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PHYSIOTHERAPEUTIC ASSISTANCE TO THE NEWBORN IN THE OBSTETRIC CENTER. A LITERATURE REVIEW

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Abstract: The physiotherapist plays an active role in the early identification of possible disorders occurring during the perinatal period, being essential for these professionals to recognize and identify the clinical manifestations and characteristics that determine the vitality of the NB. However, there is a large gap between theoretical knowledge and practical conduct on the part of health professionals. Thus, this literature review has as its object of study a bibliographical survey, on the immediate assistance to the NB and the main practices used by the professional physiotherapist when there are complications in the transition from the intrauterine to the extrauterine environment. A bibliographical survey of articles published between the years 2000 and 2016 was carried out, using the Online databases. To obtain the results, the articles were synthesized in order to provide better visualization of the data. The information obtained is a general guideline for physiotherapists and health professionals for neonatal conduct in the delivery room. Each service must adapt them to its infrastructure and human resources conditions.
Keywords: newborn, premature, care, resuscitation, neonatology.

INTRODUCTION

It is understood by immediate assistance to the Newborn (NB), the one provided right after birth, that is, in the first two hours after delivery. In a hospital environment, this assistance can be provided in the obstetric center (delivery room and/or NB room) and extend to the rooming-in environment and the Neonatal Intensive Care Unit (NICU) (CLOHERTY; EICHENWALD; STARK, 2015).

It is a fundamental role of the entire team to carry out a complete physical examination of the NB during this period, considering not only the characteristics of its anatomy and physiology, but also taking into account important data from the mother's history and the history of the pregnancy. (CLOHERTY; EICHENWALD; STARK, 2015).

The physiotherapist plays an active role in the early identification of possible disorders occurring in this perinatal period, being essential for these professionals to recognize and identify the clinical manifestations and characteristics that determine the vitality of the NB. The perinatal period is a period of great risk to the NB and of great adaptations to extrauterine life in which the chance of death or morbidity is high (CLOHERTY; EICHENWALD; STARK, 2015).

The correct recognition and identification of risk factors, the early detection of the presence of congenital malformations, obstetric trauma, cardiorespiratory problems and several other factors that can compromise the health of the newborn, make immediate assistance an important prognostic factor for the survival of NBs (CLOHERTY; EICHENWALD; STARK, 2015).

The physiotherapeutic physical examination begins before birth and consists of a detailed anamnesis with maternal and gestational data, thus allowing the early detection of various risk situations that can help in the reception and care of the NB. Right after birth, the first physical examination must be objective and quick, with the purpose of assessing the NB's vitality for decision-making (CLOHERTY; EICHENWALD; STARK, 2015).

Thus, this study seeks to carry out a bibliographical survey about protocols and practices of the physiotherapist professional during the immediate approach to the NB still in the obstetric center (OC).

METHODOLOGY

This study is characterized by a literature review, having as object of study

a bibliographical survey, on the immediate assistance to the NB and the main practices used by the professional physiotherapist when there are complications in the transition from the intrauterine to the extrauterine environment.

To carry out this review, some steps were followed: identification of the theme; establishment of criteria for inclusion and exclusion of studies; evaluation of the studies to be included in the review; summary of the information to be extracted; categorization of studies; presentation and discussion of results.

The search was carried out between May and July 2016, using the databases of the Brazilian Society of Pediatrics (SBP), the Latin American and Caribbean Literature in Health Sciences (LILACS) and the Scientific Electronic Library Online (SCIELO). The keywords used were: Newborn; premature; Care; resuscitation; neonatology. As inclusion criteria, original and review articles were used, available in full or online, published between 2000 and 2016 in Portuguese and English. Repeated articles in different databases and which in their content did not explore the proposed theme were excluded.

To obtain the results, the articles were synthesized in order to provide better visualization of the data. The content discussed referred to the main assessment practices for the NB and the synthesis of articles and protocols used for decision-making regarding the risk factors presented by the newborn.

The present study was waived by the Ethics and Research Committee, as it is a literature review.

RESULTS

The physical examination of the NB must be carried out considering the characteristics of its anatomy and physiology, integrating the maternal history and clinical evolution of the child, aiming to evaluate and determine the vitality, risk factors, detect congenital malformations, obstetric traumas and cardiorespiratory disorders that may compromise the health of the newborn (CLOHERTY; EICHENWALD; STARK, 2015).

