



Risk classification in pediatrics made by nurses focusing on clinical conditions

Classificação de risco em pediatria realizada por enfermeiros com enfoque nas condições clínicas

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Objective: to verify the association between the classification of risk made by the nurses and the clinical conditions presented by children and adolescents. **Methods:** a cross-sectional study was carried out with 397 children/adolescents in the emergency room of a public secondary hospital. In the data collection, a formulary was used, containing sociodemographic and clinical data; and the Guideline for Acceptance with Risk Rating in Pediatrics. **Results:** there was no significant association between the socio-demographic characteristics of the children and risk classification. They were female, aged between one and five years and weight appropriate for the age group. There was a significant association ($p < 0.005$) between risk ratings, risk discriminators ($p = 0.001$), procedures performed ($p < 0.001$) and patient's destination ($p = 0.013$). **Conclusion:** the association between adopted risk classification and pediatric clinical variables confirms the degree of complexity presented by children/adolescents, favoring assertive clinical evaluation by the host nurse.

Descriptors: Triage; Pediatric Nursing; User Embracement; Health Promotion.

Objetivo: verificar associação entre a classificação de risco realizada por enfermeiros e as condições clínicas apresentadas por crianças e adolescentes. **Métodos:** estudo transversal, realizado com 397 crianças/adolescentes na emergência de hospital público de nível secundário. Utilizaram-se, na coleta de dados, de formulário, contendo dados sociodemográficos e clínicos; e do Guia de Acolhimento com Classificação de Risco em Pediatria validado. **Resultados:** não houve associação significativa entre características sociodemográficas das crianças e classificação de risco. Predominaram crianças do sexo feminino, idade entre um e cinco anos e peso adequado para faixa etária. Houve associação significativa ($p < 0,005$) entre classificações de risco adotadas, discriminadores de risco ($p = 0,001$), procedimentos realizados ($p < 0,001$) e destino do paciente ($p = 0,013$). **Conclusão:** a associação entre classificação de risco adotada e variáveis clínicas pediátricas confirma o grau de complexidade apresentado por crianças/adolescentes, favorecendo avaliação clínica assertiva por enfermeiros no acolhimento.

Descritores: Triage; Enfermagem Pediátrica; Acolhimento; Promoção da Saúde.

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Introduction

The guiding principles of the implementation of public policies for reorientation of the work process in hospital units seek to justify the postulates of health promotion. In this perspective, in order to make feasible the principles and expected results with HumanizaSUS, the National Humanization Policy operates with devices, such as the Risk Classification Reception, which prioritizes service in order of severity, to the detriment of the order of arrival to the institution, from of qualified listening among health professionals and users/population, guaranteeing to all vulnerability, severity and risk assessment⁽¹⁾.

However, the overcrowding of hospital emergencies by users who could receive resolute care in primary care generates high hospitalization rates and high expenses due to the need to use technologies. Clinical efficacy evaluation allows the patient to know the clinical picture and characterize the profile of the cases attended⁽²⁾. It also assists in the preparation of grants, facilitating the work process, through the implementation of strategies that bring human and technological resources into real service needs⁽³⁻⁴⁾.

Morbidity and mortality rates in childhood represent opportunities for the development of strategies aimed at reducing the risk of death or injury among children and adolescents in health services. Epidemiological data points to malnutrition in the prevalence of deaths due to childhood diseases, especially the transmissible, neonatal and nutritional conditions. Improvements in sanitary and nutritional conditions in the country and access to health care in the hospital network, in addition to the introduction of rotavirus vaccine and oral rehydration therapy in basic care, changed the national scenario of deaths. Diarrheal diseases went from the 2nd to the 7th position among the main causes of death, respiratory diseases, especially pertussis, changed from the 3rd to the 5th position, external causes, accidents and violence were among the 15 leading causes of death in children under five years, we represent a national scenario of

preventable deaths, reducing the impact on public health and society⁽⁵⁾.

