

# DEATHS IN A NEONATAL INTENSIVE CARE UNIT IN THE HOSPITAL AND MATERNITY DONA IRIS

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## ABSTRACT

**Introduction:** Currently, it is known that neonatal mortality is associated with the quality of health care, it is the main factor in infant mortality. The neonatal intensive care unit (NICU) appears as an expectation and one of the most effective factors in trying to reduce neonatal mortality in the country. The main causes of deaths are prematurity, congenital malformation, intrapartum asphyxia, perinatal infections and maternal factors. **Objective:** To describe the incidence profile of the causes found in deaths in the NICU of the Hospital e Maternidade Dona Iris (HMDI) from January 2016 to December 2018. **Methods:** This is a cross-sectional study, where the number and number of mortality profile at the HMDI NICU, Goiânia, Goiás, from 2016 to 2018. A review of the electronic medical record was carried out. **Results:** Total number of 126 deaths occurred in the HMDI NICU, with 45 deaths in 2016, with the highest incidence in extremely premature newborns (gestational age <28 weeks). With the total number of deaths less than 28 weeks equal to 20, between 28 weeks and 33 weeks and 6 days 13 deaths, 34 weeks to 36 weeks and 6 days 4 deaths. Among the term newborns (RNT- 37 weeks to 41 weeks and 6 days), 8 deaths and post-term newborns (> 42 weeks) were not registered. In 2017, 34 deaths were recorded, 14 of which in newborns less than 28 weeks of gestational age, 12 deaths between 28 weeks and 33 weeks and 6 days, 1 death between 34 weeks and 36 weeks and 6 days, 7 deaths in RNT and not there was death in a post-term newborn. And in 2018, 47 deaths were recorded, 24 deaths in newborns under 28 weeks, 12 deaths between 28 weeks and 33 weeks and 6 days, 4 deaths between 34 weeks and 36 weeks and 6 days, 7 deaths in RNT and there was no death in post-term newborns. **Conclusion:** In 2016, 45 deaths were found, with the highest incidence in extremely premature newborns (gestational age <28 weeks). Among the term newborns (RNT- 37 weeks to 41 weeks and 6 days), 8 deaths and post-term newborns (> 42 weeks) were not registered. In 2017, 34 deaths were recorded, 14 of which in newborns less than 28 weeks of gestational age, 12 deaths between 28 weeks and 33 weeks and 6 days, 1 death between 34 weeks and 36 weeks and 6 days, 7 deaths in RNT and not death occurred in post-term newborns. In 2018, 47 deaths were recorded, with 24 deaths in newborns aged less than 28 weeks, 12 deaths between 28 weeks and 33 weeks and 6 days, 4 deaths between 34 weeks and 36 weeks and 6 days, 7 deaths in newborns and not recorded death in post-term newborns.

**KEYWORDS: NEONATAL MORTALITY. PREMATURETY. NEONATAL INTENSIVE CARE UNIT.**

## INTRODUCTION

Currently, it is known that neonatal mortality is associated with the quality of health care; it is the main factor of infant mortality since the 1990s in the country<sup>1</sup>. The neonatal intensive care unit (NICU) appears as an expectation and one of the most effective factors in trying to reduce neonatal mortality in the country. The NICU is reserved for the treatment of premature infants and newborns (NBs) who have a disease.

The reasons for mortality in the neonatal period are related to the conditions of pregnancy and childbirth, being influenced by the quality of prenatal care and childbirth. The closer the moment of birth is (early neonatal period, 0 to 6 days of life), the stronger the influence of birth conditions (especially gestational age and birth weight) and neonatal care for child survival<sup>2</sup>.

The main causes of death according to the literature are: prematurity, congenital malformation, intrapartum asphyxia, perinatal infections and maternal factors<sup>3,4</sup>. The main reasons for hospitalization in NICUs are related to respiratory causes, low weight and prematurity.

