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Hospitalization in the second year of life in children considered at risk at birth

Hospitalização no segundo ano de vida em crianças consideradas de risco ao nascimento

La hospitalización en el segundo año de la vida de niños considerados de riesgo al nacer

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ABSTRACT

Objective: To assess factors associated with hospitalization of children considered at risk at birth, during the second year of life. **Methods:** Cross-sectional study in Maringá - Paraná. The data were collected between November 2010 and February 2011, with the mothers of 248 children born in 2008. The results showed that the total number of children studied, 50 (20.1%) needed hospitalization between 12 and 24 months. **Results:** The factors associated with its occurrence were low maternal education, lack of exclusive breastfeeding up to six months, morbidity in the last year, hospitalization in the first year of life, low income and high number of household members. **Conclusion:** The findings underscore that children at risk at birth need to be assisted differently by basic health services, especially those with the lowest socioeconomic levels, previously hospitalized and who were not breastfed exclusively up to six months.

Keywords: Child Hospitalized; Morbidity; Hospitalization; Risk Factors; Nursing.

RESUMO

Este estudo objetivou verificar os fatores associados à hospitalização de crianças consideradas de risco ao nascimento, durante o segundo ano de vida. **Métodos:** Estudo transversal realizado em Maringá - Paraná. Os dados foram coletados entre novembro de 2010 e fevereiro de 2011, com mães de 248 crianças nascidas no ano de 2008. Os resultados evidenciaram que, do total de crianças estudadas, 50 (20,1%) necessitaram de hospitalização entre os 12 e 24 meses. **Resultados:** Os fatores associados à sua ocorrência foram: escolaridade materna, ausência do aleitamento materno exclusivo até o sexto mês, morbidade no último ano, hospitalização no primeiro ano de vida, baixa renda familiar e elevado número de moradores no domicílio. **Conclusão:** Os achados reforçam que crianças consideradas de risco ao nascimento necessitam ser assistidas de modo diferenciado pelos serviços básicos de saúde, especialmente aquelas com piores níveis socioeconômicos, previamente hospitalizadas e que não foram amamentadas exclusivamente até o sexto mês.

Palavras-chave: Criança hospitalizada; Morbidade; Hospitalização; Fatores de risco; Enfermagem.

RESUMEN

Objetivo: Identificar los factores asociados a la hospitalización de los niños considerados de riesgo al nacel segundo año de sus vidas. **Métodos:** Estudio transversal, realizado en Maringá, Paraná. Los datos fueron recogidos entre noviembre de 2010 y febrero de 2011, con madres de 248 niños nacidos en 2008. **Resultados:** Del total de niños estudiados, 50 (20,1%) necesitaron hospitalización entre los 12 y 24 meses. Los factores asociados fueron: baja educación materna; falta de lactancia materna exclusiva hasta los seis meses; morbilidad en el último año; hospitalización en el primer año de vida; baja renta familiar; elevado número de miembros en la familia. **Conclusión:** Los resultados refuerzan que los niños en situación de riesgo al nacer deben contar con asistencia diferenciada por los servicios básicos de salud, especialmente los de menor nivel socioeconómico, previamente hospitalizados y que no recibieron lactancia materna exclusiva hasta los seis meses.

Palabras-clave: Niño Hospitalizado; Morbilidad; Hospitalización; Factores de Riesgo; Enfermería.

INTRODUCTION

Children classified as at risk at birth have higher chances of getting sick and dying soon after birth and during the first years of life, which can lead to problems of growth, development and health in childhood, adolescence and even in adulthood[1]. In fact, Newborns (NB) of risk present high rates of hospitalization, which in addition to causing an important family suffering[2], there are events of high cost and often preventable with actions in the primary level of care[3].

Generally speaking, there are several risk factors mentioned in the literature associated with the hospitalization of children in early childhood, as for example: male; low socioeconomic status; high number of children under five years old living in the same household; residence in the urban area; exposure to smoke, cold and humidity; malnutrition; early weaning; low age of the mother; a low maternal education and; higher home density. Other risk factors also associated with outcome of interest are the conditions of child health during birth, such as low birth weight and low Apgar score[4-7].