In this sense, researchers have invested in developmental studies, which offer methods and/or tools for clinical evaluation, capable of identifying the degree of complexity and risk of death, through the main complaint and the respective clinical conditions of patients.

Due to the high flow of care in emergencies, the decision-making process of the nursing staff should be carried out in a fast and scientifically informed manner, generating evidence-based, uniform and quality assistance, thus research that has an impact on the practice of caring⁽³⁾.

Therefore, knowing the clinical conditions related to the degree of complexity of children and adolescents in care in emergencies can provide subsidies for the work of hospices in the host with risk classification, from a technical point of view, ensuring assertive decision making and reducing injuries or damages, or from the perspective of health promotion, by incorporating the National Humanization Policy into care. Thus, the objective of this study was to establish an association between the classification of pediatric risk by nurses and the clinical conditions presented by children and adolescents.

Methods

Cross sectional study, developed between July and September of 2016, in a pediatric emergency hospital, linked to the Unified Health System, a reference in the secondary care level (medium complexity), located in Fortaleza, CE. Brazil.

The population was constituted by approximately 16,000 attendances month of children and adolescents between the ages of zero and seventeen. The sample was calculated based on the formula indicated for infinite populations, with significance level of 5% ($Z_{\alpha/2}=1,96$); prevalence of 50.0%; 50.0% prevalence of children and/or adolescents attended in the host sector and 5% sample error, which corresponds to a

sample of 400 participants. However, there were losses of three participants, which were justified by lack of registration of the weight in the questionnaire, reaching the final number of the sample of 397 participants.

The non-probabilistic sampling method was performed to capture the children, using a silk screening technique for convenience, followed by the order of arrival at the hospital. Based on the inclusion criteria, children and adolescents accompanied by a person over eighteen years of age who were awaiting care in the care sector were selected. Children/adolescents with risk classification were classified as priority I, red color.

For data collection, two instruments were used, a structured form elaborated by the authors, considering the socio-demographic characteristics: sex (male, female), age (one to 11 months, one to five years, six to 10 years and 11 to 17 years) and weight for age (adequate, high and low). On the nutritional aspects, the weight for age was evaluated in this study, based on the denomination of the children's booklet of the Health Department of Brazil, varying in high weight, adequate weight, low weight⁽⁶⁾ the following clinical data: 1) Procedures performed (consultations, medication administration and examinations) and 2) Destination of the patient after emergency care (discharge with referral to specialist, discharge to the home, hospitalization in the unit or transfer to a specialized service). For this variable, it was necessary to consult the records of attendance of the children in the Medical and Statistical Archive. Before the beginning of the collection, the instrument was applied with children, from pre-test, to adjust the use of the objectives of the research.

Another instrument used in the data collection was the Guideline for Reception with Risk Classification in Pediatrics, validated in terms of content, appearance and reliability in clinical practice. The Guide was structured in five risk-discriminating flowcharts (respiratory, hemodynamic and hydro electrolytic changes level of consciousness and pain), in which the

main complaints and clinical conditions are arranged in priority sequence, in red color (emergency), yellow (urgency), green (minor urgency), and blue (non-urgent)⁽⁷⁾. In this collection, the clinical aspects related to the variables were considered: 1) Risk discriminators (respiratory, hemodynamic and hydro electrolytic changes) and 2) Risk classification adopted by the natives, through the Guide, in order to attribute degree of clinical complexity to patients.

The variable risk discriminators is regarding the set of elements (main complaint and risk indicators) that clearly indicate the existence of a risk or the probability of occurrence of having the clinical condition or not at the level of clinical complexity determined by the nurse using the Guide⁽⁷⁾.

To facilitate the analysis, the risk classification was defined according to the priority level and respective color adopted in the Guide, based on the guidelines of the National Humanization Policy, from the following classification: patient classified in red needs resuscitation or immediate care (priority I); in orange color, has a high level of complexity or imminence of cardio respiratory arrest, and should be attended to within 15 minutes (priority II); in the yellow color, the patients are in an emergency situation, requiring medical intervention, within 30 minutes (priority III); in green, those in non-acute conditions that must be attended to within one hour, or reassessed by the nurse every hour (priority IV); Finally, those classified as blue, present non-acute clinical conditions and must receive first-order care, being able to wait up to 6 hours or refer to a primary care institution (priority V)⁽²⁾.

