

Psychometric Evaluation of the Hospital Ethical Climate Survey—Brazilian Version in the Context of Primary Health Care

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Received: 30/03/2025

Sent to peers: 30/05/2025

Approved by peers: 10/12/2025

Accepted: 11/12/2025

DOI: 10.5294/aqui.2026.26.1.8

Para citar este artículo / To reference this article / Para citar este artigo

Lanes TC, Martins MEP, Dalmolin GL, Toledo LAP, Villagran CA. Psychometric Evaluation of the Hospital Ethical Climate Survey—Brazilian Version in the Context of Primary Health Care. *Aquichan*. 2026;26(1):e2618. DOI: <https://doi.org/10.5294/aqui.2026.26.1.8>

Theme: Technologies for healthcare

Contribution to the field: The present study contributes significantly to the literature by rendering the Hospital Ethical Climate Survey instrument applicable to nurses and nursing technicians in the context of primary health care. It has the potential to contribute significantly to the advancement of research and practice in the field of healthcare and nursing ethics, promoting healthier work environments and quality care for patients.

Abstract

Introduction: The ethical climate in primary health care (PHC) is essential to ensure a healthy work environment, respectful professional relationships, and the quality and humanization of care provided to users of the healthcare system. **Objective:** To evaluate the psychometric evidence of the Hospital Ethical Climate Survey—Brazilian version, for the PHC context. **Materials and Methods:** Methodological study that followed five stages: Adaptation of the instrument to the context; pilot testing of the adapted instrument; content validity; construct validity; and reliability. Before exploratory factor analysis, data adequacy was verified using the Kaiser-Meyer-Olkin (KMO) test, which ranges from 0 to 1, and Bartlett's sphericity test, with a p-value < 0.001. Exploratory factor analysis considered communality, specificity, and factor loadings. The confirmatory factor analysis was based on the Comparative Fit Index (CFI) and the Tucker-Lewis Index (TLI), both greater than 0.95; the Standardized Root Mean Square Residual (SRMR), with values ≤ 0.08 ; and the Root Mean Square Error of Approximation (RMSEA), with values < 0.08. Reliability was assessed using Cronbach's alpha, considered satisfactory when greater than 0.70, and test-retest reliability, using the weighted quadratic Kappa coefficient, whose values are considered excellent when ≥ 0.75 . Descriptive statistics were based on the mean and standard deviation. The analyses were conducted using the R program. **Results:** In the exploratory factor analysis, all factor loadings were greater than 0.40, ranging from 0.40 to 0.82. Confirmatory factor analysis demonstrated the adequacy of the model with five factors and 26 validated items, presenting a CFI of 0.988, TLI of 0.986, RMSEA of 0.084, and SRMR of 0.084, with a 90 % confidence interval (0.084-0.988) and a significant p-value ≤ 0.05 . The internal reliability of the overall instrument was 0.94. The weighted quadratic Kappa test-retest ranged from 0.18 to 0.76, and the intraclass correlation coefficient ranged from 0.26 to 0.80. **Conclusion:** The Brazilian version of the instrument, adapted for PHC, was considered valid and reliable in this sample. The instrument contributes to the advancement of research and practice in the field of ethics in healthcare and nursing in primary care, an area where studies on ethics remain scarce, to promote a healthier and more qualified work environment.

Keywords (Source: DeCS)

Organizational climate; nursing ethics; nursing team; validation studies; Primary Health Care.

4 Evaluación psicométrica del Hospital Ethical Climate Survey-versión brasileña en el contexto de la Atención Primaria de Salud

Resumen

Introducción: El clima ético en la Atención Primaria de Salud (APS) es fundamental para garantizar un ambiente de trabajo saludable, relaciones profesionales respetuosas y la calidad y humanización del cuidado brindado a los usuarios del sistema de salud. **Objetivo:** Evaluar las evidencias psicométricas del Hospital Ethical Climate Survey-versión brasileña para el contexto de la APS. **Materiales y método:** Estudio metodológico que siguió cinco etapas: adaptación del instrumento al contexto; prueba piloto del instrumento adaptado; validez de contenido; validez de constructo; y confiabilidad. Antes del análisis factorial exploratorio, se verificó la adecuación de los datos mediante el índice Kaiser-Meyer-Olkin (KMO), que varía de 0 a 1, y la prueba de esfericidad de Bartlett, con valor de $p < 0,001$. El análisis factorial exploratorio consideró la comunalidad, la especificidad y las cargas factoriales. El análisis factorial confirmatorio se basó en los índices Comparative Fit Index (CFI) y Tucker-Lewis Index (TLI), ambos superiores a 0,95; en el Standardized Root Mean Square Residual (SRMR), con valores $\leq 0,08$; y en el Root Mean Square Error of Approximation (RMSEA), con valores $< 0,08$. La confiabilidad se evaluó mediante el alfa de Cronbach, considerado satisfactorio cuando fue superior a 0,70, y mediante la confiabilidad test-retest, utilizando el coeficiente Kappa ponderado cuadrático, cuyos valores se consideran excelentes cuando son $\geq 0,75$. La estadística descriptiva se realizó con base en la media y la desviación estándar. Los análisis se llevaron a cabo en el programa R. **Resultados:** En el análisis factorial exploratorio, todas las cargas factoriales fueron superiores a 0,40, con valores entre 0,40 y 0,82. El análisis factorial confirmatorio demostró la adecuación del modelo con cinco factores y 26 ítems validados, presentando CFI de 0,988, TLI de 0,986, RMSEA de 0,084 y SRMR de 0,084, con un intervalo de confianza del 90 % (0,084-0,988) y valor de $p \leq 0,05$. La confiabilidad interna del instrumento general fue de 0,94. El test-retest del Kappa ponderado cuadrático varió de 0,18 a 0,76, y el coeficiente de correlación intraclase varió de 0,26 a 0,80. **Conclusión:** La versión brasileña del instrumento, adaptada al contexto de la APS, se consideró válida y confiable en esta muestra. El instrumento contribuye al avance de la investigación y de la práctica en el campo de la ética en salud y enfermería en la atención primaria, un ámbito aún marcado por la escasez de estudios sobre ética, favoreciendo un ambiente de trabajo más saludable y cualificado.

