews with patients and 2 interviews with nurses done. Semi-structured interview with the participants was done after obtaining informed consent from the participants and ensuring confidentiality of the data. An interview guide was developed based on the results of the theoretical phase. The guide included several broad questions, including “Would you please...”

![Flow chart of the study (theoretical review step)](image-url)
describe what kind of information you have received since you developed this disease?" "Would you explain the impact of the disease on your sexual activities? Would you explain how much physical activity you can do?" "Do you know when you can do physical activity?" Also, probing questions were formulated and used during interviews. An analysis of the interviews was conducted using directed content analysis by a non-constructed matrix. The interviews were carefully listened to several times and the text of the manuscripts was reviewed several times in order to gain a profound and correct understanding and break it into smallest units (codes). The codes were divided into four categories (physical care needs, psychological care needs, social care needs and spiritual care needs). In order to credibility, the method of continuous engagement with data and confirmation of findings by contributors (extracting codes and re-confirming by contributors in case of ambiguity in extraction codes) and review by supervisor (reviewing the process of analysis and extraction of data) was used. The codes were used by two colleagues. Then, in the final analysis step, the findings of the theoretical review and field work (prior two steps) were merged to obtain the final definition in relation to the concept. In the present study, for designed questionnaire the approach of Waltz et al., was used.

**Phase two**

In the second phase of the research, quantitative data were obtained and analyzed for the psychometric of the designed tool. Face validity was evaluated qualitatively and quantitatively. To perform face validity (qualitatively), the basic tools for care needs were prepared in the form of four Likert with terms: 1= the phrase is complex to 4= the phrase is very simple and fluent. Regarding the relevance or specificity of the care needs questionnaire, the four Likert scale was used which includes: 1= the phrase is irrelevant to 4= The phrase is quite relevant. Regarding transparency and clarity, the four Likert scale was used which includes: 1= the phrase is inaccurate to 4= The phrase is completely transparent and understandable. In order to carry out face validity (quantitatively), the coefficient of effect of items was calculated. The instrument was provided to 12 patients admitted to the study centers. The coefficient of effect of items was calculated according to the formula. The coefficients of the item's impact were higher than 1.5 and were selected as suitable items and maintained for later stages. To determine the content validity of the questionnaire, two qualitative and quantitative methods were used. To determine the content validity and clarity of the items (qualitatively), 10 medical experts in nursing and medical sciences were asked to examine each item and while studying each item, comments and views were corrected in an exhaustive manner. Content validity (quantitatively) was performed by using the Content Validity Index (CVI) and Content Validity Ratio (CVR). Calculation of the CVR for each item was performed using the CVR formula and experts' panel. Then, by referring to the Lawshe table, if the number calculated with the formula for each item is (0.6) or larger, those items were considered essential and maintained for later analysis. (In fact, this indicates that the presence of relevant items with an acceptable statistical significance level ($P<0.05$) is essential for this tool). Also, three criteria: simplicity and fluidity, relevancy, clarity and transparency used for each item based on the CVI formula. The acceptance of each item was based on the following criteria: the content of the CVI above 0.79 is appropriate, the CVI score is between 0.79 and 0.70 which needs to be corrected and revised, and the CVI score of less than 0.70 is considered unacceptable, and items were removed from the list.

Construct validity performed by exploratory factor analysis and a rotating correlation matrix was used to group the variables that have internal correlation. The sample size ($N=200$) at the quantitative stage of the present study was 5 times the number of items. Data were analyzed by SPSS software version 13. Also, before performing the analysis of the main components, adequacy of the data for exploratory factor analysis was evaluated based on the Kaiser-Meyer-Olkin (KMO) and Bartlett’s test of sphericity and data extracted with component principle method. Also, rotation method was Varimax with Kaiser normalization test and the items were found to be higher than 0.3 were used for factor analysis. In this study, Cronbach's alpha coefficient was used to determine the reliability of the instrument. Cronbach's alpha was calculated for all the structures and also, using the internal consistency method, the values above 0.7 were considered appropriate.

