Construction and validation of an instrument for classification of pediatric patients

Construção e validação de um instrumento de classificação de pacientes pediátricos

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Abstract

Objective: To construct a tool for classification of pediatric patients, validate its content, and assess the inter-rater reliability.

Methods: This is a quantitative study in which a mixed method was used. Validity of its content was assessed through a descriptive exploratory design using the Delphi technique. Inter-rater reliability was then assessed with a correlational design.

Results: After four stages of use of the Delphi technique, the instrument was composed of 11 care demand indicators. Each of them comprised one-to-four situations of graded complexity, that reflected increasing intensity of nursing need. The reliability levels as optimal, good, and weak were obtained for five, five, and one indicators, respectively.

Conclusion: The content of the instrument was constructed and validated with satisfactory reliability to classify pediatric patients into five healthcare categories.

Resumo

Objetivo: Construir, validar o conteúdo e verificar a confiabilidade interavaliadores de um instrumento para a classificação de pacientes pediátricos.

Métodos: Estudo misto com referencial quantitativo, sendo o delineamento descritivo exploratório para a validação do conteúdo do instrumento realizado pela Técnica Delphi seguido por desenho correlacional para avaliar a confiabilidade interavaliadores.

Resultados: Após quatro fases da Técnica Delphi, o instrumento ficou constituído por 11 indicadores de demanda de cuidado e cada um por quatro situações graduadas refletindo o aumento da necessidade de enfermagem. Obteve-se nível de confiabilidade ótimo para cinco indicadores; bom para cinco e apenas um indicador com fraco nível de confiabilidade.

Conclusão: Foi construído e validado o conteúdo do instrumento para classificar pacientes pediátricos em cinco categorias de cuidados com confiabilidade satisfatória.

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Introduction

Hospitalization in pediatrics is seen as an opportunity for the patients and their caregivers to experience recovery from illness and expand their knowledge on health promotion while maintaining the development of the child and preventing new admissions.[1]

In the management of pediatric admission units, the challenges to ensure high standards of care safety and quality require that the client profile be considered since only knowledge of the percent rate of bed occupancy is not sufficient for the manager to take decisions.[2-4]

Patient Classification Systems (PCS) have been disseminated since the 1970s as a method to characterize the care profile. In the PCS, the demand for nursing care by groups of patients is estimated, quantified and evaluated. In addition, the patients are categorized according to the need of care required in a specific time interval.[3] Furthermore, data obtained from application of PCS (late 1980s) have been indicated as a basis for planning costs regarding the need for human and material resources.[4]

Currently, use of PCS contributes to facilitate communication between nurses and managers, promote professional training by criteria of competence in giving assistance to different care categories, sustain staff scaling, relocation, and daily allocation of professionals.[5-8]

The need for tools and concepts of specific categories to classify pediatric patients was identified in a study (2011) that validated the concept of five care categories in pediatrics.[9] However, this study did not indicate a tool to facilitate patient classification in these categories.[9]

Therefore, the aim of this study was to construct an instrument for classification of pediatric patients in five care categories, validate its content, and verify its inter-rater reliability.

Methods

This is a mixed study, with a quantitative reference, which was conducted in two sequential steps [QUAN → quan]. In the first, a descriptive exploratory design was utilized to construct the instrument and validate its content. In the second, the correlational design was utilized to assess the inter-rater reliability of the instrument.

Conceptual references established by the PCS were taken into account to construct an objective instrument in the factor assessment style.[3,4]

Four situations increasingly graded (from one to four points) regarding care requirements were assigned to each indicator.

Validation of instrument content was carried out by a group of evaluators who used the Delphi Technique.[10] Three inclusion criteria were utilized to compose the group of evaluators: to be graduated in nursing, experienced (for a time equal to or greater than five years) in pediatric care (or in management or teaching), and conducting research on construction of instruments for patient classification.

Thus, 19 nurses (time of profession: five-23 years) participated in the study; six of them were active in assistance, five in management activity, and eight in teaching. Regarding professional qualifications, four nurses had only undergraduate degree, six had professional graduation, and nine had academic graduation (three of them with master's and six with PhD degree).

The program using the Delphi technique was obtained by e-mail after the project was submitted and evaluated for content of the instrument regarding clarity and relevance of each indicator and its scores. This technique allows consecutive steps until obtaining at least 70% agreement with instrument content. Lower levels of consensus required both modification in the content and a new step of analysis until the level of agreement previously established was reached.[10]

After the final version of the instrument was obtained, inter-rater reliability was assessed.[11] The sample consisted of patients admitted to the pediatric unit of a teaching hospital within the State of São Paulo. Data collection occurred in a single day after a term of informed consent was signed by the family. Patients were evaluated with simultaneous application of the instrument by two nursing graduate students experienced in pediatrics. Data were analyzed for reliability using the *Kappa* (k) coefficient as being optimal (k ≥ 0.75), good (0.41 ≤ k ≤ 0.74) and weak (k £ 0.40).[11]

The project of the study met all the national and international standards of ethics in research involving humans.