The first stage of this assessment begins before birth with a detailed anamnesis of maternal and gestational data. Knowledge of these data allows the early detection of risk situations that can help in the reception and assistance to the NB (CLOHERTY; EICHENWALD; STARK, 2015).

The delivery room must be prepared for the arrival of the NB, all material necessary for resuscitation must be tested and available, in an easily accessible place, before birth. This material is intended for temperature maintenance, airway aspiration, ventilation and medication administration (CLOHERTY; EICHENWALD; STARK, 2015).

Then, the process of evaluating the NB begins, after clamping the umbilical cord, the first physical examination is carried out, which must be objective and quick, with the purpose of evaluating the vitality of the NB for decision-making. Care must be taken to prevent heat loss and maintain a patent airway.

In this transition phase, the physiotherapeutic team must have adequate material and a qualified and qualified team to quickly and effectively carry out the stabilization and resuscitation procedures.

If the NB is preterm or if, shortly after birth, he is not breathing and/or is hypotonic, the initial steps of resuscitation are indicated. The success of the resuscitation depends on the prediction, the immediate recognition of the NB in need. Assessment of patient conditions such as breathing, heart rate and color must not exceed 30 seconds. The physiotherapist

must be aware of when to offer inhaled O2, ventilation with positive pressure with a mask or tracheal tube, as well as assisting in tracheal intubation and cardiac massage (Sociedade Brasileira de Pediatria, 2016).

Currently, the procedures performed during neonatal resuscitation consist of: maintaining body temperature by providing heat; keep the airways patent through proper positioning of the head and neck; aspirate the mouth, nose and, if necessary, the trachea; start breathing through positive pressure ventilation, using a bag and mask or bag and tracheal tube; maintain circulation with the aid of cardiac massage; and administering medications or fluids. All procedures are performed based on the integrated assessment of three signals: breathing, heart rate and color (Sociedade Brasileira de Pediatria, 2016);

DISCUSSION

Survival of preterm (<37 completed weeks) or term (37 completed weeks or up to 42 completed weeks) newborns reflects the structure and quality of antenatal care, labor and delivery care, and neonatal care. The physiotherapist must be attentive to all newborns in the obstetric center, both normal delivery and cesarean sections. Assistance must be based on a system that guarantees continuous care of increasing complexity and appropriate to the newborn's risk level, since approximately 5 to 10% of newborns have difficulties during the transition from intrauterine life to neonatal life and require some type of resuscitation in the delivery room (Sociedade Brasileira de Pediatria, 2016)

One of the decisive factors for predicting the need for resuscitation begins even before birth and consists of an adequate and detailed anamnesis with maternal and gestational history, such as: mother's age, number of pregnancies, parity, types of delivery, number of abortions, children, consanguinity, prenatal care, amenorrhea, previous and gestational diseases, use of medication, consumption of illicit drugs, tobacco and alcohol, results of laboratory tests, ultrasounds, fetal monitoring, labor, anesthesia, etc. (Manual of neonatology, 2015)

The delivery room must be properly prepared for the reception of the NB, all the material necessary for resuscitation must be ready and available in an easily accessible place, before the birth. This material is intended for temperature maintenance, airway aspiration, ventilation and medication administration. The room temperature in the delivery room must be at least 26ºC so that the NB's body temperature can be more easily maintained. It must also contain a source of radiant heat, a source of humidified oxygen and compressed air, with flowmeters and preferably heated. Vacuum aspirator with manometer, PPV (Self-inflating balloon and manual neonatal T-shaped mechanical ventilator), masks, material for tracheal intubation, medication and others (Sociedade Brasileira de Pediatria, 2016).

