

The evaluation of an instrument for pediatric oncology patient classification*

AVALIAÇÃO DE UM INSTRUMENTO PARA CLASSIFICAÇÃO DE PACIENTES PEDIÁTRICOS ONCOLÓGICOS

EVALUACIÓN DE UN INSTRUMENTO PARA CLASIFICACIÓN DE PACIENTES PEDIÁTRICOS ONCOLÓGICOS

Sandra de Andrade¹, Sérgio Vicente Serrano², Maria Salete de A. Nascimento³, Stela Verzinhasse Peres⁴, Allini Mafra da Costa⁵, Regina Aparecida Garcia de Lima⁶

ABSTRACT

The objectives of this study were to assess the interrater reproducibility of the instrument to classify pediatric patients with cancer; verify the adequacy of the patient classification instrument for pediatric patients with cancer; and make a proposal for changing the instrument, thus allowing for the necessary adjustments for pediatric oncology patients. A total of 34 pediatric inpatients of a Cancer Hospital were evaluated by the teams of physicians, nurses and nursing technicians. The Kappa coefficient was used to rate the agreement between the scores, which revealed a moderate to high value in the objective classifications, and a low value in the subjective. In conclusion, the instrument is reliable and reproducible, however, it is suggested that to classify pediatric oncology patients, some items should be complemented in order to reach an outcome that is more compatible with the reality of this specific population.

DESCRIPTORS

Child
Neoplasms
Classification
Pediatric nursing

RESUMO

Este estudo teve como objetivos avaliar a reprodutibilidade interavaliadores do instrumento para a classificação de pacientes pediátricos portadores de câncer; verificar se o instrumento de classificação de pacientes é adequado a pacientes pediátricos portadores de câncer e elaborar uma proposta de modificação do instrumento, permitindo a adaptação para pacientes pediátricos oncológicos. Foram avaliados, na unidade de internação pediátrica de um Hospital de câncer, 34 pacientes pelas equipes de médicos, enfermeiros e técnicos de enfermagem. Para a avaliação do grau de concordância entre os escores obtidos pelos avaliadores foi utilizado o coeficiente Kappa, que revelou um valor intermediário/alto nas classificações objetivas, e um valor baixo nas subjetivas. Conclui-se que o instrumento é confiável e reprodutível, porém, para classificação do paciente pediátrico oncológico, sugere-se a complementação de itens para atingir um resultado mais compatível com a realidade dessa população.

DESCRITORES

Criança
Neoplasias
Classificação
Enfermagem pediátrica

RESUMEN

Estudio que objetivó estimar la reproducibilidad inter-evaluadores del instrumento para la clasificación de pacientes pediátricos portadores de cáncer; verificar si el instrumento de clasificación de pacientes es adecuado para pacientes pediátricos portadores de cáncer y elaborar una propuesta de modificación del instrumento, permitiendo su adaptación para pacientes pediátricos oncológicos. Fueron evaluados 34 pacientes en la unidad de internación pediátrica de un Hospital oncológico por parte de los equipos de médicos, enfermeros y técnicos de enfermería. Para estimar el grado de concordancia entre los puntajes obtenidos por los evaluadores, se utilizó el coeficiente Kappa, que expresó un valor entre intermedio y alto en las clasificaciones objetivas, y un valor bajo en las subjetivas. Se concluye en que el instrumento es confiable y reproducible, aunque para la clasificación del paciente pediátrico oncológico se sugiere la implementación de ítems para alcanzar un resultado más compatible con la realidad de éste población.

