

NURSING ACTIVITIES THAT CONTRIBUTE TO THE QUALITY OF CARE: CONFIRMATORY FACTORIAL ANALYSIS OF THE SCALE

ATIVIDADES DE ENFERMAGEM QUE CONTRIBUEM PARA A QUALIDADE DOS CUIDADOS: ANÁLISE FACTORIAL CONFIRMATÓRIA DA ESCALA

ACTIVIDADES DE ENFERMERÍA QUE CONTRIBUYEN PARA LA CALIDAD DE LOS CUIDADOS: ANÁLISIS FACTORIAL CONFIRMATORIA DE LA ESCALA

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Objective: to analyze the factorial structure of the Perception Scale of Nursing Activities that Contribute to the Quality of Care. **Method:** a methodological study with 3,451 nurses from 36 Portuguese hospitals. In addition to carrying out confirmatory factorial analysis, Cronbach's alpha and composite reliability were used to assess the reliability of the obtained factorial model. **Results:** the factorial weights of the solution found were mostly high; the values of the model's adjustment indexes were reasonable; Cronbach's alpha was elevated for the entire scale and five dimensions, being acceptable in only one dimension. The composite reliability was also high in five dimensions, except for one, considered acceptable. All activities showed high individual reliability. **Conclusion:** Compared to the original scale, the identified factorial model contemplates six dimensions and not seven, producing a reliable and valid scale, which can be applied in the hospital context.

Descriptors: Validation Study. Factor Analysis, Statistical. Psychometrics. Quality Assurance, Health Care. Nursing Care.

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Objetivo: analisar a estrutura fatorial da Escala de Percepção das Atividades de Enfermagem que Contribuem para a Qualidade dos Cuidados. Método: estudo metodológico com participação de 3.451 enfermeiros de 36 hospitais portugueses. Além da realização da análise fatorial confirmatória, para avaliação da confiabilidade do modelo fatorial obtido, utilizou-se o alfa de Cronbach e a confiabilidade compósita. Resultados: os pesos fatoriais da solução encontrada foram majoritariamente elevados; os valores dos índices de ajustamento do modelo foram razoáveis; o alfa de Cronbach foi elevado para a totalidade da escala e para cinco dimensões, sendo aceitável em apenas uma dimensão. A confiabilidade compósita também foi elevada em cinco dimensões, excepto em uma, considerada como aceitável. Todas as atividades apresentaram uma confiabilidade individual elevada. Conclusão: em comparação com a escala original, o modelo fatorial identificado contempla seis dimensões e não sete, produzindo uma escala confiável e válida, passível de aplicação no contexto hospitalar.

Descritores: Estudos de Validação. Análise Fatorial. Psicometria. Garantia da Qualidade dos Cuidados de Saúde. Cuidados de Enfermagem.

Objetivo: analizar la estructura factorial de la Escala de Percepción de las Actividades de Enfermería que Contribuyen para la Calidad de los Cuidados. Método: estudio metodológico con la participación de 3.451 enfermeros de 36 hospitales portugueses. Además de la realización del análisis factorial confirmatoria, para la evaluación de la fiabilidad del modelo factorial obtenido, se utilizó el alfa de Cronbach y la fiabilidad compuesta. Resultados: los pesos factoriales de la solución encontrada fueron mayoritariamente elevados; los valores de los índices de ajuste del modelo fueron razonables; el alfa de Cronbach fue elevado para la totalidad de la escala y para cinco dimensiones, siendo aceptable en apenas una dimensión. La fiabilidad compuesta también fue elevada en cinco dimensiones, excepto en una, considerada como aceptable. Todas las actividades presentaron una fiabilidad individual elevada. Conclusión: en comparación con la escala original, el modelo factorial identificado contiene seis dimensiones e no siete, produciendo una escala confiable y válida, pasible de aplicación en el contexto hospitalario.

Descriptorios: Estudio de Validación. Análisis Factorial. Psicometría. Garantía de la Calidad de Atención de Salud. Atención de Enfermería.

Introduction

The quality of health issues has been a concern of organizations and professionals who work in them. Along with the significant changes in the health needs of the populations, the high technological development, the complexity of the work dynamics, and the increasing demands of patients/users are important challenges for health professionals⁽¹⁻²⁾.

The evolution of health sciences highlights, in addition to the development of scientific knowledge, the guarantee of quality in the provision of health care. Thus, the importance of quality standards and their dissemination in the provision of care as well as the involvement of professionals from the entire National Health System (SNS) have been defended in Portugal to enhance continuous quality improvement⁽³⁾. Although this is a huge challenge, the quality of care should be prioritized by health institutions and professionals who are part of them⁽⁴⁾.

In Nursing, the defense of the quality of care provided to the population is one of the purposes

of the Order of Nurses since its creation, in 1998⁽⁵⁾. In 2001, in the Portuguese context, the quality standards of nursing care were published by the regulating body of the profession, the Order of Nurses, which symbolize the reference for excellent professional performance, for nurses⁽⁶⁾.

