

Neonatal Resuscitation: Peculiarities and Challenges

Reanimação Neonatal: Particularidades e Desafios

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After birth, most newborn babies (NB) adapt well to extrauterine life, but around 10% need some support,¹ with 3% to 5% of NB requiring ventilatory support and between 0.4% and 2% requiring intubation.¹⁻³ Even though peripartum asphyxia occurs mostly in low- and middle-income countries, the World Health Organization (WHO) estimates that this occurrence is responsible for around one million neonatal deaths every year,² and therefore it is always possible to improve perinatal care even in developed countries.

Supporting NB during the transition to extrauterine life is a major challenge. It is essential to know the underlying physiological processes to recognize NB who need support during the transition.^{1,4} Effective communication between all members of the team (obstetricians, neonatologists, and nurses) is essential in identifying signs of fetal distress and ensuring that each step of resuscitation is anticipated and carried out efficiently.⁴

Healthcare professionals with training in basic resuscitation or with experience in advanced resuscitation are essential in all places where births take place.^{1,4} All equipment must be regularly checked, easily accessible and ready to use.¹

In recent years we have seen a significant systematization of guidelines for transition support and neonatal resuscitation by institutions with great international impact [e.g., the European Resuscitation Council (ERC)/International Liaison Committee on Resuscitation (ILCOR)/American Heart Association (AHA)], which has led to the development of normograms that should be used to guide delivery room practices.⁵ When a newborn does not show any respiratory movements, it is essential to dry, warm and stimulate them in order to initiate breathing.^{2-4,6} Aspiration of secretions is used only when the airway is obstructed, and it should be carried out under visualization.^{2-4,6}

All the studies show the benefit of delayed cord clamping in term NB and premature babies who do not need to be resuscitated.^{2,4,6} There is no universal definition of the duration of this procedure, but there is consensus that it should take place after 60 seconds. Several studies are ongoing

on the approach to premature infants under 28 weeks and newborns requiring resuscitation, particularly on resuscitation with an intact cord.

Unlike in adults, adequate ventilation is the main determinant in neonatal resuscitation, and it is mandatory for healthcare professionals to be trained in mask ventilation techniques.³ The use of T-piece devices makes it possible to control the positive pressure in the airway and these are considered safer than manual insufflators.⁴⁻⁶ The use of blenders, which allow air/oxygen mixing, is recommended.⁶ In preterm babies who are breathing, continuous positive airway pressure (CPAP) is recommended at a minimum pressure of 6 cmH₂O. If positive pressure ventilation is necessary, a starting inspiratory airway pressure (PIP) of 25 cmH₂O is recommended in preterm babies with a gestational age of less than 32 weeks. In term NB, the initial inspiratory pressure should be 30 cmH₂O. Inspiratory airway pressure is used for initial pulmonary insufflation, to maintain ventilation and prevent alveolar collapse, improve gas exchange and pulmonary compliance. However, the main objective of this stabilization phase is to maintain functional residual capacity, which depends above all on optimizing positive end-expiratory pressure (PEEP).

Endotracheal intubation is indicated when positive pressure ventilation with a face mask is prolonged or ineffective and when cardiac massage is required.⁴ The laryngeal mask can be a safe alternative in NB over 34 weeks of gestational age⁵ and may become the preferred interface in neonatal resuscitation.^{1,4,5} The detection of expired CO₂ is recommended to confirm the position of the tracheal tube.¹ There is also no consensus on the FiO₂ to use in resuscitation. In term NB or premature NB without respiratory distress (RDS), the initial option is to use FiO₂ 21%, while FiO₂ 30% should be used initially in NB less than 28 weeks of gestational age.

Well-being during the transition should be documented with electrocardiographic monitoring (heart rate) and assessment of transcutaneous oxygen saturation,^{3,4,6} which is also used to adjust the FiO₂ to be used later.

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Neonatal mortality - Number of deaths during the first 28 completed days of life per 1000 live births in a given year or other period.

Perinatal mortality - Includes infant deaths less than seven days of age and late fetal deaths at 28 weeks of gestation or more. Perinatal mortality rates are calculated as the number of infant and fetal deaths, divided by the number of live births and fetal deaths.

In the future, the use of videolaryngoscope, simulation and telemedicine will certainly help to improve the education, training, and performance of some of these practices.^{1,4}

Historically, the presence of parents at the time of resuscitation has been a source of concern. Today there is a debate about the impact of their presence on the team's performance and how they might be affected by seeing their child being resuscitated. Nowadays, parents want to be actively involved in decisions such as investment in resuscitation/redirection of care or suspension of care. In this context, parents should be informed about the resuscitation maneuvers being carried out and why they are necessary, and early skin-to-skin contact and visual and tactile contact should be promoted in babies who are going to need intensive care, before transferring them to the Intensive Care Unit. When death is imminent, the comfort of the newborn and the well-being of the parents should be promoted, allowing them to establish contact with the baby in accordance with the parents' desires and to collect memories later on. In Portugal, the reform of maternal and neonatal health care in 1990 which promoted the upgrade of delivery rooms and neonatology units, was a pillar in the improvement of perinatal care in Portugal. Since then, the work of devoted and dedicated perinatology professionals has been decisive in improving neonatal and perinatal mortality rates, which in the 1980s was 15‰ and 24‰ respectively, decreasing to half in 1990, and is currently 1.6‰ and 3‰, respectively.

Since our perinatal indicators have improved, we have also successfully invested in increasingly immature newborns. In Portugal, the viability threshold, defined by the gestational age at which more than 50% of the newborns survive, is currently 25 weeks' gestation and 600 g of birth-weight. In Portugal, investment is almost generalized in babies at 24 weeks' gestation, but in some countries such as the United Kingdom, the United States of America, Australia, Japan, Canada and Sweden, there is a movement to give the opportunity to even more immature newborns. In each hospital, obstetrics and neonatal teams should be aware of their indicators and make shared decisions

about what action to take, and respect the parents' wishes whenever possible.

National neonatal mortality indicators place us among the countries that perform best during birth. The study by Alves *et al*⁷ documents the adherence of Portuguese physicians to international recommendations and lists some points where we still need to improve our performance.

Hospitals were assessed based on their type and the primary area for improvement that was identified was communication among team members during team briefings before procedures, during childbirth, and in debriefings afterwards. The aim of these sessions was to analyze both the positive and negative aspects of the team's performance.

Records of the team's performance are essential if the subsequent analysis is to be supported by objective data and should be conducted by someone qualified in neonatal resuscitation. Ideally, all teams should have a physician with experience in advanced resuscitation. The Portuguese Neonatal Society is aware of the need to promote certification in neonatal resuscitation and therefore is training instructors in advanced neonatal resuscitation so that they can then provide training to professionals dedicated to this age group.

The new neonatal resuscitators will respond to some of the weaknesses identified here – newborn temperature control and monitoring with ECG and pulse oximetry, built-in blender device and the possibility of T-piece ventilation. Equipment such as expired CO₂ detectors (to confirm intubation), laryngeal masks, Guedel tubes, videolaryngoscopes and transport incubators with temperature control are essential in modern delivery rooms.

COMPETING INTERESTS

The author declare that no competing interests exist.

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