**Results**

The findings of the concept analysis showed: “Care needs of patients with CAD (patients with myocardial infarction and ACS and patients after coronary artery bypass grafting) in phase 1 of CR; Knowledge, considerations, expectations and skills in the field. Educational care needs are related to physical, psychological, social and spiritual care needs” (Table 1). The questionnaire for care needs was based on the indicators of measurement, which was identified in the qualitative phase of the study, as a tool with 40 items. This includes the physical care needs with 22 items, the psychological care needs with 6 items, the social care needs with 4 items and the spiritual care needs with 8 items. After carrying out qualitatively face validity, all tool items were considered important and were retained for the next steps. Therefore, at the end of the qualitative and quantitative face validity, the 40 items mentioned above were obtained without changing the number of items for content validity. After completing the steps for determining the CVR and the CVI of 40 items, they were preserved for decision making at a later stage. Scoring items (scaling) was prepared due to the different nature of the care needs including: 4 options and the five
Likert scale, (a) Always (4); (b) Most of the time (3); (c) sometimes (2); (d) Rarely (1); (e) Never (0). In multiple choice questions if patient answer was true, the score was 1 and if the patient answer was wrong, the score was 0.

The results showed that since the KMO value is 0.76, the number of subjects studied is sufficient for factor analysis. The Bartlett test of sphericity also expresses the accuracy of the model of the factor analysis ($P = 0.000$). The correlation coefficient matrix was calculated and variables that correlated with other variables were analyzed in the first stage of factor analysis. Commonly, the items were found to be higher than 0.3 were used for factor analysis (Table 2). Commonalities percentage question of Care Need questionnaire was shown in Table 3. Also the final name of four factors that extracted after factor analysis, variance percentage and cumulative percentage reported in Table 4. Three items were eliminated in factor analysis step, and the final version of the questionnaire with 37 items and 4 factors remained (Figure 2).

The questionnaire of care needs in patients with coronary heart disease has an internal consistency of 0.782 (Table 5).

Final Care Needs Questionnaire in Phase 1 of CR in Patients with CAD (CNCR-Q), was shown in Online Supplementary file 1.

**Discussion**

Patients admitted into intensive care wards, due to specific conditions of their disease and the specific environment of the intensive care ward, are subject to stressors and many upset factors. On the other hand, due to their weakness, disability, sedation and their short stay in this ward, they are not able to express their needs. Therefore, the questionnaire for assessing care needs was designed to provide assistance to nurses working in these wards to better identify the care needs of these patients in phase 1 (before discharge) CR and ultimately increase the quality of care for them. This research is a novelty due to the design and psychometric of the care needs questionnaire based on religious culture in Iran.

Components of this questionnaire consisted of 37 items in 4 dimensions including physical care needs (16 questions), social-family care needs (8 questions), spiritual-psychological care needs (9 questions) and requirements for the discharge plan (4 questions). For scoring the questionnaire, in physical care needs minimum score is 0 and maximum score is 16. In requirements for the discharge plan minimum score is 0 and maximum score is 4. In Spiritual-psychological care needs minimum score is 0 and maximum score is 36 and in Social-family care needs minimum score is 0 and maximum score is 21. A higher score indicates the lower patient need for education.

In the study of Ghisi et al., 11 factors were identified as the information needs of CR patients: the heart (physiology, symptoms, surgical treatment), nutrition, exercise and physical activity, drugs, work/occupation, social activity, stress/psychological factors, social/general concerns, emergency/safety, diagnosis and treatment, risk factors, goals and barriers. In another study by Gerard and Peterson, eight factors were identified as the learning needs of patients with myocardial infarction: the introduction of intensive care unit, anatomy and physiology, psychosocial factors, risk factors, drug information, nutritional information, physical activity and other relevant information. In another study by Phelan et al., thirteen factors were identified as the learning needs of heart patients, which include: understanding health, nutrition, excretion, activity/exercise, perception, sleep and rest of the patient, self-understanding, role/communication, sex, stress/compatibility, values/beliefs, clearance program and educational needs. The current study is superior as compared to the studies mentioned because care needs...
### Table 2. Rotational matrix of extracted components based on factor load