Premature delivery is defined as one whose pregnancy ends before the 37th week and the extreme premature is defined as one whose pregnancy ends before the 28th week. Prematurity is related to major complications in the neonatal period, given its condition of biological vulnerability, due to immaturity related to its organism, which is a strong factor associated with neonatal mortality<sup>5</sup>.

Birth weight and gestational age are the most important isolated factors related to neonatal death<sup>6</sup>. The risk of death being higher among newborns weighing less than 2500g and/or gestational age less than 37 weeks. The

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assessment of gestational age is important for planning neonatal care.

Therefore, the present study aims to analyze the deaths in NICU of the HMDI that occurred from January 2016 to December 2018 in order to describe the incidence profile of the causes found.

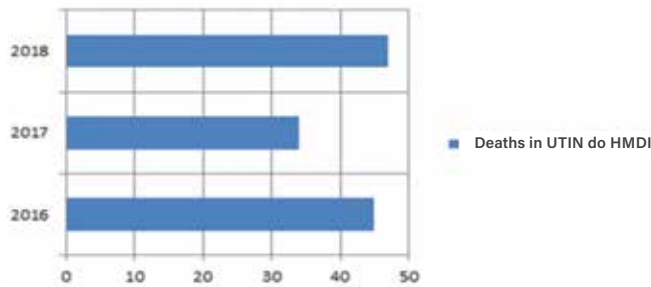
**2. METHODS**

This is a cross-sectional study, where the number and profile of mortality at the NICU of the Hospital e Maternidade Dona Iris (HMDI), located in the city of Goiânia, Goiás, between 2016 and 2018, was analyzed. A review of the electronic medical record was done in this period, with neither the patient nor the person responsible for it being exposed. Concomitant with the assessment of deaths that occurred during this period, it was analyzed the gestational age of the patients involved and their possible malformations.

The target audience was the 126 deaths that occurred at the HMDI NICU between the years 2016 and 2018, with the exclusion of neonatal deaths that occurred in the delivery room and patients who were transferred to other hospitals. This research was approved by the Research Ethics Committee of the Hospital e Maternidade Dona Iris on November 27th, 2019, CAEE 25740119.0.0000858. For data analysis, the Microsoft Excel 2010 program was used.

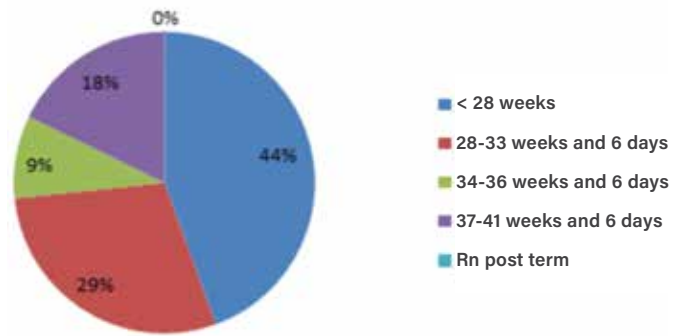
**3. RESULTS**

Graph 1 shows the total of 126 deaths that occurred in the HMDI NICU, with 45 deaths in 2016, 34 deaths in 2017 and 47 deaths in 2018.



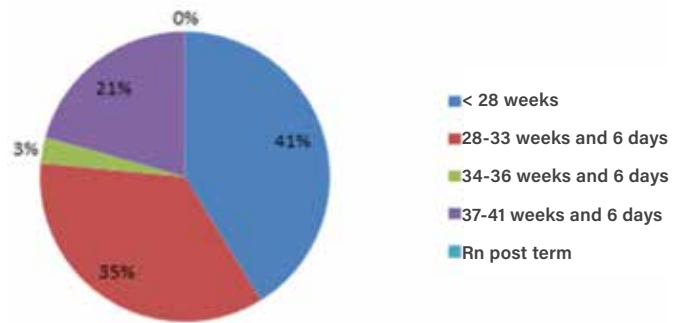
Graph 1 - numbers of deaths occurred in the NICU of the HMDI 2016 - 2018

In 2016, 45 deaths were found, with the highest incidence in extreme premature newborns (gestational age <28 weeks) - graph 1. The total number of deaths was equal to 20 for premature NBs with less than 28 weeks, between 28 weeks and 33 weeks and 6 days 13 deaths, 34 weeks to 36 weeks and 6 days 4 deaths. Among the full-term newborns (FT- 37 weeks to 41 weeks and 6 days), 8 deaths were recorded, and post-term newborns (> 42 weeks) there were no deaths.



