

Validation and the Reliability of the ACIC Questionnaire in the Primary Health Care Setting: a Study from Bosnia and Herzegovina

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Abstract

Objective. The aim of this study was to carry out the cultural adaptation and validation of the Assessment of Chronic Illness Care questionnaire (ACIC) in the Republika Srpska, Bosnia and Herzegovina. **Methods.** A validation study was conducted in two randomly selected primary health care centers in the Republika Srpska, Bosnia and Herzegovina, during March and April 2016. The study participants were all physicians working in family medicine departments during the study. Translation of the ACIC questionnaire version 3.5 was performed following the guidelines of the World Health Organization. The validity and reliability of the questionnaire were tested with face validity, construct validity, and internal consistency. **Results.** The questionnaire was distributed to 66 family physicians. Missing values were negligible, therefore the criteria for factor analysis were met. Exploratory factor analysis confirmed that the questionnaire measured one factor. The Cronbach alpha coefficient (0.970) showed the excellent level of internal consistency of the questionnaire. The intraclass correlation coefficient (0.802) confirmed the good reliability of the questionnaire. **Conclusion.** The ACIC questionnaire can be used to assess the quality of chronic care in family medicine practice in Bosnia and Herzegovina. Further research is needed to explore how changes in healthcare care delivery impact changes in the Chronic Care Model domain.

Key Words: Primary Healthcare ■ Delivery of Healthcare ■ Non-Communicable Chronic Diseases.

Introduction

Chronic, non-communicable diseases have been recognized as a significant burden within the European Region, and are one of the four priority areas of the 2020 Health Action Plan (1). In Bosnia and Herzegovina (BH), ischemic heart disease and cerebrovascular diseases are the highest-ranking causes of premature death (2). In order to resolve the problem of epidemics of non-communicable diseases, and tackle outcomes in terms of chronic illness, the Government of Bosnia and

Herzegovina has conducted a primary health care reform based on the family medicine (FM) model, over the period of the last 20 years (3-5). Globally, as the gatekeepers, family physicians have been given a crucial role in the treatment and control of most common chronic conditions, such as hypertension, diabetes, chronic obstructive pulmonary disease, and osteoarthritis (6, 7). The FM teams in the Republika Srpska (RS) are obliged to record cardiovascular risk factors, as well as to have registries of patients with hypertension, diabetes, and chronic obstructive pulmonary disease. This is in accordance with the Accreditation Guide

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for Family Medicine, launched by the RS Agency for Certification, Accreditation and Health Care Improvement.

This Agency conducts the certification and accreditation process of health institutions, monitoring and improving healthcare quality (8, 9). Increased quality of care, better clinical outcomes, patient empowerment, improved multidisciplinary collaboration, and better evaluation of chronic care quality have been assigned as the goals of the Chronic Care Model. The model encompasses six elements: health care organization, delivery system design, clinical information systems, decision-support, self-management support, and community resources (10-12). Evaluation of the Chronic Care Model implementation includes the attitudes and perceptions of patients (Patient Assessment of Chronic Illness Care – PACIC) as well as of health professionals (Assessment of Chronic Illness Care - ACIC). Validation of the Patient Assessment of Chronic Illness Care questionnaire was conducted previously in the same geographic regions (13). The ACIC survey measures to what extent the model is implemented in a specific healthcare system (14-18). Worldwide, previous studies have explored the impact of the Chronic Care Model and health system organization on the Assessment of Chronic Illness Care (19-21), however, it was unknown whether the psychometric properties of the ACIC instrument could be applicable for assessment of chronic care delivery in family practice in BH.

The aim of this study was to describe the cultural adaptation and validation of the Assessment of Chronic Illness Care questionnaire in the Republika Srpska, Bosnia and Herzegovina.