In the health area, the search for continuous quality improvement is rooted in the daily performance of nurses. However, although the conditions for ensuring the quality of care provided are clearly defined, systematic monitoring is imperative to foster and achieve a quality culture^(4,7).

In this sense, the use of indicators as a monitoring measure and the assessment of quality, also assessing the quality of nursing care through instruments that analyze the perception, experiences, and/or satisfaction of patients^(4,8-9) have been largely implemented. However, even though the assessment of quality from the patient/user's point of view is relevant⁽⁸⁾, knowing the nurses' perspective on the implementation

of activities that contribute to the quality of care provided can allow promoting their empowerment for continuous improvement and excellence in professional practice⁽¹⁰⁾.

Although the assessment of the professional's perception is less frequent, studies developed in the national and international context show a growing interest in the theme⁽¹¹⁻¹³⁾. Also, since the nurses' professional practice vary between different countries, there is a need to build and validate instruments adjusted to the reality of the different scenarios⁽¹⁴⁾.

In Portugal, some authors started the process of building an instrument in 2014 aimed at the quality standards of nursing care defined by the country's Order of Nurses⁽⁶⁾. This instrument called "Scale of Perception of Nursing Activities that Contribute to Quality of Care (EPAECQC)" was validated in 2014 in a sample of 775 nurses from a hospital in the Northern region of Portugal⁽¹⁵⁾. Due to the validation process, the Scale had 25 items distributed in seven dimensions.

Despite the methodological rigor in the construction and validation of this scale, the authors of this study recognized a limitation of applying it in a single hospital. Although the results showed that the instrument had adequate psychometric properties, with high internal consistency (Cronbach's alpha of 0.940) and with a value of 0.942 in the Kaiser-Meyer-Olkin index, the authors suggested other studies to strengthen the psychometric analyzes and improve the factorial structure of the Scale⁽¹⁵⁾.

Thus, in the context of a national investigation conducted from 2016 to 2018, confirmatory factorial analysis and to densify the psychometric properties of the EPAECQC were established as fundamental. In this segment, the objective of this study is to analyze the factorial structure of the Perception Scale of Nursing Activities that Contribute to the Quality of Care.

Method

This is a methodological study with a quantitative approach, developed in 36 hospital

institutions of mainland Portugal. The study populations were nurses who worked in surgery, medicine, and intensive care and emergency services at the aforementioned hospitals. In this context, after knowing the services where the study was authorized, the eligible population identified was 10,013 nurses.

We used the non-probabilistic convenience sampling technique to obtain the sample. The defined inclusion criteria were: practicing the professional activity in the hospital, within a time of six months or more, in surgery, medicine, or intensive care and emergency services. We excluded nurses who were absent from the services due to sick leave or vacation during the data collection period. A sample of 3,451 nurses was obtained.

Data collection took place between January and March 2016, through the application of a questionnaire consisting of two parts: one relating to the sociodemographic and professional characterization of nurses and the other with the EPAECQC. This Scale has 25 items distributed over seven dimensions: organization of nursing care (with two assessment items), patient satisfaction, health promotion and prevention of complications (with three items each dimension); well-being and self-care and functional re-adaptation (with four items each dimension) and responsibility and rigor (with six assessment items). The items are answered using a Likert scale with four degrees, in which 1 is the "never" option, 2 is the "few times" option, 3 is the "sometimes" option, and 4 is the "always" option⁽¹⁵⁾.

We used the program Statistical Package for the Social Sciences (SPSS), version 22.0 for the analysis and treatment of the data. Descriptive and psychometric analyzes were performed. To assess the reliability of the scale, we used Cronbach's alpha coefficient, item-total correlation, inter-item correlation, and the coefficient of the two halves of Guttman⁽¹⁶⁻¹⁷⁾. Subsequently, the Kaiser-Meyer-Olkin (KMO) sampling adequacy measure was calculated for each activity and the total scale. The expected KMO values vary between 0.5 and 1⁽¹⁶⁾.

Then, to assess the quality of the adjustment of the proposed model within the scope of confirmatory factorial analysis, we used the following indices: Comparative Fit Index (CFI) with an acceptable value equal to or greater than 0.9; Goodness of Fit Index (GFI) with an acceptable value of 0.85 or more; Adjusted Goodness of Fit Index (AGFI) with an acceptable value of 0.80 or more; Root Mean Square Residual (RMR) with an acceptable value less than or equal to 0.1; Root Mean Square Error of Approximation (RMSEA) with an acceptable value less than 0.1; and also the Modified Expected Cross-Validation Index (MECVI)⁽¹⁶⁻¹⁷⁾.

