



LATE NEONATAL SEPSIS: AN ANALYSIS OF RISK FACTORS OF AN INTENSIVE CARE UNIT

SEPSE NEONATAL TARDIA: ANÁLISE DOS FATORES DE RISCO DE UMA UNIDADE DE TERAPIA INTENSIVA

SEPSIS NEONATAL TARDÍA: UN ANÁLISIS DE LOS FACTORES DE RIESGO DE UNA UNIDAD DE CUIDADOS INTENSIVOS

Patrick Leonardo Nogueira da Silva¹, Ariádna Pereira Soares², Renata Patrícia Fonseca Gonçalves³, Écila Campos Mota⁴, Marcelo Rocha Torres⁵, Cássio de Almeida Lima⁶

ABSTRACT

Objective: identifying the risk factors inherent in neonates and hospital procedures related to late sepsis. **Method:** a descriptive, documentary study, of a quantitative approach, performed with 14 neonates admitted from January to June 2010. The data were collected using a semi-structured form and entered in SPSS version 15.0 for Windows and later performed a descriptive analysis. The research project was approved by the Research Ethics Committee, protocol nº 2218/2010. **Results:** it was evident that prematurity and low birth weight were prevalent. The use of HOOD (85,7%), followed by CPAP (78,6%), and the insertion of epicutaneous catheter (85,7%) mainly were statistically considered as a risk factor for the development of late onset sepsis. **Conclusion:** neonatal sepsis is presented as a significant cause of morbidity and mortality in the neonatal unit studied and stepping to the knowledge of risk factors is necessary to minimize the incidence. **Descriptors:** Sepsis; Newborn; Intensive Care Unit; Risk Factors.

RESUMO

Objetivo: identificar os fatores de risco inerentes ao neonato e a procedimentos hospitalares relacionados à sepse tardia. **Método:** estudo descritivo, documental, de abordagem quantitativa, com 14 neonatos internados de janeiro a junho de 2010. Os dados foram coletados com um formulário semiestruturado e digitados no programa SPSS, versão 15.0 para Windows e, posteriormente, realizada a análise descritiva. O projeto de pesquisa foi aprovado pelo Comitê de Ética em Pesquisa, protocolo nº 2218/2010. **Resultados:** evidenciou-se que a prematuridade e o baixo peso ao nascer foram prevalentes. O uso de HOOD (85,7%), seguido do CPAP (78,6%), e a inserção do cateter epicutâneo (85,7%), principalmente, foram, estatisticamente, considerados como fator de risco para o desenvolvimento da sepse tardia. **Conclusão:** a sepse neonatal apresenta-se como uma relevante causa de morbimortalidade na unidade neonatal estudada e a intensificação para o conhecimento dos fatores de risco faz-se necessário para minimizar a incidência. **Descritores:** Sepse; Recém-Nascido; Unidade de Terapia Intensiva; Fatores de Risco.

RESUMEN

Objetivo: identificar los factores de riesgo inherentes a los recién nacidos y a los procedimientos del hospital relacionados a la sepsis tardía. **Método:** un estudio descriptivo, documental, de enfoque cuantitativo, con 14 recién nacidos ingresados entre enero y junio de 2010. Los datos fueron recolectados a través de un formulario semi-estructurado y se introducen en el programa SPSS versión 15.0 para Windows y más tarde realizóse el análisis descriptivo. El proyecto de investigación fue aprobado por el Comité de Ética de la Investigación, el protocolo nº 2218/2010. **Resultados:** se evidenció que la prematuridad y el bajo peso al nacer eran frecuentes. El uso de HOOD (85,7%), seguido por el modo CPAP (78,6%), y la inserción de catéter epicutánea (85,7%) se consideraron estadísticamente principalmente como un factor de riesgo para el desarrollo de sepsis de aparición tardía. **Conclusión:** la sepsis neonatal se presenta como una causa importante de morbilidad y mortalidad en la Unidad Neonatal estudiada y la intensificación para el conocimiento de los factores de riesgo es necesario reducir al mínimo la incidencia. **Descriptor:** Sepsis; Recién Nacido; Unidad de Cuidados Intensivos; Factores de Riesgo.

