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Description of cases of necrotizing enterocolitis in newborns of a university hospital in southern Brazil: a retrospective study

Descrição de casos de enterocolite necrosante em recém-nascidos de hospital universitário do sul do Brasil: estudo retrospectivo

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ABSTRACT

Objective: To describe the frequency of clinical and sociodemographic variables before necrotizing enterocolitis, as well as the frequency of cases, complications, and deaths in a university hospital. **Method:** A retrospective descriptive study was carried out by requesting an anonymized query that included newborns diagnosed with Necrotizing Enterocolitis of hospital acquisition and the variables before developing the disease in the five-year period. **Results:** In the study period, 59 cases of Necrotizing Enterocolitis occurred, with an incidence of 0.9 infections by patients/day in the Neonatology Unit. The surgical outcome occurred in 42.3% of the cases, and 18.6% died, variables were also obtained regarding pregnancy, birth, and hospitalization, which could be related to the studied cases. **Conclusion:** The low supply of breast milk exclusively, in only 5.1% of the cases, is one of the results that may have had a more significant influence on the rate of Necrotizing Enterocolitis of this Unit, being this a variable cited in many studies as the main form of prevention of infection. Neonatology teams must reevaluate their care processes, mainly by promoting human milk supply exclusively to babies.

Descriptors: Necrotizing Enterocolitis; Newborn; Neonatology.

RESUMO

Objetivo: Descrever a frequência de variáveis clínicas e sociodemográficas prévias à Enterocolite Necrosante, a frequência dos casos, complicações e óbitos, em um hospital universitário. **Método:** Estudo descritivo retrospectivo, realizado através da solicitação de uma query anonimizada onde foram incluídos os recém-nascidos diagnosticados com Enterocolite Necrosante de aquisição hospitalar e as variáveis prévias ao desenvolvimento da doença, no período de cinco anos. **Resultados:** No período do estudo ocorreram 59 casos de Enterocolite Necrosante, com uma incidência de 0,9 infecções por pacientes/dia na Unidade de Neonatologia. O desfecho cirúrgico ocorreu em 42,3% dos casos e 18,6% foram a óbito, também foram obtidas variáveis quanto à gestação, o nascimento e a internação, que puderam ser relacionadas aos casos estudados. **Conclusão:** A baixa oferta de leite materno de forma exclusiva, em apenas 5,1% dos casos, é um dos resultados que pode ter tido maior influência na taxa de Enterocolite Necrosante desta Unidade, sendo esta uma variável citada em muitos estudos como principal forma de prevenção da infecção. É muito importante que as equipes de neonatologia reavaliem os seus processos de cuidado, principalmente promovendo a oferta do leite humano de forma exclusiva aos bebês.

Descritores: Enterocolite Necrosante; Recém-Nascido; Neonatologia.

INTRODUCTION

The development of necrotizing enterocolitis (NEC) has become an extremely relevant subject when related to its high morbidity and mortality rates in newborns (NB). Its involvement is multifactorial and is mainly associated with prematurity and low birth weight, however, other factors such as excessive use of antibiotics, blood transfusions,

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breastfeeding formula, and maternal predispositions are also cited as influencing high rates of NCT[1].

NCT manifests through gastrointestinal symptoms, and its diagnosis can be based on the Manual of Diagnostic Criteria for Infection Associated with Health Care in Neonatology of the National Health Surveillance Agency (ANVISA). In the first criterion, the NB should present one of the following signs: vomiting, bilious aspirated, abdominal distension, or hidden/visible blood in the feces without another recognized cause and should also present at least one alteration in radiological findings such as pneumoperitoneum, intestinal pneumatosis or slender intestinal loop in a fixed position. In the second criterion, the NB will need to present at least one of the following surgical evidence: extensive intestinal necrosis (> 2 cm of the intestine) or intestinal pneumatosis with or without perforation[2].