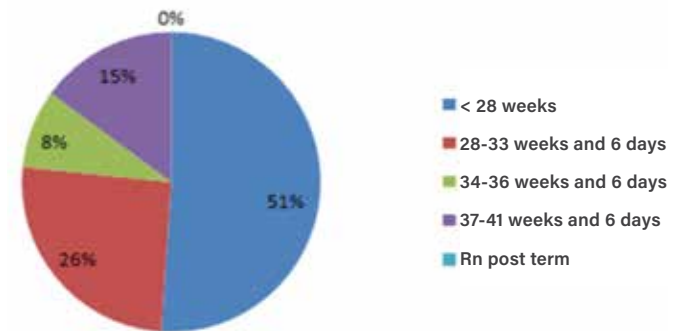
Graph 2 - mortality in the neonatal ICU in 2016 according to gestational age

In 2017, 34 deaths were recorded, 14 of which were in newborns less than 28 weeks of gestational age, 12 deaths between 28 weeks and 33 weeks and 6 days, 1 death between 34 weeks and 36 weeks and 6 days, 7 deaths in FT and there were no deaths in post-term newborns - graph 3.



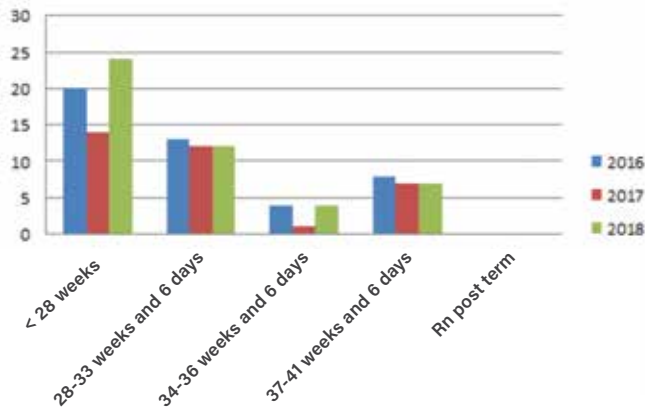
Graph 3 - mortality in the neonatal ICU in 2017 according to gestational age

In 2018, 47 deaths were recorded, being 24 deaths in NBs under 28 weeks, 12 deaths between 28 weeks and 33 weeks and 6 days, 4 deaths between 34 weeks and 36 weeks and 6 days, 7 deaths in FT and no deaths were recorded in post-term newborns - graph 4.



Graph 4 - mortality in the neonatal ICU in 2018 according to gestational age

Graph 5 shows a comparison of the incidence of deaths in relation to gestational age in the years 2016, 2017 and 2018.



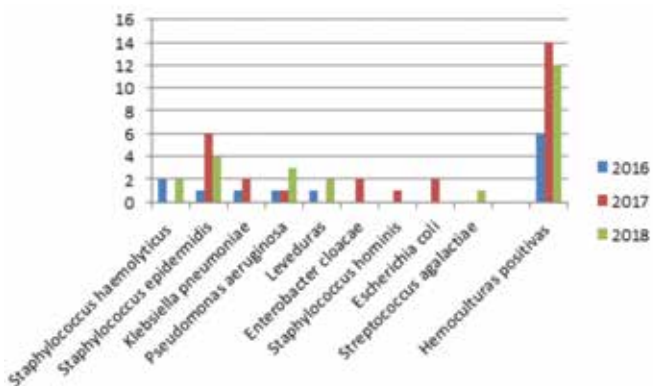
Graph 5 is a comparative sample between the years 2016, 2017 and 2018.

Table 1 shows the isolated infectious agents and their absolute number between the years 2016 to 2018.