¹Nurse, Specialist in Family Health, State University of Montes Claros/ Unimontes. Montes Claros (MG), Brazil. Email: patrick_mocesp70@hotmail.com; ²Nurse, Specialist in Surveillance and Hospital Infection Control, State University of Montes Claros/Unimontes. Montes Claros (MG), Brazil. Email: ariadna_soares@yahoo.com.br; ³Nurse, Master Teacher of Nursing, Coordinator of the Nursing Course, State University of Montes Claros/Unimontes. Montes Claros (MG), Brazil. Email: renatapfonseca@yahoo.com; ⁴Nurse, Master Teacher of Nursing, Department of Nursing, State University of Montes Claros / Unimontes. Montes Claros (MG), Brazil. Email: ecilacampos@hotmail.com; ⁵Nurse, Specialist in Emergency, Trauma and Intensive Care, Public Server of the University Hospital Clemente de Farias/HUCF. Montes Claros (MG), Brazil. Email: mrtorres26@yahoo.com.br; ⁶Academic, Graduate Nursing, State University of Montes Claros/ Unimontes. Scholarship Student of the Program for Scientific Initiation of CNPq /FAPEMIG/UNIMONTES. Montes Claros (MG), Brazil. Email: cassio-enfermagem2011@hotmail.com

INTRODUCTION

The neonatal period is the interval between the birth of the child and his 27th day of life. Most deaths occurred in this phase is related to the health care of children and mothers, due to poor prenatal care throughout the pregnancy and after birth.¹

Neonatal sepsis is a major responsible for the deaths of newborn babies, and the tenth most common cause of death in the United States and in Brazil, it is estimated an important role in the etiology of general death.² This is a syndrome clinically characterized by the presence of systemic signs of infection, caused by bacteremia during the first month of life.³ This disease is caused by uncontrolled systemic inflammatory response of the individual, of infectious origin, characterized by multiple manifestations, and that can determine dysfunction or bankruptcy of one or more organs or even death.⁴

In the first three days of life, about 4,2% of neonatal deaths are caused by sepsis, in which 14,6% occur four to seven days, 36,2% of eight and fourteen days, and 51,8% to 28 days life.⁵ We can observe two types of disease -related sepsis in the first month of life, they start with an early, when symptoms occur within the first four days of life. Her newborn (NB) often develop severe multisystemic clinical picture and sometimes fulminant pulmonary impairment may exist; and late onset: when symptoms occur from the fifth day of life, occurring at a lower percentage. In this, the clinical RN is generally more localized and almost always associated with infection of the central nervous system (CNS).⁶

In a study conducted in São Paulo (SP), corroborates the same by stating that early sepsis is related to maternal risk factors and bacterial agents found in cultures are present in the birth canal. The late sepsis, in turn, is more related to neonatal risk factors and generally affects newborns who find themselves hospitalized in Neonatal Intensive Care Units, and caused typically by microorganisms source hospitalar.⁷ Among the factors that increase the probability of infection in infants have: maternal factors (preterm labor, prolonged rupture of the membrane, urinary tract infection etc.). RN factors (prematurity, low birth weight, birth defects etc.) and environmental factors (lack of breast feeding, prolonged hospitalization, use of invasive procedures, etc.).³

In late neonatal sepsis (TNS) factors most frequently associated risk include

prematurity, due to the immaturity of the immune system, therapeutic invasive procedures, parenteral nutrition, broad-spectrum antibiotic, long hospital stay and no segment of the standards of hospital infection prevention.⁸

The increase in incidence rates and mortality related to sepsis in recent decades is directly related to medical advances made during this period, where more and more severely ill patients are treated and in more advanced stages of disease.⁴ The increased survival of preterm NB ground (PN), especially those of low weight, led to greater permanence of these children in nurseries and in Intensive Care Units (ICU) neonatal, breaking down, physical barriers formed by the skin and mucous membranes through the use of invasive methods. This breaks the barrier provides the penetration of bacteria in subepithelial tissues causing bacteremia.⁹ Despite advances in neonatal intensive care, newborns with late sepsis at high risk of mortality, with an incidence of 40 % when the pathogen is isolated gram-negative.⁸

