

Nursing diagnoses in children with congenital heart disease: cross mapping

Diagnósticos de Enfermagem em crianças com cardiopatias congênitas: mapeamento cruzado

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Abstract

Objective: To identify the NANDA International nursing diagnoses from the terms found in the nursing records of hospitalized children with congenital heart defects, and verify the association between these terms and the mapped nursing diagnoses.

Methods: Observational and cross sectional study, developed by mapping of the terms in the nursing records of hospitalized children up to two years of age with congenital heart disease. The association between the terms and the most frequent nursing diagnoses were evaluated using the Student's t-test or chi-square.

Results: The most frequent nursing diagnoses in the 82 records analyzed were: risk for infection (81.7%), impaired gas exchange (46.3%) and activity intolerance (36.6%). The terms "cyanotic" and "pallor" had significant associations with the diagnosis, impaired gas exchange.

Conclusion: The terms recorded in the records of children with congenital heart disease allowed for the identification of NANDA International nursing diagnoses, in addition to verification of associations.

Resumo

Objetivo: Identificar Diagnósticos de Enfermagem da NANDA Internacional a partir dos termos encontrados nos registros de Enfermagem de crianças com cardiopatias congênitas hospitalizadas e verificar associação entre estes termos e os Diagnósticos de Enfermagem mapeados.

Métodos: Estudo observacional, transversal desenvolvido por mapeamento dos termos nos registros de Enfermagem de crianças hospitalizadas de até 2 anos com cardiopatia congênita. A associação entre os termos e os Diagnósticos de Enfermagem mais frequentes foi avaliada pelo teste *t* de Student ou qui quadrado.

Resultados: Nos 82 registros analisados, os Diagnósticos de Enfermagem mais frequentes foram Risco de infecção (81,7%), Troca de gases prejudicada (46,3%) e Intolerância à atividade (36,6%). O termo "cianótico" e "hipocorado" tiveram relação estatisticamente significativa com o diagnóstico Troca de gases prejudicada.

Conclusão: Observou-se que os termos registrados em prontuários de crianças com cardiopatias congênitas permitiram a identificação dos Diagnósticos de Enfermagem da NANDA Internacional, além da verificação das associações.

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Introduction

Congenital heart defects are abnormalities observed at birth, both in structure as well as in cardiocirculatory function. Malformations appear to result from multifactorial interactions, including genetic and environmental factors.⁽¹⁾ One in every thousand children born each year has a heart defect, corresponding to almost 1% of live births.⁽²⁾

The nursing care must be established and implemented early, when the diagnosis of congenital heart disease is identified, in order to maintain the child in a stable or hemodynamically compensated state.⁽³⁾ The nursing process, which is a dynamic, systematized and interrelated set of actions used for this purpose, is organized into five steps: assessment, nursing diagnosis (ND), planning, implementation, evaluation.⁽⁴⁾

The ND in this study represent clinical judgments of the responses of children and/or families to heart disease and hospitalization, which provided for the selection of interventions aimed at achieving results for which nurses were responsible.^(5,6)

The implementation of the nursing process based on standardized nursing language (SNL) generates documentation and information about the contribution of nursing to the care of children with congenital heart diseases. In this regard, knowing the most frequently diagnosed NANDA International (NANDA-I) ND within this population contributes to the standardization of nursing care by providing evidence for the development of electronic patient records, protocols and recording instruments, care planning, risk management, audits, selection of indicators and outcomes to be measured, improving the quality of care, and providing greater safety to the patients.

With the advancement of knowledge, and the need to base health care on scientific evidence, this study identifies a gap in knowledge about human responses of hospitalized children with congenital heart disease, the disease and its treatment, and documenting the ND with

standardized language that, until now, were described in non-standardized language in nursing records.

This study aimed to identify the ND of NANDA-I from the terms found in the nursing records of hospitalized children with congenital heart defects, and assess the association between these terms and the mapped ND.