Palabras clave (Fuente DeCS)

Cultura organizacional; ética en enfermería; equipo de enfermería; estudio de validación; Atención Primaria de Salud.

Avaliação psicométrica do Hospital Ethical Climate Survey-versão brasileira no contexto da Atenção Primária à Saúde

Resumo

Introdução: O clima ético na Atenção Primária à Saúde (APS) é fundamental para assegurar um ambiente de trabalho saudável, relações profissionais respeitadas e a qualidade e a humanização do cuidado prestado aos usuários do sistema de saúde. **Objetivo:** avaliar as evidências psicométricas do Hospital Ethical Climate Survey-versão brasileira para o contexto da APS. **Materiais e método:** estudo metodológico que seguiu cinco etapas: adaptação do instrumento ao contexto; teste-piloto do instrumento adaptado; validade de conteúdo; validade de constructo; e confiabilidade. Antes da análise fatorial exploratória, foi verificada a adequação dos dados, por meio do Kaiser-Meyer-Olkin (KMO), que varia de 0 a 1, e do teste de esfericidade de Bartlett, com valor de $p < 0,001$. A análise fatorial exploratória considerou a comunalidade, a especificidade e as cargas fatoriais. A análise fatorial confirmatória baseou-se nos índices Comparative Fit Index (CFI) e Tucker-Lewis Index (TLI), ambos superiores a 0,95; no Standardized Root Mean Square Residual (SRMR), com valores $\leq 0,08$; e no Root Mean Square Error of Approximation (RMSEA), com valores $< 0,08$. A confiabilidade foi avaliada por meio do alfa de Cronbach, considerado satisfatório quando superior a 0,70, e pela confiabilidade do teste-reteste, utilizando-se o coeficiente Kappa ponderado quadrático, cujos valores são considerados excelentes quando $\geq 0,75$. A estatística descritiva foi realizada com base na média e no desvio-padrão. As análises foram conduzidas no programa R. **Resultados:** Na análise fatorial exploratória, todas as cargas fatoriais foram superiores a 0,40, variando de 0,40 a 0,82. A análise fatorial confirmatória demonstrou a adequação do modelo com cinco fatores e 26 itens validados, apresentando CFI de 0,988, TLI de 0,986, RMSEA de 0,084 e SRMR de 0,084, com intervalo de confiança de 90 % (0,084-0,988) e valor de p significativo $\leq 0,05$. A confiabilidade interna do instrumento geral foi de 0,94. O teste-reteste de Kappa ponderado quadrático variou de 0,18 a 0,76 e o coeficiente de correlação intraclass variou de 0,26 a 0,80. **Conclusão:** A versão brasileira do instrumento, adaptada para a APS, foi considerada válida e confiável nesta amostra. O instrumento contribui para o avanço da pesquisa e da prática no campo da ética em saúde e enfermagem na atenção primária, área ainda marcada pela escassez de estudos sobre ética, favorecendo um ambiente de trabalho mais saudável e qualificado.

Palavras-chave (Fonte DeCS)

Clima organizacional; ética em enfermagem; equipe de enfermagem; estudos de validação; Atenção Primária à Saúde.

Introduction

The ethical climate refers to the moral scope of work, which encompasses healthcare professionals' shared perceptions of ethical issues and their relationship with moral behavior. Organizational behavior fosters the ethical climate that tends to be positive when the environment favors the exercise of autonomy and the inclusion of all healthcare professionals involved in care, encouraging them to participate in decision-making and share their opinions (1-3).

A positive ethical climate is essential for quality care; therefore, providing the means for the team to feel satisfied with their work is paramount to care. However, professionals face barriers when performing their tasks due to an unfavorable environment and exhausting work, leading to burnout (1). A positive ethical climate strengthens mutual trust between healthcare professionals and patients, promoting fluid communication. This, in turn, grants nurses the autonomy to defend their patients (4).

A negative ethical climate resulting from unethical practices and a lack of transparency can generate mistrust and dissatisfaction, compromising the quality of care and the integrity of the healthcare system (1). Promoting a positive ethical environment is essential to ensure trust, respect, and quality in healthcare, both in the relationship between professionals and patients, and in the overall functioning of the system (5, 6). However, in an environment with a negative ethical climate, there are negative consequences for professionals, institutions, families, and patients. Job satisfaction has been shown to be a variable with a significant impact, as professionals tend to perceive an ethical climate as positive when they are satisfied with their work. Thus, a favorable environment contributes to adequate professional care (1-6).

This theme has been examined using various instruments in hospital settings. One such instrument is the Hospital Ethical Climate Survey (HECS), initially developed to analyze ethical interactions between nurses, patients, managers, and medical doctors who share the same workplace to assess these professionals' perceptions of the ethical climate (3, 6).

The literature shows an association between the ethical climate and issues related to occupational health, such as ethical dilemmas, job satisfaction, and turnover. Furthermore, the assessment of the ethical climate by HECS revealed a moderately positive rating in the international scenario, highlighting higher scores for the factors 'peers,' 'patients,' and 'management' as positive, and lower scores for the factors 'medical doctors' and 'hospital' as negative (3, 6, 7).

The HECS-Brazilian version (HECS-BV) is an adaptation of the original instrument for the Brazilian hospital context, which has proven to be a valid and reliable tool for assessing the ethical climate among nurses in Brazil. In addition, a positive correlation ranging

from moderate to strong was found between the different factors of the HECS-BV and the total score, indicating a consistent relationship between them (3).

The cross-cultural adaptation of instruments in the field of ethics in primary health care (PHC) is essential for the application and diagnosis of the work environment, which implies evaluation based on the values of different groups, ensuring that care provision is homogeneous. The evaluation of the ethical climate using an adapted instrument contributes to the advancement of public health (8).