As a form of prevention, studies highlight the importance of giving preference to human milk in the first months of life, be it maternal or through donations, when compared to the use of milk formula. Breast milk (LM), through its bioactive components, allows the creation of a protective barrier in the NB, which constantly acts against the development of NCS through anti-infectious processes and intestinal colonization, these components are mainly found in colostrum and transition milk[3]. From the experience lived in the study scenario, it was possible to observe the high rates of ECN infection and the outcomes that occurred in the NBs over the years, so, in the face of the problem found, the following research objective was reached: describe the frequency of clinical and sociodemographic variables before Necrotizing Enterocolitis, the frequency of cases, complications and deaths, during the period from January 2017 to December 2021 in a hospital in southern Brazil.

METHOD

This is a retrospective descriptive study with a quantitative approach. The research was developed in the Hospital Infection Control Commission of a university hospital in southern Brazil using data on newborns admitted to the Intermediate Care Unit (ICU), which comprises the conventional care rooms (UCINCO), the Kangaroo Care Room (UCINCA), and the intensive care unit (ICU) of Neonatology. These two units comprise a total of 50 Neonatology beds.

All patients who had a diagnosis of NCT of hospital acquisition from January 1st, 2017 to December 31st, 2021, were included in the study, the diagnoses were evaluated by the Hospital Infection Control Commission (CCIH) following the Diagnostic Criteria Manual of Infection Associated with Health Care Neonatology of ANVISA 2017. The NBs that presented a diagnosis of NCS considered to be of community or perinatal acquisition were excluded. After evaluating inclusion and exclusion criteria, an anonymized query was officially requested from the hospital's Medical Archive and Health Information Services (SAMIS), which presented a sample of 59 patients.

The incidence of infection, sociodemographic variables related to NB, clinical variables related to hospitalization prior to the development of NCS, variables related to pregnancy, and disease outcomes were described. Data were also obtained from the hospital's CCIH regarding the infection rates by patients/day who developed ECN in the Neonatology Unit.

To reduce the sampling selection bias, all hospitalized patients who were notified of the infection from January 2017 to December 2021 were included. No randomization was performed. To reduce the information bias related to the description of the data, a query was requested that included pre-determined information. These variables were refined before the query request and later characterized clinical and sociodemographic variables. It was not expected to exclude patients from the sample, and some information was not included in the query.

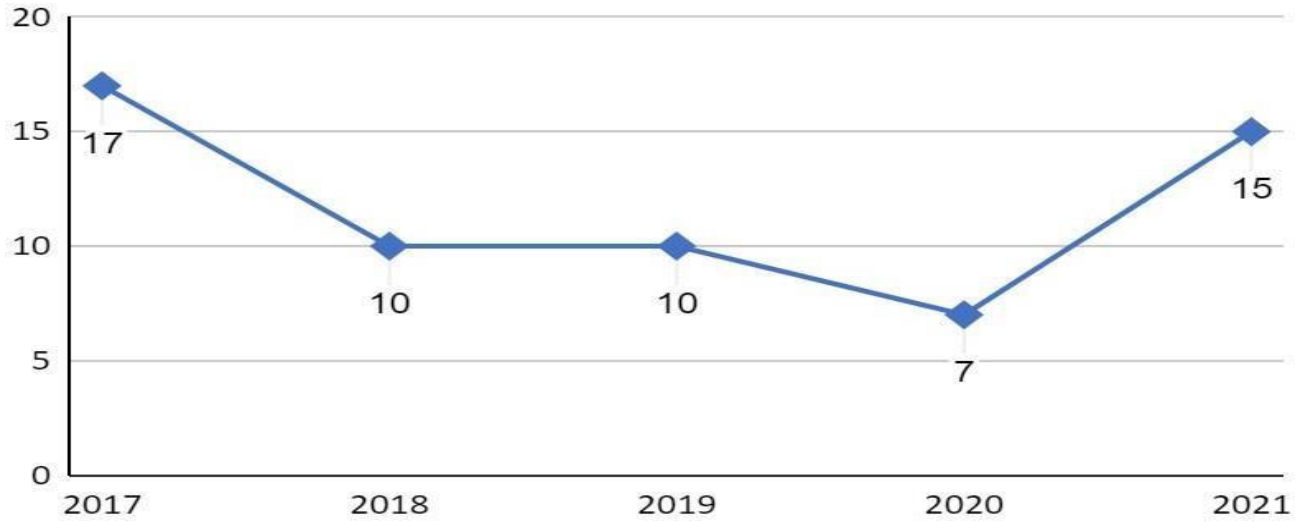
As a statistical method, the variables were described as frequency and percentage.

