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# **Introductory Chapter: Essential Issues in Neonatal Care**

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<http://dx.doi.org/10.5772/intechopen.79256>

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## **1. Introduction**

Mortality in infants and under 5-year olds has been a constant health concern. In 2015, of the total number of deaths in children under five worldwide, 45.1% corresponded to neonatal deaths, with the three leading causes of death being prematurity (15.9%), causes related to childbirth (10.7%), and sepsis or meningitis (6–8%) [1]. By the year 2030, one of the sustainable development goals (Goal 3) was to put an end to the avoidable deaths of newborns and children under 5 years of age, and it was defined that all countries must try to reduce mortality to at least 12 and 25 for every 1000 births, respectively [2].

Neonatal deaths are unequally distributed worldwide, with 99% occurring in low- and middle-income countries. The lack of basic neonatal care technologies in low-resource countries is considered a relevant contributing factor to this inequality [3]. However, prevention of mortality due to the three main causes of death (complications associated to premature birth, causes related to childbirth, and sepsis) is possible with the implementation of simple and low-cost interventions, even in countries with limited resources [4]. In addition to increasing survival, the primary objective of obstetric and neonatal care is to reduce morbidity by emphasizing the need for interventions that improve the outcome of immature babies.

The frequency of premature births, occurring before 37 weeks of gestation, also shows regional and global differences. The results show that low-income countries have the highest rate of premature births, with figures such as 15.5 and 15.8% of the total number of births in Pakistan and Indonesia, respectively, in contrast to 12% in the United States, who also has a high percentage of premature babies compared to other developed and high-income countries; providing an important contribution to infant mortality and morbidity [5].

However, extremely preterm infants disproportionately contribute to the burden of neonatal morbidity, mortality, and long-term neurodevelopmental disability, even though a significant

increase in survival without increased neonatal morbidity has been observed in preterm infants born between 25 and 28 weeks [6]. Therefore, increased survival of these newborns makes them more susceptible to developing acute and chronic morbidities such as intraventricular hemorrhage, necrotizing enterocolitis, bronchopulmonary dysplasia, chronic lung disease, and neurosensory disorders, among others.

About 80% of premature children are born between 32 and 37 weeks of gestation, which is known as moderate/late preterm. About 10% of these children are born between 28 and 32 weeks of gestation, the rest correspond to births before 28 weeks. Among the former, which has a comparatively lower risk compared to those of a lower gestational age, some die unnecessarily due to the lack of simple and essential care, such as heat and nutrition [7]. Babies born between weeks 32 and 37 have at least seven times the risk of neonatal mortality and a 2.5 times higher risk of postneonatal infant mortality [8]. Similarly, in the 28–32 week group in lower income countries, more than half of the children die; many could survive without intensive care [7].

Consequently, for neonates to face the risk of death, as well as their short- and long-term morbidity, basic prevention measures such as timely diagnosis and early treatment should be included, taking into consideration the most frequent risks and problems in these patients.

## 2. Neonatal care and the main problems in newborns

The risk of death is greater on the first day of life and it has been confirmed that the proportion of deaths occurring during the first week of life are constant in all regions and economic environments. This highlights the urgent need to provide timely and high-quality care from the moment of birth. The time between a potentially harmful event and death can be very short and the first minute after birth (golden minute) is the crucial window for neonatal resuscitation.

In general, all newborns are vulnerable after childbirth, which is a key point for growth and development. The highest risk of death is concentrated immediately after birth and in the first days of life. For most newborns, essential care is required, which the mother will ideally provide, such as providing warmth, a clean and safe environment, and providing nourishment through breastfeeding. However, in premature or low birth weight babies, the care requirements are greater since these children are especially vulnerable to thermal instability, difficulty breathing, feeding limitations, and the risk of infections.

In particular, premature babies are especially vulnerable and can become hypothermic in a matter of minutes, which increases the risk of respiratory distress, hypoglycemia, infections, and death. Problems related to childbirth and premature delivery are predominant causes of early neonatal mortality, while infections are more common in the late neonatal period [9].

Due to the abovementioned, temperature is an aspect of basic care for newborns. This is considered fundamental because hypothermia increases the probability of early and late neonatal death [10–12]. Consequently, by providing appropriate thermal conditions during delivery, immediate care, and in intensive care rooms, the risk of hypothermia is reduced and neonatal survival is improved. In this sense, differences have been observed in admission temperatures between extreme and moderate preterm infants, and it has been confirmed that extreme

premature infants have more frequently low and high temperatures at admission. In addition, an inverse relationship between temperature at admission and intrahospital mortality has been observed [13].

Other frequent problem in preterm and very low birth weight infants is hypoglycemia as a consequence of their limited reserves of glycogen and fat, and the inability to use alternative substrates for energy production. In these babies, recurrent and prolonged episodes of hypoglycemia are associated with severe brain damage and poor neurodevelopmental outcome [14–16]. The incidence of neonatal hypoglycemia has been reported between 5 and 15% in healthy children, although it exceeds 50% in risk neonates, while severe hypoglycemia reaches 20% of these children [17].

However, as previously noted, neonatal hypoglycemia not only affects high-risk infants but also continues to be a cause of significant morbidity in term and near-term newborns [18], so this problem should be a priority within preventive actions and early treatment in neonatal care.

In knowledge of the conditions and risk factors of newborns, differential detection and control measures have been proposed. For example, in term neonates, control has been proposed for 12 h after childbirth, while in smaller children the evaluation is continued for 48 h. In other conditions, such as the diabetic mother's son, 24-h monitoring has been recommended [17, 19].

Lately and considering the potential deleterious effects of hypoglycemia, measures of continuous monitoring of glycemia have been proposed, which has shown good tolerance in the newborns and absence of complications. This can detect episodes of neonatal hypoglycemia and hyperglycemia that would not otherwise be detected with intermittent measurements [20]. The use of continuous glucose monitoring in newborns can reduce the frequency of blood sampling and improve glycemic stability, with more time in the euglycemic range. It has also shown a better and timelier detection of episodes of hypoglycemia compared with conventional methods such as intermittent capillary glucose testing [21].

Respiratory disorders are also frequent problems in newborns. Respiratory distress syndrome (RDS) is the most common cause of respiratory distress in preterm infants and the most of children born extremely prematurely evolve rapidly with RDS after birth. The incidence is higher while the baby's gestational age is lower. Up to 98% of babies born at 23 weeks and 86% of babies born at 28 weeks develop RDS [22]. However, the incidence of RDS has decreased in recent decades as a consequence of the use of continuous positive airway pressure (CPAP), conventional ventilation, high-frequency ventilation, and replacement of surfactant for newborns [23].

### 3. Conclusions

The scenario shown with some examples of frequent problems and interventions involved in neonatal care highlights the need for a complex and comprehensive therapeutic approach. Neonatal care interventions that have been effective in improving the survival of hospitalized newborns and considered a priority are: the use of antenatal corticosteroids to prevent neonatal RDS, early initiation of breastfeeding, umbilical cord care, and kangaroo care in premature babies [24]. Additionally, processes to improve the quality of neonatal care are considered key

points for nutrition, use of medicines, central line care, respiratory care, and care in the delivery room with the aim of reducing the incidence of necrotizing enterocolitis, growth deficit, mortality, sepsis, chronic lung disease, brain damage, and retinopathy of prematurity [25]. Other aspects of special attention in timely neonatal care, particularly in neonatal intensive care, include hemodynamic monitoring and respiratory care.

## Conflict of interest

The author has no conflict of interests to declare.

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