DESCRIPTORES

Niño
Neoplasias
Clasificación
Enfermería pediátrica

*From the dissertation "Adaptação de um instrumento para classificação de pacientes baseado nas necessidades individualizadas no cuidado de enfermagem do paciente pediátrico oncológico", Post-graduate Program in Research and Development, Medical Biotechnology, Universidade Estadual Paulista, 2009. ¹MSc in Medical Biotechnology from the Universidade Estadual Paulista. Registered Nurse of the Barretos Cancer Hospital. Barretos, SP, Brazil. pediatriaint@hcancerbarretos.com.br ²PhD in Medical Sciences from the University of São Paulo. Physician of the Clinical Oncology Service of the Barretos Cancer Hospital. Barretos, SP, Brazil. oncologiaclinica@hcancerbarretos.com ³PhD in Medical Sciences from the University of São Paulo. Physician of the Palliative Care Service of the Barretos Cancer Hospital. Barretos, SP, Brazil. salatenascimento@hcancerbarretos.com.br ⁴PhD student in Public Health of the University of São Paulo. Biostatistician of the Teaching and Research Institute of the Barretos Cancer Hospital. Barretos, SP, Brazil. epidemiologia@hcancerbarretos.com.br ⁵Undergraduate Nursing Student. Database Manager of the Teaching and Research Institute of the Barretos Cancer Hospital. Barretos, SP, Brazil. gerenciadornap@hcancerbarretos.com.br ⁶Registered Nurse. Full Professor of the Maternal-Infant Nursing and Public Health Department of the University of São Paulo at Ribeirão Preto College of Nursing. Ribeirão Preto, SP, Brazil. limare@eerp.usp.br

INTRODUCTION

In Nursing the need is being increasingly felt for the use of a scientific method as a framework for the organization of the care. This would allow professionals to develop practical, efficient and rapid methods to obtain results, related to the improvement of the care and to the assignment of the staff⁽¹⁾. The adoption of a Patient Classification System (PCS), as a tool for the administrative practice of nursing, provides decision-making in areas related to the assignment of the staff, quality and monitoring the cost of the nursing care⁽²⁻³⁾. Patients have been classified according to few parameters such as medical diagnosis, age and gender, among others. Although these criteria are objective, they offer no clear distinction regarding the need for nursing care for the patients^(2,4). In 1920, Florence Nightingale suggested that patients who present a more severe clinical condition should stay in the beds closer to the nursing station⁽⁵⁾. However, only from this decade have the hospitals in the U.S.A. begun to classify patients according to disease severity and type of care⁽⁶⁾.

In the 1970s in Brazil, studies were initiated concerning Progressive Patient Classification (PPC) as an instrument for the assignment of nursing human resources for adult patients, in order to provide a more equitable distribution of the care, and to increase hospital productivity and efficiency⁽⁷⁾. Some classification instruments for adult patients based on the individualized nursing care needs have also been validated by authors assuming that the severity of the patient of the unit has vital importance in the assignment of staff in the healthcare institutions⁽⁸⁻¹⁰⁾.

The lack of an adequate reference leads the nursing staff to classify these patients in an equivocal manner, using parameters that do not reflect the real care needs of these clients and, consequently, cause distortions in the quantitative prediction of the nursing staff. To meet this need, an instrument used as a classification system for pediatric patients was validated, with the aim of evaluating the degree of dependency of the patient in relation to the nursing care⁽¹¹⁾. In this instrument eleven nursing demand indicators are presented, with each indicator being assigned four graduated care dependency situations with a numerical value of one to four points, with one point representing a lower nursing demand and four points a greater requirement for the nursing care. Because of the difficulty in the assignment of the nursing staff in the care of pediatric oncology patients, this study aimed to implement and apply, in the oncology inpatient unit of the Barretos Cancer Hospital, the pediatric patient classification instrument, in order to evaluate the degree of reproducibility between evaluators and to see if it integrally meets the characteristics of the pediatric oncology patient.

METHOD

A descriptive, exploratory, cross-sectional study was performed. This study evaluated 34 pediatric patients with cancer, hospitalized in the Pediatric Inpatient Unit of the Barretos Cancer Hospital - Pio XII Foundation, between September and December 2008. The evaluations were undertaken by the staff of the pediatric department which consisted of three physicians, three nurses and six nursing technicians.