The importance of improving the organizational ethical climate, both in theory and in the design of instruments, stands out (9). To date, there are still no studies using the HECS to assess the ethical climate in PHC, highlighting a lack of data on this topic. The HECS has been used in hospitals, which makes its improvement relevant for PHC (10, 11).

PHC involves a set of conditions and practices that directly affect how healthcare professionals work at the primary level of healthcare. This context covers not only the physical and organizational structure of healthcare units, but also work conditions, public policies, team interaction, and the needs of the population served (12). For this reason, it is important to assess the ethical climate in these services, which refers to the atmosphere and practices involving behaviors, values, and ethical principles within the context of PHC (13).

This concept encompasses not only the quality of care provided, but also the interpersonal and institutional relationships that directly influence the health of populations and professionals working at this level of care (12). The importance of adapting a valid and reliable instrument for assessing the ethical climate in PHC organizations is clear. Thus, the objective was to evaluate the psychometric evidence of the HECS-BV for the PHC context.

Materials and Methods

This methodological study aims to comprehensively validate instruments, ensuring more reliable and accurate results in relation to the original context and language (14). The HECS instrument was cross-culturally adapted and validated for the Brazilian version (HECS-BV) in 2022, presenting a valid internal reliability of 0.93 for the general instrument (3).

Data Collection Instrument

The research questionnaire consisted of sociodemographic and occupational characteristics (sex, age, professional category, and length of service). The HECS-BV consists of 26 items addressing

organizational practices, measured on a five-point Likert scale: 1 – almost never true; 2 – rarely true; 3 – sometimes true; 4 – often true; and 5 – almost always true (3).

The 26 items are organized into five factors: Peers (4 items: 1, 10, 18, 23); patients (4 items: 2, 6, 11, and 19); managers (6 items: 3, 7, 12, 15, 20, and 24); hospital (6 items: 4, 8, 13, 16, 21, and 25); and medical doctors (6 items: 5, 9, 14, 17, 22, and 26). The factors cannot be considered independent due to their interrelated profile. The ethical climate is classified as follows: ≥ 3.5 positive ethical climate and < 3.5 negative ethical climate, analyzed using the mean and standard deviation (3).

The process was conducted based on the methodological framework (14), following these five steps:

1. *Adaptation of the instrument to the PHC context.* The HECS instrument was developed in the United States of America for nurses working in hospital units and later adapted and validated for the Brazilian context in the same setting (3). In other countries, such as Poland (15) and Iran (16), the instrument showed adequate internal consistency, with coefficients of 0.93 (3, 15) and 0.86 (16), respectively. However, the HECS has not yet been adapted for the PHC setting, since its implementation at this level of care required minor adjustments to the content of the items. Before starting this process, authorization was requested from the researchers who validated this instrument for Brazil for its use and adaptation. The adaptation was conducted by two researchers with expertise in the fields of ethics, ethical climate, and public health, which encompasses PHC services.

Content Validity

To achieve a homogeneous Delphi, seven specialists in the field of ethics working in PHC in various regions of Brazil evaluated the clarity, relevance, consistency, and pertinence of the HECS-BV instrument. The specialists were selected using the Lattes Curriculum and invited via email, using the following selection criteria (17), as shown in Table 1.

Table 1. Scoring System for Selecting Specialists. Santa Maria, Rio Grande do Sul, Brazil, 2024.

Selection criteria	Score
Graduate in the healthcare field with at least two years of experience.	2
Work in teaching or service in PHC with at least two years of experience in health ethics.	3
Master's degree with a dissertation developed in the field of ethics in PHC.	2
Doctorate with a thesis developed in the field of ethics in PHC.	3
Research published in the field of ethics in PHC.	2
Participation in a research group in the field of ethics and/or PHC.	1

Source: Adapted from Fehring (18).

To participate, each specialist had to achieve a minimum score of five points, according to their field/specialty. Each member rated the items according to the following scale: 1 — not relevant; 2 — unable to assess the relevance; 3 — relevant, but needs minor changes; 4 — highly relevant and succinct; and according to the dichotomous clarity scale: clear or unclear.

Items rated as unclear by at least 80 % of participants were re-evaluated. The content validity index (CVI) was then calculated using the following formula: $CVI = \text{No. of responses } 3 \text{ or } 4 / \text{Total no. of responses}$. Satisfactory agreement must be at least 0.80 or above 0.90 (14).

Subsequently, the pre-final adapted version of the HECS-BV was generated. This step was performed using Google Forms®, containing the adapted HECS-BV and sociodemographic and occupational data.

HECS-BV moved on to the pilot test, which was conducted in person at three Family Clinics that are part of the project sample, with an average of 30 nursing professionals. Being a nurse or nursing technician working in PHC was adopted as an inclusion criterion. Professionals on leave for any reason during the data collection period were excluded. The selection was conducted via convenience sampling during January 2024.

Each participant was asked to rate the items on the instruments using a dichotomous scale (clear or unclear). They had the opportunity to suggest new wording and mention any questions they had. Items rated as unclear by at least 80 % of participants were reevaluated. The statistics used in the analysis were descriptive, absolute frequency (n), and relative frequency (%) in Microsoft Excel. The main author of the research was the only one to collect the data, due to her involvement in the instrument adaptation process, which enabled her to more easily understand the challenges and suggestions addressed in this step.

Construct Validity

Through exploratory factor analysis, using the main component extraction technique, the representative dimensions of the HECS-BV construct were verified. For the analysis, Varimax orthogonal rotation with Kaiser normalization was used, after sphericity and sample adequacy analysis using the Kaiser-Meyer-Olkin (KMO) and Bartlett measures. The sample consisted of 112 participants with the following inclusion criteria: nursing technicians or nurses who had been working in PHC for at least six months. Those who were absent from work for any reason during data collection were excluded.