The etiologic agents that most frequently cause neonatal infections have changed over the years; prior to use of sulfonamides, were gram-positive and the introduction of antibiotics coconuts, there was a predominance of gram- negative bacteria, especially *Escherichia coli* (50s). In the 60s it was the *Staphylococcus aureus* that prevailed in the 1970s and began a significant increase in the incidence of beta hemolytic *Streptococcus* group B and *Listeria monocytogenes*. In the 80's resurfaces *Staphylococcus aureus*, however, beta-lactamase resistant coagulase negative and finally in the 1990s the incidence increase, especially in the neonatal ICU of the following germs: coagulase-negative *Staphylococcus*, *Candida* species, mainly of the genus *albicans* and *bacilli*.⁹

The leading causes of TNS are gram-positive bacteria such as *Staphylococcus coagulase negative*, which occurs in about 50% of the time. The gram- negative cause 20-30% of late neonatal sepsis in intensive care unit (ICU), and patients have mortality rates of 30-50%.⁵ Not much different are the findings of another study in which 70,2% TNS of cases are associated with gram-positive, 17,6% of the gram-negative bacteria and fungi 12,2%.¹⁰

The signs and symptoms of sepsis in a newborn may be minimal and nonspecific, making diagnosis difficult. May be present thermal instability, apnea, bradypne, grunting, tachypnea, sternal and subcostal retractions, flaring of the nasal wings and

cyanosis; hypotonia and seizures, irritability and lethargy, gastrointestinal symptoms such as difficulty in food intake (inappetence), idiopathic jaundice, pallor, cold and sudorética skin, hypotension, and capillary refill time greater than three seconds, signs of bleeding, with a clinical diagnosis disseminated intravascular coagulation, or even subjective assessment that the RN does not look well. Laboratory findings such as leukocytosis, leukopenia, neutropenia, increased erythrocyte sedimentation rate (ESR) and C-reactive protein or interleukin changes also help to diagnose.¹¹

The diagnostic criteria for TNS, according to the International Pediatric Sepsis Consensus of 2005, are the appearance of the infection from the third to the twenty-eighth day after birth, the presence of clinical variables such as temperature instability, heart rate (HR) > 180 bpm or < 100bpm, greater than 60irpm respiratory rate (RR) (with drawing and saturation decrease), lethargy, irritability, feeding intolerance and laboratory variables: leukocytosis $\geq 25.000 \text{ mm}^3$ or leukopenia $\leq 5.000 \text{ mm}^3$, neutrophil index (IN) ≥ 0.2 , score of Hematology RODWELL ≥ 3 , CRP > 10 ml/dl, blood culture positive or not and negative CSF examination.⁸

Therapeutic modalities include antibiotic therapy, supportive measures, such as monitoring of heart and respiratory rate, saturation, blood pressure, glycemic control, temperature and urine output, electrolyte solutions and nutritional support. The use of intravenous immunoglobulin and G- CSF (human colony stimulating factor granulocyte) is part of the adjunct.⁸ However, neonatal death associated with late infection can be prevented by adopting an effective monitoring program and infection control, recognition of mortality and the adoption of interventions to reduce the incidence and the number of deaths in developing countries is necessary.⁸

Whereas the identification of risk factors and causes related to the event of the TNS is fundamental to reduce its occurrence, this study aimed to analyze the risk factors associated with TNS Neonatal and Pediatric ICU of the University Hospital Clemente de Farias (HUCF) located in the city of Montes Claros/MG, in the period January to June 2010.

METHOD

A descriptive, retrospective, documental study, of a quantitative approach, developed at the University Hospital NICU Clemente Faria (HUCF) of Montes Claros (MG) through

files at the Service Statistics and Medical Archive (SAME).

The Pediatric and Neonatal ICU "Jenny de Andrade Faria" reference is in the northern region of Minas Gerais and is not limited to cases care RN HUCF, but also serves other local and regional hospitals. The HUCF is recognized as "Baby Friendly Hospital" and as "Safe Motherhood", being the first university hospital in Brazil to receive this grant. These titles granted by the Pan American Health Organization (PAHO), the United Nations Fund for Children (UNICEF), the Ministry of Health and the Brazilian Federation of Gynecology and Obstetrics (FEBRASCO).

