Epidemiological profile of the neonatal...



# ORIGINAL ARTICLE

# EPIDEMIOLOGICAL PROFILE OF THE NEONATAL DEATHS IN THE INTENSIVE CARE UNIT

PERFIL EPIDEMIOLÓGICO DOS ÓBITOS NEONATAIS DA UNIDADE DE TERAPIA INTENSIVA PERFIL EPIDEMIOLÓGICO DE LOS ÓBITOS NEONATALES DE LA UNIDAD DE TERAPIA INTENSIVA

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#### **ABSTRACT**

Objective: to characterize the epidemiological profile of neonatal mortality in the NICU. Method: This is a retrospective quantitative study of the health situation, using the research report and the death certificate of the Newborn (NB) from January 2015 to December 2015, carried out in a Maternity of reference. Results: the maternal age group with the highest frequency was between 16 and 25 years; the death rate was higher among women with schooling until high school and between the type of cesarean delivery. In addition, there was a higher mortality among NB with Apgar equal to or lower than seven, both in the first minute and in the fifth, with low birth weight and with gestational age less than 37 weeks. Regarding the causes of neonatal death, the most prevalent diagnosis was prematurity, followed by perinatal anomalies and infections. Conclusion: the results showed that there is still a need for measures aimed at improving the care provided to pregnant women in prenatal, childbirth and puerperium, as well as improving the hospital structure and training of health professionals to help reduce neonatal mortality. Descritores: Epidemiology; Infant Mortality; Intensive Care Units, Neonatal; Gestational Age; Pregnancy Complications; Apgar Score.

#### RESUMO

Objetivo: caracterizar o perfil epidemiológico da mortalidade neonatal na UTIN. *Método*: trata-se de um estudo quantitativo, de levantamento de situação de saúde, retrospectivo, utilizando-se a ficha de investigação e a declaração de óbito do recém-nascido (RN), de janeiro de 2015 a dezembro de 2015, realizado em uma maternidade de referência. *Resultados*: a faixa etária materna com maior frequência foi entre 16 e 25 anos. A taxa de óbitos foi maior entre mulheres com escolaridade até o ensino médio submetidas ao parto cesáreo. Além disso, houve maior mortalidade entre RN com Apgar igual ou menor que sete, tanto no primeiro minuto, quanto no quinto, com baixo peso ao nascer e com idade gestacional menor do que 37 semanas. Em relação às causas de óbito neonatal, o diagnóstico de maior prevalência foi a prematuridade seguida por anomalias e infecções perinatais. *Conclusão*: os resultados mostraram que persiste a necessidade de medidas que visem a melhorar a assistência prestada à gestante no pré-natal, parto e puerpério, como, também, à melhoria na estrutura hospitalar e na capacitação dos profissionais da área da saúde para auxiliar a redução da mortalidade neonatal. *Descritores*: Aplicações da Epidemiologia; Mortalidade Infantil; Unidades de Terapia Intensiva Neonatal; Idade Gestacional; Complicações na gravidez; Índice de Apgar.

#### **RESUMEN**

Objetivo: caracterizar el perfil epidemiológico de la mortalidad neonatal en la UTIN. Método: se trata de un estudio cuantitativo, de levantamiento de situación de salud, retrospectiva, utilizando la ficha de investigación y la declaración de muerte del Recién Nacido (RN) de enero de 2015 a diciembre de 2015, realizado en una Maternidad de referencia. Resultados: el grupo de edad materna con mayor frecuencia fue entre 16 y 25 años; la tasa de muertes fue mayor entre mujeres con escolaridad hasta la enseñanza media y entre el tipo de parto cesáreo. Además, hubo mayor mortalidad entre RN con Apgar igual o menor que siete, tanto en el primer minuto y en el quinto, con bajo peso al nacer y con edad gestacional menor de 37 semanas. En relación a las causas de muerte neonatal, el diagnóstico de mayor prevalencia fue a la prematuridad, seguido por anomalías e infecciones perinatales. Conclusión: los resultados mostraron que persiste la necesidad de medidas encaminadas a mejorar la asistencia prestada a la gestante en el prenatal, parto y puerperio, así como la mejora en la estructura hospitalaria y en la capacitación de los profesionales del área de la salud para auxiliar la reducción de la salud mortalidad neonatal. Descriptores: Usos de la Mortalidad Infantil; Unidades de Cuidado Intensivo Epidemiologia; Neonatal; Edad Gestacional; Complicaciones del Embarazo; Puntaje de Apgar.

