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Obstetric and neonatal factors associated with preterm birth: a five-year cohort

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Abstract

Premature birth constitutes a moment of vulnerability for the newborn, requiring greater care and attention. Therefore, the objective of the study was to analyze obstetric and neonatal factors, related to the outcome, of newborns admitted to a Neonatal Intensive Care Unit born at term and prematurely. This is a cohort, documentary and retrospective study. Clinical, epidemiological and care variables were collected directly from the medical records and discharge summaries of newborns, hospitalized from January 2016 to December 2020, analyzed with descriptive and inferential statistics. 494 newborn hospitalizations were analyzed. Around 70% of these were premature newborns. A relationship was found between premature birth and obstetric characteristics: low number of prenatal consultations ($p<0.001$), vaginal birth ($p=0.04$), complications ($p<0.001$) and use of antibiotics during pregnancy ($p=0.02$), occurrence of ruptured membranes ($p<0.001$) and antenatal corticosteroid therapy ($p<0.001$). And, statistically significant difference between prematurity and: sex ($p=0.01$), twin birth ($p<0.001$). And, between prematurity and the need for assistance interventions: use of surfactant ($p<0.001$), central venous access ($p<0.001$), ventilatory support ($p=0.01$), phototherapy ($p<0.001$), blood transfusion ($p<0.001$) and parenteral nutrition ($p<0.001$). The various factors associated with premature birth were observed, which must be monitored in order to prevent negative outcomes.

Keywords: Newborn. Neonatology. Neonatal Intensive Care Units. Risk Factors. Prenatal Care. Premature Birth.

INTRODUCTION

Every year, around 15 million babies are born prematurely in the world[1]. In this context, Brazil appears in 10th position, with an estimated rate of 11.5% of total births, around 345,000 children among the 3,000,000 births[2].

In 2019, neonatal deaths represented, worldwide, 47% of deaths of children under five years old[3]. In Brazil, from 2007 to 2017, a total of 303,260 neonatal deaths were recorded, with an average mortality rate of 9.46 per 1,000 live births, which corresponds to approximately 70% of deaths in the first year of life[4].

Given the above, the neonatal period is the most vulnerable time for a child's survival. In this sense, adequate care for newborns constitutes one of the challenges for reducing such rates. This makes it important to know the risk and protective factors for neonatal mortality and morbidity, and requires the recognition of biological, environmental, socioeconomic, cultural and healthcare risks. Plus, in the presence of these and the need for special care, timely, comprehensive and

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qualified action, social and health protection, these rights being already recognized by the Child and Adolescent Statute (ECA)[5].

In the meantime, to guarantee the health of the mother and the newborn, it is also important that the health system guarantees access to the necessary hospitals and equipment. However, the Brazilian Society of Pediatrics points out that neonatal intensive care beds, like obstetric beds in high-risk hospitals, do not follow a regional distribution, and with the exception of the most developed regions, they are insufficient in structure, technological resources, composition of care teams and organization of clinical processes, which demonstrates the importance of risk prevention strategies and neonatal illness[6].

In the state of Rio Grande do Sul, around 140,000 newborns are born annually. And, of these, approximately 12,800 have low birth weight and, therefore, the risk of needing admission to a NICU. However, the state only provides 274 SUS neonatal beds[7]. These data demonstrate the relevance of this study.

The literature points out that several conditions can increase the likelihood of a newborn needing admission to a NICU, among which prematurity, low birth weight and severe asphyxia stand out[8–12]. In this sense, it is important to know the profile of these patients and maternal and neonatal risk characteristics, to use them as support in the development and implementation of strategies to prevent negative outcomes and seek indicators of protection for mothers and newborns. Improving care and improving results and care indicators will probably not occur through the discovery of new treatments, but rather through learning and the possibility of making existing care routines and therapies more efficient and effective, through the review of work processes and care practices, as well as dialogue between health care services[13].

In view of the data above, the goal of this study was to analyze obstetric and neonatal factors, related to the outcome at term and prematurity, of newborns admitted to a Neonatal Intensive Care Unit.

METHODS

Study design and setting

This is a cohort, documentary, retrospective and analytical study developed in the Neonatal Intensive Care Unit, of a philanthropic hospital institution, located in the city of Ijuí, northwest region of the state of Rio Grande do Sul.