Methods

Study Participants

The cross-sectional study was carried out in two randomly selected primary health care centers, in two cities in the RS, BH (Bijeljina and Prijedor). Primary health care reform in BH introduced the concept of family medicine teams, consisting of a family physician and two nurses. The nursing

profession's job description still varies greatly between the health institutions, in terms of care and treatment of chronic diseases, including education on self-management and community linkage. Therefore, we performed validation of the ACIC questionnaire among the physicians working in family medicine departments, employed by the aforementioned primary health care centers. Eligibility criteria were: working in a family medicine department and having a registered group of patients. The minimum number of responses was calculated to be 60, with a population size of 96, with an error margin of 5%, and a confidence interval of 95. The physicians were informed about the research objectives, and were asked to sign an informed consent form to participate in the study. Participants were assured that confidentiality and anonymity would not be breached by the release of any personal information without permission. To avoid coercion, the researchers approached each prospective respondent individually. Physicians who did not provide written informed consent were excluded from the study, and a questionnaire with incomplete answers was excluded from the data analysis.

The study was conducted in accordance with the World Medical Association Declaration of Helsinki, as revised in 2008. Data collection took place in the period from March to April 2016.

Instruments

The Assessment of Chronic Illness Care, version 3.5, was the tool used in the study. The questions are divided into three parts and the Integration of Chronic Care Model Components, according to the six elements of the Model. The first part, Organization of the Healthcare Delivery System, includes the following components: Overall Organizational Leadership in Chronic Illness Care, Organizational Goals for Chronic Care, Improvement Strategy for Chronic Illness Care, Incentives and Regulations for Chronic Illness Care, Senior Leaders, and Benefits. Community Linkages, the second part, includes Linking Patients to Outside Resources, Partnerships with

Community Organizations, and Regional Health Plans. The third part of the questionnaire, entitled Practice Level, consists of four parts: Self-Management Support, Decision Support, Delivery System Design, and Clinical Information Systems.

The final part of the Assessment of Chronic Illness Care questionnaire contains the Integration of Chronic Care Model Components, combining all the elements of the Model. It includes six key components related to patient information on clinical guidelines, information systems and registries, community programs, organizational planning, follow-up appointments with patient assessment and goal planning, as well as chronic care guidelines.

The Assessment of Chronic Illness Care questionnaire is organized so that the highest “score” (“11”) for any individual item, subscale, or the overall score (the average of the seven subscale scores) indicates optimal support for chronic illness. The lowest possible score on any given item or subscale is “0”, which corresponds to limited support for chronic illness care. The interpretation guidelines are as follows:

Between “0” and “2” = limited support for chronic illness care

Between “3” and “5” = basic support for chronic illness care

Between “6” and “8” = reasonably good support for chronic illness care

Between “9” and “11” = fully developed chronic illness care (18, 19).

Translation and Cultural Adaptation

At the beginning of the study, translation of the ACIC questionnaire was performed following the guidelines of the World Health Organization (22). Two healthcare professionals, fluent in both languages, translated the questionnaire independently from English to Serbian. The translations were reviewed for accuracy, and discrepancies between the translations were resolved by a third bilingual translator, not involved in the previous translation. Backward translation was performed by a fourth bilingual translator, unaware of the questionnaire’s objective. The back-translated version was

compared with the original source to reach equivalence. After subsequent revision, a consensus was reached by the translators on all questions, and a prefinal version of the ACIC was prepared for preliminary pilot testing.

Five family physicians at each primary health care center were asked to provide their opinion on each questionnaire item’s meaning, and consider its applicability for the local care context. No need for any additional modifications of the translation was identified, and the final translated version of the ACIC was produced. The final version of the ACIC was administered to 14 family physicians for whom the questionnaire is intended.