Immediately after birth, the need for resuscitation depends on the rapid assessment of situations related to the vitality of the newborn, namely cardiorespiratory and neuromuscular integrity. To demonstrate the birth conditions, the Apgar score is established in the 1st and 5th minutes of life, which includes the assessment of heart rate, respiratory effort, muscle tone, reflex irritability and color (CLOHERTY; EICHENWALD; STARK, 2015). Care must be taken to prevent heat loss, the baby must be exposed to a source of radiant heat, dry well and discard wet pads. Except for newborns < 28 weeks, who must be placed inside a plastic and polyethylene bag involving the whole body up to the neck, immediately after being placed under a source of radiant heat, without

being dried and before starting resuscitation procedures. According to the health care guide of the Ministry of Health, hypothermia leads to a decrease in surfactant production and an increase in oxygen consumption and causes depletion of caloric reserves, contributing to the development or worsening of respiratory failure (Brasil, 2014)

According to the 2016 SBP Guidelines, cardiac arrest in neonates is predominantly caused by asphyxia. Being largely due to meconium aspiration syndrome. The presence of meconium-stained amniotic fluid can mean fetal distress and an increased risk of needing resuscitation. Therefore, a multidisciplinary team with extensive knowledge and skill in caring for newborns in the delivery room is essential to reduce mortality by reducing the risk of sequelae. (Brazilian Society of Pediatrics, 2016)

Attention must be paid to the initial steps of stabilization/resuscitation, that is, when the answer is no to at least one of the three initial questions: "term pregnancy?", "breathing or crying present?", "muscle tone in flexion?", lead the NB to the resuscitation table. The initial steps for stabilizing the NB must be performed in a maximum of 30 seconds and must follow the sequence: promote heat, keep the airways patent and dry (Sociedade Brasileira de Pediatria, 2016).

Therefore, the NB must be forwarded to the resuscitation table surrounded by heated fields and positioned under a source of radiant heat, in dorsal decubitus and with the head facing the health professional. The delivery room and the room where the stabilization/resuscitation procedures will be carried out must have temperatures between 23 – 26ºC. Due to the high risk of mortality and morbidity for newborns of all gestational ages related to hyperthermia or hypothermia, temperature control has become an important indicator of the quality of care (Sociedade Brasileira de Pediatria, 2016).

In order to maintain the permeability of the airways, the physiotherapist must position the NB's neck in a slight extension. In PTNB, due to weaker muscle tone resulting from global immaturity, it is recommended to use a cushion under the shoulder to facilitate proper positioning of the head. Airway aspiration is reserved only for those with obstruction due to excess secretions. In this case, the physiotherapist must first aspirate the mouth and then the nostrils using a tracheal tube number 6–8 connected to a vacuum aspirator, under a maximum pressure of 100mmHg, the tube must not be introduced abruptly, as it may induce vagal response and spasm. laryngeal, causing apnea and bradycardia (Sociedade Brasileira de Pediatria, 2016).

After these measures to keep the airways patent, dry the body and the fontanelle region and discard the wet fields. Except for NB < 28 weeks, which must be wrapped up to the neck in a plastic bag, without being dried (Brasil, 2014).

The decision regarding stabilization/ resuscitation depends on the evaluation of some factors: breathing, heart rate and oxygen saturation (SpO2) in PTNB (Sociedade Brasileira de Pediatria, 2016).

Respiratory assessment is performed by observing chest expansion or the presence of crying. Breathing is considered adequate if the movements are regular and sufficient to maintain HR > 100bpm. Now, if the patient has no breathing movements, inadequate spontaneous breathing or a gasping pattern (deep sighs interspersed with apnea), breathing is considered inadequate (Sociedade Brasileira de Pediatria, 2016).

RR assessment is the main factor for indicating several resuscitation maneuvers. Assessment methods in the first minutes of life include palpation of the umbilical

cord, auscultation of the precordium with a stethoscope, detection of pulse signal by oximetry, and detection of the electrical activity of the heart by cardiac monitor (Sociedade Brasileira de Pediatria, 2016).

The precordium must be heard for 6 seconds and the value must be multiplied by ten, resulting in the number of beats per minute. HR is considered adequate when the heart rate is >100bpm. If the HR is below 100bpm or the NB does not show regular breathing movements, the physiotherapist must start positive pressure ventilation (PPV) while another professional attaches the 3 electrodes of the cardiac monitoring, without drying the NB's skin. (Brazilian Society of Pediatrics, 2016).