The pediatric department consists of 10 inpatient beds and daily there is a physician, a nurse and three technicians per shift, each physician is responsible for visiting the ward for seven consecutive days and the duty roster of the nurses and technicians is completed on a daily basis. Each patient was evaluated separately by a physician, a nurse and a nursing technician, as well as the researcher. The evaluations of the patient were carried out in the first 24 hours of hospitalization, during the same work shift, at times as close as possible. The duly completed forms were collected at the end of each evaluation by the principal researcher. This study was considered as a standard to compare the evaluation of the principal researcher (specialist oncology nurse). As this is an analysis of reproducibility, in which the interpretation of the subjects regarding the instrument is a fundamental part of the results, the explanations were brief and succinct. The evaluators were instructed not to consult the others during this process, and not to disclose their evaluations.

For the data collection, a previously validated pediatric patient classification instrument was used. This instrument consists of 11 nursing demand indicators: activity, interval of measurement of controls, breathing, pharmacological therapy, nutrition and hydration, elimination, bodily hygiene, skin and mucosa integrity, mobility and walking, support network, and support and participation of the partner. A degree of care dependence is assigned to the indicators, ranging from one to four points, in accordance with the increase in the nursing requirement. To determine the final level of complexity the scores of each of the 11 indicators are summed. The score ranges from a minimum of 11 points to a maximum of 44 points. This score is divided into five levels of nursing care complexity:

- Level I - minimal nursing care (11 to 18 points)
- Level II - intermediate nursing care (19 to 23 points)
- Level III - high dependence nursing care (24 to 30 points)
- Level IV - semi-intensive nursing care (31 to 36 points)
- Level V - intensive nursing care (37 to 44 points)

Because of the difficulty in the assignment of the nursing staff in the care of pediatric oncology patients, this study aimed to implement and apply, in the oncology inpatient unit of the Barretos Cancer Hospital, the pediatric patient classification instrument...

For data collection, the principal investigator and the other teams of evaluators applied the collection instrument and recorded the information on a form consisting of three parts: The first part consists of the 11 nursing demand indicators. In this the evaluators attributed a score (grade) of 0 to 4 for each indicator. The sum of these scores (grades) was used later to obtain the classification of the level of complexity of nursing care as described above, i.e. level I to V. This classification was called the **Objective Classification** and was obtained by the investigator without the knowledge of the evaluators and does not reflect the opinion of the evaluators. The second part asks for the opinion of the evaluator regarding the level, I to V, in which the patient should be classified according to level of nursing care complexity. This classification was called the **Subjective Classification**. The third part asks the evaluator to give their opinion on the need to include other indicators in the instrument and for any suggestions.

In order to measure the reproducibility of the pediatric patient classification instrument, the Kappa Coefficient was used. This coefficient can be defined as a measure of association used to describe and test the degree of concordance (reliability and accuracy) in the classification. The degree of concordance was based on the classification of Landis and Koch as follows: when the Kappa coefficient obtains a value <0.40 it is interpreted as low concordance, when the coefficient obtains a value from 0.40 to 0.75 it is interpreted as intermediate concordance, and when this value was >0.75 it is interpreted as high concordance⁽¹²⁾.

The data were tabulated and analyzed using the program SPSS for Windows, version 15.0 and intercooled STATA version 9.0. The sample characterization was performed by means of absolute and relative frequencies and measures of central tendency and dispersion (mean, median, standard deviation, minimum and maximum). A level of 5% ($p < 0.05$) was assumed for statistical significance. This study was approved by the Research Ethics Committee of the Barretos Cancer Hospital on July 11, 2008 (158/2008). In

order to verify that this instrument was adequate for the classification of pediatric cancer patients, the levels of care complexity attributed by the evaluators in the subjective classification were compared with the levels of complexity obtained by summing the scores of the 11 indicators of the instrument, in the objective classification.

RESULTS

In the 34 patients of this sample the mean age was 10.94 (sd=5.5) years, with a median of 12 years, ranging between 01 and 20 years. Table 1 shows the characteristics of the patients according to gender, type of neoplasm and the reason for hospitalization.