Factor analysis is a psychometric technique used to assess the construct validity of an instrument. Before performing it, the adequacy of the sample was verified using the KMO test, whose

value ranges from 0 to 1, with values closer to 1 being more suitable for analysis. The KMO classification values are < 0.5 (unacceptable); 0.5-0.6 (poor); 0.6-0.7 (fair); 0.7-0.8 (average); 0.8-0.9 (good); 0.9-1 (very good). In addition, Bartlett's sphericity test should have a p-value < 0.001 (19).

For the exploratory factor analysis, Varimax orthogonal rotation with Kaiser normalization was adopted. Communalities, specificities, and factor loadings were calculated. Values closer to 1 indicate better representativeness of the variables, which indicates a clear and adequate pattern of the instrument. Factor loadings were classified as follows: < 0.30 (very weak); 0.30-0.39 (weak); 0.40-0.49 (fair/acceptable); 0.50-0.59 (good); 0.60-0.69 (very good); ≥ 0.70 (excellent) (19).

For the confirmatory factor analysis, the maximum likelihood technique was used, with a sample of 112 participants, considering the values for a population lower than 250: Comparative Fit Index (CFI) > 0.95; Tucker-Lewis Index (TLI) > 0.95; Standardized Root Mean Square Residual (SRMR) ≤ 0.08 (with CFI > 0.95); Root Mean Square Error of Approximation (RMSEA) < 0.08 (with CFI ≥ 0.95) (19).

Reliability

For this indicator, the test-retest technique was used, and the analysis was conducted by intraclass correlation. The instrument was applied to a sample of 112 nursing professionals (nursing technicians and nurses), who were identified numerically from 1 to 112. For the retest, 20 % of the sample ($n = 22$) was randomly selected to complete the HECS-BV for the second time after an interval of 7 to 15 days after the first collection. This strategy aimed to assess the reliability and stability of the instrument's responses (14).

The reliability of the test-retest was assessed by calculating the weighted quadratic Kappa coefficient, for which < 0.403 – poor; 0.40 to 0.75 – satisfactory to good; and > 0.75 – excellent; and the intraclass correlation coefficient, for which < 0.4 – poor; $0.4 \leq$ < 0.75 – satisfactory; and ≥ 0.75 – excellent (18). Cronbach's alpha values were calculated for internal consistency analysis, with values above 0.70 considered satisfactory (19).

Study Location

The location of the study was the PHC system of a municipality in the southeastern region of Goiás. The PHC system consists of 18 family clinics (Family Health Strategy), three of which are located in three other districts belonging to the municipality. The PHC system is open Monday through Friday from 7:00 a.m. to 7:00 p.m.

Population and Sample

The target population of the study consisted of nursing professionals, including nurses and nursing technicians working in PHC. 175

professionals comprise the PHC, including 70 nurses and 105 nursing technicians; however, only 112 agreed to participate. All nursing professionals working in their sectors were invited to participate. Considering a sampling error of 5 %, a confidence level of 95 %, and an estimated percentage of 50 %, the minimum sample size was 103 participants. Non-probability sampling was used for convenience. Nurses and nursing technicians with at least six months of experience in healthcare services were included, and those who were absent for any reason during the data collection period were excluded.

Data Collection and Data Analysis

Data was collected online, with the form containing the instruments provided at the PHC units via QR codes on banners and folders. The lead researcher collected the data with the support of a trained team of nursing students. Prior to the start of the process, the immediate management of the units was informed of the data collection procedure and the respective schedule.

The questionnaire for sociodemographic and occupational characterization, and the HECS-BV were administered in a virtual environment using Google Forms®. Data were organized in an Excel® spreadsheet and analyzed using the R program, following the statistical analysis of each validation stage previously mentioned.

Ethical Aspects

Study approved by the Research Ethics Committee of the Federal University of Santa Maria, with Opinion 6.573.385. The regulations and guidelines governing research with human subjects, established by Resolution 466/2012 (20) and the Declaration of Helsinki (21), were followed. The informed consent form was signed by the lead researcher and the participants, ensuring their right to privacy and to withdraw from the study at any time, without public exposure of the individuals involved or their information.

The collected data were archived and kept under the researcher's responsibility on an external hard drive, and was deleted from the cloud. As established in the confidentiality agreement, they will be stored for five years and, after that period, properly deleted.

Results

Adaptation and validity of the instrument's content for the PHC context

The panel of specialists consisted of seven professionals from various regions of Brazil, specializing in ethics, who conducted a thorough evaluation of the HECS-BV. This approach granted greater credibility to the process of adapting the instrument.

During this process, linguistic and cultural adjustments were performed to preserve the original meanings of the items as closely as possible, ensuring comprehension by the target population, as shown in Table 2.

Table 2. Comparison of the Adjustments to the HECS version Adapted for PHC and the Version Adapted for the Brazilian Hospital Context. Rio Verde, Goiás, Brazil, 2024

HECS-BV	HECS-BV for PHC
4. <u>Hospital</u> policies help me with challenging issues/problems in patient care.	4. <u>Primary health care</u> policies help me with challenging patient care issues/problems.
8. A notion of the <u>hospital's</u> mission is shared in a clear manner with the nurses.	8. A notion of the mission of <u>primary health care</u> is shared in a clear manner with nurses.

Source: Prepared by the authors.

In item 4, of the seven specialists, 57.1 % (n = 4) suggested changing the term 'Policies' to 'The policies,' as well as the term 'hospital' in items 4 and 8 to 'primary health care,' since this research was conducted in that specific context. Regarding the factors, the term 'hospital' was changed to 'primary health care.'

The scores and items of the instrument were maintained according to the HECS-BV, which were rated above 80 % in clarity by participants and evaluated as highly relevant and succinct. All items were understood consistently, presenting a CVI of 0.98, which indicates acceptable agreement. The pilot test was conducted with 30 nursing professionals, in which the items were rated above 80 % in clarity among all participants (100 %, n = 30).