Ethical Approval

The research protocol was approved for each survey by the Ethics Committee of the Primary Health Centre in Prijedor on December 17, 2015 (reference number 01-1545-3/15) and in Bijeljina on December 30, 2015 (reference number 6372/15). All personal data were anonymized,

Statistical Analysis

The validity and reliability of the questionnaire were tested with face validity, construct validity, and internal consistency. Face validity was assessed with the mean, median, standard deviation, Interquartile range, percentage of missing values, the extent of ceiling and floor effects, and normality measures, by the Kolmogorov-Smirnov test. A percentage larger than 20% was associated with floor/ceiling effects (23). Internal consistency was expressed in terms of Cronbach alpha for seven subscales, and the total Assessment of Chronic Illness Care questionnaire and reliability were expressed as the intra-class correlation coefficient. The analysis of construct validity was based on the hypothesis that higher scores would be positively correlated with the implementation of chronic disease clinical guidelines at primary care level, assessed as the percentage of examinations and the percentage of normal results. Spearman’s rank-order correlation was used due

to the non-normal distribution of the variables. Factor analysis (factors with eigenvalue >1) was applied to examine the structure of our version of the ACIC questionnaire.

Results

At the time of the study, 96 family physicians were employed in both regions. Twenty-nine family physicians were on vacation or sick-leave, and sixty-six family physicians consented to participate in the study (response rate = 67.7%).

The Demographic Characteristics of the Physicians

The majority of the family physicians were younger than 39 years of age, N=23 (35.3%) and had worked in practice for less than 11 years, N=35 (53.8%). Mostly the physicians were certified (had completed residency training in family medicine, N=30, 46.9%) and were women, N=56 (84.8%). The accreditation process (meeting regulations and standards set by external accreditation bodies for family medicine) had been implemented three years before the study among 27 (41.5%) of the physicians, and 17 (26.2%) of the physicians had not been previously accredited (Table 1). Family physicians have registries and patients' lists for hypertension, diabetes, and chronic obstructive pulmonary disease (Table 1).

The Psychometric Characteristics of the Questionnaire

One questionnaire was incomplete and excluded from the study. Missing values were negligible therefore the criteria for factor analysis were met. During the analysis of the percentage of answers with 0 and 11 points, it was confirmed that none of the items had a floor effect, while many items had a ceiling effect. All items in the parts entitled Organization of the Healthcare Delivery System and Delivery System Design had a ceiling effect, and one item related to the Continuity of Care had this effect reaching over 50% (Table 2).

Table 1. Demographic Characteristics of Family Physicians and Their Practices

Categorical variables	N (%)	
Gender	Male	10 (15.2)
	Female	56 (84.8)
Age (years)	28-39	23 (35.3)
	40-51	20 (30.8)
	52-65	22 (33.9)
Working years	1-12	35 (53.8)
	13-24	12 (18.5)
	25-38	18 (27.7)
Education level	Medical doctor*	12 (18.8)
	Certified family physicians	30 (46.9)
	Professional additional education [†]	25 (34.4)
Type of work place	Urban	36 (54.5)
	Suburban	11 (16.7)
	Field	19 (28.8)
Accreditation status	No accreditation	17 (26.2)
	Accredited during 3 years	27 (41.5)
	Accredited longer than 3 years	21 (32.3)
Using registries for chronic diseases (with indicators)	Hypertension	56 (86.2)
	Diabetes	56 (86.2)
	Chronic obstructive pulmonary disease	46 (70.8)
Using patients' lists for chronic diseases (without indicators)	Hypertension	60 (93.8)
	Diabetes	59 (93.7)
	Chronic obstructive pulmonary disease	55 (87.3)

*Physicians without formal education in family medicine; [†]Physicians with other specializations and additional training in family medicine.

These results suggested non-normal distributions, as confirmed by the Kolgomorov-Smirnov test. Exploratory factor analysis confirmed one component showing that the questionnaire had one dimension, measuring one factor.

The Cronbach alpha coefficient showed an excellent level of internal consistency of the questionnaire, with a value 0.970. Internal consistency for each of the seven subscales was measured by the Cronbach alpha, and values varied from 0.861 to 0.950. The intraclass correlation coefficient for the questionnaire was 0.802 (Table 2).