Table 1 - Characteristics of the patients studied - Barretos Cancer Hospital, 2008

Variables	Categories	N	%
Gender	Female	18	52.9
	Male	16	47.1
Pathologies	Lymphomas	7	20.6
	Osteosarcoma	6	17.6
	CNS	5	14.7
	Leukemias	5	14.7
	Ewing's sarcoma	3	8.8
	Neuroblastoma	3	8.8
	Rhabdomyosarcoma	2	5.9
	Germ Cells	2	5.9
	Wilms	1	2.9
Reason for hospitalization	Febrile neutropenia	11	32.3
	Chemotherapy	11	32.3
	Clinical Support	7	20.5
	Surgical	4	11.7
	Palliative	1	3.0

Table 2 presents the comparison between the objective classification made by the physician, nurse and nursing technician evaluators and the classification made by the researcher.

Table 2 - Analysis of the concordance between the classification of the care complexity levels - Barretos Cancer Hospital, 2008

Objective Classification (evaluators)	Level of Nursing Care Complexity	Classification Attributed by the Researcher			Total
		I	II	III	
		n (%)	n (%)	n (%)	
Physicians	I	16 (88.8)	5 (41.6)	0	21
	II	2 (11.1)	7 (58.3)	2 (50.0)	11
	III	0	0	2 (50.0)	2
	Total	18 (53.0)	12 (35.3)	4 (11.7)	34 (100)
Kappa Coefficient = 0.69, p < 0.001					
Nurses	I	17 (94.4)	2 (16.6)	0	19
	II	1 (5.5)	9 (75.0)	1 (25.0)	11
	III	0	1 (8.3)	3 (75.0)	4
	Total	18 (53.0)	12 (35.3)	4 (11.7)	34 (100)
Kappa Coefficient = 0.84, p < 0.001					
Nursing Technicians	I	16 (88.8)	3 (25.0)	1 (25.0)	20
	II	2 (11.1)	9 (75.0)	0	11
	III	0	0	3 (75.0)	3
	Total	18 (53.0)	12 (35.3)	4 (11.7)	34 (100)
Kappa Coefficient = 0.71, p < 0.001					

Within the sample studied, there was no indication and/or classification of patients needing intensive or semi-intensive care by any of the professionals in the objective classification, possibly due to the care profile of the service. Note that between the researcher and the physicians an intermediate value of the Kappa coefficient ($K=0.69$), $p < 0.001$ was obtained, between the researcher and the nurses the results showed a high Kappa coefficient ($K=0.84$); $p < 0.001$, and between the researcher and the nursing technicians the Kappa coefficient was intermediate ($K=0.71$), $p < 0.001$. The resulting classification of the scores was called the objective classification and did not

necessarily reflect the opinion of each evaluator. The comparison of the objective classifications of the evaluators with the subjective classifications, regarding the levels of nursing care complexity, was performed together with the consideration of the comments and suggestions of the evaluators, to verify that the proposed pediatric patient instrument is adequate for infant-juvenile cancer patients.

Table 3 presents the comparison between the levels of nursing care complexity obtained for the objective classifications and the levels obtained for the subjective classifications of the evaluators.

Table 3 - Analysis of concordance between the objective and subjective classifications attributed by the evaluators - Barretos Cancer Hospital, 2008

Subjective Classification	Level of complexity	Objective classification				Total
		I	II	III	IV	
		n (%)	n (%)	n (%)	n (%)	
Physician	I	3 (100)	0	0	0	3 (100)
	II	13 (59.1)	9 (40.1)	0	0	22 (100)
	III	4 (50)	2 (25)	2 (25)	0	8 (100)
	IV	1(100)	0	0	0	1 (100)
	Total	21 (61.7)	11 (32.3)	2(5.8)	0	34 (100)
		Kappa= 0.12		p= 0.095		
Nurse	I	16 (100)	0	0	0	16 (100)
	II	2 (16.6)	10 (83.3)	0	0	12 (100)
	III	0	1 (20)	4 (80)	0	5 (100)
	IV	0	0	0	0	0
	Total	18 (54.5)	11 (33.1)	4 (12.1)	0	33 (100)
		Kappa= 0.91;		p= < 0.001		
Nursing Technician	I	2 (100)	0	0	0	2
	II	15 (83.3)	3 (16.6)	0	0	18
	III	3 (21.4)	8 (57.1)	3 (21.4)	0	14
	IV	0	0	0	0	0
	Total	20 (58.8)	11(32.3)	3 (8.8)	0	34 (100)
		Kappa= 0.31		p = < 0.001		