The study subjects were treated at the Neonatal ICU nurse's HUCF the period January-June 2010, and presented TNS, ranked by Service Infection Control (HICS) of the institution. They were between 1 and 27 days of life; and had a diagnosis of TNS by the HICS HUCF. However, were excluded from the study newborns in which the records were not found; and infants with severe abnormalities and complex congenital heart disease and malformation of the gastrointestinal tract and central nervous system, requiring urgent surgical approach.

In the analysis of medical records was used a form that was filled out by the researcher in the month of October 2010. This form contained information regarding the identification of patients, procedures, comorbidities, diagnosis, etiology and outcome, ie, death or survival until the end of the neonatal period, which in turn were analyzed and transferred to a database. The instrument of data collection was based on Hospital Infection criteria established by the National Agency for Sanitary Surveillance in Hospital Infection Criteria for Neonatology 2010.

Data were tabulated, interpreted, processed, analyzed, and entered into a database the Statistical Package for the Social Sciences/SPSS, version 15.0 for Windows for Windows on which enabled the construction of tables.

The statistical procedure was based on descriptive and comparative analysis. For comparison of the frequency responses of Chi-Square test was used. Thus, the significance is $p \text{ value} \leq 0,05$ if p is smaller than 0,05 there is a significant difference in comparison; if p is greater than 0,05 there is no significant difference.

There were adhered to ethical issues as regulating the Resolution 196/96 of the National Health Council (CNS), which provides

regulatory ethical standards for research involving humans. The research project was approved by the Ethics Committee of Universidade Estadual de Montes Claros (UNIMONTES CEP) embodied in Opinion No. 2218/2010.

RESULTS

The data of 14 newborns admitted to the NICU of HUCF Montes Claros/MG were analyzed. According to Table 1, of the 14 neonates with TNS, 50% were female and 50% were male, showing no difference between the sexes has been made when compared with the cases of TNS surveyed in HUCF.

Table 1. Distribution of cases of TNS occurred in the neonatal ICU and pediatric HUCF second gynecobstetric aspects. Montes Claros (MG), 2010.

Variable	Description	n=14	%
Gender	Male	07	50
	Female	07	50
Twin Pregnancy	Yes	02	14,3
	No	12	85,7
Birth weight	751-1000 g	05	35,7
	1001-1500 g	07	50
	1501-2500 g	02	14,3
Type of parturition	Cesarean	10	71
	Vaginal	04	29

Source:

SAME/HUCF/Montes

Claros/MG.

Regarding twinning, it was observed that 14,3% and 85,7% had not had this characteristic. In this study, 85,7% of the neonates studied had weight less than 1.500g (Table 1). According to Table 1, the cesários births accounted for 71% of cases of late-onset sepsis while 29% of cases were related to vaginal deliveries. However, it is noteworthy that these data represent only one piece of

reality, ie, only one picture of the trend at that time, so it is not possible to challenge studies, that because the research has not owned a significant number of reality, being applicable only to population searched. Furthermore, the mean gestational age at delivery corresponded to 30,28 weeks/day (Table 2).

Table 2. Distribution of cases of TNS occurred in the neonatal ICU and pediatric HUCF seconds maternal age, gestational age and permanence. Montes Claros (MG), 2010.

Variable	Average	Minimum	Maximum	SD
Mother's age	27,42	16,00	41,00	7,92
Pregnancy age	30,28	26,00	39,00	3,22
Permanence	40,85	18,00	67,00	16,01

Source: SAME/HUCF/Montes Claros/MG.

For having shown as an important protective factor against mortality of infants, the use of parenteral nutrition has become a routine therapy in neonatal, being inconceivable that early and is not used

routinely in infants of very low birth weight. In this study, the data show the use of parenteral nutrition in 100% of the studied cases of sepsis (Table 3).

Table 3. Procedures related to cases of TNS occurred in the neonatal ICU and pediatric HUCF. Montes Claros (MG), 2010.

Procedure	Description	n=14	%	Sign. (p*)
Parenteral nutrition	Yes	14	100	-
	No	00	00	-
Vesical probe of delay	Yes	03	21,4	0,033*
	No	11	78,6	0,033*
Enteral feeding	LM/LHP	14	100	-
	Milk formula	00	00	-
Surgery	Yes	03	21,4	0,033*
	No	11	78,6	0,033*
Use of H2 Blocker	Yes	02	14,3	0,008*
	No	12	85,7	0,008*
Blood transfusion	Yes	06	42,9	0,593
	No	08	57,1	0,593
Corticosteroid	Yes	05	35,7	0,285
	No	09	64,3	0,285

Source: SAME/HUCF/Montes Claros/MG. The value of significance is $p \leq 0.05$.