For the evaluation of the reliability of the factorial model obtained, we used Cronbach's alpha coefficient and composite reliability. In the Cronbach's alpha, we considered that a value greater than 0.8 would mean that the internal consistency would be good, with the ideal value between 0.8 and 0.9^(16,18). On the other hand, in composite reliability, we considered that a value equal to or greater than 0.7 would be an indicator of appropriate construct reliability, although lower values could still be acceptable⁽¹⁷⁾.

For the assessment of the factorial validity, the standardized regression weights for each activity were calculated, and the square of these weights, designated as individual reliability. Individual reliability was considered to be appropriate for a value equal to or greater than 0.25⁽¹⁷⁾. Finally, the convergent validity of each dimension was measured using its Average Extracted Variance (AEV), adequate when equal to or greater than 0.5⁽¹⁷⁾.

Since this study is part of a national investigation, the Health Ethics Committee of a hospital in Northern Portugal initially approved it, with Opinion number 98-15. Subsequently, the Ethics Committees and the Boards of Directors of

the 36 hospital institutions involved approved the study. After being informed about the study, the participants signed the informed consent. The anonymity and confidentiality of the information collected were guaranteed.

Results

Of the 3,451 participants, 2,659 (77.1%) were female, with a minimum age of 22 years old and a maximum age of 62 years old. The mean age was 36.4 years old, with a standard deviation of 8.3. Regarding marital status, 2,109 nurses (61.1%) were married or living in a stable relationship and 1,168 (33.8%) were single. In their professional practice, 2,633 (76.3%) were general care nurses (with undergraduate studies), 686 (19.9%) were specialist nurses (who, in addition to graduation, had one specialization in the areas recognized by the Order of Nurses of Portugal) and 132 (3.8%) were nurse managers (with graduation, specialization, and training in management). In the units, 1,526 (44.2%) worked in medical services, 1,161 (33.7%) in surgery services, and 764 (22.1%) in intensive care and emergency services.

The distribution of nurses according to the Health Regions of the hospitals they worked, there were 1,492 (43.2%) working in the North, 829 (24.0%) in Lisbon and Vale do Tejo, 771 (22.3%) in the Center, 213 (6.2%) in the Alentejo and 146 (4.2%) in Algarve.

First, the results from the application of the EPAECQC verified whether the data were appropriate to do the factorial analysis. The corrected item-total correlations ranged between 0.827 and 0.999, with an average correlation of 0.955, very high values that showed a strong homogeneity of the items (activities) that make up the Scale (Table 1).

Table 1 – Corrected item-total correlations. Porto, Portugal – 2016. (N=3.451)

(continued)

Activity	Correlation	Activity	Correlation	Activity	Correlation
1	0.968	10	0.997	19	0.928
2	0.951	11	0.981	20	0.827
3	0.936	12	0.982	21	0.890
4	0.874	13	0.987	22	0.900

Table 1 – Corrected item-total correlations. Porto, Portugal – 2016. (N=3.451) (conclusion)

Activity	Correlation	Activity	Correlation	Activity	Correlation
5	0.914	14	0.990	23	0.959
6	0.909	15	0.976	24	0.998
7	0.994	16	0.972	25	0.997
8	0.993	17	0.967		
9	0.998	18	0.999		

Source: Created by the authors.

Cronbach's alpha coefficient, item-total correlation, inter-item correlation, and the coefficient of the two Guttman halves were used to analyze the scale's reliability. In the Cronbach's alpha, dividing the scale into two parts with as many activities as possible, the values obtained were considered high. In the first part of the scale, with a total of 13 items, Cronbach's alpha value corresponded to 0.994; and in the second part, with 12 items, Cronbach's alpha value was 0.990.

The average corrected item-total correlation was 0.955, a value that we considered high. The average inter-item correlation was 0.304, classified as very acceptable since there was an expressive number of moderate or high correlations, showing a convergent validity.

Finally, the coefficient of the two halves of Guttman was 0.988, considered also a very high value. Thus, with all of these coefficients, we concluded that the Scale's consistency was very good.

Table 2 shows the Kaiser-Meyer-Olkin sampling adequacy measure, for each activity and the entire Scale (global value). The global value was 0.902, corresponding to a very high level. The values for each activity are all high or very high, showing well above 0.5. In 16 activities, the value was greater than 0.9, and in all other activities, it was greater than 0.7. Therefore, the factorability of the correlation matrix was very good, and appropriate to perform a factorial analysis with these data.

Table 2 – Kaiser-Meyer-Olkin sampling adequacy measure. Porto, Portugal – 2016. (N=3.451)

Activity	Kaiser-Meyer-Olkin	Activity	Kaiser-Meyer-Olkin	Activity	Kaiser-Meyer-Olkin
1	0.960	10	0.944	19	0.921
2	0.952	11	0.909	20	0.721
3	0.953	12	0.904	21	0.840
4	0.948	13	0.942	22	0.723
5	0.934	14	0.970	23	0.855
6	0.933	15	0.920	24	0.910
7	0.872	16	0.931	25	0.934
8	0.814	17	0.938		
9	0.841	18	0.883	Total	0.902

Source: Created by the authors.