Construct Validity of the HECS-BV for the PHC Context

The population of this study consisted of 112 participants, of whom 38 % (n = 43) were nurses and 62 % (n = 69) were nursing technicians. Female professionals were prevalent (87 %; n = 97), with a mean age of 40 years (SD = 10.46) and five years (SD = 5.34) of service.

The KMO sample measure supported the suitability of the sample for analysis, with a value of 0.87. Bartlett's sphericity test ($\chi^2 = 1806.365$, DF = 325, $p < 0.000$) indicated that the strength of the relationship between the variables is strong, which allows for both exploratory and confirmatory factor analyses.

Regarding exploratory factor analysis, the communality of HECS-BV ranged from 0.22 to 0.82, and the specificity presented values ranging from 0.17 to 0.77, indicating a clear pattern of the instrument, as shown in Table 3.

Table 3. Community and Specificity of HECS-BV (n = 112). Rio Verde, Goiás, Brazil, 2024

Instrument items	Community	Specificity
My colleagues are attentive to my concerns regarding patient care.	0.68	0.31
Patients know what to expect from the care provided to them.	0.3	0.69
When I am unable to decide what is right or wrong in a patient care situation, my supervisor assists me.	0.6	0.39
The PHC policies help me with challenging patient care issues/problems.	0.58	0.41
There is mutual trust between nurses and medical doctors.	0.48	0.51
Nurses have access to the necessary information to resolve an issue/problem in patient care.	0.54	0.45
My boss supports me in my decisions regarding patient care.	0.74	0.25
A notion of the mission of PHC is shared in a clear manner with nurses.	0.47	0.52
Medical doctors seek the opinion of nurses regarding treatment decisions.	0.22	0.77
My colleagues help me with challenging issues/problems in patient care.	0.65	0.34
Nurses use the information necessary to resolve a specific issue/problem in patient care.	0.61	0.38
My boss listens to what I have to say regarding issues/problems in patient care.	0.71	0.28
The feelings and values of all parties involved in a patient care issue/problem are considered when deciding.	0.49	0.5
I participate in decisions regarding the treatment of patients under my care.	0.61	0.38
My boss is someone who I can trust.	0.61	0.38
Conflicts are resolved openly and are not avoided.	0.24	0.75
Nurses and medical doctors here respect each other's opinions, even when they disagree on what is best for patients.	0.39	0.6
I work with competent colleagues.	0.57	0.42
Patients' wishes are respected.	0.43	0.56
When my colleagues are unable to decide what is right or wrong in a specific patient care situation, I notice that my boss helps them.	0.68	0.31
There is an openness to questioning, learning, and seeking creative answers to patient care problems.	0.56	0.43
Nurses and medical doctors respect each other.	0.55	0.44
Safe care is provided to patients in my unit.	0.72	0.27
My boss is someone I respect.	0.78	0.21
I am able to practice nursing in my unit in the way I believe it should be practiced, both ethically and legally.	0.82	0.17
Nurses are supported and respected in this service.	0.47	0.52

Source: Prepared by the authors.

To identify a significant factor loading, coefficients equal to or greater than 0.40 were considered for the Varimax rotation method, ranging from 0.40 to 0.82, as shown in Table 4 and Figure 1.

Table 4. Rotated Factor Loading Matrix of HECS-BV (n = 112). Rio Verde, Goiás, Brazil, 2024

Items	Factors				
	Pairs	Patients	Managers	Hospital	Medical Doctors
My colleagues are attentive to my concerns regarding patient care.	0.49	0.44	-0.0	0.46	-0.13
10. My colleagues help me with challenging issues/problems in patient care.	0.66	0.24	-0.0	-0.18	0.36
18. I work with competent colleagues.	0.67	-0.0	-0.21	-0.15	0.27
23. Safe care is provided to patients in my unit.	0.76	-0.33	0.16	-0.0	-0.0
2. Patients know what to expect from the care provided to them.	0.24	0.4	0.24	0.34	0.27
6. Nurses have access to the information necessary to resolve an issue/problem in patient care.	-0.0	0.69	0.26	-0.0	-0.0
11. Nurses use the information necessary to resolve a specific issue/problem in patient care.	-0.0	0.77	-0.0	0.3	0.22
19. Patients' wishes are respected.	-0.0	0.59	0.18	-0.22	-0.0
3. When I am unable to decide what is right or wrong in a patient care situation, my supervisor assists me.	0.25	-0.20	0.7	-0.0	-0.0
7. My boss supports me in my decisions regarding patient care.	-0.0	-0.18	0.82	0.26	-0.0
12. My boss listens to what I say regarding issues/problems in patient care.	-0.0	-0.0	0.76	-0.36	-0.0
15. My boss is someone who I can trust.	0.22	-0.29	0.64	0.24	-0.23
20. When my colleagues are unable to decide what is right or wrong in a specific patient care situation, I notice that my boss helps them.	-0.22	-0.25	0.75	-0.0	-0.0
24. My boss is someone I respect.	-0.61	-0.15	0.62	0.62	-0.0
4. The PHC policies help me with difficult patient care issues/problems.	0.25	0.32	0.37	0.56	-0.0
8. A notion of the mission of PHC is shared in a clear manner with nurses.	0.21	0.31	0.53	0.61	0.29
13. The feelings and values of all parties involved in a patient care issue/problem are considered when deciding.	-0.17	-0.25	-0.0	0.63	-0.0

