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Evidence of validity of an instrument on nurses' knowledge of ostomies in primary care

Evidências de validade de instrumento sobre conhecimento de enfermeiros em estomias na
atenção primária

Evidencia de validez de un instrumento para evaluar el conocimiento de las enfermeras sobre
ostomías en atención primaria

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ABSTRACT

Objective: to develop an instrument to assess nurses' knowledge about the care of intestinal elimination ostomies in Primary Health Care and to gather evidence of content and construct validity.

Method: a psychometric study conducted in three stages: theoretical development, evaluation of content validity evidence by experts, and analysis of construct validity and reliability, according to international guidelines for the development of assessment instruments. Eleven

expert judges and 190 nurses from Primary Health Care in the capital of Piauí, Brazil, participated. The Content Validity Ratio, exploration factor analysis, and reliability estimates were assessed using Cronbach's Alpha and McDonald's omega.

Results: all items showed content validity above the recommended cutoff point (≥ 0.59). Exploratory factor analysis demonstrated adequacy and structural stability. Reliability estimates were satisfactory ($\alpha=0.88$; $\omega=0.87$; ORION between 0.72 and 0.90). The final version of the instrument consisted of 33 items distributed across four dimensions, with true or false responses.

Conclusion: the results showed satisfactory psychometric properties. The instrument, composed of 33 items distributed across four dimensions, proved to be valid and reliable. It was considered suitable for assessing nurses' knowledge about intestinal stoma care in Primary Health Care.

Descriptors: Stoma; Knowledge; Nursing; Validation studies.

RESUMO

Objetivo: desenvolver um instrumento para avaliar o conhecimento de enfermeiros sobre os cuidados com estomias intestinais de eliminação na Atenção Primária à Saúde e reunir evidências de validade de conteúdo e de construto.

Método: estudo psicométrico realizado em três etapas: desenvolvimento teórico, avaliação das evidências de validade de conteúdo por especialistas e análise da validade de construto e da fidedignidade, conforme diretrizes internacionais para a elaboração de instrumentos de avaliação. Participaram 11 juízes especialistas e 190 enfermeiros da Atenção Primária à Saúde da capital do Piauí, Brasil. Foram utilizados o *Content Validity Ratio*, a análise fatorial exploratória e as estimativas de confiabilidade pelo alfa de *Cronbach* e ômega de McDonald.

Resultados: todos os itens apresentaram validade de conteúdo superior ao ponto de corte recomendado ($\geq 0,59$). A análise fatorial exploratória demonstrou adequação e estabilidade estrutural. As estimativas de confiabilidade foram satisfatórias ($\alpha=0,88$; $\omega=0,87$; ORION entre 0,72 e 0,90). A versão final do instrumento foi composta por 33 itens distribuídos em quatro dimensões, com respostas do tipo verdadeiro ou falso.

Conclusão: os resultados evidenciaram propriedades psicométricas satisfatórias. O instrumento, composto por 33 itens distribuídos em quatro dimensões, mostrou-se válido e confiável. Mostrou-se adequado para avaliar o conhecimento de enfermeiros sobre cuidados com estomias intestinais na Atenção Primária à Saúde.

Descritores: Estomia; Conhecimento; Enfermagem; Estudos de validação.

RESUMEN

Objetivo: Desarrollar un instrumento para evaluar el conocimiento de enfermería sobre el cuidado de estomas de eliminación intestinal en Atención Primaria y obtener evidencia de validez de contenido y de constructo.

Método: Se realizó un estudio psicométrico en tres etapas: desarrollo teórico, evaluación de la validez de contenido por expertos y análisis de la validez de constructo y la fiabilidad, según las directrices internacionales para el desarrollo de instrumentos de evaluación. Participaron once jueces expertos y 190 enfermeras de Atención Primaria en la capital, Piauí, Brasil. Se utilizaron el Índice de Validez de Contenido (IVC), el análisis factorial exploratorio y las estimaciones de fiabilidad mediante el alfa de Cronbach y el omega de McDonald.

Resultados: Todos los ítems mostraron una validez de contenido superior al punto de corte recomendado ($\geq 0,59$). El análisis factorial exploratorio demostró adecuación y estabilidad estructural. Las estimaciones de fiabilidad fueron satisfactorias ($\alpha=0,88$; $\omega=0,87$; ORION

entre 0,72 y 0,90). La versión final del instrumento consta de 33 ítems distribuidos en cuatro dimensiones, con respuestas de verdadero o falso.

Conclusión: Los resultados mostraron propiedades psicométricas satisfactorias. El instrumento, compuesto por 33 ítems distribuidos en cuatro dimensiones, demostró ser válido y fiable. Resultó adecuado para evaluar el conocimiento del personal de enfermería sobre el cuidado de estomas intestinales en atención primaria.

Descriptores: Estoma; Conocimiento; Enfermería; Estudios de validación.