The information collected was compiled and later analyzed using the Statistical Package for the Social Sciences program, version 20.0. For data analysis, descriptive and analytical statistical tests were used, absolute frequencies, relative and Fisher exact test. For the statistical analyzes, the significance level of 5% and the confidence interval (CI) of 95%, were considered.

The study respected the national and inter-

national norms that regulated ethical precepts of research with human beings, according to Resolution 466/12, and was approved by the Ethics Committee, according to the Certification of Presentation for Ethical Appreciation 56143616.4.0000.5054.

Results

In the evaluation of the association between the socio-demographic characteristics of the children and the risk classification, no significant association was observed between these (Table 1).

Table 1 – Sociodemographic characterization of children regarding risk classification

Variables	Priority levels				p*
	Orange II n (%)	Yellow III n (%)	Green IV n (%)	Blue V n (%)	
Gender					0.295
Male	-	39 (21.6)	101(56.1)	40(22.2)	
Female	3 (1.3)	59 (26.8)	113(51.3)	45(20.4)	
Age					0.119
1 to 11 months	-	24(28.5)	48(57.1)	12(14.2)	
1 to 5 years	2 (1.0)	53(27.6)	98(51)	39(20.3)	
6 to 10 years	1 (1.5)	11(16.7)	32(8.5)	22(33.3)	
11 to 17 years	-	10(17.2)	36(62.0)	12(20.7)	
Weight for age					0.972
Suitable	2 (0.6)	75(24)	171(54.8)	64(20.5)	
High	1 (1.4)	19(26.4)	35(48.6)	17(23.6)	
Low	-	4(30.8)	6(46.1)	3(23.0)	

*Fisher-Freeman-Halton exact

In Table 2, there was a statistically significant association between risk classification and risk discriminators (p=0.001), procedures performed in the emergency room (p<0.001) and patient’s destination after care (p=0.013). It should be emphasized that the child may present more than one clinical condition and/or procedures, during the health problem.

The risk discriminator respiratory change, 207 (52.0%), was the most predominant in the green classification, 117 (56.5%), followed by yellow, 55 (26.6%). Among the procedures performed during the service, 136 (33.8%) prevailed, mainly of children classified at the green priority level 79 (58.1%). The

most observed result in attendance was the discharge home, 313 (78.2%), especially children who received a risk classification IV - green color 162 (58.1%). were observed in the sample. There were losses of 10 children in the variable procedures performed and 40 in the variable patient destination, both resulting from the absence of annotations in the medical records analyzed.

Table 2 – Sample distribution of the risk discriminators, procedures performed and destination of the patient with the risk classification

Variables	Priority levels				p*
	Orange II n (%)	Yellow III n (%)	Green IV n (%)	Blue V n (%)	
Risk Discriminator					0.001
Respiratory change	3 (1.5)	55 (26.6)	117(56.5)	32 (15.5)	
Hemodynamic commitment	6 (4.3)	29 (20.7)	74 (52.9)	31 (22.1)	
Change in level of consciousness	3 (60.0)	1 (20.0)	1 (20.0)	-	
Pain	4 (5.3)	20 (26.3)	31 (40.8)	21 (27.6)	
Electrolyte alteration	3 (3.2)	9 (9.8)	33 (35.8)	47 (50.1)	
Procedures performed					<0.001
Consultation	-	11 (8.1)	79 (58.1)	46 (33.8)	
Consultation and medication	1 (1.8)	20 (37.0)	24 (44.4)	9 (16.7)	
Consultation and exams	2 (2.3)	15 (17.0)	55 (62.5)	16 (18.2)	
Consultation, medication and exams	-	52 (46.4)	51 (45.5)	9 (8.0)	
Destiny of the patient					0.013
Discharge to Home	2 (0.6)	76 (24.9)	162(51.8)	73 (23.3)	
Discharge with forwarding	-	5 (15.6)	24 (75)	3 (9.3)	
Transfer to another service	-	5 (45.4)	5 (45.4)	1 (9.1)	
Hospitalization in the unit	-	4 (100.0)	-	-	