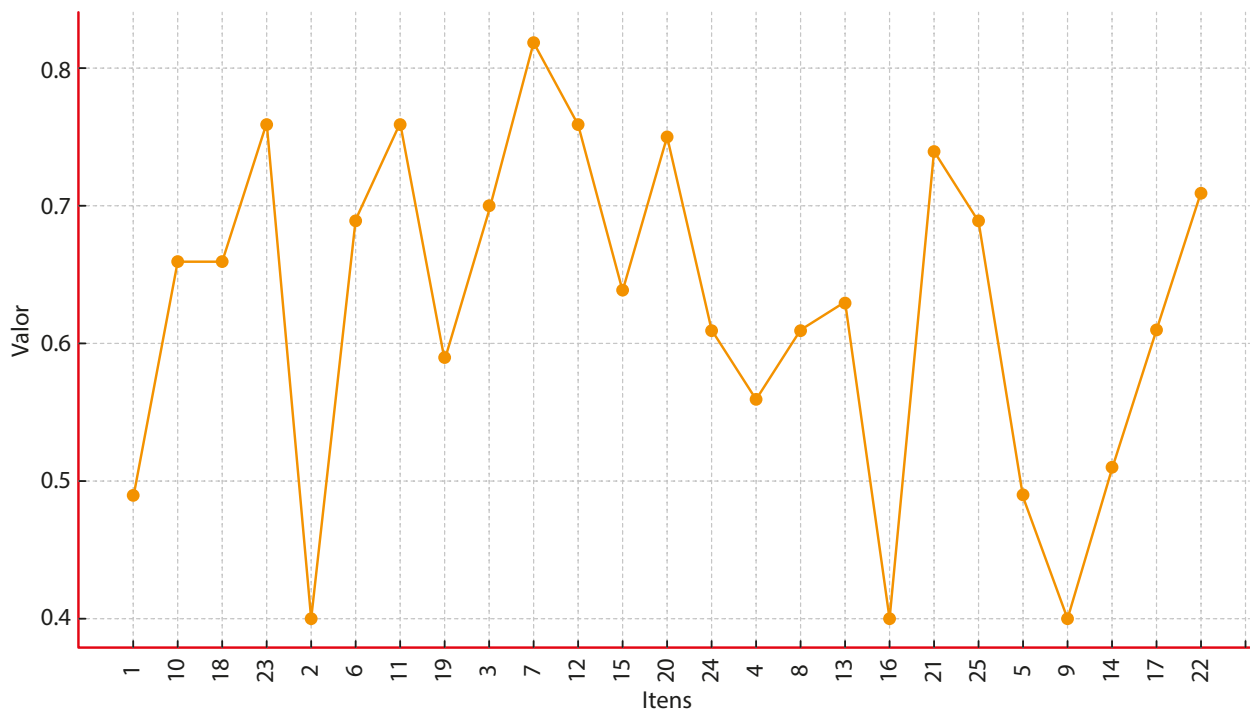
16. Conflicts are resolved openly and are not avoided.	0.27	-0.17	-0.0	0.4	-0.0
21. There is an openness to questioning, learning, and seeking creative answers to patient care problems.	0.24	0.32	0.4	0.74	0.5
25. I am able to practice nursing in my unit in the way I believe it should be practiced, both ethically and legally.	-0.52	-0.0	0.26	0.70	-0.0
5. There is mutual trust between nurses and medical doctors.	0.22	0.31	-0.31	-0.13	0.49
9. Medical doctors ask nurses for their opinion on treatment decisions.	0.15	-0.21	0.22	0.4	0.4
14. I participate in decisions regarding the treatment of patients under my care.	0.46	-0.37	-0.0	-0.0	0.51
17. Nurses and medical doctors here respect each other's opinions, even when they disagree on what is best for patients.	0.5	0.42	0.44	0.36	0.61
22. Nurses and medical doctors respect each other.	-0.19	-0.11	-0.0	-0.0	0.71

Source: Prepared by the authors.

Note: Delete absolute load values lower than 0.2. Items were organized according to the factor to which they belong, not in ascending order.

Figure 1 shows the factor scores grouped by their five factors.

Figure 1. Decline in Factor Loadings for Items Grouped by Factors



Source: Prepared by the authors.

Confirmatory factor analysis was tested for the 26-item, five-factor instrument, following the original model of questions and factors, in which the CFI was 0.988; the TLI was 0.986; the RMSEA was 0.084; and the SRMR was 0.084, with a 90 % confidence interval (0.084-0.988) and a significant p-value ≤ 0.05 , as shown in Table 5.

Table 5. Confirmatory Factor Analysis of the HECS-BV for PHC (n = 112). Rio Verde, Goiás, Brazil, 2024.

Variables	Confirmatory factor analysis
CFI	0.988
TLI	0.986
RMSEA	0.084
SRMR	0.084

Source: Prepared by the authors.

HECS-VB Reliability

Table 6 shows the HECS-BV test-retest reliability for PHC, which was performed with 20 % of the sample.

Table 6. HECS-BV Reliability: Test-Retest (n = 22). Rio Verde, Goiás, Brazil, 2024

HECS-BV factors	HECS-BV items	Weighted kappa		Kappa intraclass correlation coefficient		
		K	p-value*	CCI	CI	p-value*
Peers	1.	0.46	0.02	0.50	(0.068-0.734)	<0.05
	10.	0.60	<0.05	0.60	(0.259-0.812)	<0.05
	18.	0.70	<0.05	0.71	(0.426-0.868)	<0.05
	23.	0.70	<0.05	0.71	(0.43-0.869)	<0.05
Patients	2.	0.44	0.03	0.45	(0.055-0.727)	<0.05
	6.	0.65	<0.05	0.66	(0.34-0.84)	<0.05
	11.	0.65	<0.05	0.66	(0.34-0.84)	<0.05
	19.	0.72	<0.05	0.73	(0.461-0.878)	<0.05
Managers	3.	0.18	0.3	0.26	(-0.167-0.605)	0.11
	7.	0.58	<0.05	0.59	(0.234-0.803)	<0.05
	12.	0.72	<0.05	0.73	(0.465-0.879)	<0.05
	15.	0.52	0.01	0.49	(0.097-0.747)	<0.05
	20.	0.57	<0.05	0.59	(0.228-0.801)	<0.05
	24.	0.76	<0.05	0.80	(0.596-0.915)	<0.05