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1

#### INTRODUCTION

The infant mortality rate is considered to be a sensitive indicator to the social and health conditions of human populations, and hospital neonatal mortality may have a large participation in these indices. In this same perspective, it contributes to the contesting of this reality, due to the vulnerability, living conditions and access to health goods and services, since the first days of life constitute one of the periods of greatest risk of human death.

In this sense, the neonatal mortality rate is defined as the number of deaths from zero to 27 days of life per thousand live births and that of post-neonatal mortality as the number of deaths from 28 to 364 days of life each one thousand live births, the first one having greater weight the more developed the country in analysis.<sup>2</sup>

It is known that there are variations between 8.4 and 26% in developed countries in the rates of infections associated with health care (IRAS) in the Units of Neonatal Intensive Care (NICU). In Brazil, these rates range from 18.9 to 57.7%, with a higher prevalence of bloodstream infections. Because of this, NBs constitute a portion of the population with the immature immune system, insofar as they are more susceptible to invasive microorganisms, being victims of hospitalization, IRAS and, consequently, neonatal mortality.

The main human and material resources needed to provide uninterrupted support for the vital functions of newborn infants in the neonatal intensive care unit are provided. Appropriate medical care is provided for their recovery and development in the first days of life.<sup>3</sup>

In view of the above, the following question was formulated: What is the epidemiological profile of neonatal deaths registered in the NICU in a public hospital in Teresina-PI?

In this perspective, it is sought, in the study, to reduce problems that show their high rates, rely on the knowledge of health professionals, academics of the area and the population in general for a discussion about neonatal mortality.

#### **OBJECTIVE**

- To Identify the epidemiological profile of neonatal mortality in the NICU.
- To evaluate the main etiological factors related to neonatal deaths in the NICU.
- To establish the prevalence of educational level, type of delivery and the

Epidemiological profile of the neonatal...

maternal age range with the neonatal death rates in the NICU.

• To analyze the frequency of birth weight, gestational age, APGAR index and causes of neonatal death with the occurrence of NICU mortality.

#### **METHOD**

This is a descriptive, retrospective and quantitative study of the health situation, based on the research records and death certificates of the NB from January 2015 to December 2015, in the Neonatal Intensive Care Unit (NICU) . The study, of the census type, was carried out in a reference maternity hospital in Teresina-Piauí. As inclusion criteria, we evaluated the investigation card and the death certificate of the NB (zero up to 27 days of birth) in the NICU as well as the medical records of the respective mothers, in the period studied, totaling 178 patients. Investigation records and death certificates that were not readable and / or contained more than one incomplete researched factor were excluded.

A structured, tabulated script was used as a tool for data collection and, subsequently, a spreadsheet was elaborated, according to the objectives proposed by the study, with data from the research file and the death certificate of the NB existing in the maternity ward. The data were collected in July 2016. Maternal variables were: age, schooling and type of delivery. Regarding the discussions of the newborns, the Apgar score, the birth weight, the cause of death, the sex and the gestational age.

This study was conducted with human subjects based on Resolution 466 | 2012 and submitted to Facid's Ethics and Research Council and the institution where the research was carried out, which was later registered in the Brazil Platform with CAAE 59717816.4.0000.5211 using the Term of Data Use Commitment (TDUC).