| Questions | Factors | Questions | Factors |
|-----------|---------|-----------|---------|
| 1         | 0.291   | Q20       | 0.211   |
| 2         | 0.427   | Q21       | 0.308   |
| 3         | 0.504   | Q22       |         |
| 4         | 0.403   | 0.502     | Q23     | 0.513   |
| 5         | 0.543   | Q24       | 0.328   |
| 6         | 0.399   | Q25       | 0.253   |
| 7         | 0.190   | 0.525     | Q26     | 0.720   |
| 8         |         |           | Q27     | 0.265   |
| 9         |         |           | Q28     | 0.774   |
| 10        | 0.171   | 0.353     | Q29     | 0.631   |
| 11        | 0.524   | Q30       | 0.686   |
| 12        | 0.404   | Q31       | 0.349   |
| 13        | 0.541   | Q32       | 0.173   |
| 14        |         |           | Q33     | 0.457   |
| 15        | 0.366   | Q34       | 0.401   |
| 16        | 0.052   | Q35       | 0.517   |
| 17        | 0.376   | 0.399     | Q36     | 0.343   |
| 18        | 0.260   | 0.525     | Q37     | 0.471   |
| 19        | 0.269   |           | Q38     |         |
| 20        |         |           |         |         |

### Table 3. Communalities questionnaire Care Need

| Questions | Communalities | Questions | Communalities | Questions | Communalities | Questions | Communalities |
|-----------|---------------|-----------|---------------|-----------|---------------|-----------|---------------|
| 1         | 0.291         | 11        | 0.404         | 21        | 0.349         | 31        | 0.500         |
| 2         | 0.427         | 12        | 0.366         | 22        | 0.173         | 32        | 0.216         |
| 3         | 0.504         | 13        | 0.052         | 23        | 0.457         | 33        | 0.511         |
| 4         | 0.403         | 14        | 0.376         | 24        | 0.173         | 34        | 0.806         |
| 5         | 0.502         | 15        | 0.260         | 25        | 0.457         | 35        | 0.720         |
| 6         | 0.543         | 16        | 0.269         | 26        | 0.401         | 36        | 0.774         |
| 7         | 0.399         | 17        | 0.303         | 27        | 0.517         | 37        | 0.631         |
| 8         | 0.390         | 18        | 0.513         | 28        | 0.343         |         |               |
| 9         | 0.171         | 19        | 0.328         | 29        | 0.211         |         |               |
| 10        | 0.524         | 20        | 0.253         | 30        | 0.317         |         |               |

### Table 4. Total variance of 4 factors in Care Needs Cardiac Rehabilitation Questionnaire

| Factors                        | Total | % Of Variance | Cumulative % |
|--------------------------------|-------|---------------|--------------|
| Spiritual-psychological care needs | 4.965 | 11.117        | 13.117       |
| Physical care needs            | 4.904 | 12.906        | 26.023       |
| Social-family care needs       | 3.182 | 8.373         | 34.379       |
| Requirements for the discharge plan | 2.307 | 6.070         | 40.467       |

### Table 5. Number of questions and internal consistency of Cronbach's alpha for each factor and the entire questionnaire

| Factor name                      | Number of questions | Cronbach's alpha |
|----------------------------------|---------------------|------------------|
| Physical care needs              | 16                  | 0.85             |
| Spiritual-psychological care needs | 9                  | 0.83             |
| Social-family care needs         | 8                   | 0.73             |
| Requirement of the discharge plan | 4                   | 0.39             |
| Total                            | 37                  | 0.78             |

In this research, the needs for care are based on patients' interview and understanding their actual needs, while in the studies mentioned, patients' information and educational needs are limited to literature review. It has been found that in some cases, these needs may not be appropriate for the patient's actual need. In another study by Ghisi et al., four factors were identified as the educational needs of patients undergoing CR: CAD, drug diagnosis and treatment.
risk factors and lifestyle and related sports. Compared with Ghisi et al., who have mainly dealt with training on physical needs, our study is more comprehensive and conclusive in that it is also concerned with other patients’ care needs such as the spiritual, social and psychological needs were investigated.