	2016	2017	2018
<i>Staphylococcus haemolyticus</i>	2	0	2
<i>Staphylococcus epidermidis</i>	1	6	4
<i>Klebsiella pneumoniae</i>	1	2	0
<i>Pseudomonas aeruginosa</i>	1	1	3
Leveduras	1	0	2
<i>Enterobacter cloacae</i>	0	2	0
<i>Staphylococcus hominis</i>	0	1	0
<i>Escherichia coli</i>	0	2	0
<i>Streptococcus agalactiae</i>	0	0	1
Hemoculturas positivas	6	14	12

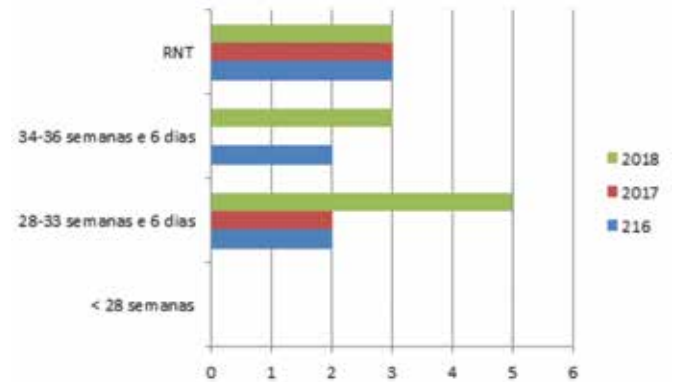
Table 1: Isolated infectious agents and their absolute number between the years 2016 to 2018

Graph 6 represents the comparison between the numbers of infectious agents in blood cultures from 2016 to 2018.



Graph 6 - comparison between blood cultures between the years 2016 to 2018

Deaths related to congenital malformations - graph 6 shows comparatively the deaths that occurred due to congenital malformations associated with gestational age in the period from 2016 to 2018.



Graph 6 - number of deaths associated with congenital malformations x gestational age

**DISCUSSION**

Neonatal mortality should be a target of worldwide interest, as its "fall" is slow compared to the mortality rate in toddlers, preschool and school patients<sup>8</sup>. Neonatal mortality is an indicator that is related to health care, the mother-child binomial and timely access to qualified delivery and birth care services. An important point is the contribution of this group of newborns to infant mortality

This study analyzed the deaths that occurred in the NICU of the HMDI between the years 2016 to 2018, tracing the profile of deaths according to gestational age, relating their cause to prematurity, infections, associated with congenital malformations and/or related to the delivery room, aiming to seek ways to improve the quality of pre, peri and post-natal care. According to data from the Brazilian Institute of Geography and Statistics (IBGE), the average infant mortality rate in the city of Goiânia in 2016 was 12.54 per 1,000 live births, compared to the one in 2017, which was 11.25. Graph 1 shows that there was a reduction between the years 2016 and 2017.

The data in this study corroborates with data found in a similar study, where the incidence of the number of deaths was higher in newborns less than 28 weeks, due to the greater vulnerability of the newborn, greater chance of complications because of the immaturity of multiple organs, such as structural pulmonary immaturity.

Extreme prematurity, although representing only 1 to 2% of births, is responsible for one third of perinatal deaths<sup>9</sup>. Prematurity is one of the main risk factors for neonatal mortality. The chance of death in NBs, at the 25th week of pregnancy, can be 32 times higher than at the 31st week<sup>10,11</sup>. Most of the HMDI study found the highest death rate in extremely premature infants (less than 28 weeks), 44% of deaths in 2016 (graph 2), 41% in 2017 (graph 3) and

51% in 2018 (graph 3), thus showing the greater vulnerability in this group.

In the study carried out at the NICU of the Hospital Geral de Caxias do Sul, it was found that a large number of NBs died on the first day due to maternal infection, a disease that can be prevented through good prenatal care. It was important to note that in this group of NBs who died on the first day, 16.2% of mothers did not have any consultations during pregnancy, which certainly contributed to the evolution of preterm birth and unfavorable prognosis of the NBs<sup>12</sup>. In Pelotas, less than five prenatal consultations were found as one of the main risk factors for early neonatal mortality<sup>13</sup>.