## **RESULTS**

The results correspond to the analysis of 178 medical records, with 100% of the neonatal deaths recorded in a public maternity hospital in Teresina-PI, during the period from January 1, 2015 to December 31, 2015, of which it was observed that 50% (n = 89) of these women are between 16 and 25 years of age; 38.76% (n = 69), between 26 and 35 years; 10.68% (n = 19) are older than 36 years and 0.56% (n = 1) are 15 years or younger.

It is noted that, in relation to schooling, 39.89% of mothers have high school education; 37.08%, or fundamental; 10.67% were ignored or did not contain records; 10.11%, incomplete or complete higher education and 2.25%, without schooling. It is demonstrated the high prevalence of deaths among mothers with high school.

It is shown, in relation to the type of delivery, that 62.92% (n = 112) of the mothers had a cesarean delivery and 37.08% (n = 66), normal delivery. In addition, the higher prevalence of cesarean delivery refers to a greater possibility of complications for newborns such as respiratory morbidity, neonatal ICU admission, hypoxic-ischemic encephalopathy, intracranial hemorrhage and increased neonatal mortality.<sup>4</sup>

In the study sample, 47.19% of the NB who died were between 1000g and 2500g (n = 84) followed by 35.39% (n = 63) with a weight

Epidemiological profile of the neonatal...

below 1000g and, for last, 17.42% (n = 31) weighing more than 2500g. In this same perspective, the prevalence of NBs with low weight is observed to a greater probability of complications, which leads them to death because it affects their health. In this sense, it is stated that prematurity and low weight have a close relationship with neonatal deaths, especially those of extremely low birth weight.<sup>4</sup>

As for the Apgar score, 69.1% (n = 123) had an index less than or equal to seven; 22.47% (n = 40), greater than 7 and 8.43% (n = 15), without reporting in the first minute (Table 1). Since there is a close relation with undesirable alterations for the NB, it is suggested that the value of Apgar equal to or less than seven in the study in question has a relation for the weakening of the health of the baby and, consequently, to the possible deaths.

Table 1: Distribution of the Apgar score frequency in the first minute and in the fifth minute associated with neonatal death. Teresina-PI, 2015.

|        | N   | %     | N  | %     |
|--------|-----|-------|----|-------|
| ≤7     | 141 | 79.21 | 88 | 49.44 |
| >7     | 22  | 12.36 | 75 | 42.13 |
| No     | 15  | 8.43  | 15 | 8.43  |
| report |     |       |    |       |

In the research, 77.53% (n = 138) of deaths in newborns were of gestational age less than 37 weeks, followed by 18.54% (n = 33) with age equal to or greater than 37 weeks and , finally, 3.93% (n = 7) are ignored.

It can be seen, in relation to the causes of death, a diagnosis of higher prevalence of prematurity, with a percentage of 37.08%; 16.85% for anomalies; 15.73% for perinatal infections; 6.18% due to placental abruption, twinning and others; 5.06% by premature amniorrex; 3.93% for pregnancy-specific hypertensive disease and 2.81% for meconium aspiration syndrome (Table 2).

Table 2. Distribution, by percentage, of the causes of neonatal death, Teresina-PI, 2015

| causes of fleoriatal death, Telesina-F1, 2013 |     |       |  |  |  |
|---|-----|-------|--|--|--|
| Prematurity                                   | 66  | 37.08 |  |  |  |
| Anomalies                                     | 30  | 16.85 |  |  |  |
| Perinatal infections                          | 28  | 15.73 |  |  |  |
| Placental abruption                           | 11  | 6.18  |  |  |  |
| Gemelarity                                    | 11  | 6.18  |  |  |  |
| Others  | 11  | 6.18  |  |  |  |
| Premature amniorrexis                         | 9   | 5.06  |  |  |  |
| Specific pregnancy                            | 7   | 3.93  |  |  |  |
| hypertensive disease                          |     |       |  |  |  |
| Muconium aspiration                           | 5   | 2.81  |  |  |  |
| syndrome.                                     |     |       |  |  |  |
| Total   | 178 | 100   |  |  |  |
|   |     |       |  |  |  |