INTRODUCTION

Caring for individuals with intestinal elimination ostomies requires nursing professionals to have specific technical-scientific knowledge that supports safe, patient-centered practices aimed at preventing complications⁽¹⁾. Literature indicates that nurses' knowledge regarding ostomy care, ostomy appliance, and peristomal skin care directly impacts the quality of care, the improvement of self-care, and the patient's postoperative adaptation⁽²⁾.

Despite the importance attributed to postoperative care and educational initiatives, evidence shows that many patients receive insufficient guidance during hospitalization, which compromises the continuity of care after discharge. Additionally, there is a lack of continuing education and specific training among nursing professionals, factors that can compromise the quality of care and the experience of patients with ostomies⁽³⁾. In this context, Primary Health Care (PHC) and the specialized services that comprise the Health Care Network play a strategic role in rehabilitation and should work in an integrated manner to promote longitudinal follow-up, addressing the physiological, emotional, and social aspects of the adaptation process⁽⁴⁾.

Although nurses have the academic training required for stoma management, workplace challenges can hinder high-quality practice and the consolidation of knowledge. Therefore, it is essential for these professionals to engage in a continuous process of updating and professional development throughout their careers⁽⁵⁾. This need is reinforced by findings from a study conducted in PHC⁽⁶⁾, in which, although 88.24% of professionals reported knowing how to perform stoma care, observations revealed insecurity and shortcomings during procedure execution, highlighting a gap between theoretical knowledge and practice. In view of the above, assessing this knowledge becomes a fundamental step in guiding continuing education initiatives and improving the quality of care provided⁽⁶⁾.

In various countries, instruments have been developed to assess the knowledge and competencies of nurses and caregivers regarding stoma care, particularly to measure the

effectiveness of educational interventions and training technologies focused on this topic⁽⁷⁻⁹⁾. In the Brazilian context, however, most studies have focused on hospital or perioperative settings, with less emphasis on the reality faced by PHC teams, who encounter specific challenges regarding educational support, continuous monitoring, and the prevention of complications⁽¹⁰⁻¹¹⁾.

In this context, the development and validation of instruments designed for this purpose can contribute to improving care, guiding educational strategies, and strengthening safe, evidence-based practices. Based on these premises, this study proposes the development and investigation of psychometric evidence for an instrument designed to assess nurses' knowledge of care for intestinal elimination ostomies, thereby contributing to nursing practice in PHC.

Thus, the objective of this study was to develop an instrument to assess nurses' knowledge of care for intestinal elimination ostomies in PHC and to gather evidence of content and construct validity.

METHOD

Study design

This is a psychometric study conducted in three complementary stages: theoretical development, evaluation of evidence of the instrument's content validity, followed by the investigation of construct validity and reliability analysis. The use of the term psychometric study is aligned with international guidelines for the development of measurement instruments, as recommended by the Standards for Educational and Psychological Testing⁽¹²⁾.

The instrument was developed following the stages recommended in the psychometric literature⁽¹²⁻¹³⁾: definition of the conceptual model, item construction and review, evaluation of content validity, investigation of construct validity through Exploratory Factor Analysis (EFA), and analysis of the response process and reliability.

Population, sample, and eligibility criteria

To evaluate evidence of content validity, the *expertise* of expert judges in stomatherapy was used. The initial selection was conducted through purposive sampling, with the selection of a stomatherapist nurse holding a master's degree in nursing to analyze the knowledge instrument. Subsequently, the snowball sampling technique was employed, in which one specialist indicated other potential participants.

Twenty-one judges were invited via email, together with an invitation letter to participate in the study, resulting in responses from 11 nurses specializing in Stomatherapy. According to Lynn⁽¹⁴⁾, a measurement instrument should be evaluated by at least six experts. These experts should be individuals who have published or presented studies and/or are nationally and internationally recognized for their expertise in the field under study. This ensures that the evaluation of the instrument's validity is based on global practices rather than standardized local practices.

The selection of judges to evaluate evidence of content validity was based on criteria adapted from Fehring⁽¹⁵⁾, which consider academic background, professional experience in teaching, research, and extension activities, continuing education courses, and scientific production in the area of interest. Experts who did not complete the evaluation of all items were excluded.

After verifying eligibility criteria, the Informed Consent Form (ICF) was sent via email, along with an invitation letter containing instructions for content validation and a link to the instrument evaluation form. A file containing the initial version of the instrument and the questionnaire on sociodemographic and occupational characteristics was also attached. Data collection was conducted using Google Forms[®]. The expert panel was asked to submit their responses via email within 15 days, and proposed changes were incorporated into the developed instrument.

In this study, no pilot study was conducted, as the content validation stage with experts was intended to ensure the clarity and appropriateness of the items before their application.

Following the completion of content validation by the expert judges, the construct validation phase was conducted with the target population. The study involved 190 PHC nurses who were actively practicing and agreed to participate. Professionals who provided incomplete questionnaire responses were excluded.

Stage 1: Theoretical framework and item development

The selection of items comprising the instrument was based on educational materials, scientific articles, and the Brazilian Consensus on the Care for Adults with Elimination Stomas⁽¹⁶⁾. The topics addressed included specific legislation concerning individuals with ostomies, ostomy management, self-care, care of the ostomy appliance and peristomal skin, as well as the main associated complications. Priority was given to the inclusion of content focused on technical and scientific care and the decision-making process of nurses working in PHC.