This unit provides the population with eight inpatient beds, and maintains an average monthly occupancy rate of 87.5%, with an average number of patients being 10.7, with a total of 128, in 2021. It has a multidisciplinary team, composed of by pediatricians, nurses, nursing technicians and physiotherapists[14].

Study population

The target population of the study comprised all 498 newborns admitted to the Neonatal Intensive Care Unit.

Inclusion and exclusion criteria

The established inclusion criteria were: being a newborn up to 28 days old, having been hospitalized for at least five days in the NICU, from January 1, 2016 to December 31, 2020. Four children who were admitted to the NICU with more than 28 days of life were excluded.

Study variables

The outcome variables evaluated in this study were prematurity and full-term birth[15]. The explanatory variables were clinical, epidemiological and care, obstetric and neona-

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tal characteristics.

Data collection

Data collection was carried out by the researcher, directly from the newborns' medical records and discharge summaries. To operationalize the collection of information, an instrument was used that included maternal variables: maternal age, number of pregnancies, number of prenatal consultations, previous maternal illnesses, complications during pregnancy (syphilis, ruptured membranes, urinary tract infection), need for antibiotic therapy and antenatal corticosteroid therapy, colonization by Group B *Streptococci* (GBS), place of birth, type of delivery, twin pregnancy; newborn variables: gestational age at birth, Apgar, sex, need for resuscitation at birth, birth weight, malformation, reason for admission to the NICU, length of stay, use of parenteral nutrition, ventilatory support, antibiotic therapy, nitric oxide, surfactant, phototherapy, occurrence of sepsis, complications during hospitalization and death. For stratification, premature and full-term, neonates born alive before the end of 37 weeks of gestation were considered premature. And, the subcategories of premature birth, defined based on gestational age, are: extremely premature, a newborn with less than 28 weeks of gestation; very premature, from 28 to 32 weeks; and, moderate to late preterm from 32 to 37 weeks[15].

Data analysis

For analysis, the data was transferred to the Statistical Package for Social Science (SPSS), version 22.0, and analyzed with descriptive and inferential statistics. Categorical variables were described using absolute (n) and relative frequency (%) and quantitative variables, using measures of central tendency and dispersion. The internal consistency of the data was verified using the Cronbach's Alpha coefficient (α=0.905). Variable association tests were used, including the Chi-square test and Fisher's exact test, with values of $p < 0.05$ being considered significant.

Ethical aspects

The study was submitted to the University's Research Ethics Committee under CAAE no. 42342521.1.0000.5350 and approved under Opinion no. 4.601.870/2020.

RESULTS

494 newborn hospitalizations were analyzed. Of these, 69.6% were born prematurely and 30.4% were born at term. It was evident that 82% of the newborns' mothers were aged between 16 and 35 years, with a range between 13 and 45 years, and an average of 27±7.09 years. Table 1 presents the epidemiological, clinical and maternal care characteristics related to premature and full-term births. In this, it appears that 202 (40.9%) of the mothers were first-time mothers, 345 (69.8%) had more than six prenatal consultations, and cesarean section was the most frequent (75.3%).

When stratifying premature and full-term births, a statistically significant difference was found between prematurity and the low number of prenatal consultations ($p<0.001$), vaginal birth ($p= 0.04$), occurrence of complications ($p<0.001$) and use of antibiotics during pregnancy ($p=0.02$), ruptured membranes ($p<0.001$) and antenatal corticosteroid therapy ($p<0.001$). Positive colonization for Group B *Streptococci* (GBS) had a higher percentage (52.9%) among those born at term. The institution was the most frequent place of birth among premature babies (73.6%).

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Still about Table 1, regarding previous illnesses, in the maternal and gestational description, it was observed that diabetes was diagnosed in 2.6% of mothers and systemic arterial hypertension (SAH) in 7.9%. However, there was no statistical difference between premature and full-term births in terms of previous illnesses. Specifically regarding complications during pregnancy, the most common were: premature labor (28.9%), followed by Pregnancy-Specific Hypertensive Disease (PSHD) (16%) and gestational diabetes in 9.3%.

Table 2 presents the results regarding the epidemiological, clinical and care characteristics of newborns, premature and full-term. It is evident that, of these, the highest percentage was male (59.5%) and that 479 (97%) did not have malformations at birth. A statistically significant difference was found between prematurity and: sex (p=0.01) and twin birth (p<0.001).