Morbidity studies are of great importance in the control of diseases and in the planning of actions in health care, both hospital and outpatient, aimed at children. Typically, these studies assess the severity of the diseases that affect them and allow highlighting aspects of the health-disease process that escape mortality statistics. Thus, the frequency of hospitalization and re-hospitalization and the factors associated with their cause are considered important indicators for the evaluation of primary health care services[3].

From this perspective, studies to identify the risk factors associated with the hospitalization of children in early childhood has made possible the development of actions able to reduce this traumatic event for the child and his family. Several investigations have been conducted on the hospitalization of children younger than five years old[3,4,8]. However, as far as is known, studies that specifically address children after 12 months of life and that at the time of birth have been classified as NB at risk are scarce[9].

On the relevance of the subject and the scarcity of jobs that focus on the subject, the present study aimed to verify the factors associated with the hospitalization of children considered at risk at birth, during the second year of life.

METHODS

It is a cross-sectional descriptive study with quantitative approach, held along the 248 children of mothers living in Maringá-PR, born in the period from January 1st to December 31st 2008 and that they have been included in the Program for Monitoring of the Newborn at Risk (PMNBR) of the municipality.

This program was implemented in Maringa in the year 2000, and aims to track all NB considered at risk. The monitoring is performed by the municipal Team of Epidemiological Surveillance that visits every hospital daily for data collection of live births and filling out the SINASC (Information system of newborn) form. When the birth of a child that fits in one of the risk criteria adopted by the municipality is identified, it is included in the program during the hospitalization.

This inclusion is through filling out the admission sheet in two copies and with the guidance of the mother about the importance of monitoring the NB in Basic Health Units (BHU) or at a private doctor. One of the copies of the admission form is forwarded to the BHU of reference, according to the family address and the other remains archived in the Epidemiological Surveillance Sector, according to the month of birth.

From the monthly archived forms the inclusion of NB in research was possible. In the period under study, in the PMNBR of Maringá 802 children were included, but only 248 (30.9%) took part in the survey, considering that in 340 cases (42.4%) the relatives have not been found; in 128 (16.0%) the family changed residence, without leaving a new address with the neighbors; in 45 (5.6%) there was refusal of mothers to participate in the study, in six (0.7%) the child was given up for adoption, in 34 (4.3%) the child was died before one year of life and in 01 case (0.1%) the child was died after one year old.

First a telephone contact with their mothers was held for the visit to be scheduled according to their availability. When it has not been possible to establish this contact an active search on the addresses contained in the schedule of admission at PMNBR was made. In order to reduce losses, the families were searched including in the BHU of reference from the registration of the electronic health record. The family that was visited three times on different days and times and that was not found any family member that could participate in the interview was considered loss.

The data collection took place during the period from November 2010 to February 2011. Each interview had an average duration of one hour, with the majority held with mothers of children. The structured itinerary for data collection consisted of seven parts, which contemplated the socioeconomic identification and characterization of the child and his family; the access to health care; and the health-disease history, food, nutrition, infant growth and development.

The information regarding morbidity and hospitalization of the child during the second year of life were collected, through the account of the respondent, being considered the hospitalizations that occurred in the period of 12 to 24 months and the cases in which the child has remained at least 24 hours in inpatient unit, regardless of the reason.

The quantitative data were archived in spreadsheets. For the tabulation and information processing the Excel program for Windows® 2007 was used and for statistical analysis we used the Software Statistica version 7.0®. The Shapiro-Wilk and Lilliefors normality test, showed a normal distribution of the data, for this reason nonparametric tests of association were employed, such as the Pearson Chi-square for dichotomous variables and the Mann Whitney for continuous variables, using a significance level of 5%. For the variables associated with the outcome of interest the Odds Ratio (OR) was calculated in order to verify the extent of the association.

The study was carried out in line with the guidelines established by Resolution 196/96 of the National Council of Health/Ministry of Health and the project was approved by the Permanent Committee on Ethics in Research with Human Beings at the participate in the study signed a Free and informed consent statement (FICS) in two copies.