The items were structured in a true/false/don't know format. This choice follows fundamental, well-established principles of measurement theory, according to which items in this format are relatively easy to score. Furthermore, they allow for broad content coverage, as respondents can answer a large number of questions in a relatively short time; meanwhile, the inclusion of the "don't know" option reduces random response bias and increases the accuracy of the data obtained.

Correct answers were assigned a score of "1," while incorrect or indeterminate ("don't know") answers received a score of "0." The preliminary version contained 44 items distributed across five domains. Topics addressed included specific legislation concerning individuals with ostomies, stoma complications, self-care, collection appliance care, and peristomal skin care. Following the assessment of validity evidence, the instrument was finalized with 33 items distributed across four domains: general knowledge (seven items), ostomy appliance (10 items), ostomy care (seven items), and peristomal skin care (nine items).

For the analysis of the results, a cutoff score of 80% correct responses was adopted to classify the level of knowledge as adequate. This scoring criterion was established based on a previous study⁽¹⁷⁾, which also developed and validated an instrument to assess knowledge about ostomies, adopting similar methodological principles.

It should be noted, however, that the instrument developed in this study presents fundamental differences compared to the reference study. While the former was developed with an emphasis on the perioperative period and the hospital setting⁽¹⁷⁾, the latter was constructed and validated specifically for Primary Health Care, encompassing the content, guidelines, and competencies essential to the continuous, longitudinal, and comprehensive care that characterizes this level of care, a setting where, until then, there was no knowledge of validated tools in the field.

Stage 2: Evidence of content validity of the instrument

The process of verifying content validity evidence took place between January and February 2025. During this stage, experts remotely evaluated each item within the domains using the criteria of importance, clarity, and relevance⁽¹⁸⁾.

Response options for the items were arranged on a Likert-type scale. Each item received a score ranging from 1 to 4 (1 = not important/unclear/not relevant; 2 = slightly important/unclear without revision/item needs major revision to be relevant; 3 = quite

important/clear but needs modification/item needs minor revision to be relevant; and 4 = completely important/item is clear/item is relevant), according to the definitions of each criterion. Additionally, participants completed a sociodemographic and professional questionnaire. For each question in the questionnaire, an open field was provided for experts to make suggestions aimed at improving the material.

Stage 3: Evidence of construct validity of the instrument

In the construct validity assessment stage, the instrument was administered in March 2025 during a training session addressing the topic of this study, aimed at PHC nurses. A total of 190 practicing PHC nurses who agreed to participate were included in the study. The exclusion criterion was incomplete completion of the questionnaires.

For psychometric validation studies, the literature recommends samples of over 100 participants, ensuring a minimum of five to ten respondents per item to guarantee the stability of factor solutions and the precision of estimates. The sample size reflected a ratio of 5.8 respondents per item, meeting the minimum parameters recommended in the literature⁽¹⁹⁾. This sample size contributed to the adequacy of the EFA, allowing reliable estimates of factor loadings and greater robustness of the evidence of validity and reliability of the instrument.

Data processing and analysis

Participants were characterized using descriptive statistics, including absolute and relative frequencies for qualitative variables and mean and standard deviation for quantitative variables. Data were obtained using validated instruments and organized into a database in Microsoft Office Excel 2025® and analyzed using the statistical software Statistical Package for the Social Sciences (SPSS), version 20.0®.

To analyze agreement among the judges, the Content Validity Ratio (CVR) was calculated. This measure is characterized by a linear transformation of agreement among judges, ranging from -1 to +1, with values close to 1 indicating perfect agreement. The CVR was calculated according to the following formula: $CVR = (ne - (N/2)) / (N/2)$, where *ne* corresponds to the number of experts who assigned scores of 3 and 4, and *N* corresponds to the number of judges⁽¹⁹⁾.

As the panel consisted of 11 experts, the critical value of 0.59 was used as the cutoff point, as recommended by Ayre and Scally⁽¹⁹⁾. Thus, items with $CVR \geq 0.59$ for any of the criteria were considered valid and retained in the instrument, whereas those with $CVR < 0.59$ were revised or excluded.

For construct validation, Exploratory Factor Analysis (EFA) was performed using the Factor software (version 12.06)®. First, the factorability of the data matrix was assessed using measures of sample adequacy, such as the Kaiser-Meyer-Olkin (KMO) criterion and Bartlett's test of sphericity, which were used to assess the correlations among the items of the component. KMO values range from 0 to 1 (the higher, the better), with values from 0.5 to 0.7 considered "mediocre"; 0.7 to 0.8, "good"; 0.8 to 0.9, "great"; and above 0.9, "magnificent." A significant result of Bartlett's test of sphericity ($p < 0.05$) indicates that there are relationships among the variables expected to be included in the analysis⁽²⁰⁾.