Table 2. Data Quality of the Assessment of Chronic Illness Care Questionnaire

Assessment	Mean±SD	Missing values (%)	Floor (%)	Ceiling (%)	Cronbach alpha
Total ACIC* score	8.099 (2.145)	-	-	-	0.970
Organization of the HDS [†]	8.97 (2.112)				0.944
Q1	8.57 (2.562)	1.5	-	31.8	-
Q2	9.05 (2.011)	1.5	-	27.3	-
Q3	8.97 (2.449)	1.5	-	37.9	-
Q4	8.22 (2.870)	1.5	-	30.3	-
Q5	9.45 (2.031)	1.5	-	48.5	-
Q6	9.57 (2.311)	1.5	-	51.5	-
Community linkages	7.45 (2.606)				0.937
Q7	7.26 (3.017)	1.5	-	-	-
Q8	7.48 (2.658)	1.5	-	-	-
Q9	7.62 (2.602)	1.5	-	-	-
Self-Management support	7.83 (2.755)				0.942
Q10	8.05 (3.074)	1.5	-	21.2	-
Q11	7.40 (3.156)	1.5	-	-	-
Q12	7.77 (3.306)	1.5	-	22.7	-
Q13	8.12 (2.308)	1.5	-	-	-
Decision support	7.82 (2.477)				0.861
Q14	9.03 (2.481)	1.5	-	37.9	-
Q15	6.37 (3.781)	1.5	-	-	-
Q16	8.45 (2.450)	1.5	-	27.3	-
Q17	7.45 (2.889)	1.5	-	-	-
Delivery system design	9.12 (1.793)				0.941
Q18	9.03 (2.172)	1.5	-	37.9	-
Q19	9.32 (1.953)	1.5	-	37.9	-
Q20	8.89 (2.306)	1.5	-	31.8	-
Q21	9.15 (2.152)	1.5	-	39.4	-
Q22	9.51 (1.592)	1.5	-	40.9	-
Q23	8.82 (1.991)	1.5	-	27.3	-
Clinical information systems	8.13 (2.298)				0.934
Q24	8.37 (2.589)	1.5	-	30.3	-
Q25	7.92 (2.564)	1.5	-	22.7	-
Q26	7.52 (2.784)	1.5	-	-	-
Q27	7.94 (2.855)	1.5	-	21.2	-
Q28	8.92 (1.971)	1.5	-	30.3	-
Integration of components	7.35 (2.540)				0.950
Q29	7.46 (2.599)	1.5	-	-	-
Q30	7.42 (2.839)	1.5	-	-	-
Q31	6.20 (3.336)	1.5	-	-	-
Q32	6.89 (3.098)	1.5	-	-	-
Q33	8.42 (2.277)	1.5	-	24.2	-
Q34	7.77 (2.760)	1.5	-	21.2	-

*Assessment of Chronic Illness Care; [†]Healthcare Delivery System.

Total ACIC score: Intraclass correlation coefficient 95%: 0.802; Confidence Interval: 0.739-0.859

Scores of the Questionnaire

The total score was 8.1, indicating good support for chronic illness care. Organization of the Healthcare Delivery System (8.97) and the Community Linkage (7.45) scores indicated advanced support for chronic illness care. Self-Management Support and Decision Support in the third part of the questionnaire had almost the same score (7.83, 7.82) and Delivery System Design had the highest score (9.12). The Clinical Information Systems score was 8.14. The lowest score was evidenced for Integration of Components (7.36).

The total average score of male family physicians was 8.5 (standard deviation, SD 1.5) and of female family physicians 8.0 (SD 2.2). The difference is not statistically significant. Two item scores of male physicians were significantly different, Linking Patients to Outside Resources ($P=0.005$) and Organizational Planning for Chronic Illness Care ($P=0.035$).

There was no statistically significant regression of the scores or the following predictors: age and gender, education level, working years, accreditation status, and type of working place.