These data show a low Kappa coefficient ($K=0.12$) $p=0.095$ for the opinions of the physicians and a low Kappa coefficient ($K= 0.31$), $p < 0.001$ for the opinions of the nursing technicians. This demonstrates a low concordance between the subjective classification and the objective classification obtained from the opinion of the physicians and nursing technicians. Concerning the objective and subjective classifications attributed by the nurses surprisingly a higher Kappa coefficient ($K=0.91$) $p < 0.001$ was observed.

DISCUSSION

Analyzing the suggestions and comments made by the evaluators a correlation was observed between some aspects of the clinical condition of the patients and the subjective classification of the levels of nursing care complexity attributed by physicians, nurses and nursing technicians. It was verified that the teams of physicians and technicians subjectively classified the patients with a

greater degree of dependence, mainly due the particularity and complexity of the pediatric oncology patient. As previously mentioned there was high concordance between the objective classifications and the subjective classifications made by the nursing team, which did not occur in the physician and nursing technician evaluators. As verified by the teams of evaluators, with pediatric oncology patients the classification instrument does not take into consideration the presence of an important clinical characteristic, i.e. febrile neutropenia. The complexity of the disease imposes a greater demand on the healthcare teams for care to these patients. Therefore, in the majority of cases the pediatric patient classification instrument used classified the neutropenic patient as level I (minimal care), whereas this patient should be classified as level II (intermediate care). Febrile neutropenia is defined as the absolute neutrophil count below 1000 per mm^3 . When the neutrophil level falls below 500 per mm^3 the possibility of infections occurring increases significantly. The clinical signs or symptoms are probably manifested due

to the reduction in the inflammatory response, because of the lack of neutrophils. The patient should be watched carefully, avoiding major complications, and therefore requires greater care from the nursing team⁽¹³⁾.

This study showed that when the evaluators classified the patients objectively, i.e. through the instrument, the Kappa coefficient was shown to be intermediate to high ($K=0.69$ to $K=0.84$), which shows that the instrument is useful, reproducible and practical. However when the comparison of the subjective classification of patient complexity was performed through the sum of the scores versus the subjective opinion of the evaluators, there was a discrepancy in the concordance, especially that of the physicians and of the nursing technicians, with low Kappa coefficient values ($K=0.12$ and $K=0.31$ respectively). However, the Kappa coefficient of the nursing team was high ($K = 0.91$). Thus, the study verified the reproducibility of the instrument among the evaluators, since in the Brazilian literature there is only one instrument for the classification of pediatric patients and this is an instrument for the classification of pediatric non-oncology patients.

The lack of specific instruments for the classification of pediatric oncology patients was the motivating factor for this study, since the patient classification instrument is essential for the assignment of the nursing team to ensure quality care. In addition to minimizing costs to the hospital and providing better utilization of both the physical area and the nursing team, it is the job of the nurse to classify the patients according to the care required in order to establish an adequate framework of personnel⁽¹⁴⁾. In the literature, some studies of the classification of adult patients that included pediatric patients in their sample classified the pediatric patient as high nursing care dependency regardless of the level of complexity presented⁽⁹⁾. Studies conducted with nurses in the use of the patient classification system show that nurses do not use the patient classification system appropriately in their daily clinical practice⁽¹⁵⁾.

The limitations of the study were the small number of evaluators in the pediatric department, the rotation of the nursing duty rosters, and the reduced number of inpatients during the study period. In the literature authors⁽¹⁶⁾ have studied the properties of the Kappa coefficient and, among other topics, have approached statistical significance, presenting the test power for different sample sizes and null hypotheses. It was found that the sample size of 30, considering a two-tailed test hypothesis with null value = 0, has a test power 0.9 (90%) to identify a Kappa Coefficient index ≥ 0.6 (60%) being statistically different from zero. Therefore, considering that the significant Kappa Coefficients in this study were all greater than or equal to 0.6 (60%) with a sample size of 34 patients, it can be considered that the results can be expanded to the population taking into consideration the conclusions reached in the interpretation of the estimates. The lack of classification instruments for pediatric patients makes it impossible to compare the data from this study.