Factors were extracted using the Robust Unweighted Least Squares (RULS) technique, which reduces matrix residuals. Promax oblique rotation was considered when multiple factors were identified, indicating multidimensionality. Thus, the extraction and rotation method used for the matrix was unweighted least squares extraction with Promax rotation of the data. Subsequently, the robust Chi-square correction with LOSEFER and the empirical correction were performed⁽²¹⁾.

The instrument's quality parameters were estimated based on the explained variance, which should be approximately 60%, and initial factor loadings of 0.30, as recommended when the sample comprises fewer than 300 individuals. However, the model should aim for factor loadings above 0.50, and communalities should have values above 0.40⁽²¹⁾.

As a complementary analysis, factor stability was assessed using the H-Index with the *Robust Promin* technique (h and w) (robust rotation), which evaluates the importance of items for the instrument's structure. The variable with the least stable set of correlations (i.e., a high h value) will have a weight (w) value close to zero. Conversely, a variable with a perfectly stable set of correlations will have a weight (w) value equal to 1. The higher the w value, the more important the variable is for defining the simple structure of the factor solution; that is, the instrument item⁽²²⁾ will be considered the most important.

Construct replicability was assessed using the Generalized G-H Index, which requires a value greater than 0.80. Regarding the quality of factor score estimates, the Factor Determinacy Index (FDI) was used to assess adequacy, with values exceeding 0.90; along with EAP marginal reliability (> 0.80), the sensitivity ratio ($SR > 2$), and the expected percentage of true differences ($EPTD > 90\%$)⁽²²⁾.

For the model fit indices, the Comparative Fit Index ($CFI > 0.95$), the Root Mean Square Error of Approximation ($RMSEA < 0.08$), and the Tucker-Lewis Index ($TLI > 0.90$) were adopted, in accordance with the recommendations⁽²²⁾.

Reliability was assessed using three indicators: ordinal Cronbach's alpha and McDonald's omega, both considered acceptable at values ≥ 0.70 . In addition, to assess the quality and effectiveness of factor estimation, the Factor Determinacy Index (FDI), indicating an adequate estimate for values > 0.90 ; the Overall Reliability of Fully Informative Prior Oblique N-EAP Scores (ORION) (> 0.80); the Sensitivity Ratio (SR) (> 2); and the Expected Percentage of True Differences (EPTD) ($> 90\%$) were used⁽²¹⁾.

After this stage, the final version of the instrument consisted of 33 items, organized into four domains (general aspects related to ostomies, ostomy care, changing the ostomy appliance and peristomal skin care).

Ethical aspects

The study was approved by the Research Ethics Committee (REC) of the *Universidade Federal do Piauí* (UFPI), under CAAE No. 76793324.9.0000.5214 and Opinion No. 6.636.292, in compliance with Resolution No. 466/2012 of the National Health Council (*Conselho Nacional de Saúde* - CNS). All nurses and expert judges agreed to participate in the study and signed the Informed Consent Form (ICF). Additionally, participant anonymity was ensured through the creation of numerical codes based on the sequence in which the instruments were returned.

RESULTS

Regarding the first stage, concerning evidence of content validity, of the 20 experts invited, 11 expressed interest in participating and returned their assessments within the established deadline. Most participants were female (90.9%), with a mean age of 47 years, and were from the Northeast Region (54.5%). Regarding professional experience, participants had a mean of 14 years of experience in the field of ostomies, and 90% had experience in instrument validation. Regarding academic background, master's degree holders were the most frequent (45.4%), as were professionals working in clinical practice (63.6%) and authors of articles in the field of interest (60%).

In the CVR analysis, all items evaluated for importance, relevance, and clarity presented values above the recommended cutoff point (0.59). The overall CVR obtained for the importance, relevance, and clarity scales was 0.86, 0.85, and 0.85, respectively, indicating high agreement among the experts. The main modifications suggested by the judges involved

terminological adjustments, replacement with synonyms, and greater textual detail to improve the precision of the statements. The results of this stage confirmed that all items presented adequate evidence of content validity, being considered clear, relevant, and pertinent, and showed satisfactory agreement among the evaluators (Table 1).

Table 1 - CVR according to the items of the instrument for assessing nurses' knowledge of ostomies in primary care regarding importance, relevance, and clarity. Teresina, Piauí, Brazil, 2025.