In the classification of newborns according to the subcategories of premature birth, it was found that of the 69.6% premature, 31.8% were borderline premature, with 35 to 37 weeks of gestation; 18.4% of them, moderately premature, from 32 to 34 weeks of gestation; 15.6% very premature, at 28 to 32 weeks of gestation; and, 3.8% extremely premature, less than 28 weeks of gestation.

Regarding birth weight, it was found that 40.1% were born weighing >2,500 g, 54.5% between 1000 and 2500g and 5.5% weighing less than 1000g. The median was 2196.50 g, minimum weight of 355g and maximum weight of 4830g.

The causes for admission of newborns to the NICU are presented in Figure 1. It can be seen that the most frequent clinical diagnosis upon admission was respiratory dysfunction, in 66.8% of cases. And, respiratory dysfunction, associated with Hyaline Membrane Disease (HMD) and prematurity was observed in 15.2% of newborns.

Table 3 presents the care interventions to which the newborns were subjected during their stay in the NICU and the outcomes they presented. In this case, it can be seen that in terms of care interventions, 475 (96.2%) of the newborns underwent antibiotic therapy, 467 (94.5%) received some type of oxygen support, 195 (39.5%) at least one transfusion blood and 313 (63.4%) were prescribed Total Parenteral Nutrition (TPN). Regarding outcomes during hospitalization, 467 (94.5%) of the newborns presented early sepsis and 19 (3.8%) of them died.

A statistically significant difference was found between prematurity and the need for assistance interventions: use of surfactant (p<0.001), central venous access (p<0.001), ventilatory support (p=0.01), phototherapy (p<0.001), blood transfusion (p<0.001) and parenteral nutrition (p<0.001).

Regarding central venous access, 64.8% used a peripherally inserted central catheter (PICC) and 11.9% used a PICC associated with umbilical catheterization. Regarding ventilatory support, regarding mechanical ventilation, the median time of use was ten days, with a minimum of one and a maximum of 77 days; in relation to the use of nasal Continuous Positive Airway Pressure (CPAP), the median was five days, minimum of one and maximum of 27 days; when using a hood, the median was three days, minimum one and maximum 24 days; and, of nasal catheter the median was five days, minimum of one and maximum of 40 days. Regarding the time of oxygen therapy use, the median was eight days, with a lower limit of one day and an upper limit of 116 days.

When using TPN, the median was 11 days, with a minimum of two and a maximum of 60 days. As for antibiotic therapy, it was found that 96.2% of newborns received antibiotics; of these, 60.7% used ampicillin and gentamicin; 17.4% vancomycin and cefepime; and 15.4% vancomycin associated with amikacin.

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Table 1 - Maternal factors associated with premature and full-term outcomes, assisted in a Neonatal Intensive Care Unit. Ijuí, Rio Grande do Sul, 2016 – 2020.