Discussion

This study aimed to validate the original ACIC questionnaire in the RS, BH, as an instrument to evaluate the level of non-communicable chronic disease care. The Cronbach alpha and intra-class correlation coefficients showed high internal consistency for the total instrument. The internal consistency and reliability of the ACIC questionnaire are in line with the validation study previously carried out in BH, showing high internal consistency and reliability of the PACIC questionnaire (13). These findings are important due to the influence on the information provided by this instrument (24). Exploratory factor analysis found one latent factor (one dimension) that could explain as much of the variability of the initial multidimensional instrument as possible in the context of primary health care in BH. The Integration of Chronic Care Model Component is a variable that reliably measures one (latent) factor.

Bonomi et al. (18) defined the ACIC questionnaire as a tool for identifying areas for improvement of chronic illness care, as well as to evaluate the level of improvement. Initial testing of this questionnaire was done within 108 organizational teams across the United States during quality improvement collaboration focused on chronic illness care. The results of the initial testing showed the best average scores for Organization of the Healthcare Delivery System and Community Linkage, and the lowest scores for Clinical Information System. The results of the final testing showed improvements in Decision Support as well as the Clinical Information System. Therefore, the authors suggested the questionnaire as a “useful quality improvement tool” (18). The good validity and reliability of the BH version of the ACIC suggest its applicability to measure changes in the primary care system of BH.

Family physicians in the current study stated that chronic illness care was well supported, with Delivery System Design scoring best, as previously found in a study by Cramm et al. (19), and Community Linkage and Integration of Components having the lowest average scores. Most of our study respondents work in urban areas, and it has been shown that physicians who work in urban areas, as well as in individual practices, commonly provide the lowest average scores for Community Linkage. The low scores in this domain may be attributed to the family physicians’ high work overload or time constraints, but also to the lack of patient motivation for community programs (25).

In contrast to our findings, physicians in the Netherlands perceived good community linkage (19). Bar et al. (26) suggested a need for tighter connection between delivery system design and the community, affecting citizen organizations, non-profit groups, and the healthcare organization (26). The Netherlands has a very well-developed primary care system, continuity of health care services, and different innovative initiatives to increase community engagement. Increasing access to effective programming in the community, through linkages with the relevant agencies was a cost-effective way to improve quality of care (27).

Davy et al. (28) launched a review of results from 77 quantitative and qualitative studies as the relevant international evidence on the effectiveness of Chronic Care Model elements for improving healthcare practices and health outcomes. This review showed the wide range of variations of the model elements and their implementation, depending on the country. The most commonly used elements in the chronic care model were self-management support and delivery system design (28). The scores in these domains may have been better in other countries in comparison to Bosnia and Herzegovina due to differences in primary health care system organization. First, primary care reform in Bosnia and Herzegovina is still not complete, and healthcare delivery calls for improvement (29). Following the trend in Western European countries, governmental institutions could transfer tasks from the medical to the nursing profession by employing a higher number of nurses with a bachelor's degree, well-trained to provide chronic patient care. Second, there is a lack of community engagement programs within the country, which commonly deepen relationships between healthcare providers and the community. Stakeholders have an important role in supporting community initiatives targeted to derive sustainable decisions and social transformation. Third, patients have a central role in providing quality chronic disease care (30), but their path toward self-management and responsibility is not always smooth. Patient empowerment can only be achieved through consistent medical feedback expenditure on social services in long-term care.

This study has several limitations. The results of the study cannot be generalized as the survey included two primary health care centers at a single point of time. Although a family medicine team consists of one FM physician and two nurses, the current study focused only on family physicians; therefore, it is possible that including nurses in the validation process would provide a consensus rating for each item. We did not estimate either the test-retest reliability of the ACIC or responsiveness to changes, and checking the time stability of the questionnaire by re-administering it after a defined period would reflect whether measurement errors

could be attributable to differences in participants' responses over time.