Domains/ Items	CVR		
	Importance	Relevance	Clarity
General			
Item 1	1.00	0.82	0.64
Item 2	0.82	0.64	0.82
Item 3	0.64	0.64	0.64
Item 4	1.00	1.00	1.00
Item 5	0.64	0.64	0.64
Perioperative care			
Item 6	1.00	0.82	1.00
Item 7	0.82	0.82	0.82
Item 8	1.00	1.00	1.00
Item 9	0.82	0.82	0.82
Item 10	0.82	1.00	1.00
Ostomy care			
Item 11	0.82	0.82	0.82
Item 12	0.64	0.64	0.64
Item 13	1.00	1.00	1.00
Item 14	1.00	1.00	1.00
Item 15	0.64	0.64	0.64
Item 16	1.00	1.00	1.00
Item 17	0.64	0.64	0.64
Item 18	1.00	1.00	1.00
Changing the ostomy appliance			
Item 19	0.64	0.64	0.64
Item 20	1.00	1.00	1.00
Item 21	1.00	1.00	1.00
Item 22	0.82	1.00	1.00
Item 23	0.82	0.82	0.82
Item 24	1.00	1.00	1.00
Item 25	1.00	1.00	1.00
Item 26	0.64	0.64	0.64
Item 27	0.64	0.64	0.64
Item 28	1.00	1.00	1.00
Item 29	1.00	1.00	1.00
Item 30	1.00	1.00	1.00
Item 31	1.00	1.00	1.00
Item 32	0.64	0.64	0.64
Item 33	1.00	1.00	1.00
Item 34	1.00	1.00	1.00

Peristomal skin care

Item 35	1.00	1.00	1.00
Item 36	1.00	1.00	1.00
Item 37	0.64	0.64	0.64
Item 38	0.64	0.64	0.64
Item 39	0.64	0.64	0.64
Item 40	1.00	1.00	1.00
Item 41	0.64	0.64	0.64
Item 42	0.64	0.64	0.64
Item 43	1.00	1.00	1.00
Item 44	1.00	1.00	1.00
Total	0.86	0.85	0.85

Legend: CVR: Content Validity Ratio.

A total of 190 nurses participated in the construct validation phase. Regarding demographic characteristics, 88.9% were female, with a mean age of 46 years; specialization was the highest level of education identified (68.9%). Concerning experience with ostomies, most professionals (59.5%) had not received specialized training on the subject; however, 76.5% of these professionals had experience with ostomies.

To ensure that the data were compatible with a polychoric correlation analysis model, they were assessed using the Kaiser-Meyer-Olkin (KMO) Test (KMO = 0.80) and Bartlett's Test of Sphericity ($p < 0.001$), which demonstrated adequate levels of factorability⁽²¹⁾. Parallel analysis indicated five factors as the most representative within the data. However, items 1, 2, 3, 12, 35, 36, and 40 showed inadequate levels of adequacy in the factor analysis and were consequently excluded from the final version.

To determine whether elements should be removed from or retained in the instrument, factor loadings and communality (h^2) were analyzed. Factor loadings ranged from 0.30 to 1.0 in the sample, indicating satisfactory and adequate levels⁽²³⁾. Communalities presented values above 0.40, ranging from 0.30 to 0.63, indicating that the items adequately assessed the latent variable.

Moreover, Confirmatory Factor Analysis (CFA) indicated that the factor loadings of 13 elements were above 0.5 (0.70 and 0.84, respectively), according to the literature⁽²¹⁾, thereby confirming the absence of redundancy among the elements and their relevance to the construct under investigation. However, a pattern of cross-loadings was identified (i.e., items with factor loadings above 0.30 on more than one factor). In addition to removing the five items that did not comply with the sample adequacy guidelines, the adjustment procedure involved the careful exclusion of items, removed gradually, one at a time, until the instrument was adequately adjusted. The items removed were: 5, 9, 27, and 38.

Thus, the instrument was validated, retaining a configuration of 35 items and four factors, accounting for 48% of the variance.

To achieve greater precision and quality in the instrument's validation, robust rotation (h and w) was employed⁽²²⁾. Table 2 presents the corresponding robust weights (w). As can be observed, the element that generated the least stable set of correlations (Item 3) obtained a weight of 0.00, while the element that resulted in the most stable set of correlations (Item 32) obtained a weight of 0.63.

Table 2 - Factor loadings, communalities, and robust rotation (h and w) of the instrument for assessing nurses' knowledge regarding ostomy care in primary care. Teresina, Piauí, Brazil, 2025.

Item	Factor loading				h ²	Robust rotation	
	Factor 1	Factor 2	Factor 3	Factor 4		h	w
1	0.444	0.186	-0.360	0.305	0.69	2.97	0.18
3	0.611	0.092	-0.074	0.293	0.90	3.67	0.00
7	0.310	0.215	-0.018	0.082	0.72	2.74	0.25
19	0.308	-0.249	0.157	0.268	0.87	3.43	0,06
26	0.547	-0.044	0.118	-0.178	0.77	2.86	0.21
27	0.378	-0.037	0.110	0.237	0.85	3.26	0.10
5	0.300	0.185	-0.102	0.186	0.56	2.35	0.35
4	0.049	0.386	-0.166	0.030	0.76	1.53	0.58
17	0.163	0.511	0.101	0.101	0.65	1.69	0.53
24	0.146	-0.590	0.218	0.029	0.68	3.06	0.16
6	-0.092	0.090	0.439	0.102	0.61	2.07	0.43
9	-0.136	0.060	0.409	0.290	0.54	1.82	0.50
11	0.018	0.311	0.496	-0.490	0.96	2.97	0.19
13	0.042	0.347	0.465	0.006	0.55	2.36	0.35
14	0.323	0.049	0.371	0.218	0.82	3.46	0.05
18	0.364	-0.106	0.438	-0.154	0.70	2.65	0.28
20	-0.124	0.355	0.547	-0.055	0.71	2.63	0.28
23	-0.012	0.249	0.320	0.125	0.57	1.63	0.55
25	0.067	0.099	0.404	-0.050	0.54	1.50	0.59
2	0.159	0.056	-0.171	0.715	0.74	2.24	0.39