Variables		Premature n (%)	Full-term n (%)	Total	p-value#
Age (years)	< 16	12 (3.5)	7 (4.7)	19 (3.8)	0.53
	16 – 35	280 (81.4)	125 (83.3)	405 (82.0)	
	> 35	52 (15.1)	18 (12)	70 (14.2)	
Number of pregnancies	One	143 (41.6)	59 (39.3)	202 (40.9)	0.63
	Two	102 (29.7)	51 (34)	153 (31.0)	
	Three or more	99 (28.8)	40 (26.7)	159 (28.1)	
Prenatal consultations	< 6 consultations	127 (36.9)	22 (14.7)	149 (30.2)	<0.001*
	≥ 6 consultations	217 (63,1)	128 (85,3)	345 (69,8)	
Type of birth	217(63.1)	128 (85.3)	345 (69.8)	122 (24,7)	0.04*
	Vaginal	94 (27.3)	28 (18.7)	122 (24.7)	
Previous illnesses	C-section	250 (72.7)	122 (81.3)	372 (75.3)	0.47
	No	307 (89.2)	135 (90)	442 (89.5)	
Intercurrences during pregnancy	Yes	37 (10.8)	15 (10)	52 (10.5)	<0.001*
	No	42 (12.2)	80 (53.3)	122 (24.7)	
Syphilis	Yes	302 (87.8)	70 (46.7)	372 (75.3)	0.34
	Yes	14 (4.1)	9 (6)	23 (4.7)	
Ruptured membranes	No	330 (95.9)	141 (94)	471 (95.3)	<0.001*
	Yes	67 (19.5)	11 (7.3)	78 (15.8)	
Urinary infection	No	277 (80.5)	139 (92.7)	416 (84.2)	0.35
	Yes	45 (13.1)	17 (11.3)	62 (12.6)	
Use of ATB during pregnancy	No	299 (86.9)	133 (88.7)	432 (87.4)	0.02*
	Yes	102 (29.7)	31 (20.7)	133 (26.9)	
Antenatal corticosteroid therapy	No	242 (70.3)	119 (79.3)	361 (73.1)	<0.001*
	Yes	185 (53.8)	5 (3.3)	190 (38.5)	
GBS Colonization	No	159 (46.2)	145 (96.7)	304 (61.5)	0.02*
	Yes	8 (2.3)	9 (6)	17 (3.4)	
	No	21 (6.1)	16 (10.7)	37 (7.5)	
Place of birth	Not performed	315 (91.6)	125 (83.3)	440 (89.1)	0.001*
	Institution	270 (78.5)	97 (64.7)	367 (74.3)	
	Another institution	74 (21.5)	53 (35.3)	127 (25.7)	
Total		344 (69.6)	150 (30.4)	494 (100)	-

ATB, Antibiotic therapy; GBS, Group B *Streptococci*.
#Chi-square test; *significative (p<0,05).

Source: Author, 2016 to 2020.

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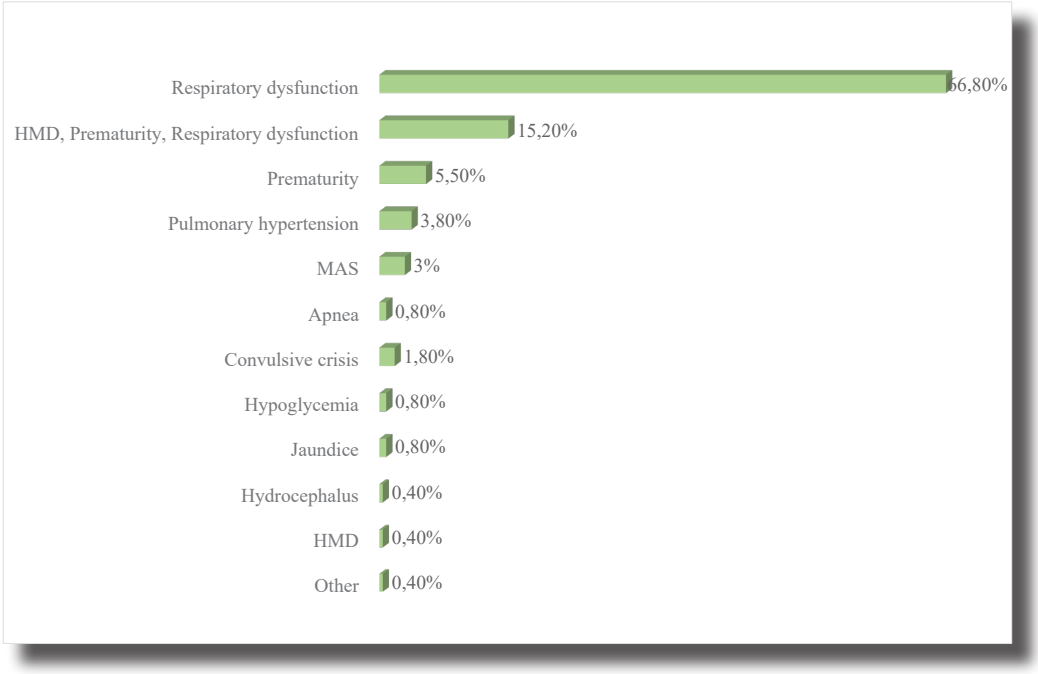
Table 2 - Characterization of neonates associated with premature and full-term outcomes in a Neonatal Intensive Care Unit. Ijuí, Rio Grande do Sul, 2016 – 2020.