Given these exposed raises the need for a more detailed study in this regard so that the conclusions are more precise. The urinary

catheter was reported in 21,4% of cases of illness and cited in 78,6% of cases did not notice the use of this artifice. In the

literature, studies of this aspect are still little discussed, so the confront with data from other studies were hampered. However, in this study, after application of the chi-squared test to evaluate the significance level, the indwelling catheter was shown to be a risk ($p = 0,033$) factor. Regarding enteral nutrition data show that in 100% of cases, infants with signs of sepsis were using breast milk or human milk pasteurised (LHP), and none made use of infant formula.

Surgery, when performed in newborns admitted to the NICU/Pediatric HUCF, were associated with cases of sepsis ($p = 0,033$). Of newborns diagnosed with SNT, 21,4% underwent surgical procedures and 78,6% did not undergo surgical procedures . With regard to the use of H2- blocker, the study

demonstrates the prevalence of 14,3% in the cases of neonatal sepsis. The use of inhibitors of gastric acid showed SNT risk ($p = 0,008$). Blood transfusion was quoted in the data surveyed in 42,9% of cases ($p = 0,593$). Considering that the patients in the neonatal ICU are patients who need more assisted treatment, blood transfusion often is routine in both volume replacement, as well as in the treatment of anemia. The use of corticosteroids was noted in 35,7% of cases ($p = 0,285$).

According to Table 4, the data show that use of CPAP Hood and were associated with the development of TNS, $p = 0,008$ and $p = 0,033$, respectively. The use of mechanical ventilation was present in 100% of cases surveyed.

Table 4. Procedures, access type and associated clinical signs to cases of TNS of HUCF. Montes Claros (MG), 2010.

Invasive procedure	Yes		No		Sign. (p^*)
	n	%	n	%	
VM	14	100	00	00	-
CPAP	11	78,6	03	21,4	0,033*
HOOD	12	85,7	02	14,3	0,008*
Type of Access	Yes		No		Sign. (p^*)
	n	%	n	%	
Umbilical catheter	10	71,4	04	28,6	0,109
Epicutaneous catheter	12	85,7	02	14,3	0,008*
Venous dissection	02	14,3	12	85,7	0,008*
Clinical signs	Yes		No		Sign. (p^*)
	n	%	n	%	
Gastric residue	05	35,7	09	64,3	0,285
Vomite	07	50	07	50	1,000
Abdominal distension	12	85,7	02	14,3	0,008*
Jaundice	02	14,3	12	85,7	0,008*
Bradycardia < 100bpm	03	21,4	11	78,6	0,033*
Tachycardia > 180bpm	02	14,3	12	85,7	0,008*
Hypotension	01	7,1	13	92,9	0,001*
External retractions and subcostals	11	78,6	03	21,4	0,033*
Tachypnea > 60irpm	02	14,3	12	85,7	0,008*
Hypotonia	02	14,3	12	85,7	0,008*
Bleeds	03	21,4	11	78,6	0,033*
Apnea	08	57,1	06	42,9	0,593
Thermal instability	06	42,9	08	57,1	0,593

Source: SAME/HUCF/Montes Claros/MG. The value of significance is $p \leq 0.05$.

As for venous access, the umbilical catheterization was present in 71,4% of cases of neonatal sepsis occurred in the ICU of HUCF being representative venous dissection of 14,3% of associations with the same disease. Have the epicutaneous catheter was associated with 85,7% of cases of neonatal infection (sepsis) (Table 4). In the analysis of risk factors, only the use of epicutaneous catheter and venous dissection showed association with TNS.

Statistically, although central catheters present risks for the development of sepsis in this study, their use allows the recovery of preterm infants who require prolonged hospital stays and increased use of intravenous therapy.