8	-0.070	-0.283	-0.275	0.524	0.76	2.41	0.34
10	-0.189	-0.290	-0.087	0.431	0.81	2.79	0.24
12	0.030	-0.255	0.037	0.573	0.94	2.64	0.28
15	0.430	0.169	-0.124	0.486	1.00	3.02	0.18
16	0.099	-0.098	-0.136	0.630	0.84	3.02	0.18
21	0.084	-0.017	0.151	0.595	0.76	2.88	0.21
22	0.079	0.103	0.127	0.683	0.78	2.80	0.23
28	-0.044	0.156	-0.038	0.462	0.58	1.47	0.60
29	-0.023	0.078	0.148	0.430	0.68	1.35	0.63
30	-0.374	0.010	0.044	0.402	0.53	1.59	0.57
31	-0.221	0.004	0.249	0.319	0.63	1.64	0.55
32	-0.075	-0.064	0.240	0.703	0.97	2.77	0.24
33	0.019	-0.072	0.006	0.680	0.83	2.10	0.43

Table 3 presents the indicators of reliability, stability, quality, and score estimation for the instrument. All measures of sample adequacy were at satisfactory levels, and item reliability was assessed using Cronbach's alpha (α) and McDonald's omega (ω), resulting in values of 0.88 and 0.87, respectively. Construct replicability was examined using the G-H Index, for which Factors 1, 3, and 4 presented indices above 0.80, whereas Factor 2 presented an index below 0.80

To ensure the quality and effectiveness of factor assessment, the FDI, ORION, SR, and EPTD were used. ORION and FDI showed satisfactory results; however, SR and EPTD presented values below those expected.

Table 3 - Indicators of reliability, stability, quality, and score estimation for the instrument regarding nurses' knowledge of ostomies in primary care. Teresina, Piauí, Brazil, 2025.

Indicators	Factor 1	Factor 2	Factor 3	Factor 4
Measures of sample adequacy				
Matrix determinant			< 0.000001	
KMO			0.80	
Bartlett's sphericity		2039.7 (df =	528; P = 0.000010)	
Fit indices				
Root Mean Square Error of Approximation (RMSEA)			0.060	
Comparative Fit Index (CFI)			0.949	

Tucker Levis Index (TLI)			0.920	
Reliability				
Standardized Cronbach's Alpha			0.88	
McDonald's Omega			0.87	
G-H Index	0.80	0.72	0.80	0.91
Quality and effectiveness				
ORION Marginal Reliability	0.80	0.72	0.80	0.90
Sensitivity Ratio (SR)	1.92	1.61	1.93	3.18
Expected Percentage of True Differences (EPTD)	57.2%	56.3%	57.2%	60.8%
Factor Determinacy Index (FDI)	0.90	0.90	0.90	0.95

The order of the items was reorganized based on the factor analysis results, resulting in a final version comprising four domains and 33 items, with true, false, and do not know response options. Chart 1 presents the results for the final version of the instrument after the analyses.

Chart 1 - Final version of the instrument for assessing nurses' knowledge regarding ostomies and peristomal skin care. Teresina, Piauí, Brazil, 2025.

Domains and Items
Domain 1. General knowledge
1. In Brazil, Ordinance No. 400, dated November 16, 2009, regulates care for individuals with ostomies within the Unified Health System (<i>Sistema Único de Saúde</i> - SUS), in which individuals with ostomies are entitled to care at all levels of health care.
2. Preoperative stoma site marking reduces postoperative complications and contributes to improving quality of life. It should be performed with the patient standing, bending, lying down, and sitting, by a stomatherapist nurse and/or a surgeon.
3. Parastomal hernia, stenosis, stoma retraction, and prolapse may occur as late complications.
4. Irritant contact dermatitis is the most frequent complication among individuals with ostomies.
5. Stoma and peristomal skin complications may be related to the inappropriate use of the ostomy appliance and the lack of follow-up after hospital discharge.
6. The convexity of the adhesive base helps reduce leakage and improve body fit, promoting comfort and a better quality of life for individuals with ostomies.
7. In cases of difficulty with ostomy appliance adhesion or irritant dermatitis, individuals should always be referred to the surgeon for the prescription of adjuvants.
Domain 2. Ostomy appliance
8. The appliance selected for use in the operating room should be a transparent, non-drainable, disposable bag to facilitate stoma management, emptying, and effluent monitoring.
9. Individuals with stomas should be discharged with a referral to PHC and a referral to a specialized Stoma Care Service.