Conclusions

The validated Assessment of Chronic Illness Care questionnaire is available now in Bosnia and Herzegovina. It could be applicable in the health care system of the country in order to analyze the current system, to identify areas for improvement, and to evaluate all improvements.

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What Is Already Known on This Topic:

The Chronic Care Model encompasses six elements: health care organization, delivery system design, clinical information systems, decision-support, self-management support, and community resources. The Model implementation includes the attitudes and perceptions of patients as well as health professionals. Previous studies explored health professionals' attitudes using the Assessment of Chronic Illness Care instrument. However, it is unknown whether the psychometric properties of this instrument could be applicable for the assessment of chronic care delivery in family practice in Bosnia and Herzegovina.

What This Study Adds:

The Assessment of Chronic Illness Care instrument, validated in Bosnia and Herzegovina, is a useful tool to assess the quality of care for patients with chronic diseases in primary care.

The tool could be used to strengthen collaboration between patients, nurses and physicians.

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References

1. WHO Regional Committee for Europe. Health 2020: a European policy framework supporting action across government and society for health and well-being. [cited 2019 Apr 21]. Available from: <http://www.euro.who.int/en/who-we-are/governance>.
2. Public Health Institute of Republika Srpska. Analysis of Population Health in Republika Srpska. [cited 2019 Apr 21]. Available from: http://www.phi.rs.ba/pdf/publikacije/Zdravstveno_stanje_stanovnistva_RS_2016_web.pdf.