PHC	4.	0.55	<0.05	0.56	(0.195-0.788)	<0.05
	8.	0.74	<0.05	0.75	(0.496-0.888)	<0.05
	13.	0.42	0.04	0.44	(0.042-0.721)	<0.05
	16.	0.50	0.02	0.49	(0.101-0.749)	<0.05
	21.	0.67	<0.05	0.67	(0.37-0.85)	<0.05
	25.	0.70	<0.05	0.71	(0.427-0.868)	<0.05
Medical Doctors	5.	0.71	<0.05	0.72	(0.44-0.872)	<0.05
	9.	0.65	<0.05	0.66	(0.343-0.842)	<0.05
	14.	0.60	<0.05	0.56	(0.248-0.808)	<0.05
	17.	0.60	<0.05	0.59	(0.234-0.803)	<0.05
	22.	0.71	<0.05	0.72	(0.441-0.872)	<0.05
	26.	0.71	<0.05	0.71	(0.438-0.871)	<0.05

Source: Prepared by the authors.

Note: Values significant for $p < 0.01$.

The weighted quadratic Kappa ranged from 0.18 to 0.76 (items 3 and 24, classified as poor and satisfactory to good, respectively). The intraclass correlation coefficient ranged from 0.26 to 0.80, corresponding to items 3 and 24, classified as poor and excellent, respectively. Considering the weighted quadratic Kappa coefficient and the intraclass correlation coefficient, 96.1 % of the items presented satisfactory results.

The reliability of internal consistency via Cronbach's alpha coefficient was 0.94 for the HECS-BV in the context of PHC and varied among the five factors: peers (0.68), patients (0.66), managers (0.88), PHC (0.77), and medical doctors (0.77), as shown in Table 7.

Table 7. Cronbach's Alpha for the HECS-BV in PHC. Rio Verde, Goiás, Brazil, 2024

Variables	Cronbach's alpha
General instrument	0.94
Peers factor	0.68
Patients factor	0.66
Managers factor	0.88
PHC factor	0.77
Medical doctors factor	0.77

Source: Prepared by the authors.

Discussion

The HECS-BV adaptation process was conducted while respecting the meanings of the items, but some adjustments were necessary to maintain the meaning of the words in the context of PHC. The HECS was designed for the hospital context (6), which has different aspects from PHC, with items 4 and 8 referring to hospital policy (12). Thus, these items were adjusted by replacing 'Policies' with 'The policies' and 'hospital' with 'Primary Health Care,' since these services have various health policies, as well as different services provided (12).

In hospitals, the care provided is complex and specialized compared to that provided by PHC, given that hospitals deal with critical conditions and require advanced infrastructure and multidisciplinary teams to treat acute illnesses, perform surgeries, and conduct medical procedures (22). However, PHC is the gateway to the healthcare system and covers a range of essential care to promote health, prevent disease, treat common conditions, and manage people's health in a comprehensive and continuous manner (12). It is based on Brazil's Unified Health System (SUS, for its initials in Portuguese) principles, such as accessibility, equity, comprehensiveness, and longitudinality, that require more than one policy to support care (12).

These adaptations contributed to a good understanding of the instrument, with specialists agreeing on the evaluation of the items that comprise it (19). The adjustments made during the adaptation process were crucial to maintaining the meaning of the words in the PHC Brazilian context, ensuring that the instrument was well understood and culturally appropriate for the target audience (23).

The results of the panel of specialists indicated that the five factors and 26 items of the instrument were well grounded in the study, in which more than 80 % of participants rated them as satisfactory, demonstrating an adequate structure for assessing the ethical climate in PHC. Similarly, the validation of the HECS for Brazil presented an adequate structure, in which 76.9 % of the panel of specialists evaluated the items as satisfactory (3). Such evidence suggests that, in different countries and cultural contexts, the HECS maintains robust reliability and validity, which strengthens the argument that the factor structure used in the Portuguese version—approved by specialists on its panel—finds comparable support in the international literature (3).

The clarity of the instrument in the pilot test stage was considered satisfactory, indicating that its structure and language are easily understood by PHC nursing professionals. This finding reinforces the importance of the pre-test stage in the adaptation of psychometric instruments, since adequate understanding of the items is a key condition for the quality of responses and, consequently, for the validity of the results. International studies present similar results, such as in the adaptation of the HECS to the Swedish culture,

in which nurses participated in focus groups aimed at analyzing each item in detail, discussing ambiguities, and proposing minimal linguistic and conceptual adjustments. In this study, participants emphasized that minor terminological changes were sufficient to improve semantic accuracy without compromising the theoretical structure of the instrument, demonstrating that direct collaboration with professionals is crucial to improving its practical applicability. This iterative process, characterized by cycles of discussion, review, and testing, is widely recognized in the literature as a key step in ensuring cultural equivalence, the relevance of items to the local context, and the usability of the instrument in various health settings, strengthening the reliability and validity of its measures (24, 25).

The adequacy of the sample, verified using the KMO index, reinforces the consistency of the data and the relevance of applying exploratory factor analysis, since high KMO values indicate a strong correlation between items and suggest that the latent structure can be adequately identified. The comparison with the Polish study, which also presented a high KMO value of 0.937, and a significant Bartlett's chi-square test for sphericity ($\chi^2 = 6792.8$, $df = 325$, $p < 0.001$) (15), demonstrates methodological convergence and strengthens confidence in the instrument's ability to reflect relevant dimensions of the ethical climate (19). In addition, Bartlett's significant sphericity test confirms that the correlations between items are not random, ensuring the feasibility of factor analysis. Collectively, these results show that the instrument has robust psychometric properties, supporting its applicability in assessing the ethical climate in various healthcare contexts, including PHC, where understanding ethical dynamics is essential to guide professional practices and improve the quality of care (19).