Thus, factorial analysis was performed with factorial extraction by the principal component method, necessary to first determine the number of factors to retain. The rules commonly used to select the number of factors to retain in the analysis lead to different solutions. One of these rules consists of selecting factors whose associated eigenvalues are greater than one

(Kaiser's rule), with the sixth factor being the last to comply, so this rule would point to a solution with six factors, a satisfactory number, explaining 65.29% of the total variance, which is also very acceptable. A second rule is to reconstitute 80% of the total variance (Pearson's rule), which leads to a solution with 12 factors. The set of the first 12 factors explains 80.03%

of the total variance, which is highly high and, therefore, is not adequate. Finally, the third rule used is based on the scree plot, in which the number of factors is retained and the greatest break in the percentage of explained variance occurs (Cattell's rule), leading to retaining four factors, which explain only 56.7% of the total variance.

Considering the three possibilities, we adopted the six-factor solution since it explains an acceptable percentage of the total variance (65.29%) and is the best solution for the interpretation and meaning of the factors. Also, the consideration of a higher number of factors led to unnecessary factors or an almost zero increase in the explained variance. A lower number is not enough because it makes the representation of various activities of poor quality and reduces the percentage of explained variance.

Table 3 shows the results of the factorial analysis forced to six factors, followed by

varimax rotation and Kaiser normalization, indicating the factorial weights of the different activities in each factor, with the highest weight of each activity highlighted in bold. For easier reading and interpretation of the results, the activities are indicated in the order of the factor in which they saturate and not in the order of the original Scale. The factorial weights of the obtained solution generally present high, very high, or at least acceptable values (some cases only), concluding again that the obtained factorial solution has good quality. As for communalities, that is, the percentage of variance for each activity explained together with by the six factors extracted, we verified that it is mostly greater than 50% in all activities, with only five exceptions (and four of these are extremely close to 50%), being good in some activities and high in others, which means, once again, that the results of this factorial analysis are of good quality.

Table 3 – Perception Scale of Nursing Activities that Contribute to Quality of Care – factorial structure. Porto, Portugal – 2016. (N=3.451) (continued)

Activities	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Communalities
Patient satisfaction – Item 1	0.640	0.244	0.116	0.080	0.063	-0.014	0.494
Patient satisfaction – Item 2	0.651	0.168	0.142	0.019	0.038	0.109	0.486
Patient satisfaction – Item 3	0.729	0.066	0.169	0.190	-0.029	0.113	0.614
Health promotion – Item 1	0.462	-0.003	0.043	0.323	0.347	0.104	0.451
Health promotion – Item 2	0.636	0.015	0.262	0.312	0.077	0.103	0.587
Health promotion – Item 3	0.646	0.031	0.269	0.308	0.075	0.170	0.620
Responsibility and rigor – Item 1	-0.001	0.791	-0.028	0.036	0.227	-0.016	0.691
Responsibility and rigor – Item 2	0.335	0.685	0.225	0.139	-0.067	0.214	0.714
Responsibility and rigor – Item 3	-0.035	0.775	-0.012	0.020	0.284	0.031	0.686
Responsibility and rigor – Item 4	0.259	0.742	0.196	0.133	0.026	0.229	0.680
Responsibility and rigor – Item 5	0.162	0.511	0.224	0.219	0.019	0.085	0.760
Responsibility and rigor – Item 6	0.387	0.417	0.287	0.210	-0.124	0.350	0.840
Well-being and self-care – Item 1	0.217	0.142	0.690	0.171	0.319	0.079	0.694
Well-being and self-care – Item 2	0.153	0.094	0.770	0.178	0.315	0.062	0.480
Well-being and self-care – Item 3	0.325	0.125	0.799	0.240	0.096	0.115	0.753
Well-being and self-care – Item 4	0.282	0.154	0.714	0.260	0.028	0.112	0.773
Functional re-adaptation – Item 1	0.114	0.206	0.261	0.572	0.164	0.045	0.745
Functional re-adaptation – Item 2	0.130	0.090	0.080	0.831	0.172	0.036	0.769
Functional re-adaptation – Item 3	0.336	0.118	0.283	0.734	0.017	0.163	0.710
Functional re-adaptation – Item 4	0.344	0.123	0.287	0.710	0.020	0.156	0.680
Prevention of complications – Item 1	0.067	0.121	0.088	0.086	0.808	0.065	0.702
Prevention of complications – Item 2	0.030	0.117	0.150	0.087	0.817	0.043	0.685

Table 3 – Perception Scale of Nursing Activities that Contribute to Quality of Care – factorial structure. Porto, Portugal – 2016. (N=3.451) (conclusion)

Activities	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Communalities
Prevention of complications – Item 3	0.048	0.130	0.204	0.091	0.785	-0.003	0.728
Nursing care organization – Item 1	0.075	0.138	0.045	0.083	0.150	0.844	0.393
Nursing care organization – Item 2	0.258	0.161	0.177	0.149	-0.016	0.751	0.588

Source: Created by the authors.