### **DISCUSSION**

The prevalence of the maternal age group between 16 and 25 years of age is identified. There are favorable conditions in this age group for a healthy gestation both for the mother and for the fetus, because there are possibilities of complications much lower than in those with extreme age. These data are corroborated by the study carried out in which mothers with the highest percentage were

aged between 16 and 25 years, followed by 26 and 35 years, with neonatal deaths. 1

The same point of view reinforces the idea that the extremes of maternal ages do not favor gestation according to the data. It is shown the prevalence of births of children in mothers aged 20 to 34 years older than those under 20 years of age and above 34.5

In addition, there is a lower prevalence in relation to the intermediate age (between 15 and 34 years), in relation to neonatal death,

since this one presents with greater prevalence in the extreme ages.<sup>6</sup>

From this perspective, in the literature, the effectiveness of health promotion and prevention actions is improved through knowledge and understanding of certain risk factors for health and population life, especially of mothers with fundamental schooling. <sup>7</sup> As language that is compatible with the level of education of the community is used, a better orientation and, consequently, a more effective assistance to the population.

Neonatal deaths are reported less frequently, the higher the mother's schooling years. In view of this, neonatal mortality is associated with sociocultural conditions such as schooling, family income, access to health services, sanitation and the education level of pregnant women.<sup>8</sup>

It is also shown a inversion proportional to the rates of neonatal mortality and the school level of the mother, that is, the higher the intellectual level of the mother, the lower the death rates. As a result, neonatal mortality is addressed not only by improving prenatal care, but also by improving maternal education in the face of pregnancy.<sup>9</sup>

In this same perspective, low schooling interferes with the understanding of possible irregularities or pathologies during the gestational period, and this fact may lead the NB to death due to lack of understanding or assimilation of information about these casualties.<sup>1</sup>

It is noticed that the protective effect of cesarean delivery was perceived as having a lower prevalence in relation to normal delivery. To justify this, it is due to the characteristic of the sample of the newborns coming from the NICU and, therefore, of highrisk pregnancies, in which the survival of the newborns is increased by the procedure with reduction of the perinatal risks. However, there is a higher risk of death when they are born vaginally related to extremely low birth weight infants<sup>10</sup>.

In the same sense, 70.27% of neonatal mortality with vaginal delivery is related. Thus, there is a need for adequate structures in maternities and trained teams to better care for pregnant women to reduce neonatal deaths.<sup>11</sup>

In addition, a combination of the vaginal delivery route and 67.9% of neonatal deaths are indicated. A change in this high percentage is affirmed if pregnant women had more pre-natal care.<sup>12</sup>

Epidemiological profile of the neonatal...

It is shown that 65% of neonatal deaths are from mothers undergoing vaginal delivery. Therefore, the data presented in the research, in relation to the type of delivery, are contrary to much of the studies on neonatal mortality. <sup>1</sup>

In the analysis of the profile of neonatal mortality, 200-300 times greater chance of death in the first 28 days of life, compared to full-term newborns with birth weight  $\geq 2,500g$  are indicated. They are aimed at prematurity and low birth weight as the main causes of neonatal deaths.<sup>5</sup>

In this same understanding, 70.3% of the infants who died were weighing less than 2500g. Low birth weight is due to several factors, such as socio-environmental conditions of maternal health, and the occurrences of these events are associated with the quality of prenatal care. 13

It is also stated that the majority of neonatal deaths happened in NBs with low birth weight. Because of this, prenatal care is necessary for the improvement of public health, not only because of the subsequent risks of mortality and morbidity, but also because of the frequency with which they occur in neonatal deaths<sup>11</sup>.