The study was approved by the Research Commission (COMPESQ) of the School of Nursing of the Federal University of Rio Grande do Sul on February 16th, 2022, and by the Research Ethics Committee (CEP) of the hospital where the research was carried out under number CAEE 56594822200005327 with date of DO opinion delivered on May 23rd, 2022. All ethical health research requirements were respected according to Resolution No. 466 of December 12th, 2012, and Resolution No. 510 of April 07th, 2016, of the National Health Council.

RESULTS

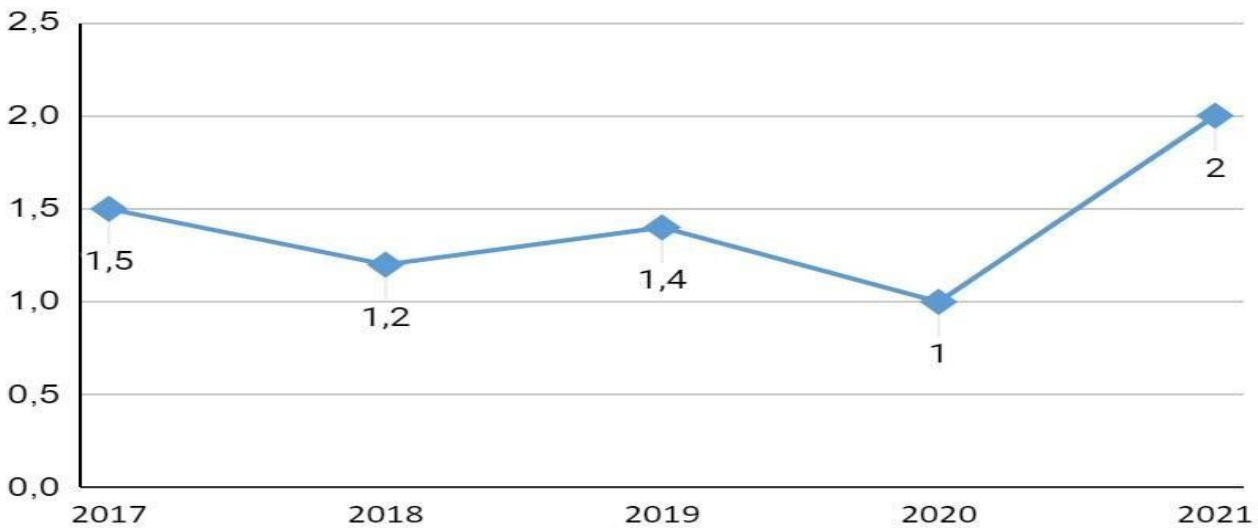
The study presented 59 NBs that developed NCS from 2017 to 2021 (Figure 1). We can highlight that the years with the highest occurrence of NCS cases were 2017, with 17 cases, 28.8% of the sample, and 2021, with 15 cases, 25.4% of the sample.

Figure 1 - Number of Necrotizing Enterocolitis cases - 2017 to 2021 - Neonatology. Porto Alegre, RS, Brazil, 2022