In the assessment of the quality of the proposed model adjustment, the Comparative Fit Index (CFI) was 0.845, indicating an adjustment that can be considered almost acceptable. Also, the Goodness of Fit Index (GFI) and the Adjusted Goodness of Fit Index (AGFI) were 0.842 and 0.803, respectively, with acceptable values, although they are not yet good. The Root Mean Square Residual (RMR) was 0.021, a value estimated as low, considering the scale of the response of the activities, which is favorable. The Root Mean Square Error of Approximation (RMSEA) was 0.087, a value that is also reasonable, considering that the adjustment is acceptable below 0.1 and good below 0.06. Finally, for comparison with other models, the Modified Expected Cross-Validation Index (MECVI) was also confirmed, which assumed the value 2.083.

Therefore, the quality of the adjustment is reasonable, close to being good.

Subsequently, we assessed the reliability of the new structure of the Scale using the internal consistency, Cronbach's alpha coefficient, and the composite reliability for the entire Scale and the six dimensions now identified.

The Cronbach's alpha value for the entire Scale was 0.917, which is very high and shows a very strong internal consistency of the Scale. Also, the consistency of all dimensions was high since the respective Cronbach's alpha values were greater than 0.8, except for the sixth dimension, where the value was acceptable. Regarding composite reliability, we found that it was high for all dimensions, except for the sixth that it was still acceptable (Table 4). In conclusion, both the global scale and the dimensions identified reveal good reliability and internal consistency.

Table 4 – Perception Scale of Nursing Activities that Contribute to Quality of Care – reliability of the new dimension structure. Porto, Portugal – 2016. (N=3.451)

Dimensions	Cronbach Alpha	Composite Reliability
1 – Patient satisfaction and health promotion	0.801	0.803
2 – Responsibility and rigor	0.809	0.830
3 – Well-being and self-care	0.876	0.880
4 – Functional re-adaptation	0.837	0.841
5 – Prevention of complications	0.820	0.822
6 – Nursing care organization	0.650	0.672

Source: Created by the authors.

To assess the factorial validity, Table 5 shows the standardized regression weights for each activity in the different dimensions and the square of these weights, designated by individual

reliability. All activities showed individual reliability greater than 0.25 and then appropriate, much higher in most of them, and affirming that all dimensions have factorial validity.

Table 5 – Perception Scale of Nursing Activities that Contribute to Quality of Care – regression weights standardized in the dimensions. Porto, Portugal – 2016. (N=3.451)

Dimensions and activities	Regression weight	Individual reliability
Dimension 1: Patient satisfaction and health promotion.		
Patient satisfaction – Item 1	0.521	0.271
Patient satisfaction – Item 2	0.520	0.270
Patient satisfaction – Item 3	0.659	0.434
Health promotion – Item 1	0.531	0.282
Health promotion – Item 2	0.765	0.585
Health promotion – Item 3	0.795	0.632
Dimension 2: Responsibility and rigor		
Responsibility and rigor – Item 1	0.562	0.316
Responsibility and rigor – Item 2	0.800	0.640
Responsibility and rigor – Item 3	0.578	0.334
Responsibility and rigor – Item 4	0.848	0.719
Responsibility and rigor – Item 5	0.533	0.284
Responsibility and rigor – Item 6	0.670	0.449
Dimension 3: Well-being and self-care		
Well-being and self-care – Item 1	0.749	0.561
Well-being and self-care – Item 2	0.793	0.629
Well-being and self-care – Item 3	0.900	0.810
Well-being and self-care – Item 4	0.771	0.594
Dimension 4: Functional re-adaptation		
Functional re-adaptation – Item 1	0.563	0.317
Functional re-adaptation – Item 2	0.685	0.469
Functional re-adaptation – Item 3	0.880	0.774
Functional re-adaptation – Item 4	0.862	0.743
Dimension 5: Prevention of complications		
Prevention of complications – Item 1	0.700	0.490
Prevention of complications – Item 2	0.828	0.686
Prevention of complications – Item 3	0.805	0.648
Dimension 6: Nursing care organization		
Nursing care organization – Item 1	0.589	0.347
Nursing care organization – Item 2	0.824	0.679

Source: Created by the authors.

We used the Average Extracted Variance (AEV) to measure the convergent validity of each dimension. In the dimension of patient satisfaction and health promotion, AEV was 0.413; in responsibility and rigor was 0.457; in well-being and self-care was 0.649; in functional re-adaptation was 0.576; in the prevention of complications was 0.609, and in the nursing care organization was 0.531. Thus, the last four dimensions have an AEV greater than 0.5, an indicator of adequate convergent validity. On the contrary, the first two have an AEV of less than 0.5, but very close to this value, which indicates a convergent validity still acceptable.