Results

At the beginning of construction, the instrument consisted of ten care indicators, and four steps (using the *Delphi* technique) were necessary to validate the content of all indicators and their respective scores (Table 1).

After four steps using the Delphi technique, the instrument has acquired its final configuration (Table 2).

To assess inter-rater reliability, the instrument was applied simultaneously in 42 pediatric patients by two nurses (Table 3).

Table 1. Percent rate of agreement of judges (n=19) with the content of the instrument

Indicators*		Delphi 1		Delphi 2		Delphi 3	Delphi 4
		Concepts	Score	Concepts	Score	Score	Score
I-1	Relevance	77	46	92	62	57	71
	Clarity	62	54	92	69	71	71
I-2	Relevance	100	92	92	92	-	-
	Clarity	46	85	92	92	-	-
I-3	Relevance	100	92	100	100	-	-
	Clarity	54	62	100	100	-	-
I-4	Relevance	92	77	100	85	-	-
	Clarity	85	69	100	100	-	-
I-5	Relevance	92	77	100	100	-	-
	Clarity	54	69	100	100	-	-
I-6	Relevance	92	23	92	54	79	
	Clarity	46	46	100	85	86	-
I-7	Relevance	92	46	100	69	71	-
	Clarity	69	69	100	69	86	-
I-8	Relevance	100	54	92	46	93	-
	Clarity	62	54	92	85	86	-
I-9	Relevance	85	77	100	54	57	86
	Clarity	62	43	100	69	93	79
I-10	Relevance	-	-	100	92	-	-
	Clarity	-	-	92	85	-	-
I-11	Relevance	-	-	100	77	-	-
	Clarity	-	-	92	85	-	-
I-12	Relevance	77	46	-	-	-	-
	Clarity	62	38	-	-	-	-

Legend: n=19; * I-1: Activity; I-2: Assessment of physiological controls; I-3: Oxygenation; I-4: Drug therapy; I-5: Cutaneous and mucosal integrity; I-6: Feeding and hydration; I-7: Elimination; I-8: Personal hygiene; I-9: Mobility and ambulation; I-10: Participation of the accompanying person; I-11: Support network; I-12: Education to the family member

Table 2. Instrument for classification of pediatric patients (ICPP)

Activity: Possibility of maintaining activities compatible with developmental age exercising skills relevant to each age and interacting with the accompanying person, staff, or other children to make smile, play, talk, etc.

1   Development of activities compatible with the age group

2   Sleepy

3   Hypoactive or hyperactive, or with deficient development

4   Unconscious or sedated, or vigil coma

Physiological controls assessment: need for observation and control of data such as vital signs, central venous pressure, capillary blood glucose, and water balance.

1   6/6 h

2   4/4 h

3   2/2 h

4   < 2 h

Oxygenation: ability of the child or adolescent to maintain permeability of airways, and normal ventilation and oxygenation.

1   Spontaneous breathing, without the need for oxygen therapy or airway clearance

2   Spontaneous breathing, with the need for airway clearance by instilling saline

3   Spontaneous breathing, with the need for airway clearance by aspirating secretion and/or need for oxygen

4   Mechanical ventilation (non-invasive or invasive)

Drug therapy: need of the child or adolescent to receive medication

1   No need for medication

2   Need for medication by topical, inhalation, ocular and/or oral route

3   Need for medication by feeding tube or parenteral route (subcutaneous, intramuscular or intravenous)

4   Use of vasoactive agents and/or blood derivatives and/or chemotherapeutic agents

Mucocutaneous integrity: need for maintaining or restoring the mucous and cutaneous integrity

1   Intact skin without change in color across body surface

2   Need for surface bandage, small size

3   Presence of hyperemia (pressure points or perineum) or flogistic signs anywhere in body surface requiring medium size bandage

4   Presence of lesion, with dehiscence or secretion, requirements large size bandage

Feeding and Hydration: the ability of a child or adolescent to ingest food alone, with assistance, by feeding tube, or parenteral route

1   Oral route, independently, or exclusive maternal breastfeeding

2   Oral route, with assistance, and cooperative patient

3   Feeding tube (gastric, enteral, or gastrostomy)

4   Nutrition by parenteral or oral route, patient with difficulty of swallowing, or risk of aspiration

Eliminations: ability of the child or adolescent to perform urinary and intestinal elimination, alone and/or need to use a tube