In addition, the communality, specificity, and factor loadings were within adequate parameters, which reinforces the internal consistency of the instrument and the ability of the items to accurately represent the proposed theoretical constructs. Satisfactory communalities indicate that each item shares sufficiently high variance with its respective factor, demonstrating conceptual alignment and contributing to the robustness of the factor solution. Similarly, adequate levels of specificity show that the items do not present excess residual variance, suggesting that they are predominantly capturing the phenomenon to be measured, without significant interference from external factors or statistical noise. The factor loadings, in turn, when adequate, confirm the relevance of the items within the identified factors, reinforcing their theoretical and empirical relevance (26).

The factorial structure of the HECS, confirmed by exploratory analysis, maintained the five predicted factors, expressing a dimensional organization consistent with the original proposal of the instrument. This result demonstrates that the items function

as consistent indicators of the domains evaluated, ensuring that the instrument, in its entirety, presents adequate construct validity. Thus, the full retention of the items, without the need for exclusion or adjustments, reinforces the adequacy of the analyzed version, as well as its ability to reliably measure the dimensions that comprise the ethical climate in PHC (26).

In the confirmatory factor analysis, the CFI, TLI, SRMR, and RMSEA fit indexes were adequate and within the recommended parameters, reinforcing the robustness of the structure composed of 26 items distributed across five factors in the HECS-BV (19). These indicators, by presenting satisfactory values, show that the previously defined theoretical model finds empirical correspondence in the observed data, demonstrating internal consistency and stability of the factor solution. In methodological terms, this result is particularly relevant, as the confirmatory analysis assesses the adequacy of a previously proposed model, allowing the verification of whether the hypothesized structure remains after cultural adaptation and application in the new context. Thus, the maintenance of the adjustment parameters confirms that the instrument not only preserves its multidimensional organization but also presents consistent statistical performance, which strengthens its construct validity (19).

The consistency of these findings with the literature, especially when compared to the results of the Polish study, further reinforces the reliability of the version analyzed. The similarity between the fit indexes (CFI = 0.92; IFI = 0.92; TLI = 0.91; SRMR = 0.047; RMSEA = 0.070) (15) indicates that the HECS exhibits stable psychometric behavior in various cultural contexts, suggesting that its factor structure has a high level of invariance across populations. This alignment not only validates the adequacy of the model used, but it also shows that the theoretical domains of ethical climate—such as relationships between colleagues, managers, medical doctors, and hospital organization—tend to maintain their statistical expression regardless of the country where the instrument is applied. Therefore, the convergence between the results of the present study and those found in the literature confers greater solidity to the interpretation of the findings, highlighting the consistency and applicability of the HECS-BV in various healthcare practice scenarios (15).

Regarding reliability analysis, the test-retest showed satisfactory reproducibility estimates, both by the weighted quadratic Kappa and by the intraclass correlation coefficient, which demonstrates the temporal stability of the responses and the consistency of the instrument when applied at different times. The adequacy of these indicators points to minimal interobserver variation, reinforcing that participants tend to interpret and respond to items in a similar manner over time, without significant influence from random or circumstantial factors. This stability is essential in instruments that assess complex organizational constructs, such as ethical climate, since it assumes that the perceptions measured do not fluctuate inconsistently in the short term, ensuring that the changes identified

over time reflect real transformations in the work environment, and not methodological limitations of the instrument (27).

Furthermore, the adequate degree of agreement evidenced by the coefficients reinforces that the items are sufficiently clear and precise to minimize divergent interpretations among different respondents. This is particularly relevant in the context of PHC, in which multidisciplinary teams and varied work dynamics can influence how professionals understand and experience aspects of the ethical climate. Thus, the reliability demonstrated by the analysis contributes to consolidating the psychometric robustness of the instrument, ensuring that it has the sensitivity and stability necessary to be used in institutional research and evaluations, as well as to support interventions aimed at improving ethical practices in the healthcare field (27).

The high internal consistency reliability found for the 26-item instrument ($\alpha = 0.94$) reinforces the psychometric robustness of the HECS-BV and its ability to measure the ethical climate construct in a stable and consistent manner. This performance is consistent with that found in the original instrument ($\alpha = 0.91$) (6) and in the previously validated Brazilian version ($\alpha = 0.93$) (3), which demonstrates stability in the internal properties of the instrument across various populations and contexts of application. Similarly, studies conducted in Poland (15) and Iran (16) also demonstrated adequate internal consistency indexes (0.93 and 0.86, respectively), reinforcing the structural robustness of the HECS in various cultural contexts and healthcare systems. The convergence of these findings suggests that the set of items presents conceptual coherence and good interrelation, supporting its relevance for reliably capturing the dimensions of ethical climate. In addition, consistent reproducibility across studies indicates that the instrument maintains its performance regardless of sociocultural variations, which strengthens its applicability and international comparability in research on organizational ethics in the healthcare environment (19).

Therefore, the HECS-BV for PHC proved to be valid and reliable, with instrument reliability greater than 0.70 (19). That is, based on these findings, it can be inferred that the results of the confirmatory factor analysis of the HECS-BV questionnaire, with significant and adequate fit indexes, validate the structure of 26 items and five factors, ensuring its reliability and validity for assessing the proposed constructs.

One limitation of this study is the fact that it was conducted only with nursing professionals, which hinders the generalization of the results. In future studies, it is necessary to use the HECS-BV instrument in PHC in other regions of Brazil. Another limitation was the use of only three types of validity evidence (content, construct, and reliability). Currently, over five types of validity evidence are available, in addition to more robust models, such

as item response theory, which is a complementary validation process. Furthermore, although a sample calculation was performed, it is limited.

Conclusion

The HECS-BV proved to be valid and reliable for assessing the perception of the ethical climate in PHC, which was the first instrument adapted to assess the ethical climate in PHC. During the adaptation and validation process, minor linguistic adjustments were made to facilitate its understanding and completion in the context of PHC. In the validation stage, the HECS-BV showed good psychometric properties and adequate internal consistency reliability and confirmatory factor analysis with satisfactory and significant values.

Conflict of interest: None declared.

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