The content validity of the questionnaire was evaluated based on expert judgment. Verification of the content of the questionnaire by experts is one of the best ways to obtain evidence in support of a tool. While there are three tools available in this field, their content was not reported, which has led to their use with caution. In the initial design of the questionnaire, the four dimensions: physical, psychological, social and spiritual care needs were classified. The results of the factor analysis showed that the psychological dimension is consistent with the spiritual meaning. Therefore, the terms of these two domains were called “spiritual care needs”. Phrases related to the physical care needs were also similar factor load after the factor analysis, and they were placed under the category of “physical care needs”. The next field phrases were a combination of questions on physical, psychological and social dimensions, and given the fact that the most frequent factor was sexual questions, this dimension was called the dimension of “social care needs”, and in relation to the final dimension, given that the questions in this dimension were a combination of questions relating to the physical, social and spiritual dimension, they were called the “requirements of the discharge plan”. Therefore, due to the consistency of the expressions in the factors resulting from factor analysis with the definition and dimensions of the concept of care needs in phase 1 of the rehabilitation of patients with CAD, the validity of the tool construct was confirmed by factor analysis. Ghisi et al., also used factor analysis to determine the validity of the educational tool construct for coronary heart disease patients under CR. However, due to different definitions of the concept of care needs in this research, the number and naming of factors were different. In another study by Ghisi et al., on the design of educational needs of patients undergoing CR, only the criterion validity to validate their tools were used, and the authors pointed out that the construct validity of the instrument and its sensitivity were not investigated in different situation, thus, this is the limitation to the use of this tool. In two other tools designed by Phelan et al., and Gerard & Peterson, for the needs of heart patients, the construct validity of the tool was not investigated, which is one of the limitations of the above tools. Reliability in the tool is one of the most important criteria that shows the quality of the tool (burns). The questionnaire of care needs in patients with coronary heart disease has an internal consistency of 0.782 (Table 5).

Ghisi et al., also used the internal consistency method to determine the reliability of their tools. However, the author used the test retest method to determine the stability of the tools, but in the current study, due to the nature of the concept of care needs, this method was not used for determination of stability. Also, tools designed by Phelan et al., and Gerard & Peterson, on the needs of heart patients also did not show the content validity of the tool. One of the differences between the present questionnaire and some of the tools that have been introduced so far is its reliance on acceptable values and beliefs in Iranian society. One of the main features of this difference is the need for spiritual care as one of the components of the caring needs of heart patients. Examples such as “nurses provide conditions for prayer for patients”, “Nurses refer patients to religious clerics”, or other similar items, show that Iranian heart patients seek some of their care needs in connection with divine sources and seek help from God through worship practices in order to meet their spiritual needs.

Despite the fact that the most important strengths of this study were the use of a hybrid model for analyzing the concept of care needs, both theoretical review and work done in the field also has limitations. One of the limitations of this study was that the participants were selected from hospitals affiliated to medical universities and private hospitals in Ahvaz. Although, the Ahvaz is known as a treasure of cultures due to its diverse cultures, considering that there are different cultures in Iran, the results of this study may not be generalized to all patients throughout Iran. On the other hand, due to executive constraints, the samples of this study for measuring psychometric properties were selected by convenience sampling. Other limitations of this study are that the detected factors in the psychometric step of the tool include about 40% of the total variance. It seems that there are other factors that play a role in measurement of the care needs and this study was not able to identify them. Also, another limitation of this study is failure to implement criterion validity, because none of available tools were performed in phase 1 CR and all available instruments have assessed patients’ needs while they have completed CR. CR include three phase and the patients needs are different in different phase. Although this study seems to be the first attempt by the nursing community to develop the concept of care needs and build its measurement tools based on Islamic teachings in Iran, it will not naturally be the last attempt, thus further studies should be done. Therefore, it is suggested that the psychometric properties of this tool should be measured based on different cultures and different points of Iran based on random sampling.

Conclusion

Based on the results of this study, the care needs questionnaire for patients with CAD in phase 1 of CR were designed based on the concept of the care needs in Iranian culture. Because this tool was designed based on understanding of the concept of care needs from the viewpoint of patients with CAD and examining their experiences through qualitative research, reliability and
validity, simplicity and fluidity, and ability to complete within 10-15 min to examine care needs of heart patients is suitable. Therefore, considering the lack of valid and reliable tools in accordance with Iran's cultural conditions to assess the care needs of patients with CAD, this study will be helpful in achieving the above goal.

Acknowledgments
As part of the first author’s Neda Sayadi Ph.D. thesis, this study was financially supported by the Nursing Care Research Center in Chronic Diseases and Vice Chancellor for Research and Technology of Ahvaz Jundishapur University of Medical Sciences hereby we thank for all their supports.