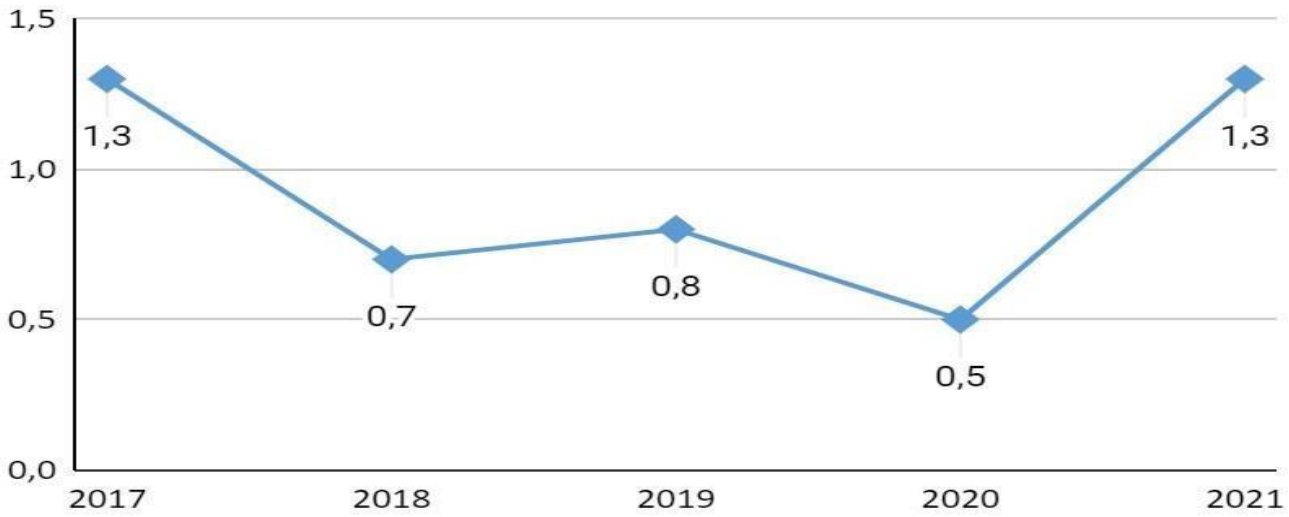
When analyzed exclusively in the Neonatal ICU (Figure 2), the rates of hospitalized patients who developed NCT in the period studied with the number of days patients admitted to the Neonatal ICU showed a large increase in 2021, with a rate of 2.0 infections per patient/day, compared to the years 2018 and 2020, which respectively had rates of 1.2 and 1.0 infections per patient/day.

Figure 2 - Necrotizing Enterocolitis (rate per 1000/patients-day) 2017 to 2021 - Neonatal ICU. Porto Alegre, RS, Brazil, 2022



When the broad chart of the Neonatology Unit (Figure 3) is observed, rates decrease because there is an increase in the number of hospitalized day patients and a lower occurrence of cases in intermediate beds. Thus, we can analyze that there is a line with a lower rate and with lower oscillation when compared to the graph with hospitalization only in the Neonatal ICU.

Figure 3 - Necrotizing Enterocolitis (rate per 1000/patients-day) 2017 to 2021 - Neonatal ICU+ Intermediate. Porto Alegre, RS, Brazil, 2022



In the study, data were observed on variables related to pregnancy, sociodemographic, clinical, related to hospitalization before the development of NCS, and the outcome of the disease, and were cited in Table 1 below:

Table 1 - Sociodemographic and clinical variables related to pregnancy and outcome of the disease of newborns with NCT - 2017 to 2021 - Neonatology (n=59). Porto Alegre, RS, Brazil, 2022

Variables	n	%
Sex		
Female	23	38.9
Male	36	61.1
Gestational Age		
Post-term 42 without or >	0	0
Term 37 - 41 without	11	18.6
Premature light 34 - 36 without	8	13.5
Premature moderate 30 - 33 without	16	27.1
Premature extreme 26 - 29 without	18	30.5
Premature very extreme 23 - 25 without	6	10.1
Birth weight		
< 750g	9	15.2
751g - 1000g	11	18.6
1001g - 1500g	14	23.7
1551g - 2500g	14	23.7
> 2500g	11	18.6
Type of pregnancy		
Unique	51	86.4
Twin	6	10.1
Triplet	2	3.3
Type of birth		
Childbirth	15	25.4
Caesarean	44	74.6
Diets		
NPO	1	1.7
Exclusive breast milk	3	5.1
Exclusive formula	9	15.2
Breast milk or formula	46	78
Previous risk procedures		
Mechanical ventilation	20	33.9
Vascular catheters	59	100
Antibiotic therapy	34	57.6
Blood transfusions	40	67.7
Neonatal Inpatient Unit		
ICU	46	78
UCINCO	9	15.2
UCINCA	4	6.8
Surgical interventions	25	42.3
2017	4	23.5
2018	8	80
2019	6	60
2020	2	28.5
2021	5	33.3
Death	11	18.6
2017	3	17.6
2018	1	10
2019	2	20
2020	2	28.6
2021	3	20