The clinical signs are important factors for the detection of the occurrence of cases of sepsis. According to Table 5, there are several signs that were significantly present in patients with TNS, as follows: hypotension (92,9%), jaundice (85,7%), tachycardia (85,7%), tachypnea (85,7%) and hypotonia (87,5 %). This study also showed that the presence of vomiting, gastric residual, thermal instability and apnea were not significant for the development of sepsis ($p > 0,05$), refuting with data found in Brazilian literature, demonstrating apnea as a significant symptom of worsening of clinical symptoms in infants.

Table 5. Distribution of cases of TNS related to the time of onset of symptoms, to culture harvested and the finalization of cases in intensive care neonatal and pediatric HUCF. Montes Claros (MG), 2010.

Variable	Description	n=14	%	Sign. (p*)
Episodes of late sepsis	1° episode	13	92,9	-
	2° episode	01	7,1	-
	More than 02 episodes	00	00	-
Blood culture	Positive	05	35,7	0,285
	Negative	09	64,3	0,285
	Non conducted	00	00	-
CSF fluid	Positive	01	7,1	0,030*
	Negative	04	28,6	0,030*
	Non conducted	09	64,3	0,030*
Other culture	Positive	03	21,4	0,033*
	Negative	00	00	-
	Non conducted	11	78,6	0,033*
Death	Yes	02	14,3	-
	No	12	85,7	-

Source: SAME/HUCF/Montes Claros/MG. The value of significance is $p \leq 0.05$.

In this study, 13 children (92,9%) had only 01 episode of late-onset sepsis and in 7,1% of cases observed the occurrence of 02 episodes. There were no cases diagnosed with the presence of more than 02 episodes (Table 5).

Regarding the etiology of neonatal sepsis, a blood culture was presented as the main instrument being collected in 100% of cases observed. In 64,3 % the result was negative, which is an impressive number within the hospital setting, especially in cases of sepsis, blood culture because it is one of the best methods for the diagnosis of bacteremia or fungemia and are closely linked to cases of sepsis (Table 5).

In 35,7% of cases the blood culture was positive giving subsidies in order to work the importance and need of an instrument of essential value in the diagnosis and treatment of infectious diseases. Moreover, one of the first major difficulties is the relatively low frequency of positive blood cultures in suspected cases of sepsis. However for a reduction in these events it is necessary to take some control measures as skin preparation, volume, and adequate blood samples among others. Regarding the performance of the culture of cerebrospinal fluid, 64,3% in this test was not done, 28,6% resulted in negativity and only 7,1% confirmed the suspicion of infection.

Statistically at 78,6% were not made other types of culture and 21,4% of the time these other cultures were confirmed as positive. Another fact of utmost importance that could be identified was the most prevalent microorganisms in the cultures of patients with sepsis. *Staphylococcus* sp was seen in 42% of cultures were found positive. Também *Pseudomonas aeruginosa* (14%) and *Candida* sp

in 7% of microbiological analyzes. Agree highlight the main antibiotics used in patients with neonatal sepsis, oxacillin and amikacin antibiotics that are commonly used for the treatment of late-onset sepsis.

As seen in Table 5, the percentage of cases of late-onset sepsis who had as an evolutionary factor death was 14,3%. It is noteworthy that neonatal death due to late onset sepsis is extensive damage to the hospital because, with this result, it becomes more difficult to maintain not only the securities received (eg Child Friendly Hospital), but also the confidence of clients served there. The discharge from the ICU was found in 85,7% of cases studied, which represents a great advance in the treatment of critically ill patients.

DISCUSSION

The increased risk among male infants compared to females, was observed in all ranges of birth weight and gestational age studied. This is confirmed by other studies of the same author that included all infants of low birth weight and very low birth weight. One of the main reasons for the higher mortality in males may be a lower speed in the overall maturation and especially the lungs, affecting boys with a higher incidence of hyaline membrane disease, which is the main cause of morbidity and mortality in this group of children studied.¹²

Many details surrounding the outcome of twin pregnancies remain, however, poorly defined. Great controversy exists about being different predictions of twins depending on the birth order. The authors relate a higher incidence in the second twin, acute asphyxia at birth, measured by the pH of the umbilical

cord, and the possibility of a late onset sepsis.¹³ In another study, we highlight the low birth weight and prematurity as factors expressive propensity for the development of SNT since they are the leading causes of admission of neonates in intensive care units.¹⁴