RESULTS

A number of 248 children with age ranged from 24 to 38 months participated in this study, and median of 30 months of life. There was slight female predominance (52.0%). With regard to the place of birth it was showed that 247 (99.5%) births took place in hospital, of whom 179 (72.1%) were cesarean section. They lived with their parents (67.5%) 166 children, the other only resided with the mother (54-21.9%), the father (21-8.6%) or third parties (05-2.0%).

The criterion of risk responsible for the inclusion of children in the PMNBR that most prevailed was the prematurity (137-55.2%); followed by low birth weight (115-46.4%); maternal age less than or equal to 17 years (68-27.4%); APGAR SCORE less than seven at the fifth minute of life (21-8.4%); and the presence of congenital anomaly (13-5.2%). The concomitance between two or more criteria occurred in 92 children (37.1%), being the low birth weight and prematurity the two risk factors that were associated, in 74 NB (80.4%).

Of the total number of children in the study, 50 (20.1%) were hospitalized during the second year of life, of which 28 (56.0%) were female, but no statistically significant difference was found between hospitalization and sex ($p = 0.52$). It can be checked that the fact of the mother working outside ($p = 0.78$), the care being provided by other persons than the mother ($p = 0.77$) and the child remaining at least part-time in educational institutions ($p = 0.21$) were not presented as risk factors associated with infant hospitalization (Table 1).

With respect to maternal education, it was found that 15 (30.0%) children hospitalized were children of mothers with less than eight years of education, while among those not hospitalized this number was only 25 (12.6%) children, showing statistically significant difference ($p = 0.00$) between the groups. The calculation of OR revealed that risk children, daughters of mothers with less than eight years of education were 2.5 times more likely to be hospitalized during the second year of life, when compared to children of mothers with more than eight years of education.

In relation to the type of food, it was observed that of the 50 children hospitalized, 40 (80.0%) did not receive Exclusive Breastfeeding (EB) during the first six months of life, while among the 198 not hospitalized, 126 (64.3%) did not receive the EB, showing a statistically significant difference ($p = 0.02$) between the two groups. The calculation of OR revealed that children who did not receive EB until six months of age were 2.3 times more likely to be hospitalized during the second year of life, when compared with children who received the BE.

Of the total number of children hospitalized during the second year of life, 41 (82.0%) presented some episode of morbidity in the last twelve months leading up to the visit, while that of 198 children not hospitalized, 134 (67.7%) were sick, with statistically significant difference between the two groups ($p = 0.04$). The calculation of OR demonstrated that children who presented episodes of morbidity over the past year had 2.2 times more likely to be hospitalized.

It was showed that of the 50 children hospitalized, 25 (50.0%) also need hospitalization in the first year of life, while 67 (33.8%) children were hospitalized in the first year of life, but they were not in the second year, with statistically significant difference between the two groups ($p = 0.03$). The calculation of OR demonstrated that children who were hospitalized in the first year of life, had 2.0 times more likely to be hospitalized again during the second year.

The family income and the number of residents living in the same were household socioeconomic characteristics significantly associated with the outcome of interest. On the other hand, the maternal age and the basic characteristics of the general state of health of a NB as the Apgar score ($p = 0.24$); the birth weight ($p = 0.84$); and gestational age ($p = 0.69$) showed no statistically significant difference between the Group of kids hospitalized or not (Table 2).

DISCUSSÃO

The results of this study showed a predominance of female children which is similar to the one found in a cohort study conducted in Maringá (PR), with 247 NB, in which 52.7% of children also were female[10]. Despite often being reported in the literature that the male sex is a risk factor for hospitalization in children under five years old[3,8], in the present investigation statistically significant differences in hospitalization among the sexes were not found.

The risk criterion responsible for the inclusion of children in PMNBR most prevalent was the prematurity, followed by the low weight at birth and maternal age less than or equal to 17 years old, results found in a study carried out in Londrina (PR), in which it was also verified that the main criteria that caused the inclusion of the NB in PMNBR were: low weight at birth; maternal age less than or equal to 17 years old; and prematurity[11].