Methods

This was an observational, cross-sectional study, using the cross mapping as a methodological tool, defined as a method to explain something in words with the same or similar meaning, serving as a method to compare data.⁽⁷⁾

The study was conducted by analyzing 82 medical records of hospitalized children in a national reference institution in cardiology, in the city of Rio de Janeiro (RJ), Brazil. The main characteristics of the institute were: high complexity cardiology activities; caring services (prevention, diagnosis, medical-surgical treatment of cardiovascular diseases, and rehabilitation); teaching and research. The research scenario was chosen because of the implementation of the nursing process with standardized languages.

For data collection, all records were used of children up to 2 years old, admitted to the service in the period from January to June of 2014, corresponding to approximately 110 hospitalizations, according to data taken from the hospital management system of the institution. Among these, 17 records corresponded to recurrent hospitalizations and 11 records were not found by the medical archive service, because they were in use for medical evaluations, billing or hospitalization, totaling 82 studied medical records.

Inclusion criteria for the children's records were: those with confirmed medical diagnosis of acyanotic or cyanotic congenital heart disease, and, hospitalization ≥ 48 hours from January to June of 2014. All the records completed by nurses and nursing technicians/assistants, without identifying the authorship of those records, were

considered. The records of children with congenital heart disease who underwent corrective surgery were excluded.

The mapping was performed through transcription and analysis of the admission nursing record, which was completed between 24 and 48 hours after admission. The selection of this period for the collection of the terms was due the higher amount of terms registered by the nursing staff during this time.

For the mapping, two rules were used: categorization of the nursing terms (search terms) and separation of nuclear modifier concepts (process performed to increase the combinations between terms). In order to facilitate the completion of the mapping, a documentation tool was used, developed by the researchers,⁽⁷⁾ composed of five parts: child identification; transcript of records after 24 hours of admission; fragmentation of records to search for the original terms; identification of diagnostic labels by exact or partial combination, and evaluation by experts.

The records contained a total of 3,940 terms, which were analyzed and mapped by one nurse researcher with ten years of professional experience in pediatric cardiology, and another with a doctorate in nursing, specializing in the nursing process and SNL.

The mapping was performed from the fragmentation of records to search for original terms, and the distribution into categories, according to the type of combination. If the term found matched exactly with the language of NANDA-I, it was categorized as an exact combination; if synonyms, similar concepts or related terms were present, it was categorized as a partial combination. The exclusion of repetitions and standardization of the terms occurred subsequent to the mapping.

A total of 357 terms were obtained after excluding repetitions. Next, the standardization was performed, with 312 remaining terms; namely, the uniformity of genera and elimination of elements that did not refer to particular concepts, defined as pseudo-terminological

expressions. In the standardization step, only 45 terms were excluded, due to the small deletion of synonyms, since the partial match mapping considers the synonyms. Through partial combination, 148 terms were mapped, and five terms through exact combination; thus, a total of 153 terms were mapped. Likewise, a total of 159 terms were not mapped, because they did not result in an exact or partial combination with the ND of the NANDA-I classification. Therefore, these terms did not affect the outcome of the study. Some examples of terms that had no combination are: *acyanotic*, *afebrile*, *without normality*.

The forms were sent via e-mail for evaluation by five expert nurses who analyzed the ND, whose presence or absence were considered to be valid when there was agreement from three experts. This method of evaluation was used to ensure greater accuracy in the selected ND.⁽⁸⁾

The selection of expert nurses occurred according the following criteria: professionals in clinical practice for more than five years in pediatric cardiology, experience in teaching and research in nursing diagnoses confirmed by at least two publications in the area, master's and/or doctorate with thesis/dissertation in the field of congenital heart defects/nursing diagnoses.

The following variables were considered for the study: sex, age, place of birth, origin, ethnicity, reason for hospitalization, type of heart disease, vital signs (respiratory rate, heart rate, temperature, systolic blood pressure, arterial oxygen saturation), nursing terms, ND of NANDA-I, and the number of ND per patient. All variables were transversally analyzed. The documentation and registration form data were entered into the computer and stored in a Microsoft Excel 2013 program database; the Statistical Package for the Social Sciences (SPSS), version 20.0, was used for statistical analysis. A descriptive analysis was performed using frequency of calculation, mean or median, standard deviation and percentiles, according to the behavior of the variable (normal), as identified by the Shapiro-Wilk statistical test.