Mean gestational age-related birth derives the proportionality between the degree of immunodeficiency and gestational age, since initially the newborn depends on antibodies transferred by the mother through the placenta, a process that starts after the 2nd trimester, and infants with less than 34 weeks of gestational age still have insufficient levels of protective factors against the aggressions of microorganisms.¹⁵

Accordingly, in a survey conducted in the neonatal unit show through test for linear trend between weight and the occurrence of sepsis that infants weighing between 1.001 and 1.499g, had 46.5 times more likely to develop sepsis compared with those weighing ≥ 2500 g (linear x2: 46,69; $p < 0,001$).¹⁶

Regarding the type of delivery presented in this study, the data are not consistent with the literature in some studies since it was observed that 59,4% of sepsis born by vaginal delivery, which is typically more via the associated risk of infection by *Streptococcus* group B, however, in the study, there was no statistical difference in the means of delivery according to the author's own.¹⁰

In a more detailed evaluation of his study, this variable only showed decreased risk during early neonatal mortality. In the phase of late neonatal mortality she indicated a high risk of death. The higher incidence of death during the early neonatal period was caused by hyaline membrane disease, and during the late neonatal mortality by sepsis. Total parenteral nutrition in this period could not be acting as protection but as a risk factor for sepsis and death.¹⁷

Resuming some issues already discussed, analyzing the use of parenteral nutrition, prolonged use of that power has been associated with late infection and delay the start of enteral nutrition. In other studies suggested that the enteral route should be initiated as early as possible to reduce the time of use of parenteral, which is associated with a high risk of infection. However it is known the need to observe dietary association parenterally related to late-onset neonatal infection, preventive measures so as early initiation of enteral or oral feeding with the use of human milk should be implemented.¹²

The use of corticosteroids in cases of sepsis triggers a broad discussion in the literature return to the idea that although, in theory, has always been regarded as having some corticosteroids blocking action of cytokine synthesis, their use and efficacy in sepsis or in septic shock came not being supported by clinical evidence has even been studies suggesting that their use could be harmful to patients. More recently, increased interest in the use of corticosteroids in sepsis again. The observation that severe sepsis may be associated with relative adrenal insufficiency or resistance to glucocorticoid receptors induced by systemic inflammation has increased the interest in studies evaluating the usefulness of corticosteroids in low doses, in the situation of sepsis.¹⁸

This study found results that meet with the current literature showing that the same factors being known for some time still represent aspects of large associativity with the development of cases of sepsis.¹⁹ This study showed that in a prospective study of preterm and very low birth weight, use of early CPAP, 24 hours after birth, is important for the onset of sepsis predictor, even if it is made use of systemic antibiotics. A likely explanation is the fact that nasal CPAP facilitates the entry of microorganisms acquired in hospital and lower airways. In addition, there is greater need for aspiration of secretions to keep the airway clear, increasing the chances of injury to the nasal mucosa, serving as a gateway to infections. However, these hypotheses need to be further studied and discussed.

Due to advances in neonatal intensive care, the survival of premature infants of very low birth weight has increased and late sepsis remains an important cause of morbidity and mortality in these neonates.²⁰ In which the prevention of births was reported in the scientific study of neonatal nosocomial infection preterm infants is one of the most effective strategies to promote the reduction of such risk population. However, the implementation of this measure is not easy since it depends directly of good assistance from health services to improve the care of pregnant.²¹

The results show that these signs and symptoms described are quite common in cases of sepsis when it is based on studies published in the literature. In one study, it was observed that most neonates presented with early respiratory distress, but always associated with other clinical and laboratory manifestations, as demonstrated in the North American jobs.¹⁰

Findings such as feed refusal, hypoactivity, irritability, or simply the impression that the RN does not seem right can lead to suspicion of an infection. There are obvious clinical presentations, such as difficulty breathing (tachypnea, grunting, retractions, nasal flaring of wings), apnea, lethargy, fever or hypothermia, jaundice without other determinant, vomiting and diarrhea, or cutaneous manifestations, including petechiae, abscess and scleredema.²²