The concomitance between low weight at birth and prematurity, which occurred in 29.8% of children, can be understood as a situation expected because the pre-term labor leads to the birth of a child without the appropriate body weight, happening in around 10% of pregnancies, depending on the population studied[8]. Prematurity and low weight at birth are determining factors for neonatal mortality, development of infection, higher rates of hospitalization, neuropsychological deficit postnatal and low school performance[12].

With regard to hospitalization, it was showed that the percentage of children hospitalized during the second year of life (20.1%), can be considered low if compared to the results of a

Table 1. Distribution of the factors associated with the hospitalization of children considered at risk at birth, during the second year of life. Maringá-PR, 2011

Variables	Hospitalized		Not hospitalized		Total		p
	n	%	n	%	n	%	
Sex							
Male	22	44.0	97	49.0	119	48.0	0.52
Female	28	56.0	101	51.0	129	52.0	
Maternal Education							
< 8 years	15	30.0	25	12.6	40	16.1	0.00*
≥ 8 years	35	70.0	173	87.4	208	83.9	
Maternal Occupation							
Yes	22	44.0	82	41.3	104	42.3	0.78
No	28	56.0	114	58.7	142	57.7	
Main Caregiver							
Mother	34	68.0	138	70.0	172	69.6	0.77
Other	16	32.0	59	30.0	75	30.4	
Place of residence							
House	16	32.0	82	41.6	98	39.7	0.21
Educational Institution	34	68.0	115	58.4	149	60.3	
EB**							
≤ 6 months	40	80.0	126	64.3	166	66.9	0.02*
> 6 months	10	20.0	72	36.7	82	33.1	
Disease in the last year							
Yes	41	82.0	134	67.7	175	72.2	0.04*
No	09	18.0	64	32.3	73	27.8	
Hospitalization in the 1º year of life							
Yes	25	50.0	67	33.8	92	37.1	0.03*
No	25	50.0	131	66.2	156	62.9	

* p - significant value for the Chi-square test of Pearson; ** Exclusive breastfeeding.

Table 2. Distribution of continuous variables associated with hospitalization of children considered at risk at birth, during the second year of life. Maringá-PR, 2011

Variables	Hospitalized (n = 50)			Not hospitalized (n = 198)			p
	Minimum	Maximum	Median	Minimum	Maximum	Median	
Maternal age	15	42	25	14	44	24	0.65
Family income	100.00	7,000.00	1,500.00	500.00	10,000.00	2,000.00	0.00*
Nº of residents at home	03	09	05	02	08	04	0.02*
Apgar in the 5º' month	04	10	09	05	10	10	0.24
Weigh at birth	770	3,660	2,487	660	4,080	2,660	0.84
Gestational Age	26	41	36	26	41	36	0.69

* Significant test p-value of Mann-Withney.

cohort study, conducted by the Oswaldo Cruz Foundation, with 86 children born with very low weight at birth, which it was verified a hospitalization rate of 56.3% during the second year of life with respiratory causes[9]. It was considered that this high percentage of hospitalization was related to the fact of children being born with very low weight at birth (< 1500 g), premature (< 34 weeks) and being previously hospitalized in Neonatal Intensive Care Unit (ICU)[9]. It was therefore of children who were notably higher conditions of fragility, which resulted in the hospitalization in the first years of life.

Due to the greater fragility of the Ministry of Health stated that the children of risk should be prioritized, by the teams of the Family Health Strategy (FHS) both in the development of actions for health surveillance, as in the early uptake and active search for maintenance of the schedule of care to child health, as well as for the fulfilment of the proposed monitoring of their growth and development[13].

In practice, it is observed that the removal of the child of the routines of BHU is closely correlated to socioeconomic factors of vulnerability, being that in the present investigation was detected statistically significant association between hospitalization of children and low maternal educational level. Nevertheless, the role of socioeconomic factors on the morbidity and mortality in childhood, has been described in the literature[4,5,9,14], demonstrating that the highest maternal education provides a set of actions related to the most appropriate care of the child, greater adherence to health care services and knowledge of preventive care measures, which reduce the morbidity[5,9].