Variables		Premature n (%)	Full-term n (%)	Total n (%)	p-value
Sex	Female	152 (44.2)	48 (32)	200 (40.5)	0.01#*
	Male	192 (55.8)	102 (68)	294 (59.5)	
Twin	Yes	53 (15.4)	1 (0.7)	54 (10.9)	<0.001&*
	No	291 (84.6)	149 (99.3)	440 (89.1)	
5th minute Apgar[a]	< 7	25 (7.3)	10 (6.7)	35 (7.1)	0.79#
	≥ 7	316 (92.7)	140 (93.3)	456 (92.3)	
Malformation	Yes	9 (2.6)	6 (4)	15 (3.0)	0.29&
	No	335 (97.4)	144 (96)	479 (97.0)	

Li, Inferior limit; Ls, Superior limit; A, Average; SD, Standard deviation. a3 not informed; #Chi-square test; &Fisher's Exact Test significative for (p<0,05); *significative (p<0,05).

Source: Author, 2016 to 2020.



HMD, Hyaline Membrane Disease; MAS, Meconium Aspiration Syndrome.

Source: Author, 2016 to 2020.

Figure 1 - Diagnosis of hospitalization of newborns assisted in a Neonatal Intensive Care Unit. Ijuí, 2016 – 2020.

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Table 3 - Outcomes and care interventions in newborns, associated with premature and full-term infants, cared for in a Neonatal Intensive Care Unit. Ijuí, 2016 – 2020.

Variables		Premature n (%)	Full-term n (%)	Total n (%)	p-value
Resuscitation at birth	No	229 (66.6)	107 (71.3)	336 (68.0)	0.40#
	Yes	115 (33.4)	43 (28.7)	158 (32.0)	
Early sepsis[a]	Yes	327 (95.3)	140 (93.3)	467 (94.5)	0.36#
	No	16 (4.7)	10 (6.7)	26 (5.3)	
Surfactant[a]	Yes	148 (43.1)	2 (1.3)	150 (30.4)	<0.001&*
	No	195 (56.9)	148 (98.7)	343 (69.4)	
Antibiotic	Yes	334 (97.1)	141 (94)	475 (96.2)	0.10#
	No	10 (2.9)	9 (6)	19 (3.6)	
Central venous access	Yes	290 (84.3)	89 (59.3)	379 (76.7)	<0.001#*
	No	54 (15.7)	61 (40.7)	115 (23.3)	
Ventilatory support	Yes	331 (96.2)	136 (90.7)	467 (94.5)	0.01#*
	No	13 (3.8)	14 (9.3)	27 (5.5)	
Nitric oxide	Yes	11 (3.2)	10 (6.7)	21 (4.3)	0.08#
	No	333 (96.8)	140 (93.3)	473 (95.7)	
Phototherapy	Yes	284 (82.6)	74 (49.3)	358 (72.5)	<0.001#*
	No	60 (17.4)	76 (50.7)	136 (27.5)	
Blood transfusion	Yes	158 (45.9)	37 (24.7)	195 (39.5)	<0.001#*
	No	186 (54.1)	113 (75.3)	299 (60.5)	
Parenteral Nutrition	Yes	251 (73)	62 (41.3)	313 (63.4)	<0.001#*
	No	93 (27)	88 (58.7)	181 (36.6)	
Deaths	Yes	12 (3.5)	7 (4.7)	19 (3.8)	0.53#
	No	332 (96.5)	143 (95.3)	475 (96.2)	

Li. Inferior limit; Ls. Superior limit; A. Average; SD. Standard deviation. a1 not informed; b2 not informed; #Chi-square test; &Fisher's Exact Test significant for (p<0,05); *significative (p<0,05)

Source: Author, 2016 to 2020.

DISCUSSION

Obstetric and neonatal characteristics contribute to the occurrence of premature birth and are associated with the need for intensive care. This statement emerges from reflections based on the results of the present study, which demonstrate that prematurity is related to a lower number of prenatal consultations, vaginal birth, complications during pregnancy, use of antibiotics and antenatal corticosteroid therapy. As well as, they highlight the association between prematurity and the sex of the newborn, twins, the need for assistance interventions of greater technical complexity, that is, intensive care.