10. The charcoal filter, when present in the ostomy appliance, should be protected during bathing and cleaning of the appliance.
11. Currently, ostomy appliances are available on the market as one-piece or two-piece systems, transparent or opaque, with or without odor filters, drainable or closed, and with or without protective skin barriers.
12. The ostomy appliance should be emptied when it is one-third full.
13. It is not necessary to empty the appliance before going to sleep or engaging in outside activities; this is only necessary when the appliance reaches its maximum capacity.
14. The opening cut into the adhesive base must be perfectly fitted to the size (diameter) and shape of the stoma, ensuring a seal that prevents effluent from contacting the skin.
15. The adhesive plate of the ostomy appliance should always be cut on the day it is changed, as the stoma may undergo changes in circumference.
16. For cutting, it is important to always use a sterile scalpel or scissors to prevent contamination of the ostomy pouch.
17. The frequency of changing the ostomy appliance should be determined by its fit, adhesion, and integrity.
Domain 3. Ostomy care
18. The stoma should be pink or pale, with a shiny and moist appearance, and may be painful to the touch.
19. Individuals with colostomies are more likely to develop peristomal dermatitis and experience difficulties related to daily activities than individuals with ileostomies.
20. Cleaning the stoma at home should be performed using normal saline and sterile gauze to prevent contamination of the stoma.
21. The collection system must be prescribed exclusively by a surgeon, in accordance with established criteria for the specific stoma and appliance.
22. The main parameters for stoma assessment when selecting an ostomy appliance are stoma height, drainage angle, type of adhesive base, and abdominal contour.
23. During ostomy appliance changes, accessories should be used to prevent stoma complications.
24. Caution should be exercised regarding the adhesion of the adhesive base, as the firmer the adhesion, the greater the risk of leakage, which may cause complications such as dermatitis.
Domain 4. Peristomal skin care
25. The stoma and peristomal skin should preferably be cleaned with water and mild soap or appropriate cleansing products and subsequently dried gently.
26. Gently pressing the adhesive base of the ostomy appliance with the fingertips helps activate heat and improve adhesion.
27. The pouch should preferably be positioned with the opening facing downward, using a closure system such as a clamp, plastic clip, velcro-style fastener, or plastic connectors.
28. The adhesive base of the ostomy appliance should be removed without water, as water makes removal of the adhesive more difficult.
29. The use of substances such as ointments, oils, moisturizing creams, and talcum powder on the peristomal skin helps prevent dermatitis.
30. If there is a lesion on the peristomal skin, it is important to recommend daily replacement of the appliance to facilitate healing.
31. The use of moisturizing substances on the peristomal area helps the adhesive of the collecting pouch adhere to the skin.
32. A hydrocolloid adhesive base for ostomy care protects the skin from contact with effluent and relieves irritant dermatitis.

33. The use of hydrocolloid paste as an accessory is indicated to improve adhesion between the adhesive base and the skin; however, in the presence of cavities or folds, it should be combined with another adjunct to level the peristomal skin.
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Source: Research data (2025).

DISCUSSION

Nursing professionals play an important role in providing care and guidance to patients with ostomies, contributing to their adaptation to the new circumstances they will face in their daily routines. In the absence of specialized nurses, generalist nurses assume the responsibility of providing essential care and meeting patients' educational needs⁽²⁴⁾. Thus, it is essential to create an instrument to assess nurses' knowledge regarding this care.

The importance of using scientific knowledge to develop reliable instruments for decision-making in health services is noteworthy. Adopting such instruments drives quality improvements and enhances patient care, particularly in PHC⁽²⁵⁾.

This study was developed with the objective of constructing an instrument to assess nurses' knowledge regarding care for individuals with intestinal elimination ostomies. The guidelines required to ensure scientific and methodological rigor were duly observed, and the research results demonstrated a robust and reliable model through various psychometric analyses conducted throughout the instrument development process. The final version of the instrument comprises four domains and 33 items.

The first domain, entitled "General Knowledge," consists of seven items addressing aspects related to legislation, preoperative stoma site marking, and possible complications associated with the stoma and peristomal skin. The second domain, entitled "Ostomy Appliance," contains 10 items related to the characteristics, indications, management, and frequency of changing ostomy appliances. It should be noted that such guidance represents a significant part of the demands addressed during consultations in health services, requiring nurses to have comprehensive technical and scientific knowledge of the different types of ostomy appliances and accessories available for the care of individuals with ostomies⁽²⁶⁾.

The third domain, "Ostomy Care," consisting of seven items, encompasses aspects related to stoma assessment, individualized selection of the most appropriate ostomy appliance, and the indication of adjunctive therapies when necessary. In turn, the fourth domain, "Peristomal Skin Care," comprising nine items, addresses the main complications affecting the peristomal skin and the therapeutic approaches used in their management.

In this context, it is worth noting that enhancing nurses' knowledge regarding stoma and peristomal skin assessment contributes to preventing and reducing complications, while

also improving the quality of care and the quality of life for individuals with ostomies⁽²⁷⁾. Therefore, it is crucial to use instruments capable of accurately and reliably assessing this knowledge, thereby supporting the identification of gaps in the care process and the planning of educational and clinical interventions tailored to the professionals' needs.