A research conducted in Pelotas (RS) with 757 children under one year old, of which 625 were cases of hospitalization for acute respiratory disease and 152 were controls, showed that children of mothers with absence or low level of education had 12.5 times more likely to be hospitalized for acute respiratory disease, when compared with the control group[5].

Thus, the mother's education has been presented as a strong predictor of child health, which reinforces the idea that maybe this factor is the most important socioeconomic determinant of general health conditions and disease of the child[14].

Not only the low education is presented as triggering factor of hospitalization, but also the lowest maternal age has been described as a potential feature that leads to hospitalization of children in early childhood[7]. However, although in this investigation have not been observed association between hospitalization and maternal age, it is important to point out that a study conducted in Londrina (PR) showed that 23.7% of NB were included in the program for monitoring the NB on risk of the municipality as a result of the mother have age less than or equal to 17 years old on the childbirth[11]. At Sobral (CE), almost 30.0% of underweight NB were children of teenage mothers[7]. The same study showed that approximately 33.0% of children who required four or more doctor's visits during the first year of life, were children of mothers under 20 years old[7].

Early motherhood, therefore, is configured as a serious public health problem, because it represents risks for both the teenager and the fetus, requiring joint efforts of health services management, of the multidisciplinary team of FHS and the community together to develop effective intervention strategies, which aim to bring a solution on the problem.

The main care dispensed to children when performed by the mother, except the cases of teenage mothers and having low educational level, appears as a protective factor for hospitalization[4]. However, unlike found in a study carried out in São Paulo (SP) which revealed that the not maternal care done most often by grandparents, it was presented as a risk factor for hospitalization of children under five years old, 4 in this study cannot be shown the occurrence.

A study in Pelotas (RS) noted that the fact that the mother has employment away from home was a protection factor for hospitalization in children younger than one year old[5], demonstrating the need for other studies which better assess the correlation between maternal care and hospitalization of children in early childhood.

Another factor often mentioned as a risk for morbidity as for hospitalization in early childhood, is the use of educational institutions[5]. In the present investigation, although most of the children who were hospitalized remain at least part-time in educational institutions, there was no association with the outcome variable of interest. Data that corroborate the results of a study conducted in the metropolitan region of São Paulo, with 893 children under the age of five, in which the hospitalization also did not show association statistically significant with the use of day care[4].

With regard to the feeding of children, it is indisputable the benefits of breastfeeding for the health of the mother-child, representing a key factor in the humanization of birth and providing numerous advantages for the NB, of which include: nutritional properties and immunological human milk, her role in gastrointestinal maturation and in the formation of the mother-child bond, neurological behavior performance increase, lower incidence of infection, better cognitive and psychomotor development and lower incidence of re-hospitalization[15-17].

A case-control study conducted in Pelotas (RS) with 625 cases of hospitalization for acute respiratory disease found that early weaning constituted a risk factor for hospitalization. That is, children who were weaned prematurely showed 2.3 times greater chance of being hospitalized in relation to that received the EB until the six months of life, with linear trend of increase of significant hospitalizations for acute respiratory disease as time of breastfeeding decreased[5].

In practice, it is observed that in the case of NB of risk several factors may be involved in early weaning, e.g., extended period of hospitalization in Neonatal ICU, presence of congenital abnormalities, difficulty of taking and suction, low maternal educational level, in addition to conditions of the mother that would

contraindicate breastfeeding, among which stands out, the fact of being the bearer of Human Immunodeficiency Virus (HIV). All of these factors, although isolated, contribute to the NB of risk receive EB for a lower period and at the same time, constitute a larger values determining more propensity for hospitalization.

Generally speaking, except in cases where breastfeeding is strictly contraindicated, the health staff, especially nurses, should closely monitor the mothers of NB at risk, in order to diagnose early difficulties in the process of breastfeeding, to implement, when necessary, intervention strategies that reduce them and finally, encourage them continually, so that breastfeeding can be perceived by the mother as indispensable and also pleasurable.