In the research in question, there was a predominance of cesarean section, which occurred in 75.3% of births, however, it is noteworthy that vaginal birth was more frequent in situations of prematurity. Cesarean delivery is a procedure that constitutes an effective intervention to save the lives of mothers and newborns, in situations such as: prolonged

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or obstructed labor, fetal distress, or because the baby is presenting in an abnormal position. However, it must be precisely indicated for this benefit, as in addition to the surgical risks, it can cause important and sometimes permanent complications[16]. South America has the highest average rates of cesarean sections in the world, with around 42.9% of births. Already, the rate in Latin America and the Caribbean is around 40%. And, the Brazilian cesarean rate (55.6%), higher than that in Africa and Asia[17].

It is worth highlighting the fact that the highest percentage of newborns admitted to the unit under study were premature and that prematurity is related, among other factors, to the low number of prenatal consultations and deserves attention. Although a lower number of consultations among premature babies is an expected result, since these mothers had an early birth, it may not only limit access to important information regarding care inherent to the gestational period, but also reduce the possibility of prevention, early identification of risks and abnormalities and, in particular, timely treatment. The Ministry of Health determines that at least six prenatal consultations be carried out and highlights that assistance to pregnant women presupposes a dynamic assessment of risk situations and readiness to identify problems and carry out the necessary interventions, in order to prevent an unfavorable outcome[5].

A study carried out in Ceará[18] pointed out that the majority of pregnant women underwent the necessary number of consultations, as does the present research, however, the relationship between neonatal hospitalization and less than six prenatal consultations, the presence of gestational risk and intrapartum risk is highlighted[8], in the present study, premature birth was associated with less than 6 prenatal consultations.

The occurrence of illnesses prior to pregnancy was reported by only 10.5% of the mothers in this study. However, 75.3% of them had complications during the gestational period, including premature labor, Pregnancy-Specific Hypertensive Disease (PSHD) and gestational diabetes. This denotes the importance of early identification of risk factors and effective prenatal care. Similar results were identified in an investigation[19] that explains among the complications during pregnancy, premature labor and PSHD. In addition to these, gestational diabetes mellitus was also identified as a complication of pregnancy[20,21].

Furthermore, among the obstetric risk factors, the results of the present investigation show that 15.8% of pregnant women presented premature rupture of the ovular membranes, premature rupture of the membranes (PROM), with greater frequency among premature babies. Characterized by its influence on preterm labor, cord prolapse, placental abruption and intrauterine infection, PROM has chorioamnionitis as a sequel and may precede endomyometritis or sepsis of the newborn[22]. The main causes of PROM include maternal infections, intrauterine infection, cervical insufficiency, multiple previous pregnancies, polyhydramnios, nutritional deficit and decreased membrane tension forces[23]. This evidence demonstrates the relevance of attention to risks, with screening and prevention, as well as the possible relationship between PROM and the use of antibiotic therapy and antenatal corticosteroid therapy.

When there is a risk of premature birth, one of the measures used is the use of corticosteroids by the mother, to promote lung maturation of the fetus[24]. Administration of prenatal intramuscular corticosteroids to the mother reduces the chances of the newborn needing special care for respiratory disorders, especially intensive care[25]. And, the highest percentage (61.5%) of pregnant women who did not undergo antenatal corticosteroid therapy, may be related to emergency deliveries, which demonstrates the need to review care protocols, as well as the need for new studies, including with other methodological designs, with a view to specifically tracking high-risk pregnancies.

Another class of medications evaluated was

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the use of antibiotics during pregnancy, probably related to cases of urinary infection, since both this and antibiotic therapy had higher percentages among premature babies. These medications are most commonly used for Group B *Streptococcus* and urinary tract infections[22].

It is noteworthy that there are still inadequacies in access services to exams. Results are evidenced in this investigation, as GBS collection was performed in only 3.4% of pregnant women and syphilis was diagnosed in 4.7%. Congenital syphilis is prevented by screening all pregnant women and treating those with evidence of infection[26]. Therefore, for adequate diagnosis and treatment, it is necessary to carry out serological tests in the first trimester, around 28 weeks of gestation and at birth[27].

The identification of neonatal characteristics associated with prematurity is relevant for the early identification and prevention of neonatal illness. The newborns most likely to be admitted to the NICU are those with lower birth weight, lower gestational age, lower maternal parity, congenital malformation or 5 minutes Apgar score of <7[28], and low weight and prematurity were also more prevalent in newborns hospitalized in the present study. Compared to single-fetus pregnancies, twin pregnancies are more likely to have complications, including DHEG, gestational diabetes, anemia, preterm birth, antepartum hemorrhage and maternal death[29], although such outcomes were not analyzed in this research.