Ethical Issues
This study was confirmed by ethical committee of Ahvaz Jundishapur University of Medical Sciences (AJUMS) with code: IR.AJUMS.REC.1394.722.

Conflict of Interest
The authors declare no conflict of interest in this work.

Author’s Contributions
All authors contributed to the conception and design, acquisition of data, analysis and interpretation of data, drafting the article, review of article and find approval.

Supplementary Materials
Supplementary file 1. Final Care Needs Questionnaire in Phase 1 of CR in Patients with CAD: CNCR-Q.

References
1. Anderson JL, Adams CD, Antman EM, Bridges CR, Califf RM, Casey DE Jr, et al. 2012 ACCF/AHA focused update incorporated into the ACCF/AHA 2007 guidelines for the management of patients with unstable angina/non-ST-elevation myocardial infarction: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. J Am Coll Cardiol 2013; 61(23): e179-347. doi: 10.1016/j.jacc.2013.01.014.
2. Pardaens S, De Smedt D, De Bacquere D, Willems AM, Verstreken S, De Sutter J. Comorbidities and psychosocial characteristics as determinants of dropout in outpatient cardiac rehabilitation. J Cardiovasc Nurs 2017; 32(1): 14-21. doi: 10.1097/jcn.0000000000000296.
3. Anderson L, Oldridge N, Thompson DR, Zwisler AD, Rees K, Martin N, et al. Exercise-based cardiac rehabilitation for coronary heart disease: cochrane systematic review and meta-analysis. J Am Coll Cardiol 2016; 67(1): 1-12. doi: 10.1016/j.jacc.2015.10.044.
4. Kushner FG, Hand M, Smith SC Jr, King SB 3rd, Anderson JL, Antman EM, et al. 2009 focused updates: ACC/AHA guidelines for the management of patients with ST-elevation myocardial infarction (updating the 2004 guideline and 2007 focused update) and ACC/AHA/SCAI guidelines on percutaneous coronary intervention (updating the 2005 guideline and 2007 focused update) a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. J Am Coll Cardiol 2009; 54(23): 2205-41. doi: 10.1016/j.jacc.2009.10.015.
5. Conway J, McMillan MA, Solman A. Enhancing cardiac rehabilitation nursing through aligning practice to theory: implications for nursing education. J Contin Educ Nurs 2006; 37(5): 233-8. doi: 10.3928/0022-0124-20060901-06.
6. Levine GN, Bates ER, Bittel JA, Brindis RG, Fihn SD, Fleisher LA, et al. 2016 ACC/AHA guideline focused update on duration of dual antiplatelet therapy in patients with coronary artery disease: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines: an update of the 2011 ACCF/AHA/SCAI guideline for percutaneous coronary intervention, 2011 ACCF/AHA guideline for coronary artery bypass graft surgery, 2012 ACC/AHA/ACP/AATS/PCNA/SCAI/STS guideline for the diagnosis and management of patients with stable ischemic heart disease, 2013 ACCF/AHA guideline for the management of ST-elevation myocardial infarction, 2014 AHA/ACC guideline for the management of patients with non-ST-elevation acute coronary syndromes, and 2014 ACC/AHA guideline on perioperative cardiovascular evaluation and management of patients undergoing noncardiac surgery. Circulation 2016; 134(10): e123-55. doi: 10.1161/cir.0000000000000404.
7. Greco A, Cappelletti ER, Monzani D, Pancani L, D’Addario M, Magrin ME, et al. A longitudinal study on the information needs and preferences of patients after an acute coronary syndrome. BMC Fam Pract 2016; 17: 136. doi: 10.1186/s12875-016-0534-8.
8. Smith J, Liles C. Information needs before hospital discharge of myocardial infarction patients: a comparative, descriptive study. J Clin Nurs 2007; 16(4): 662-71. doi: 10.1111/j.1365-2702.2006.01689.x.
9. Hillis LD, Smith PK, Anderson JL, Bittel JA, Bridges CR, Byrne JG, et al. 2011 ACCF/AHA guideline for coronary artery bypass graft surgery: executive summary: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. J Thorac Cardiovasc Surg 2012; 143(1): 4-34. doi: 10.1016/j.jtcvs.2011.10.015.
10. Komasi S, Saedini M. Aging is an important cause for a lack of understanding of the main risk factor in cardiac rehabilitation patients. Thrita 2015; 4(4): e32751. doi: 10.5812/thrita.32751.
11. Woodruffe S, Neubeck L, Clark RA, Gray K, Ferry C, Finan
J, et al. Australian Cardiovascular Health and Rehabilitation Association (ACRA) core components of cardiovascular disease secondary prevention and cardiac rehabilitation 2014. Heart Lung Circ 2015; 24(5): 430-41. doi: 10.1016/j.hlcc.2014.12.008.