*Fisher-Freeman-Halton exact

Discussion

The clinical evaluation of the children and adolescents attended at the emergency department was limited due to the small size of the sample and to be selected in a single unit when compared to international and multicentric research. In spite of this, this research found a potential relationship between the

risk classification, the clinical conditions of children and the quality of the care in the hospital environment, providing evidence that assure the assertive decision making of nurses working in host, as health promotion strategies.

The degree of complexity of the clinical conditions presented by the female children, in relation to the male sex, was higher in all levels of priority. The finding diverges from the majority of the studies about the classification of pediatric risk available in the literature, in which there is prevalence of seriously ill and male children⁽⁴⁻⁸⁾.

Culturally, the predominance of males in literature can be justified by the fact that boys prefer activities or games that involve strength, body impact and speed, exposing themselves to situations that precede accidents, while girls play games and less energetic activities, minimizing the risk of an accident. It is emphasized that the current way of playing of children has been influenced by the media and technologies, taking them to prefer electronic toys, tablets, computers, online games, among others (to the detriment of traditional toys)⁽⁹⁻¹⁰⁾ However, current cultural changes can influence health indicators, signaling trends that should alert both parents/guardians and the organization of health promotion policies in the area of Pediatrics, similar studies to deepen the understanding about the influence of this variable is suggested in decreasing the severity of clinical conditions in male children.

With regard to the age profile of child/adolescent care in a hospital unit, a survey was carried out in Canada in 12 emergency hospitals, with 550,940 children, mean age of 3.91 years and majority classified as green⁽¹¹⁾, corroborates with data from this study, in which the majority of the visits were from children between one and five years of age (48.0%), classified as green (45.8%). The finding reflects the need of more investment in the network of Basic Attention, involving actions of health promotion and health education in Basic Health Units, to the detriment of hospital care.

Despite efforts to prevent morbidity and mor-

tality from preventable diseases in children under five, rates are still high. After implementation of the Integrated Management of Childhood Illness strategy, there were reductions in the mortality rate, but the figures are still not in line with the expected predictions. Therefore, it is recommended the recognition of clinical conditions during illness, in order to guarantee the reduction of incidence and/or increase of severity in this age group in the emergency services⁽¹²⁾.

Despite the prevalence of children with adequate weight for age, the findings showed that the children with high weight for age had a clinical profile of greater severity, in the colors orange and yellow, in relation to the children with low weight (yellow to blue), a finding characterized in the literature as a public health problem that is growing all over the world, since weight gain plays a central role in metabolic changes in childhood, because it predisposes risk factors for cardiovascular diseases (obesity, dyslipidemia, hypertension and glycemia altered), for which the literature suggests the implementation of interventions, through the promotion of healthy eating habits from childhood⁽¹²⁻¹³⁾.

It is corroborated with the research in question a study developed in child first aid of a school hospital in the city of São Paulo, Brazil which also found a higher prevalence of children affected by diseases of the respiratory system⁽¹⁴⁾.

Respiratory diseases constitute a major challenge to health services, since they comprise a large part of hospitalizations. Pneumonias are among the leading causes of hospitalization for respiratory disease at all ages and are considered responsible for approximately 50.0% of hospitalizations in children aged zero to nine⁽¹⁵⁾.

Children are the most vulnerable and immunologically immature group to pathological processes, consequently, more susceptible to complications and death. It emphasizes the importance of clinical evaluation in the reduction of health damage in children who seek care in the emergency services, since most have non-severe respiratory infections that, if left un-

treated, can progress to more serious infections⁽¹⁵⁻¹⁶⁾.