The Brazilian Society of Pediatrics[27] explains that around 75% of premature deaths can be avoided through essential care: birth assistance, thermal control, basic ventilatory support, nutritional practices with breast milk and infection control. With greater relevance for admission to the NICU, respiratory dysfunction was the most diagnosed condition among newborns. Although lung problems are very prevalent in newborns, lower rates of Respiratory Distress Syndrome (RDS) are reported[30]. However, it is observed that most premature newborns require respiratory or ventilatory support[31], related to the disease in the admission diagnosis, which was mostly associated with the pulmonary system. In this sense, one of the interventions to reduce the time of respiratory supply in premature infants is the use of surfactant, which is crucial in the management of lung immaturity, and the most recent protocols for the administration of surfactants aim to avoid exposure to mechanical ventilation[32]. In the present study, 30% of the premature population received at least 1 dose of surfactant.

Of the newborns in the study, 39.5% received at least one blood transfusion. The indications for performing it in newborns vary according to the clinical context, including gestational age at birth. In general, infants of all gestational and postnatal ages in the NICU tend to be transfused using the same guidelines, although there is little evidence specifically relating to full-term infants. This procedure occurs because they often become anemic, partly caused by losses from blood collections, sometimes with larger sample volumes[33].

Another intervention, recommended when there is a need for a high supply of nutrients, especially in cases of water restriction or high concentrations of glucose and osmolarity, difficulty in establishing venous access is the central access route (PICC)[34]. Also, among the indications is antibiotic therapy, followed by parenteral nutrition[35]. However, despite greater durability, complications such as infections, rupture and extravasation may occur[36]. Thus, to reduce the occurrences that compromise the permanence of the catheter, training and ongoing education of professionals is required, in order to develop knowledge, dexterity and ability to handle the PICC[37].

Although there was no statistical difference, the fact that a higher percentage of premature infants required antibiotic therapy may be associated with the occurrence of sepsis resulting from care procedures, given that 94.5% of newborns presented early sepsis. It is estimated that for each documented infection, between 11 and 23 uninfected

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newborns are treated with antibiotics in Neonatal Units. Approximately 70% of very low birth weight premature babies use antibiotics after the 3rd day of life, due to infections[38]. In this sense, the World Health Organization points out that by the year 2050 there will be around 10 million deaths each year caused by drug-resistant diseases[39]. This makes implementing antibiotic indication protocols important. The literature shows that the use of initial empirical antibiotic therapy, for more than 5 days, prolongs hospitalization time, increases family and hospital costs, as well as complications for newborns[40].

Finally, the fact that 3.8% of newborns died is a result worthy of attention, given that more than half of these were born prematurely. It is also noteworthy that many survivors face a lifetime of disabilities, which include learning difficulties, visual and hearing problems[1]. Neonatal care demands that perinatal units be integrated into risk-stratified gestational care for prompt birth assistance, according to maternal-fetal and neonatal risk, systematized in care microsystems, with prompt birth assistance to prevent neonatal hypothermia, prevention and approach to infections, case management with ventilatory, cardiocirculatory and nutritional support, with neural protection[27]. The countries that currently have the lowest maternal and neonatal mortality rates have made important investments in the regionalization of perinatal care, from prenatal care to hospital care, with the distribution of perinatal units in response to the clinical demands of pregnant women and newborns[27].

Regarding the limitations of this investigation, the fact that it was carried out in just one institution and only with newborns admitted to the NICU.

CONCLUSION

The low number of prenatal consultations, vaginal birth, complications, use of antibiotics during pregnancy, and antenatal corticosteroid therapy by the pregnant woman were found to be risk factors for prematurity. In relation to newborns, prematurity was associated with the female sex and twins, and the need for assistance interventions (use of surfactant, central venous access, ventilatory support, phototherapy, blood transfusion and parenteral nutrition.

The identification of maternal and neonatal risk factors provides support that favors the development and implementation of strategies that make it possible to qualify and increase the safety of care, as well as reduce possible health problems for newborns and, consequently, neonatal morbidity and mortality rates.

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