Among the patients diagnosed with ECN, 38.9% were female and 61.1% were male. As for gestational age at birth, the vast majority, 81.2% of babies were born premature. Regarding birth weight, 81.2% were born with low weight (below 2500g), and 57.5% were born with less than 1500g. As for pregnancy, 86.4% were unique, 10.1% were twins, and 3.3% were triplets, and for births, 74.6% were born from cesarean section, and only 25.4% were born from childbirth. In 78% of the cases, the diet used was breast milk or formula, while only 5.1% of the NBs had an exclusive diet of breast milk. They were subjected to invasive procedures prior to infection, such as mechanical ventilation in 33.9% of the cases, vascular catheters in 100% of NBs with NCS, antibiotic therapy in 57.6%, and blood transfusions in 67.7% of the cases.

Of the cases of NCS, 78% occurred in the neonatal ICU, 15.2% in the intermediate care unit, and 6.8% in the kangaroo intermediate care unit. The NBs were submitted to surgical interventions mainly in 2018, with 80% of the cases affected that year, and in 2019 with 60% of the cases. As for death rates in a maximum period of 30 days after infection, we had a higher rate in 2020 with 28.6% of the cases, not being possible to relate only to the NCT, but there is also the possibility of other previous comorbidities that the NB may have presented.

DISCUSSION

From the analysis of the results, a profile of the characteristics of the babies studied was found. Most of the babies are premature births (81.2%), through cesarean section (74.6%), single-gestation (86.4%), with a birth weight below 1500g (57.5%), male (61.6%), and had as diet both breast milk and lactea formula (78%), they were exposed to invasive procedures before infection (100%) and had their hospitalization in the neonatal ICU (78%).

It was observed in the hospital that only 5.1% of the babies had exclusive feeding with LM, being exclusive breastfeeding (EBF) an important prevention factor for NCS. The study carried out by Campos emphasizes the importance of breastfeeding since the first hours of life because colostrum is rich in IgA immunoglobulins that are responsible for strengthening the mucosa of the infant by creating an epithelial barrier that prevents the invasion of bacteria, the study also reports that even with the transition of breast milk phases, the protection of the microbiota remains active [4]. EBF is extremely necessary for the protection of babies and healthy development thus, having a 5.1% rate of LM exclusivity is unfavorable to this outcome. It is essential to point out that information regarding the type of diet was sought in the medical prescription since the information regarding the percentages administered for each diet was not identified.

The study carried out by Santos observed a total of 5 cases of NCT in a neonatal intensive care unit in 2 years and 10 months, with a death rate in 80% of the cases [5]. We can highlight in this study that in 100% of the cases, the NBs had their first feeding with LM and milk formula, and none of the cases had exclusive breastfeeding. In the 59 cases observed in the hospital, we can notice the similarity in the prescription of the enteral diet, emphasizing LM and milk formula. According to Muller, the reports brought by the parturients of a public hospital indicate the lack of guidance in prenatal care regarding the possibility of hospitalization of the NB, and this causes many mothers not to know how they could contribute to the development and rehabilitation of babies in the ICU [6]. Through the need for hospitalization of newborns, mothers, and staff should be sensitized and guided as to the importance of breast milk within the neonatal hospitalization units since the first hours of life of the NB, but this is not what has been happening in some of the Brazilian hospitals. This lack of guidance results in low adherence by mothers to extracting milk banks and consequently decreases the amount of breast milk available for feeding NBs exclusively in neonatology units.