3. Atun RA, Kyratsis I, Jelic G, Rados-Malicbegic D, Gurol-Urganci I. Diffusion of complex health innovations-implementation of primary health care reforms in Bosnia and Herzegovina. *Health Policy Plan.* 2007;22(1):28-39.
4. Ministry of Health and Social Welfare of the Republika Srpska. The Primary Health Care Strategy. [cited 2019 Apr 21]. Available from: <http://www.vladars.net/sr-SP-Cyrl/Vlada/Ministarstva/MZSZ/Documents/Primarna%20zastita%20Brosura.pdf>.
5. Godwin M. Family Medicine Development Project in Bosnia and Herzegovina. *Can Fam Physician.* 1999;45:1098-103.
6. Shapiro J. Gatekeeping must go beyond the linear referral model. *BMJ.* 2016;355: i5793.
7. Gross R, Tabenkin H, Brammli-Greenberg S. Who needs a gatekeeper? Patients' views of the role of the primary care physician. *J Fam Pract.* 2000;17(3):222-9.
8. RS Official Gazette 106/09. [cited 2017 Jan 24]. Available at: <https://www.rgurs.org/en/zakonska-regulativa>.
9. Agency for certification, accreditation and health care improvement of the Republika Srpska. [cited 2017 Jan 24]. Available at: <https://www.askva.org/en/agency.html>.
10. Houle J, Beaulieu MD, Lussier MT, Del Grande C, Pellerin JP, Authier M, et al. Patients' experience of chronic illness care in a network of teaching settings. *Can Fam Physician.* 2012;58(12):1366-73.
11. Strickland AP, Hudson VS, Piasecki A, Hahn K, Cohen D, Orzano AJ, et al. Features of the Chronic Care Model (CCM) associated with behavioral counseling and diabetes care in community primary care. *J Am Board Fam Med.* 2010; 23(3):295-305.
12. Aragones A, Schaefer EW, Stevens D, Gourevitch MN, Glasgow RE, Shah NR, et al. Validation of the Spanish translation of the Patient Assessment of Chronic Illness Care (PACIC) survey. *Prev Chronic Dis.* 2008;5(4):A113.
13. Pilipovic-Broceta N, Vasiljevic N, Marinkovic J, Todorovic N, Jankovic J, Ostric I, et al. Validation of Patient Assessment of Chronic Illness Care (PACIC) in the Republika Srpska, Bosnia and Herzegovina. *EJPCH.* 2018;6(1):12-9.
14. Glasgow ER, Wagner HE, Schaefer J, Mahoney DL. Development and Validation of the Patient Assessment of Chronic Illness Care (PACIC). *Med Care.* 2005;43(5):436-44.
15. Lagos G ME, Salazar M A, Salas F P. Assessment of a Chilean Spanish version of the Patient Assessment of Chronic Illness Care Questionnaire. *Rev Med Chil.* 2017 Jul;145(7):869-78. Spanish.
16. Tusek-Bunc K, Petek-Ster M, Ster B, Petek D, Kersnik J. Validation of the Slovenian version of patient assessment of chronic illness care (PACIC) in patients with coronary heart disease. *Coll Antropol.* 2014;38(2):437-44.
17. Cramm JM, Nieboer AP. Factorial validation of the Patient Assessment of Chronic Illness Care (PACIC) and PACIC short version (PACIC-S) among cardiovascular disease patients in the Netherlands. *Health Qual Life Outcomes.* 2012;10:104.
18. Bonomi AE, Wagner EH, Glasgow RE, VonKorff M. Assessment of chronic illness care (ACIC): a practical tool to measure quality improvement. *BMC Health Serv Res.* 2002;37(3):791-820.
19. Cramm JM, Strating MMH, Tsiachristas A, Nieboer AP. Development and validation of a short version of the Assessment of Chronic Illness Care (ACIC) in Dutch disease management programs. *Health Qual Life Outcomes.* 2011;9:49.
20. Øvretveit J, Bate P, Cleary P, Cretin S, Gustafson D, McInnes K, et al. Quality collaboratives: lessons from research. *Qual Saf Health Care.* 2002;11(4):345-51.
21. Steinhäuser J, Goetz K, Ose D, Glassen K, Natanzon I, Campbell S, et al. Applicability of the assessment of Chronic Illness Care (ACIC) instrument in Germany resulting in a new questionnaire: questionnaire of chronic illness care in primary care. *BMC Health Serv Res.* 2011;11:164.
22. World Health Organization. Process of translation and adaptation of instruments. [cited 2019 Mar 26]. Available from: <http://www.who.int>.
23. Krucien N, Le Vaillant M, Pelletier-Fleury N. Adaptation and validation of the patient assessment of chronic illness care in the French context. *BMC Health Serv Res.* 2014;14:269.
24. Souza AC, Alexandre NMC, Guirardello EB. Psychometric properties in instruments evaluation of reliability and validity. *Epidemiol Serv Saude.* 2017;26(3):649-59.
25. Steurer-Stey C, Frei A, Schmid-Mohler G, Malcolm-Kohler S, Zoller M, Rosemann T. Assessment of Chronic Illness Care with the German version of the ACIC in different primary care settings in Switzerland. *Health Qual Life Outcomes.* 2010;8:122.
26. Barr VJ, Robinson S, Marin-Link B, Underhill L, Dotts A, Ravensdale D, et al. The Expanded Chronic Care Model: An Integration of Concepts and Strategies from Population Health Promotion and the Chronic Care Model. *Hosp Q.* 2003;7(1):73-82.
27. Wagner EH, Austin BT, Davis C, Hindmarsh M, Schaefer J, Bonomi A. Improving chronic illness care: translating evidence into action. *Health Aff (Millwood).* 2001;20(6):64-78.
28. Davy C, Bleasel J, Liu H, Tchan M, Ponniah S, Brown A, et al. Effectiveness of chronic care models: opportunities for improving healthcare practice and health outcomes: a systematic review. *BMC Health Serv Res.* 2015;15:194.
29. Racic M, Pekez-Pavlisko T, Jokovic S. Barriers and facilitators for implementation of family medicine-oriented model of primary care in Bosnia and Herzegovina: A qualitative study. *Int J Health Plann.* 2018;33(1) e378-90.
30. Paulo MS, Loney T, Lapão LV. The primary health care in the emirate of Abu Dhabi: are they aligned with the chronic care model elements? *BMC Health Serv Res.* 2017;17(1):725.