Discussion

The EPAECQC was built to address a weakness related to the lack of instruments that would assess nurses' perception of the quality of nursing care, concerning the quality standards legally defined in Portugal⁽¹⁵⁾. The specificity of the Scale was used in the national context^(12,19) and attracted the attention of other researchers, interested in its validation in other contexts⁽¹¹⁾.

Although the instrument has the quality standards of nursing care as a theoretical reference⁽⁶⁾, studies to validate its factorial structure, and its internal consistency have become urgent.

The fact that this study was carried out in 36 hospital institutions in 5 regions of mainland Portugal is an excellent opportunity to strengthen psychometric analyzes and improve the scale's structure. In this sense, in addition to analyzing the correlations, the internal consistency and the quality of the adjustment obtained, we sought to compare these results with those of the study on the validation of the original Scale⁽¹⁵⁾. This is also important for identifying the need for adjustments to instruments of this nature, according to the changes that may emerge in nursing praxis.

Regarding the analysis of the scale's factorial structure, the first factor presented high factorial weights of the activities included in the dimensions of patient satisfaction and health promotion, so it was decided to rename this factor as the dimension of patient satisfaction and health promotion. Although patient satisfaction and health promotion are different descriptive statements⁽⁶⁾, these two types of activities saturate the same factor, as this means that they are associated. Thus, we concluded that the activities of nurses that lead to health promotion are closely linked to those that provide patient satisfaction.

These findings showed important aspects in the context of nurses' practices since they support activities to be valued in healthcare and nursing care and management. It is even more relevant when other studies highlight the measuring guidelines for services based on the reasons for patient satisfaction and their needs⁽²⁰⁻²¹⁾.

In this context, the first factor becomes part of the activities for the patients' wishes, values, beliefs and capacities, empathy in the interactions that are established with patients, and the involvement of significant cohabitants in the care process ("patient satisfaction" dimension on the original scale). It also includes activities related to the identification of health situations and the resources of patients/users, the optimization of hospitalization, to promote healthy lifestyles and the provision of information that generates cognitive learning and new skills by patients ("promotion health" dimension on the original scale)⁽¹⁵⁾.

Following previous investigations, although activities integrated into the health promotion dimension are more often carried out by nurses in Primary Health Care than by nurses in the hospital context⁽²²⁾, the findings of this factorial analysis require these professionals to reflect that could culminate in a paradigm shift.

In effect, if patient satisfaction can be related to activities integrated into the health promotion dimension, it is logical to continue, in the hospital context, not to prioritize these interventions? Also, the fact that they are essential interventions in the autonomous domain of the profession, makes it even more evident the need for nurses to act to train patients to make them active agents in their health/disease process, providing them with the professional help they need and, at the same time, making them responsible for their health project and the adoption of healthy lifestyles⁽²²⁾. Consequently, this paradigm shift may have repercussions not only in patient satisfaction but also in the profession's visibility, which signals their social position⁽²⁰⁾.

The second factor had high factorial weights of the activities included in the responsibility and rigor, maintaining the designation of the respective dimension in the original instrument. Similarly, the remaining dimensions (factors) presented high factorial weights only in the activities integrated into them, continuing with the designation of the original Scale: well-being and self-care, functional re-adaptation, prevention of complications, and nursing care organization. This perfect correspondence between the factors and the types of activities proves that the Scale is very well constructed with no overlap or repetition of activities in different factors.

Regarding internal consistency, in the original version of the Scale, Cronbach's alpha was 0.940 for the total scale. In the seventh dimensions, it reached reasonable or good values: in the patient satisfaction dimension was 0.744; in health promotion was 0.740; in the prevention of complications was 0.779; in well-being and self-care was 0.862; in functional re-adaptation was 0.830; in the organization of nursing care

was 0.684, and in responsibility and rigor was 0.855⁽¹⁵⁾. With the new factorial structure, although Cronbach's alpha value for the total scale is slightly lower (0.917) in four dimensions, the value was higher: in the patient satisfaction and health promotion (0.801); well-being and self-care (0.876); in functional re-adaptation (0.837); and in the prevention of complications (0.820). Although there is no consensus among several authors, the most recommended Cronbach's alpha values are between 0.80 and 0.90^(18,23), which is in line with the values obtained in five of the dimensions of the new factorial structure.