The importance of prenatal care is also related to the diagnosis of congenital malformations in the uterus to define the best conduct in the delivery room, as the suitable mode of delivery. As an example, there is the diagnosis of myelomeningocele in the prenatal period, which indicates the cesarean delivery route and how postnatal follow-up will take place. Regarding malformations, in some regions of the world, they represent the leading cause of neonatal deaths, accounting for 25% of deaths in this period, overcoming prematurity (associated with 20% of deaths)<sup>14, 15</sup>.

In this study, deaths in NBs older than 34 weeks were mostly associated with congenital malformations. The association of congenital malformations with perinatal mortality is also a current concern, as they are associated with fetal deaths and deaths during the first month of life. Malformations are also found in newborns less than 34 weeks, but can be underdiagnosed due to early mortality.

In HMDI the number of deaths due to congenital malformation was mostly diagnosed in newborns over 34 weeks. During the analysis of these three years, 9 patients were diagnosed who died due to malformations in NBs less than 34 weeks and in newborns over 34 weeks, 14 deaths were related to congenital malformations, graph 7.

Congenital anomalies are morphological, structural or functional changes which can be detected in intrauterine life, or after birth. According to the World Health Organization (WHO), worldwide, congenital anomalies were the cause of death for 303,000 live births, that is, 7% of the total, during the first month of life in 2016. They may be linked to genetic factors (genetic syndromes), environmental and multifactorial<sup>16</sup>.

The prevention of neonatal sepsis by means of elements for the control of perinatal infections and hospital infection by microorganisms, including the establishment of a hand washing routine and the existence of a functioning Hospital Infection Control Commission, may result in a reduction in the number of deaths, being able to trace the microbiological profile of hospital infection cases<sup>8</sup>. Sepsis is a major cause of morbidity and mortality in the neonatal period. It affects FT and PTNB, the latter group being the most vulnerable, whose incidence can reach 25%, being responsible for approximately half of the deaths that occurred in the neonatal period in developed countries<sup>17</sup>.

At the NICU of the Hospital das Clínicas from the Federal University of Triângulo Mineiro, a greater susceptibility to the development of sepsis in premature neonates was observed, reinforcing the aggravating potential of this condition in the development of sepsis<sup>18</sup>. In the same study despite efforts to isolate microorganisms, on average, blood cultures are positive in 34% of "septic" patients, ranging from 9 to 64%.

In HMDI, a high rate of positive blood cultures was observed in 2017, an important data that may indicate an increase in neonatal sepsis, with 14 positive blood cultures being isolated that year. In 2016, 6 deaths associated with positive blood culture were isolated and in 2018, 12 positive blood cultures were isolated - graph 6.

Based on the determination of these causes, interventions that reduce the occurrence of premature births and, consequently, infant mortality rates can be planned<sup>19</sup>.

## CONCLUSION

In 2016, 45 deaths were found, with the highest incidence in extreme premature newborns (gestational age <28 weeks) - graph 1. The total number of deaths less than 28 weeks equal to 20, between 28 weeks and 33 weeks and 6 days 13 deaths, 34 weeks to 36 weeks and 6 days 4 deaths. Among the full-term newborns (FT- 37 weeks to 41 weeks and 6 days), 8 deaths were recorded, and among post-term newborns (> 42 weeks) there were no deaths.

In 2017, 34 deaths were recorded, 14 of which were in newborns less than 28 weeks of gestational age, 12 deaths between 28 weeks and 33 weeks and 6 days, 1 death between 34 weeks and 36 weeks and 6 days, 7 deaths in FT and no deaths in post-term newborns. In 2018, 47 deaths were recorded, 24 deaths in newborns aged less than 28 weeks, 12 deaths between 28 weeks and 33 weeks and 6 days, 4 deaths between 34 weeks and 36 weeks and 6 days, 7 deaths in FT and no registered deaths in post-term newborns.

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