In the inferential analysis, the association between the characterization of numerical variables (vital signs and number of ND per patient) and the more frequent ND was evaluated using the Student t-test or Mann Whitney. The most frequent ND were those present in at least 30% of the nursing records after analysis of agreement of the expert nurses.

To evaluate the association between nominal variables of characterization and the ND, the chi-square test and Fisher's exact test were used, when necessary. In all cases, the differences were considered statistically significant when the value associated with the analysis was <0.05 .

The development of the study met national and international standards of ethics in research involving human subjects.

Results

Table 1 presents the characteristics of children with congenital heart disease. The patients were predominantly: male (54.9%), infants (91.5%), born in the metropolitan area of Rio de Janeiro (76.8%), and of mixed race (41.5%). The children were admitted mostly for surgical treatment (53.7%), with acyanotic heart disease (58.5%). Among them, 19.5% also had Down syndrome. Of the records obtained from the medical files, 41.5% were completed by nursing technicians. Six of the children who were participants of this study died.

After selecting the 153 nursing terms for cross mapping to ND by the experts, the most commonly found terms in the medical files of children with congenital heart disease were: "cyanotic" (80.5%), "respiratory effort" (79.3%) "tachypnea" (72.0%), "pallor" (65%), "infant" (64.6%), "peripheral venous access" (42.7%), "intravenous hydration" (34.1%), "respiratory rate = 60 rpm" (30.5%), "respiratory rate = 52 bpm" (28.0%), "accompanied by the mother" (28.0%), "tearful" (22%), "heart rate = 160bpm" (19.5%) and "arterial oxygen saturation = 75%" (18%).

Table 1. Distribution of children with congenital heart disease, according to their demographic and clinical characteristics (n = 82)

Characteristics	n(%)	Mean (±SD)	Median (25-75%)
Sex			
Male	45(54.9)	-	-
Female	37(45.1)	-	-
Age (months)			8(4.5-14.5)
Age group			
Infant	75(91.5)	-	-
Newborn	7(8.5)	-	-
Time of hospitalization (days)			9(3-16)
Place of birth			
Unknown	4(4.9)	-	-
Capital	63(76.8)	-	-
Rural area	13(15.9)	-	-
Other state	2(2.4)	-	-
Origin			
Unknown	2(2.4)	-	-
Residence	64(75.6)	-	-
Transfer from another hospital	16(19.5)	-	-
ICU of the institution	1(1.2)	-	-
Ethnic group			
Unknown	32(39)	-	-
Mixed race	34(41.5)	-	-
White	15(18.3)	-	-
Black	1(1.2)	-	-
Reason for hospitalization			
Surgical	44(53.7)	-	-
Interventional	29(35.4)	-	-
Clinical	9(11)	-	-
Type of heart disease			
Acyanotic	48(58.5)	-	-
Cyanotic	34(41.5)	-	-
Weight (kg)			6.8(4.7-9.2)
Respiratory rate (rpm)		50.9±16.0	
Heart rate (bpm)		133.2±25.7	
Temperature (°C)		36.0±0.5	
Oxygen saturation (%)		83.4±11.1	
Systolic arterial pressure (mmHg)			90(80-100)
Person charting in the medical files			
Unknown	15(18.3)	-	-
Nursing technicians	34(41.5)	-	-
Nurses	33(40.2)	-	-
Deaths	6(7.31)	-	-

SD - standard deviation; ICU - intensive care unit; rpm - respirations per minute; bpm - beats per minute

Table 2 shows the frequency of ND related to the presence or absence of the ND, along with disagreements among experts, *risk for infection* (NANDA-I code 00004) was the most frequent diagnosis among the patients (81.7%), followed by impaired gas exchange (00030) with 46.3%, and activity intolerance (00092) with 36.6%. There was a mean of 3.0 ± 1.5 ND per child, and more than 75% of the patients had more than five diagnoses. The *risk for falls* (00155)

diagnosis showed the highest percentage of disagreement among the experts (45.1%).

Verifying the association between the three most frequent ND, *risk for infection*, *impaired gas exchange* and *activity intolerance*, with the most frequently mapped terms, “cyanotic” (p <0.001) and “pallor” (p = 0.04), showed statistical significance with the diagnosis, *impaired gas exchange*.