1   Toilet, without assistance

2   Toilet, with assistance

3   Diaper (need a professional to exchange) or indwelling urinary catheter

4   Intravesical catheter or stoma, or use of bedpan or urinal, or diaper (need two professionals to exchange)

Personal hygiene: ability of the child or adolescent to perform, need assistance, or total dependence for personal hygiene

1   Aspersion bath, without assistance

2   Aspersion bath, with assistance

3   Tub bath or chair bath

4   Bed bath or bath in the incubator, or need more than one nurse to perform any bath

Table 2. Continuation

Mobility and ambulation: ability of the child or adolescent to voluntarily move the body or body segments

1   Ambulation without assistance

2   Bed rest, moves without assistance

3   Bed rest, moves with assistance or ambulates with assistance

4   Bedridden, entirely dependent for change in decubitus

Participation of the accompanying person: performance of the accompanying person to perform care and meet the needs of the child or adolescent

1   The accompanying person recognizes the emotional and physical needs of the pediatric patient and can meet them

2   The accompanying person seeks information to meet the emotional and physical needs of the pediatric patient

3   The accompanying person has difficulty in recognizing some emotional and physical needs of the pediatric patient and resists in seeking help and making changes

4   The accompanying person appears to be neither attentive nor interested in the emotional and physical needs of the pediatric patient and/or patient not accompanied

Support Network: support that the child or adolescent can count on during his/her hospital stay

1   Presence of a reliable person accompanying the patient all the time

2   Presence of a reliable person accompanying the patient for more than 12 hours a day

3   Presence of a reliable person accompanying the patient for less than 12 hours a day

4   Not accompanied

Legend: Score to classify patients regarding the level of care: 11-17 points: Minimum care; 18-23 points: Intermediate care; 24-30 points: High-dependency care; 31-37 points: Semi-intensive care; 38-44 points: Intensive care.

Table 3. Kappa (k) values for all indicators of the instrument in the classification of pediatric patients

Indicators	Levels of reliability		
	Weak	Good	Optimal
	k≤0.40	0.41≤ k≤0.74	k≥0.75
Activity	0.38		
Physiological controls assessment		0.41	
Drug therapy			0.84
Oxygenation			0.86
Cutaneous and mucosal integrity		0.60	
Mobility and ambulation		0.66	
Personal hygiene		0.67	
Feeding and hydration		0.60	
Elimination			0.84
Participation of the accompanying person;			0.82
Support network			0.81

Legend: n=42

Discussion

The type of reliability used in this study, not verification of internal consistency of the instrument, and evaluation of construct validity were the limitations of this study.

This study allowed us to build, validate the content, and assess the inter-rater reliability of the ICPP in five care categories defined in the literature as minimal, intermediate, high-dependency, semi-intensive, and intensive care.[9]

The presence of five care categories was similar to that in the Fugulin's instrument (for adult patients in the surgical clinic) but differed from that in the *Perroca's* instrument (for adult patients), which does not include the high-dependence cat-

egory, and from that in the *Bochembuzio's* instrument (for neonatal patients), which includes only three care categories.[12-14]

The classification of pediatric patients in the of high-dependence category was considered important because it allows identifying care needs inherent to the development phase, in which there is dependence in basic needs, independent of the clinical stability.[9]

The use of *Delphi* technique was advantageous for validation of its content, because it allowed its assessment by professionals from different geographic locations, hierarchical positions, knowledge, insights, and professional perspectives.[10]

The most important changes in the content of the instrument occurred in the first stage of the *Delphi* technique, when the indicator "Education to the family member" was replaced by "Participation of the accompanying person" and "Support Network". In the second stage, all indicators achieved the consensus established, but the score required change in six indicators. In the third stage, the score was validated in four indicators. In the last stage, the score in the last two indicators reached the level of agreement established.

We highlight that two indicators related to family members were validated, since their presence in the hospital environment has determined changes in the care and challenged the staff in a new perspective of care quality, which includes provision of care, involvement of accompanying persons in daily actions, and promoting continuity of the treatment at the patient's home.[1,2]

In the assessment of inter-rater reliability, ICPP showed optimal reliability levels for five indicators; good for five indicators, and weak for only one indicator.[11]

Conclusion

The content of the instrument for classification of pediatric patients was constructed and validated in five care categories with a satisfactory reliability.

Collaborations

Dini AP and Guirardello EB declare that they contributed equally to the conception and design of the study, analysis and interpretation of data, writing of the manuscript, critical review for relevant intellectual content, and final approval of the version to be published.

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