CONCLUSION

The present study demonstrated the importance of the classification of pediatric oncology patients. The pediatric patient classification instrument used is an easy to apply tool with high inter-evaluator reproducibility. A limitation of this instrument is that it does not contemplate a clinical feature frequently observed in pediatric oncology patients and that has great importance for the classification of the level of nursing care complexity. Therefore it is proposed to adapt the pediatric patient classification instrument used in this study, with an additional indicator for febrile neutropenia. The instrument can be used as a basis for further studies aiming to improve the nursing care process, and in future investigations, to test the instrument and apply it as a management tool in the clinical practice.

REFERENCES

1. Martins PASF, Arantes EC, Forcella HT. Sistema de classificação de pacientes na especialidade psiquiátrica: validação clínica. Rev Esc Enferm USP. 2008;42(2):233-41.
2. Giovanetti P. Understanding patient classification systems. J Nurs Adm. 1979;9(2):4-9.
3. Huber D. Leadership and nursing care management. Philadelphia: Saunders; 2000. Staffing and scheduling; p. 573-90.
4. RainioAK, Ohinmaa AE. Assesment of nursing management and utilization of nursing resourcer with the RAFAELA patient classification system-case study from the general wards of one central hospital. J Clin Nurs. 2005;14(6):674-84.
5. Alward RR. Patient classification systems: the ideal vs reality. J Nurs Adm. 1983;13(2):14-9.
6. Fugulin FMT, Gaidzinski RR. Horas de assistência de enfermagem: análise comparativa de parâmetros. Nursing (São Paulo). 2003(23):30-4.
7. Ribeiro CM. Sistema de classificação de pacientes como subsídio para provimento de pessoal de enfermagem [tese doutorado]. São Paulo: Escola de Enfermagem, Universidade de São Paulo; 1972.
8. Versa GLGS, Inoue KC, Nicola AL, Matsuda LM. Influência do dimensionamento da equipe de enfermagem na qualidade do cuidado ao paciente crítico. Texto Contexto Enferm. 2011;20(4):796-802.

9. Fugulin FMT, Gaidzinski RR, Kurcgant P. Sistema de classificação de pacientes: identificação do perfil assistencial dos pacientes das Unidades de Internação do HU-USP. *Rev Latino Am Enferm*. 2005;13(1):72-8.
10. Perroca MG, Gaidzinski RR. Análise da validade de construção do instrumento de classificação de pacientes proposto por Perroca. *Rev Latino Am Enferm*. 2004;12(1):83-91.
11. Dini PA, Fugulin FMT, Verissimo MLOR, Guirardello EB. Pediatric Patient Classification System: construction and validation of care categories. *Rev Esc Enferm USP [Internet]*. 2011 [cited 2011 July 25];45(3):575-80. Available from: http://www.scielo.br/pdf/reeusp/v45n3/en_v45n3a04.pdf
12. Landis JR, Koch GG. An application of hierarchical Kappa-type statistics in the assessment of majority agreement among multiple observers. *Biometrics*. 1977;33(2):363-74.
13. Pollock ER, Doroshow JH, Khayat D, Nakao A, Sullivan BO, editores. *UICC manual de oncologia clínica*. 8ª ed. São Paulo: Fundação Oncocentro; 2006.
14. Martins EAP, Haddad MCL. Validação de um instrumento que classifica os pacientes em quatro graus de dependência do cuidado de enfermagem. *Rev Latino Am Enferm*. 2000;8(2):74-82.
15. Vigna PC. Utilização de Sistema de Classificação de Pacientes e métodos de dimensionamento de pessoal de enfermagem. *Arq Ciênc Saúde*. 2007;14(1):8-12.
16. Sim J, Wright CC. The Kappa statistic in reliability studies: use, interpretation, and sample size requirements. *Phys Ther*. 2005;85(3):257-68.