Respiratory affections may present a large variety of clinical conditions, especially wheezing, bronchitis, dry cough and productive cough with purulent rhinorrhea. Research indicates the risk of dysentery and bronchitis in the first year of life as a defense mechanism of the organism against allergic respiratory outcome in urbanized environments⁽¹⁷⁾. Dry cough is related to mechanisms of decreased efficacy of elimination of airway secretions⁽¹⁶⁾ which, according to the Reference Guide used in this study, may appear as mild in children classified as blue (non-urgent), or persistent, in children classified as yellow (in an emergency situation) who require medical attention within 30 minutes, and therefore, should be considered relevant for evaluation of respiratory changes at all ages⁽⁶⁾.

The significant association between the procedures performed and the risk classification confirms the quality of the clinical evaluation with the use of the Guide by the nurses in the study. This fact was also observed in a systematic review, which presented studies confirming the validity and quality of screening systems for pediatric emergency patients, evidenced by the consistent association between hospitalization and resource utilization variables⁽¹⁸⁾.

A study carried out in Spain found that more than half of the children classified as orange (as very urgent) were also discharged to the home because they had symptoms of upper airway obstruction due to the abundant production of nasal secretions, obtaining care such as aspiration and stabilization before discharge. The percentage of hospitalization was higher in children classified with higher level of priorities (yellow III)⁽¹⁹⁾.

A similar result was found in a Brazilian study about the evaluation of the risk classification, in which a large part of the users classified as yellow were released from home, as health problems reached resolution. According to the study, the conduct causes dissatisfaction among some users, as a result of the disagreement between the risk established by the professional responsible for the classification of risk and

the level of complexity that the user considers or feels to be affected⁽²⁰⁾.

In order to contemplate health promotion actions, it is considered important that nurses working in emergency departments need to continually improve knowledge and skills, so that risk classification actions are efficient and effective and provide humanized care.

Conclusion

The association between adopted risk classification and pediatric clinical variables confirms the degree of complexity presented by children/adolescents, favoring assertive clinical evaluation by nurses in the host.

Collaborations

Veras JEGLF and Barbosa LP contributed in the conception and design, analysis and interpretation of the data, writing of the article and in the relevant critical revision of the intellectual content. Teixeira OCM, Joventino ES, Lima FET and Aguiar MIF have helped in the relevant critical review of the intellectual content. All authors collaborated with the final approval of the version to be published.

References

1. Ministério da Saúde (BR). Secretaria de Atenção à Saúde. Acolhimento na Gestão e o Trabalho em Saúde: Ministério da Saúde; 2016.
2. Coleman DE, Kamai S, Davis KF. Impact of a collaborative evidence-based practice nursing education program on clinical operations. *J Hosp Librarianship*. 2018; 18(4):323-30. doi: <https://doi.org/10.1080/15323269.2018.1509194>
3. Amthauer C, Cunha MLC. Manchester triage system: main flowcharts, discriminators and outcomes of a pediatric emergency care. *Rev Latino-Am Enfermagem*. 2016; 24:e2779. doi: <http://dx.doi.org/10.1590/1518-8345.1078.2779>