Many of the patients affected by ECN end up having an unfavorable outcome, a study carried out in Poland by Gaÿÿzka observed for 6 years the development of 76 cases of ECN in their department, in which of these patients, 73% had unfavorable outcomes, and surgical interventions were necessary and 21% of the patients died[7]. The Lima study in the interior of the Brazilian northeast brought a rate of 2.8% incidence of NCT 2016 in three neonatal ICUs and 80% of unfavorable outcomes in its cases[8]. When compared to the results of the study hospital, in five years, there is also a very high incidence of NCT, highlighting the surgical outcome of the year 2018 that presented an even worse result compared to the study of Gaÿÿzka, with a total of 80% of surgeries, and the year of 2020, even with fewer hospitalized patients, which may be an impact of the COVID-19 pandemic on the

reduction of hospitalizations, there was an increase in deaths, with a rate of 28.6%.

It is essential to highlight that unfavorable outcomes in cases of NCS, such as the need for surgical interventions in 42.3% of cases, can negatively impact the costs generated for the Unified Health System, which is a considerable value and could be assigned to other needs of the Neonatology Unit, for example, the banks for the collection of human milk, offering easy access to the puerpera of the hospital and the community. The hospital in question does not have a Milk Bank for the collection and reception of human milk from women in the community, this often leads to the lack of human milk stock for inpatients who do not have the possibility of receiving their mother's milk and need donations.

Another variable observed in the study was that the cases occurred mainly in the neonatal ICU, which is possible to associate with the increase in handling, especially if it is a school hospital, which causes the rise in the number of professionals on the care team and consequently increases the handling of babies, but it can also be associated with the number of interventions that the baby needs during hospitalization, such as the use of mechanical ventilation, central venous catheters, blood transfusions and also the use of antibiotic therapy. According to Monteiro, excessive handling, mainly routine interventions, impairs the development of the baby and prolongs his hospitalization time, harming his physiological development, generating stress, and increasing the risks of infection [9].

It was also observed that 24% of cases occur in the intermediate unit and 6.8% in the kangaroo unit, the unit where the least invasive procedures or other interventions arise, on the contrary, it is the unit where the mother-baby bond and breastfeeding should be encouraged. The Zirpoli study describes the kangaroo method's benefits to babies, such as reducing stress and pain and increasing the prevalence of EBF[10]. Points like these make us question that the kangaroo unit has essential benefits so that infections like ECN do not occur, so there should not be a 6.8% rate in the unit. It is essential to highlight that the Neonatology of this study has an architecture planned in 1970, where the KANGAROO facilities (UCINCA) were not considered as an assistance project, so the UCINCA of this hospital is a suitable place for mothers and their companions to stay with their babies.

As a limiting factor for this study, we considered a need for more current publications related to ECN, which made it difficult to compare the data obtained in this research with other studies.

CONCLUSION

This study answered the proposed objective by describing the frequency of clinical and sociodemographic variables before Necrotizing Enterocolitis and the frequency of cases, complications, and deaths in the last five years. This made it possible to verify that many interventions considered in the literature as unfavorable to hospitalized babies are being practiced in this hospital.

The low supply of exclusive breast milk, in only 5.1% of cases, is one of the possible factors that had a more significant influence on the rate of necrotizing enterocolitis, being this a variable cited in many studies as the primary form of infection prevention. The prescription of exclusive breast milk is essential for neonatology health teams to analyze their care processes and modify the rates of NCT in the institution since this disease is related to high mortality rates.

From the theoretical review, it was observed that there is a shortage of current publications related to NCT, such as the influence of invasive procedures on the development of the disease and the profile of infants who developed NCT in Brazil, which made it difficult to compare the data obtained with other studies. It is essential to highlight that the NCS is not a mandatory notification data of ANVISA, even though it has a high rate of unfavorable outcomes in published studies, impacting the lives of NBs, which is a data loss in the country.

CONFLICT OF INTERESTS

The authors have declared that there is no conflict of interests.

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Data analysis and interpretation: Presser GM, Moretto VL
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Final approval of the version to be published: Presser GM, Oliveira LL de, Konkewicz LR, Moretto VL
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