In the dimension of nursing care organization, Cronbach's alpha had the lowest value (0.650), as in the original version of the Scale (0.684)⁽¹⁵⁾. In a study carried out in Turkey aimed at validating the Perception Scale of Nursing Activities that Contribute to the Quality of Care⁽¹¹⁾, Cronbach's alpha regarding the dimension of nursing care organization was also the lowest compared to all other dimensions (0.716). Such a finding may be because this dimension includes only two activities. After all, when a dimension includes few items, Cronbach's alpha value is often low, which does not necessarily mean low consistency^(18,23). Even so, both in the original version and in the current version of the Scale, Cronbach's alpha value is acceptable⁽²³⁾.

Considering that the composite reliability equal to or greater than 0.7 is an indicator of appropriate construct reliability⁽¹⁷⁾, the composite reliability of the model obtained is very high for all dimensions, except in the nursing care organization that it was acceptable.

As for the confirmatory analysis of the new structure of the Scale, in addition to the factorial weights having high, very high, or, at least, acceptable values, the quality of the adjustment was reasonable, close to being considered good. Given that the adjustment is acceptable for a CFI greater than or equal to 0.9, it is important to highlight that the coefficient obtained is very close to this value (0.845)⁽¹⁶⁾. Considering that GFI and AGFI values greater than 0.85 and 0.8 respectively indicate a good adjustment, the coefficient obtained in GFI was 0.842, close to 0.85, being AGFI 0.803 already higher than the

reference value. The values obtained through other adequacy tests were also favorable (RMR = 0.021; RMSEA = 0.087)⁽¹⁶⁻¹⁷⁾.

Finally, considering that individual reliability is appropriate for a value equal to or greater than 0.25, all activities showed reliability higher than this value, being much higher in most of them. Therefore, the six dimensions proposed presented factorial validity⁽¹⁷⁾.

The new factorial model showed good quality, reliability, and validity, so we concluded that it is appropriate, showing potential for acceptance. Despite the contribution of this study to improve the performance of the EPAECQC, we assumed that the sampling technique was a non-probabilistic convenience. Although nurses from different contexts are part of the sample, the profile of those who accepted and decided to participate may have determined the new factorial structure, suggesting the development of studies that use the version of the Scale that results from this factorial analysis.

Furthermore, the adjustment indicated in the composition of the Scale, in addition to being a stimulus for nursing professionals to act in line with all the descriptive statements, reinforces, once again, the need for health promotion practices to be properly incorporated into the exercise nurses' professional in the hospital context⁽¹⁹⁾ because they may be determinants for patients satisfaction and promote the visibility of the profession.

Conclusion

Following the factorial analysis carried out and the adjustment measures implemented, a change in the number of dimensions of the EPAECQC emerges. While the original Scale includes seven dimensions, the proposal of this study has six dimensions, suggesting the possibility of grouping the dimensions "patient satisfaction" and "health promotion" in a single factor. In the other dimensions, the adjusted correspondence between them and the respective activities shows that the instrument is properly constructed. In practice, the fact that the activities inherent to "patient satisfaction" and "health promotion"

integrate the same dimension requires a paradigm shift in the hospital context, so that it is fundamentally centered on the autonomous domain of the profession.

The results of the confirmatory factorial analysis justify the acceptance of the new model, and it is important to consider the suggested readjustment in the number of dimensions. Therefore, we suggest to carry out investigations using the Scale, with the proposed factorial model, which will allow comparing the findings of the studies conducted using the original version.

Collaborations:

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References

- Feiten AM, Coelho TR. Quality management in service organizations: barriers and success factors. *Rev Adm FACES Journal*. 2019;18(3):56-71. DOI: <https://doi.org/10.21714/1984-6975FACES2019V18N3ART6619>
- Galan K, Kunaviktikul W, Akkadechanunt T, Wichaikhum OA, Turale S. Factors predicting quality of nursing care among nurses in tertiary care hospitals in Mongolia. *Int Nurs Rev*. 2019;66(2):176-82. DOI: <https://doi.org/10.1111/inr.12502>
- Fronteira I, Jesus EH, Dussault G. Nursing in Portugal in the National Health Service at 40. *Ciênc saúde coletiva*. 2020;25(1):273-82. DOI: <http://dx.doi.org/10.1590/1413-81232020251.28482019>
- Caldana G, Gabriel CS, Rocha FLR, Bernardes A, Françolin L, Costa DB. Evaluating the quality of nursing care at a private hospital. *Rev Eletr Enf*. 2013;15(4):915-22. DOI: <https://doi.org/10.5216/ree.v15i4.19655>
- Cantante AP, Fernandes HI, Teixeira MJ, Frota MA, Rolim KM, Albuquerque FH. Health Systems and Nursing Skills in Portugal. *Ciênc saúde coletiva*. 2019;25(1):261-72. DOI: <https://doi.org/10.1590/1413-81232020251.27682019>
- Ordem dos Enfermeiros. Padrões de qualidade dos cuidados de enfermagem, enquadramento conceptual. Enunciados descritivos [Internet]. Lisboa: Ordem dos Enfermeiros; 2012 [cited 2020 Mar 13]. Available from: <https://www.ordemenfermeiros.pt/media/8903/divulgar-padroes-de-qualidade-dos-cuidados.pdf>
- Organisation for Economic Co-operation and Development. Caring for quality in health: Lessons learnt from 15 reviews of health care quality [Internet]. Paris: OECD; 2017 [cited 2020 Mar 8]. Available from: <http://www.oecd.org/health/caring-for-quality-in-health-9789264267787-en.htm>
- Dias CF, Lima SB, Fernandes GA. Scientific production on the instruments of assessment of the quality of nursing care: Bibliometric Study. *Saúde (Santa Maria)*. 2018;44(2):1-12. DOI: <http://dx.doi.org/10.5902/2236583433477>
- Dorigan GH, Guirardello EB. Translation and cross-cultural adaptation of the Newcastle satisfaction with nursing scales into the Brazilian culture. *Rev Esc Enferm USP*. 2013;47(3):562-68. DOI: [10.1590/S0080-623420130000300006](https://doi.org/10.1590/S0080-623420130000300006)
- Dempsey C, Assi MJ. The impact of nurse engagement on quality, safety, and the experience of care: what nurse leaders should know. *Nurs Adm Quarterly*. 2018;42(3):278-83. DOI: <http://dx.doi.org/10.1097/NAQ.0000000000000305>
- Yilmaz AT, Demirsoy N, Martins MM. Validity and Reliability Testing of the Turkish Version of the “Scale of Perception of Nursing Activities That Contribute to Nursing Care Quality (EPAECQC)”. *Int J Caring Sci [Internet]*. 2018 [cited 2020 Mar 3];11(3):1340-51. Available from: <https://internationaljournalofcaringsciences.org/docs/2.%20Demirsoy.pdf>
- Ribeiro OM, Martins MM, Tronchin DM. Nursing care quality: a study carried out in Portuguese hospitals. *Rev Enf Ref*. 2017;4(14):89-100. DOI: <http://dx.doi.org/10.12707/RIV16086>

13. Ryan C, Powlesland J, Phillips C, Raszewski R, Johnson A, Banks-Enorensen K, et al. Nurses' Perceptions of Quality Care. *J Nurs Care Qual.* 2016;32(2):180-5. DOI: <http://dx.doi.org/10.1097/NCQ.0000000000000211>
14. Caldana G, Hirotani LC, Gabriel CS, Silva LGC, Bernardes A. Outcome assessment tools for quality improvement programs: integrative review. *Rev baiana enferm.* 2018;32:e22292. DOI: <http://dx.doi.org/10.18471/rbe.v32.22292>
15. Martins MM, Gonçalves MN, Ribeiro OM, Tronchin DM. Quality of nursing care: instrument development and validation. *Rev Bras Enferm.* 2016;69(5):864-70. DOI: <http://dx.doi.org/10.1590/0034-7167-2015-0151>
16. Maroco J. *Análise Estatística com o SPSS Statistics.* Pero Pinheiro: Report Number; 2018.
17. Maroco J. *Análise de Equações Estruturais – Fundamentos Teóricos, Software e Aplicações.* 2nd ed. Pero Pinheiro: Report Number; 2014.
18. Cunha CM, Almeida Neto OP, Stackfleth R. Main psychometric evaluation methods of measuring instruments reliability. *Rev Aten Saúde.* 2016;14(47):75-83. DOI: <https://doi.org/10.13037/ras.vol14n47.3391>
19. Ribeiro OMPL, Martins MMFPS, Sousa PAF, Trindade LL, Forte ECN, Silva JMAV. Quality of nursing care: contributions from expert nurses in medical-surgical nursing. *Rev Rene.* 2020;21:e43167. DOI: <https://doi.org/10.15253/2175-6783.20202143167>
20. Esperidião MA, Viera-da-Silva LM. The satisfaction of the user in health services evaluation: essay on the imposition of problems. *Saúde debate.* 2018;42(spe2):331-40. DOI: <https://doi.org/10.1590/0103-11042018s223>
21. Protasio APL, Gomes LB, Machado LS, Valença AMG. User satisfaction with primary health care by region in Brazil: 1st cycle of external evaluation from PMAQ-AB. *Ciênc saúde coletiva.* 2017;22(6):1829-44. DOI: <https://doi.org/10.1590/1413-81232017226.26472015>
22. Freire RM, Lumini MJ, Martins MM, Martins T, Peres HHC. Taking a look to promoting health and complications' prevention: differences by context. *Rev Latino-Am Enfermagem.* 2016;24:e2749. DOI: <http://dx.doi.org/10.1590/1518-8345.0860.2749>
23. Souza AC, Alexandre NM, Guirardello ED. Psychometric properties in instruments evaluation of reliability and validity. *Epidemiol Serv Saúde.* 2017;26(3):649-59. DOI: <https://doi.org/10.5123/S1679-49742017000300022>

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