Children who had the *risk for infection* diagnosis had more ND inferred by the experts (p = 0.004). Children with the *impaired gas exchange* diagnosis presented a higher number of ND and a lower mean oxygen saturation than children without this ND (p <0.001 and p = 0.002, respectively). Patients with the *activity intolerance* diagnosis demonstrated a lower oxygen saturation than children without this diagnosis (p <0.001).

Table 2. Nursing diagnoses identified in children with congenital heart disease, after analysis of agreement of expert nurses (n = 82)

Nursing diagnosis	Presence n(%)	Absence n(%)	Disagreement n(%)
(00004) Risk for infection	67(81.7)	14(17.1)	1(1.2)
(00030) Impaired gas exchange	38(46.3)	43(52.4)	1(1.2)
(00092) Activity intolerance	30(36.6)	49(59.8)	3(3.7)
(00032) Ineffective breathing pattern	22(26.8)	58(70.7)	2(2.4)
(00094) Risk for activity intolerance	17(20.7)	65(79.3)	-
(00029) Decreased cardiac output	16(19.5)	64(78.0)	2(2.4)
(00155) Risk for falls	15(18.3)	30(36.6)	37(45.1)
(00204) Impaired peripheral tissue integrity	15(18.3)	67(81.7)	-
(00111) Delay in growth and development	14(17.1)	66(80.5)	2(2.4)
(00116) Disorganized infant behavior	14(17.1)	68(82.9)	-
(00062) Risk for caregiver role strain	11(13.4)	71(86.6)	-
(00039) Risk for aspiration	9(11.0)	73(89.0)	-
(00031) Ineffective airway clearance	6(7.3)	76(92.7)	-
(00206) Risk for bleeding	4(4.9)	77(93.9)	1(1.2)
(00200) Risk for decreased cardiac tissue perfusion	4(4.9)	78(95.1)	-
(00007) Hyperthermia	3(3.7)	79(96.3)	-
(00205) Risk for shock	2(2.4)	80(97.6)	-
(00046) Impaired skin integrity	2(2.4)	80(97.6)	-
(00011) Constipation	1(1.2)	81(98.8)	-
(00132) Acute pain	1(1.2)	81(98.8)	-
(00025) Excess fluid volume	1(1.2)	81(98.8)	-

Table 3 shows the related/risk factors and defining characteristics of the three most common ND (present in at least 30% of nursing records), after agreement among the experts: *risk for infection*, *impaired gas exchange* and *activity intolerance*.

Invasive procedures (89.6%) and inadequate primary defenses (77.6%) presented as the most frequent risk factors for *risk for infection*, the diag-

nosis most evident in the group of children with congenital heart disease, according to the expert evaluation.

The only related factor identified with the *ineffective breathing pattern* diagnosis was hyperventilation (86.4%); the most frequent defining characteristic was tachypnea (100.0%).

Table 3. Frequency of related factors and defining characteristics of the nursing diagnosis most frequently present in patients with congenital heart disease (n = 82)

Nursing diagnosis	n(%)
Risk for infection	
Risk factor	
Invasive procedures	60(89.6)
Inadequate primary defenses	52(77.6)
Increased environmental exposure to pathogens	6(9)
Impaired gas exchange	
Related factors	
Ventilation-perfusion imbalance	34(89.5)
Alveolar-capillary membrane changes	1(2.6)
Defining characteristics	
Hypoxemia	28(73.7)
Tachycardia	20(52.6)
Dyspnea	15(39.5)
Cyanosis	12(31.6)
Activity intolerance	
Related factor	
Imbalance between oxygen supply/demand	29(96.7)
Defining characteristics	
Exertional dyspnea	25(30.5)
Exertional discomfort	5(6.1)
ECG changes - arrhythmias	1(1.2)

Discussion

A limitation presented by this study is the cross-sectional design of the method, which makes it impossible to evaluate the evolution of the ND in the sample studied during hospitalization. Moreover, the diagnostic inference of experts may have been interfered with by the incomplete description of the nursing records concerning human responses of patients.