4. Lustbader D, Mudra M, Romano C, Lukoski E, Chang A, Mittelberger J, et al. The impact of a home-based palliative care program in an accountable care organization. *J Palliat Med.* 2017; 20(1):23-8. doi: <http://doi.org/10.1089/jpm.2016.0265>
5. França EB, Lansky S, Rego MAS, Malta DC, França JS, Teixeira R, et al. Leading causes of child mortality in Brazil, in 1990 and 2015: estimates from the Global Burden of Disease study. *Rev Bras Epidemiol.* 2017; 20(1):46-60. doi: <https://dx.doi.org/10.1590/1980-5497201700050005>
6. Ministério da Saúde (BR). *Caderneta de Saúde da Criança.* Brasília: Ministério da Saúde; 2017.
7. Veras JEGLF, Joventino ES, Coutinho JFV, Lima FET, Rodrigues AP, Ximenes LB. Risk classification in pediatrics: development and validation of a guide for nurses. *Rev Bras Enferm.* 2015; 68(5):913-22. doi: <http://dx.doi.org/10.1590/0034-7167.2015680521i>
8. Rafael MS, Portela S, Sousa P, Fernandes AC. Utilização do serviço de urgência pediátrica: a experiência de um centro português. *Sci Med.* 2017; 27(1):1-8. doi: <dx.doi.org/10.15448/1980-6108.2017.1.24919>
9. Fodor FFR, Sousa HMJC, Mantovani R, Ohara CVS. Profile of accidents in children and adolescents receiving care at a public hospital. *Acta Paul Enferm.* 2017; 30(3):287-94. doi: <http://dx.doi.org/10.1590/1982-0194201700044>
10. Araujo C, Reszka MF. O brincar, as mídias e as tecnologias digitais na educação infantil. *Universo Acadêmico [Internet].* 2016 [citado 2019 mar 13]; 9(1):175-91. Disponível em: www2.faccat.br/portal/sites/default/files/UA2016_o_brincar.pdf
11. Gravel J, Fitzpatrick E, Gouin S, Millar K, Curtis S, Joubert G, et al. Performance of the Canadian triage and acuity scale for children: a multicenter database study. *Ann Emerg Med.* 2013; 61:27-32. doi: <http://dx.doi.org/10.1016/j.annemergmed.2012.05.024>
12. Mupara LU, Lubbe JC. Implementation of the integrated management of childhood illnesses strategy: challenges and recommendations in Botswana. *Glob Health Action.* 2016; 9:29417. doi: <dx.doi.org/10.3402/gha.v9.29417>
13. Mansur FM, Madeira IR, Narciso LP, Costa APC, Machado ACC, Ribas SA, et al. Diagnóstico nutricional das crianças atendidas no projeto de extensão AMAR - Assistência Multidisciplinar em Pediatria. *Interagir Pensando Ext.* 2017; 23:1-18. doi: <doi.org/10.12957/interag.2017.22864>
14. Macedo GPOS, D'innocenzo M. Satisfaction of quality of care in a pediatric emergency room. *Acta Paul Enferm.* 2017; 30(6):635-43. doi: <http://dx.doi.org/10.1590/1982-0194201700092>
15. Passos SD, Maziero FF, Antoniassi DQ, Souza LT, Felix AF, Dotta E, et al. Acute respiratory diseases in Brazilian children: are caregivers able to detect early warning signs? *Rev Paul Pediatr.* 2018; 36(1):3-9. doi: <http://dx.doi.org/10.1590/1984-0462/2018;36;1;00008>
16. Araújo AAO, Pascoal LM, Gontijo PVC, Lopes MVO, Santos Neto M, Nunes SFL. Accuracy and prevalence of defining characteristics of the diagnosis Impaired gas exchange in children. *Rev Rene.* 2019; 20:e40159. doi: <http://dx.doi.org/10.15253/2175-6783.20192040159>
17. Tischer C, Dadvand P, Basagana X, Fuertes E, Bergström A, Gruziova O, et al. Urban upbringing and childhood respiratory and allergic conditions: a multi-country holistic study. *Environ Res.* 2018; 161:276-83. doi: <https://doi.org/10.1016/j.envres.2017.11.013>
18. Barbosa MCM, Robaina JR, Lopes CS, Barbosa AP. Validity of triage systems for paediatric emergency care: a systematic review. *Emerg Med J.* 2017; 34:711-9. doi: <http://dx.doi.org/10.1136/emmermed-2016-206058>
19. Mesquita M, Pavlicichb V, Luaces C. El sistema espanol de triaje en la evaluación de los neonatos en las urgencias pediátricas. *Rev Chil Pediatr.* 2017; 88(1):107-12. doi: <dx.doi.org/10.1016/j.rchipe.2016.07.001>
20. Guedes MVC, Henriques ACPT, Lima MMN. Acolhimento em um serviço de emergência: percepção dos usuários. *Rev Bras Enferm.* 2013; 66(1):31-7. doi: <http://dx.doi.org/10.1590/S0034-71672013000100005>