Regarding a prior hospitalization, it was contacted that of the 50 children hospitalized, 25 (50.0%) were already during the first year of life. A cross-sectional study performed in São Paulo (SP), with 893 children under five years old who were not considered at risk of childbirth, showed that only 7.3% need two or more hospitalizations in less than 12 months[4]. And in a study conducted in the Netherlands with 1,412 children and adolescents (0-17 years old) it was showed that only 80 (7.0%) of them had two or more episodes of hospitalization for respiratory causes, over a year[18].

In the present study, therefore, the fact of 25.0% of children have been hospitalized in the first and second year of life, is due to the fact that they have been classified as NB at risk and, therefore, they present features which makes them potentially more susceptible to early childhood morbidity and, consequently, to hospitalization.

Another feature that was shown to be statistically different between the group of children hospitalized and no hospitalized was the family income, being its lower median in the first group. A case-control study conducted in Pelotas (RS) with 625 cases of hospitalization for acute respiratory disease, showed that the family income per capita of cases was almost two times less than the controls group[5]. Another study showed that the income of one to two minimum wages was associated with increased incidence of morbidity for respiratory diseases in children of very low weight at birth, during the second year of life[9].

Also a study in Rio Grande (RS) with 771 children under five years old showed higher prevalence of respiratory symptoms among those who lived with families of lower socioeconomic status, being that in this situation, the chance of the child to asthma and bronchitis increased to 2.2 times[14]. This fact led the study authors to conclude that the family income influences on quality of life, because families with higher per capita income has the possibility to handle more actively the health of children, which may result in lower occurrence of diseases and hospitalizations[14].

Reduced home density, reflection of better financial conditions, possibly influences in the dispensation of largest childcare. As noted in other surveys that showed an association between high home density and clinical outcome of interest[4], it was also verified in this study that the number of people living in the same household was significantly higher among the group for hospitalized children.

Unfavorable socio-environmental factors as the high home density, unhealthy rooms that present greater environmental pollution and less access to medical care are factors that can contribute individually or may interact to increase the susceptibility of the occurrence and recurrence of morbidity in children in early childhood[14].

Despite not having been shown associations between characteristics representative of bad prognosis of the child at the time of delivery, e.g., Apgar score less than or equal to seven in the fifth minute of life, low weight at birth and prematurity with hospitalization, it is known that such children are at increased risk for hospitalization in Neonatal ICU shortly after childbirth; neonatal morbidity requiring hospital readmission; and mortality due to complications presented, when compared with children born at term[9].

Although not having theoretical bases to support the magnitude of these long-term complications, it is believed that the interference occurred in this stage of life are reflected in adulthood. Besides, the fact that the pre-term NB were born before their nervous systems are fully developed, raises the need for large population studies that seek to evaluate the long-term results of these neurological development and behavior children[12], featuring a wide field of research to the nursing area.

CONCLUSION

In this study the prematurity, low weight at birth, teenage motherhood, the severe asphyxia and presence of congenital anomaly were the factors that affected the population as risk on the birth. The results showed that several factors were associated with the hospitalization of children at risk, during the second year of life, such as: low maternal education, absence of EB until the sixth month of life, maternal morbidity report in the last year, the presence of hospitalization in the first year of life, low family income and high home density.

The considerable percentage of children hospitalized during the second year of life (20.1%), found in this study, is attributable to the fact that the population analyzed present greater vulnerability, resulting from several orders, which reinforces the need for monitoring and specific interventions and effective in preventing illness and improving the quality of life of children and their families. Therefore, they should be the focus of attention of health services, especially in Primary Health Care.

We believe that non-association of some variables, which are described in the literature as significantly associated with the outcome of interest, is due firstly to the fact of being studied children considered at risk at birth and then to the expressive number of kids/families not located, which, however, does not diminish the value of scientific results, and may be necessary to ensure that the health team mainly the professional nurse, who has been identified as the strong link between health services and

family, can act directly on the factors influencing the hospitalization of NB at risk during early childhood, developing intervention strategies that minimize the occurrence of the event expensive to public coffer and traumatic for children and their families.

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