12. Rushton M, Howarth M, Grant MJ, Astin F. Person-centred discharge education following coronary artery bypass graft: a critical review. J Clin Nurs 2017; 26(23-24): 5206-15. doi: 10.1111/jocn.14071.

13. Schwartz-Barcott D, Kim HS. An Expansion and Elaboration of the Hybrid Model of Concept Development. 2nd ed. Philadelphia: Saunders; 2000.

14. Burns N, Grove SK. The Practice of Nursing Research: Conduct, Critique, and Utilization. 5th ed. Philadelphia: Saunders; 2005.

15. Waltz CF, Strickland OL, Lenz ER. Measurement in Nursing and Health Research. 5th ed. United States: Springer Publishing Company; 2016.

16. Ayre C, Scally AJ. Critical values for Lawshe’s content validity ratio: revisiting the original methods of calculation. Meas Eval Couns Dev 2014; 47(1): 79-86. doi: 10.1177/0748175613513808.

17. Leung K, Trevena L, Waters D. Content validation of the evidence-based nursing practice assessment tool. Nurse Res 2018; 26(1): 33-40. doi: 10.7748/nr.2018.e1544.

18. Kareshki H, Heydari A, Malekzadeh J, Esmaily H, Mohammadzadeh Tabrizi Z, Hesari Moghaddam M, et al. Design of psychometric assessment questionnaire to determine the causes of discomfort among patients admitted to the intensive care unit. Evidence Based Care 2015; 5(1): 47-56. doi: 10.20382/ebc.2016.4059. (Persian)

19. Ghisi GL, Grace SL, Thomas S, Evans MF, Oh P. Development and psychometric validation of a scale to assess information needs in cardiac rehabilitation: the INCR Tool. Patient Educ Couns 2013; 91(3): 337-43. doi: 10.1016/j.pec.2013.01.007.

20. Gerard PS, Peterson LM. Learning needs of cardiac patients. Cardiovasc Nurs 1984; 20(2): 7-11.

21. Phelan C, Finnell MD, Mottla KA. A patient self-assessment tool for cardiac rehabilitation. Rehabil Nurs 1989; 14(2): 81-7. doi: 10.1002/j.2048-7940.1989.tb01425.x.

22. Ghisi GL, Durieux A, Manfroi WC, Herdah AH, Carvalho T, Andrade A, et al. Construction and validation of the CADE-Q for patient education in cardiac rehabilitation programs. Arq Bras Cardiol 2010; 94(6): 813-22. doi: 10.1590/s0066-782x2010000500045.

23. Zamanzadeh V, Rassouli M, Abbaszadeh A, Alavi Majd H, Nikanfar A, Ghahramanian A. Details of content validity and objectifying it in instrument development. Nurs Pract Today 2014; 1(3): 163-71.

24. Smith J, Garton-Smith J, Briffa T, Maiorana A. The development of a new cardiac rehabilitation needs assessment tool (CRNAT) for individualised secondary prevention. Heart Lung Circ 2015; 24(5): 458-64. doi: 10.1016/j.hlcc.2015.01.001.

25. Vorwerg S, Stamm O, Menant A, Alex S, Müller-Werdan U. Observational study in cardiac rehabilitation groups phase III: a comparison of perceived and measured training intensity during a moderate-intensity workout. Eur J Phys Rehabil Med 2020. doi: 10.23736/s1973-9087.20.06379-0.

26. Ambrosetti M, Abreu A, Corrè U, Davos CH, Hansen D, Frederix I, et al. Secondary prevention through comprehensive cardiovascular rehabilitation: from knowledge to implementation. 2020 update. A position paper from the Secondary Prevention and Rehabilitation Section of the European Association of Preventive Cardiology. Eur J Prev Cardiol 2020: 2047487320913379. doi: 10.1177/2047487320913379.