Considering that there are no objective methods for precisely measuring evidence of the content validity of an instrument, it may be assessed by a panel of judges or experts, as occurred in this study, in which the relevance of each questionnaire item was analyzed individually⁽²⁸⁾.

The assessment of evidence of content validity by experts is an essential stage in instrument development, as it allows verification of the representativeness and appropriateness of the items in relation to the construct and the context of use. In this study, all items presented CVR values above the critical cutoff point (0.59), with overall values above 0.80 for importance, relevance, and clarity, indicating a high degree of consensus. The experts' suggestions contributed to terminological adjustments and improvements in wording, with no need to exclude any items. Similar results have been observed in national studies investigating knowledge regarding ostomies in different care settings⁽⁹⁻¹⁰⁾.

The assessment of evidence of content validity constitutes a key stage in instrument development, ensuring its reliability and validity for preliminary testing. Validation is a comprehensive process, the first phase of which consists of studying content validity. This stage makes it possible to identify whether the instruments used are appropriate for the construct, population, and sociocultural context of the research or whether there is a need to develop or adapt instruments⁽²⁹⁾.

The findings of this study revealed adequate factor loadings and high reliability indices via EFA, in addition to the indicators employed, providing evidence of an instrument with indications of a solid and reliable internal structure for measuring the intended construct. Although the results of the confirmatory analysis indicated good model fit, some parameters related to construct replicability performed below expectations, possibly due to the sample size. Therefore, future studies are recommended to use larger and more diverse samples, including professionals from other care settings, which may contribute to strengthening the instrument's internal structure.

Regarding reliability, the instrument's items showed adequate values for both criteria ($\alpha = 0.88$ e $\omega = 0.87$). Although Cronbach's alpha is not an appropriate parameter for comparing models, as reported in recent literature⁽³⁰⁾, it remains a widely used indicator in studies involving the development of measurement instruments.

Communalities presented values above 0.40, ranging from 0.40 to 0.63, demonstrating that the items effectively measure the latent variable. Most items showed factor loadings above 0.50, as recommended in the literature⁽²¹⁾.

To achieve greater precision and quality in the instrument validation technique, as well as incorporating additional information into the model, the robust rotation technique (h and w) was used. The higher the value of w, the more significant the variable becomes within the instrument⁽²²⁾. Thus, the most relevant components of the instrument in each dimension were Item 29 (“The use of substances such as ointments, oils, moisturizing creams, and talcum powder on the peristomal skin contributes to the prevention of dermatitis.”) ($w = 0.63$) and Item 28 (“The adhesive base of the collecting appliance should be removed without water, as this makes the removal of the adhesive more difficult?”) ($w = 0.60$). None of the items obtained a weight close to 1, as all presented correlations with a significant sampling error, as indicated in the literature⁽²¹⁾.

Regarding the CFA, the instrument presented satisfactory levels of composite reliability and average variance. With respect to the CFA fit indicators, the instrument met the criteria for good model fit, with satisfactory RMSEA, GFI, and CFI values. The fit index is a measure that helps determine how well the instrument fits the model and, in this case, the instrument met all the criteria and was considered validated⁽²⁵⁾.

Although some items were reorganized based on their factor loadings, certain items were retained in their original domains, considering their conceptual relevance and alignment with the content addressed. Items 2, 8, and 5 remained in the “General Knowledge” domain; Items 3, 4, 12, 15, 16, 18, and 19 were retained in the “Ostomy Appliances” domain; and Items 13, 14, and 25 remained in the “Ostomy Care” domain.

The final instrument was consolidated into four dimensions: general aspects related to ostomies, ostomy care, ostomy appliance management, and peristomal skin care. Greater statistical relevance (higher w weights) was observed for items related to clinical management and skin care, whereas items concerning legislation or general concepts presented lower weights within the factor structure.

It is important to highlight that all 33 items comprising the final version of the instrument are presented in full in this article. The answer key is available for consultation and upon request directly from the corresponding authors. Limitations include the fact that data collection was conducted in a single municipality, which may restrict the generalizability of the findings, although this represents a first step toward establishing a valid instrument for the Brazilian context.

CONCLUSION

The study resulted in the development and evaluation of validity evidence for an instrument designed to assess nurses' knowledge regarding care for intestinal ostomies and peristomal skin in PHC. The instrument comprises 33 items distributed across four dimensions: general knowledge of ostomies, ostomy care, ostomy appliance management, and peristomal skin care. The instrument demonstrated satisfactory evidence of content validity, with high levels of agreement among experts, as well as an adequate factor structure and internal consistency, confirming its reliability and precision.

These findings demonstrated that the instrument has validity and reliability for assessing nurses' knowledge in this context, enabling the identification of educational gaps and supporting the planning of targeted educational interventions. Its implementation in clinical practice may contribute to improving the care provided to individuals with ostomies, particularly in the prevention of peristomal complications, thereby strengthening nursing practice in PHC.

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Data and material availability

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