This study showed, for the first time, the most common NANDA-I ND in children with congenital heart disease, by mapping of the terms from the nursing records, and made the inclusion of these data in the computer information systems that use this standardized language possible, bringing benefits to nursing and to the hospital institutions caring for this population. The most frequent ND were

risk for infection, impaired gas exchange and activity intolerance.

A study on ND in children with congenital heart disease hospitalized in northeastern Brazil found an association between ND, related factors/collaborative problems, and also identified *risk for infection* as the most frequent risk ND (82.2%). The major risk factors of this diagnosis were invasive procedures and inadequate primary defenses.⁽⁹⁾

Considering the complexity of congenital heart diseases, this population becomes more vulnerable to infections, which may lead to increased length of stay and higher mortality. A number of factors contribute to the development of nosocomial infections in the child, such as: the slow maturation of the immune system, sharing of objects among pediatric patients; acute malnutrition; the presence of congenital anomalies; the use of medicines, particularly corticosteroids; and, hematological and oncological diseases. Bacteria cause most infections that affect hospitalized children, and it can be seen that even clinically important viral infections are less common. The incidence of pediatric infection has grown in recent years, with the increase in invasive procedures, technological development, and the indiscriminate use of antimicrobials.⁽¹⁰⁾

A study in Fortaleza (CE) with 270 diagnostic assessments in children with congenital heart disease found *impaired gas exchange* (91.5%) to be the most frequent ND, and the most prominent related factor was ventilation-perfusion imbalance (89.5%).⁽⁹⁾ Such evidence is consistent with the data shown in this study, in which children received this diagnosis, often due to the same related factor. The most evident defining characteristic of this diagnosis was mapped in nursing records with the term “cyanotic”. Another study found a high incidence of this diagnosis prenatally (66%), by means of a public health screening performed by nurses with pulse oximetry. The early detection of these heart diseases is essential, given the prognostic implications due to rapid clinical deterioration and high mortality.⁽¹¹⁾

The nursing diagnosis, *activity intolerance*, was evidenced in more than one third of the study sample. A study, featuring the sociodemographic and

diet history of children with congenital heart diseases, described that in newborns, physical efforts are very limited; with only sucking at the breast and crying constituting physical effort. Infants may experience respiratory distress during the effort to evacuate and in activities such as playing with other children. Such situations were identified and characterized in the study primarily as dyspnea on exertion, which is one of the defining characteristics of *activity intolerance*.⁽¹²⁾

Ineffective breathing pattern was one of the few diagnoses mapped by exact combination, from the term recorded in the chart, namely tachypneic, which is an important human response to congenital heart disease due to the imbalance between oxygen supply/demand. It was also the human response (88.5%) most commonly found in studies that analyzed this diagnosis in children with congenital heart disease.^(5,13,14)

Risk for falls was the ND with the highest percentage of disagreement among the experts (45.1%) as the only risk factor mapped in the records was “under two years of age”, because this was considered to be of little clinical importance for diagnostic inference.

However, a case study of a child at eight months of age, with congenital heart disease, which described a plan of care using NANDA-I ND, the *Nursing Interventions Classification* (NIC), and *Nursing Outcomes Classification* (NOC), identified *risk for falls* as the main risk ND in the presence of risk factors related to the child location.⁽¹⁵⁾ Further studies are necessary to demonstrate the etiology of *risk for fall* in this population, and to establish nursing interventions.

Conclusion

The cross mapping enabled a correspondence between the free terms used by nurses with the standardized nomenclature of NANDA I ND. These terms confirmed the presence of 21 ND in children in these clinical conditions and age groups, and reinforced the need for planning of actions that meet these care demands. The most frequent ND were:

risk for infection, impaired gas exchange, and activity intolerance, and the terms “cyanotic” and “pallor” were associated with the *impaired gas exchange* ND.

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Colaborations

Silva VG, Figueiredo LS and Guimarães TCF declare that contributed to the writing of the article, relevant critical review of the intellectual content and final approval of the version to be published. Silva VG, Pereira JMV and Cavalcanti ACD collaborated in the design stages of the study, analysis, data interpretation, article writing, critical review of the relevant intellectual content and final approval of the version to be published.

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