As for SpO2, the choice of target saturations for the first minutes of life is based on the curves studied in preterm infants who did not require resuscitation. It is noteworthy that the choice of intervention parameters does not have scientific evidence (Dawson et al, 2010). That said, the recommended SpO2 values in the first minutes of life in our country are described in Table 1.

minutes of life	Pre-ductal SatO2
Up to 5	70-80%
5-10	80-90%
>10	85-95%

Table 1: Desirable pre-ductal SpO2 values, according to postnatal age

Based on the assessment of breathing, heart rate and SpO2, the physiotherapist must be aware of some situations that may occur: 1st) NB with spontaneous breathing without discomfort and HR >100bpm and SpO2 proper. In this situation, the NB must follow the routines of the delivery room and leave him in skin-to-skin contact with the mother, covered with dry and heated cotton fabric; 2nd) NB with absent or irregular breathing or HR < 100 bpm. In this case, initiate PPV within the first 60 seconds after birth and monitor HR using a cardiac monitor and oxygen saturation ($SatO_2$) using a pulse oximeter; 3rd) PTNB with HR >100bpm and respiratory distress or low SpO2. One must consider applying positive airway distending pressure (CPAP) in the delivery room and keep monitoring respiration, HR and SpO2; 4) PTNB in apnea and/or with irregular breathing and/or bradycardia. The PTNB with apnea and/or irregular breathing and/or bradycardia needs PPV, which must be started within the first 60 seconds of life ("Golden Minute") (Brazilian Society of Pediatrics, 2016).

The application of CPAP in PTNB helps to keep the alveoli of immature and surfactant-deficient lungs non-collapsed, preventing atelectrauma. A meta-analysis of three clinical trials and one observational study, which analyzed the use of CPAP versus intubation and ventilation in the delivery room in 2,782 neonates <32 weeks, showed that CPAP reduces the need for mechanical ventilation and surfactant in the neonatal period, without increasing the incidence of pneumothorax. According to studies CPAP started in the delivery room decreases oxygen dependency at 36 weeks or in-hospital death: for every 25 PTNB who receive CPAP, instead of being intubated and ventilated in the delivery room, one more baby can survive without bronchopulmonary dysplasia with 36 weeks corrected gestational age (Schmölzer, et al, 2013).

The use of CPAP is indicated in PTNB <34 weeks who present spontaneous breathing and HR > 100bpm, but who show respiratory distress and/or SatO2 below the expected in the normal transition, soon after birth. CPAP can be applied using a mask/prong connected to the T-shaped manual mechanical ventilator circuit, with a pressure of 4-6 cmH2O and a

flow of 5-15L/min. The amount of oxygen offered to the NB must be as small as possible to maintain adequate SpO2 (Wickoff, Willie, 2015; Perlman, 2010).

The critical point for the success of resuscitation is adequate ventilation, causing the NB's lungs to inflate and, with that, dilation of the pulmonary vasculature and appropriate hematosis. The VPP is indicated in the first 60 seconds of life ("Golden Minute") to all newborns with apnea and/or irregular breathing and/or bradycardia (HR < 100 bpm) (Sociedade Brasileira de Pediatria, 2016).

In the resuscitation of PTNB in the delivery room, research has not yet answered the question regarding the ideal oxygen concentration during ventilation. Hypoxia is associated with dysfunctional damage to all biological systems, which ultimately result in multiple organ failure and death. Hyperoxia, in turn, generates free radicals, which trigger enzymatic oxidation, inhibition of protein synthesis, inhibition of DNA synthesis and lipid peroxidation, with more pronounced diffuse tissue damage in PTNBs, as their antioxidant protection mechanisms are immature. Thus, on the one hand, the use of room air may not be sufficient for such patients to achieve adequate oxygenation; on the other hand, the use of 100% oxygen is deleterious, contributing to inflammatory lesions at the systemic level (Goldsmith; kattwinkel, 2012). Based on current knowledge, it is recommended not to initiate resuscitation with high oxygen concentrations. Some studies cause concern regarding unfavorable outcomes with the use of room air for ventilation of PTNB (Rabi; Singhal; Nettel, 2011) Thus, starting ventilation of PTNB <34 weeks with oxygen concentrations of 30%, titration the inspired gas fraction according to pre-ductal SatO2 monitoring (Chart 1). (Rabi, et al, 2015). titrating the inspired fraction of the gas according to the pre-ductal SatO2 monitoring (Chart 1). (Rabi, et al, 2015). titrating the inspired fraction of the gas according to the pre-ductal SatO2 monitoring (Chart 1). (Rabi, et al, 2015).