It is noteworthy that some practices may, thus, be adopted as measures not elimination, but to reduce the incidence of late onset sepsis. The late-onset neonatal infection may also be related to the contact of the newborn with family, friends or other patrons of the hospital environment. As reported earlier in this discussion, it is known that the use of the HOOD and CPAP and mechanical ventilation itself are closely related to the presence of infection, so the time to maximum use should be reduced so that it is able to reduce rates late sepsis. Hygiene measures in handling these equipments may be important in protection against infection of the airways, which is one of the major sites of nosocomial infection related to the appearance of late-onset sepsis, as will be discussed later.⁸

Blood culture is one of the most relevant resources for clarifying the origin of undetermined fevers, infectious causes and is also indicated for clinical suspicion of bacteremias.²³ Also contributing to this concept, often blood cultures are the only source available to identify the etiologic agent in cases of severe systemic infections and even sometimes threatening to life.²⁴

The identification of the etiologic agent when performed quickly and reliably makes objective and rational antibiotic therapy, significantly improving the cost-benefit.²⁵ Examination of the cerebrospinal fluid culture should be performed in all infants with suspected sepsis, ie, those who show any sign or symptom of the disease. In infants who have risk factors for infection, but are completely asymptomatic with negative blood culture, examination of the cerebrospinal fluid is required and must be entered in accordance with the clinical course of study via patient.²⁶ In Datasus during 2005-2009, despite the high incidence and mortality of smaller range than a year, and even its lethality is relatively high (25,73%), drew attention to continuous increases of the lethality observed from the age of 5 to 9 years, ranging from 13,48% to 63,47%, which stand out tracks which showed higher mortality at 50%.²⁷

CONCLUSION

This study demonstrated the risk factors related to TNS in NICU/Pediatric HUCF the period January to June 2010. Regarding factors inherent in neonates was evident that prematurity and low birth weight were prevalent in the cases studied. Prematurity was present in 85,7% of cases and the mean gestational age at birth corresponded to 30,28 weeks, alluding to an increased likelihood of developing late-onset sepsis compared with infants who did not have low weight and extreme prematurity. The Cesario delivery accounted for 71% of cases of late-onset sepsis, opposite to the data found in the literature, where vaginal birth was prevalent and this route is usually more associated with the risk of infection by *Streptococcus* group B.

As for the procedures that RN ICU were submitted, the use of indwelling catheters, surgery and therapy with H2 blockers were statistically considered as a risk factor for the development of TNS ($p \leq 0,05$). Regarding the use of venous access, the epicutaneous catheter was present in 85,7% of cases of TNS, with the use of umbilical venous catheter and representative dissection of 71,4% and 14,3%, respectively. In the analysis of risk factors, only the use of epicutaneous catheter and venous dissection showed association with TNS.

This study also showed that the presence of vomiting, gastric residual, thermal instability and apnea were not significant for the development of sepsis ($p \geq 0,05$), refuting with data found in Brazilian literature, demonstrating apnea as a significant symptom of worsening of clinical symptoms in infants. Several signals that were significantly present in patients with TNS, namely: hypotension (92,9%), jaundice (85,7%), tachycardia (85,7%), tachypnea (85,7%), and hypotonia (87,5%). It was determined in this study the most prevalent microorganisms in the cultures of patients with sepsis. *Staphylococcus* sp was seen in 42% of cultures were found positivas. Também *Pseudomonas aeruginosa* (14%) and *Candida* sp in 7% of microbiological analyzes.

Regarding the outcome of the cases, the percentage of infants with late onset sepsis who had as an evolutionary factor death was 14,3%. The discharge from the ICU was found in 85,7% of cases studied, which represents a great advance in the treatment of critically ill patients. The TNS is presented as one of the most significant causes of mortality in the period, becoming ever more necessary to carry out studies that show the national

situation in this respect, especially as concerns the most prevalent etiologic agents and risk factors for that it can provide action plans in an attempt to reduce the rates of late-onset neonatal infection. Based on this information, preventive measures can be taken to minimize these risk factors and consequently the incidence of TNS.

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Corresponding Address

Patrick Leonardo Nogueira da Silva
Avenida Doutor Sidney Chaves, 1171 / Ap. 102
/ Bloco H
Bairro Edgar Pereira
CEP 39400-648 — Montes Claros (MG), Brazil