It is also shown that low birth weight is responsible for most of the neonatal mortality. A strong relationship between low birth weight and infant and neonatal death is highlighted, with the interaction of biological and social factors and reinforcing its preservation as an isolated criterion for the identification of children vulnerable to death.<sup>7</sup>

It was found that 75% of the neonatal deaths presented Apgar less than seven in the first minute, since the low Apgar scores in the first minute indicated a lower vigor at birth and a greater chance of mortality. As a result, the need for support measures for the immediate care, with competence in the care offered to the neonates, is made necessary, making neonatal mortality an avoidable event.<sup>14</sup>

It is stated, in the same sense, that Apgar less than eight in the first minute prevails in neonatal deaths. This fact was attributed to the fact that NB mortality has a certain relation to the Apgar index, since this index rapidly analyzes neonatal vitality, that is, the poor birth conditions of NBs with a value lower than eight.<sup>15</sup>

In the fifth minute, 49.44% (n = 88) of the neonates were found, Apgar less than or equal to seven; in 42.13% (n = 75), greater than 7 and 8.43% (n = 15), without report. There is a

close relationship with neonatal death, when the Apgar score is less than or equal to seven in the fifth minute. 1,5,6

Furthermore, the deficit in NB care is shown when the Apgar score is below seven in the fifth minute of life, in which the sequelae are tried to minimize the lack of cerebral oxygenation, since the high number of neonatal deaths in the cases of asphyxia / hypoxia, it has a relation with the lack of preparation of the professionals and the lack of adequate technological resources. Therefore, it is a sensitive indicator of the quality of the support provided during the labor and birth process. <sup>16</sup>

According to research data, low gestational age is the most significant risk factor for neonatal mortality due to morphological and functional immaturity. The NB is more susceptible to resuscitation maneuvers and intercurrences and to death due to fragility.<sup>6</sup>

It is also confirmed that NBs, with a gestational age of less than 36 weeks, are responsible for 91.6% of the deaths, and those below <31 weeks, alone, account for 83.3% of deaths. These values were attributed to the fact that the NB below 36 weeks usually has dysfunction of any organ or body system, and that this changes with each week of gestation, which causes that the gestational age influences considerably in the clinical state and in the NBs mortality.<sup>15</sup>

It is observed, therefore, that the high percentage of neonatal death was 74.3% among mothers who had a gestational age of less than 37 weeks. Neonatal deaths resulting from low gestational age are certified as a factor for the improvement of maternal and child care and a greater investment in the structure of services and in the training of professionals to care for women in the pregnancy-puerperal cycle and the neonate, in the immediate postpartum.<sup>13</sup>

The main causes of neonatal deaths are prematurity (corresponding to 1/3 of the cases) followed by anomalies, infections, maternal factors and asphyxia / hypoxia. 10,5

The main causes of death are prematurity, congenital malformation, intrapartum asphyxia, perinatal infections and maternal factors, with a considerable percentage of preventable deaths due to health services.<sup>17</sup>

It is also named as the main cause of neonatal death, prematurity, corresponding to 61%. In this sphere, it is important to invest in actions for the prevention of preventable prematurity, as well as development in the care of this vulnerable newborn. 5

Epidemiological profile of the neonatal...

Data for health professionals are used as a warning sign for the monitoring of the fetal development of the child during pregnancy and for neonatal deaths. 18

#### CONCLUSION

It is concluded, after data analysis, that neonatal mortality in the NICU is more frequent in young patients with a regular level of schooling and that they underwent cesarean delivery. As for the mortality of newborns in the NICU, a majority of patients with Apgar less than seven were present in the first and fifth minutes, and the most prevalent cause was related to prematurity.

Many comorbidities and pathologies are diagnosed at the onset of the disease, which often occurs during pregnancy, with prenatal follow-up to combat neonatal mortality in the NICU, for example, with a higher qualification of the responsible health team, with the monitoring of the pregnant woman and the maternal referral to the high risk service.

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Submission: 2018/01/29 Accepted: 2018/07/02 Publishing: 2018/09/01

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