When PPV is indicated in newborns ≥34 weeks, start with room air (21% oxygen). Once ventilation is started, it is recommended to use pulse oximetry to monitor supplemental oxygen delivery. Desirable SatO2 values vary according to the minutes of life and are shown in Table 1. SatO2 monitoring enables judicious and rational use of oxygen. When the NB does not improve and/or does not reach the desired SatO2 values with PPV in room air, it is always recommended to check and correct the ventilation technique before offering supplemental oxygen. The need for supplemental oxygen is exceptional in newborns ≥34 weeks if PPV is performed with the proper technique. In the few cases where this is necessary, the application of an O2/air mixture is indicated, Brasileira de Pediatria, 2016). Evaluate the saturation after 30 seconds, which is enough time to balance the oxygen concentration offered by ventilation throughout the entire lung area of the NB, and then, if necessary, make 20% increments and wait another 30 seconds to reassess the need of new increments. Remembering that oxygen supply cannot cause an increase in saturation greater than 95% in NB 34 weeks in the delivery room, due to the deleterious effects of hyperoxia (Vain, 2004).

The ideal equipment for ventilation at birth must enable reliable control of inspiratory pressure and its administration time, in addition to providing positive end-expiratory pressure (PEEP) (Sociedade Brasileira de Pediatria, 2014).

The T-hand mechanical ventilator has been increasingly used in neonatal resuscitation. It is a flow-controlled and pressure-limited device, in addition to allowing the application

of CPAP in spontaneously breathing patients. For its operation, it needs a source of compressed air and oxygen connected to a blender, which mixes the gases and makes it possible to reach the desired oxygen concentration reliably. In the mechanical T-type ventilator, set the gas flow at 5-15 L/ minute, limit the maximum circuit pressure to 30-40 cmH2O, select the inspiratory pressure to be applied in each ventilation, generally around 20-25 cmH2O, and adjust PEEP to 4-6 cmH2O. The initial oxygen concentration is 30%. Ventilate at a frequency of 40-60 breaths per minute, which can be obtained with the practical rule "occlude/ loose/loose", "occlude/loose/loose"... After the first five ventilations, readjust the inspiratory pressure in order to visualize the slight thoracic movement and listen to the air inlet in the lungs. Remember that the purpose of PPV is to create functional residual capacity, provide adequate tidal volume to facilitate gas exchange and stimulate spontaneous breathing, minimizing lung injury (Wyllie, et al, 2015)

When it is not possible to use a T-shaped manual mechanical ventilator, PPV is applied with a self-inflating bag and mask, at a frequency of 40-60 movements per minute, according to the practical rule "tighten/ release/release", " tighten/loosen/loosen"... As for the pressure to be applied, this must be individualized so that the PTNB reaches and maintains HR >100 bpm (Wyllie, et al, 2015).

The self-inflating balloon is inexpensive and is the only ventilation device that does not require a source of compressed gas to function, and must always be available and ready for use at every birth. It is not capable of providing constant and/or prolonged peak inspiratory pressure, nor of providing continuous airway distention pressure (CPAP), nor reliable PEEP (Dowson, 2011; Szyld, 2014). When not connected to the oxygen and reservoir, it provides 21% oxygen concentration (room air) and when connected to the oxygen source at 5L/min and the reservoir, it is possible to reach an oxygen concentration of 90-100%. It does not allow a reliable control of the parameters mentioned above (Thio, et al, 2010, 2014).

During PPV, observe the adaptation of the mask to the face, the permeability of the airways and lung expansion. Mask ventilation is not a simple procedure, and it is difficult for the professional who resuscitates the PTNB to ensure that the tidal volume is adequate, as there are frequent large-scale gas leaks between the face and mask and airway obstruction (Wood; Morley, 2013).

The most important indicator that PPV is being effective is the increase in HR. Effective ventilation must initially cause an increase in HR and then establish spontaneous breathing. If, after 30 seconds of PPV with a mask, the patient has a HR >100 bpm and spontaneous and regular breathing, suspend the procedure and check the need for CPAP using a mask before being transported to the neonatal unit. The use of CPAP is indicated in these cases, if HR >100 bpm and spontaneous breathing, but the PTNB presents respiratory distress and/or SatO2 below the expected according to chart 1 (Sociedade Brasileira de Pediatria, 2016).

A failure is considered if, after 30 seconds of PPV with a mask, the PTNB maintains a HR <100 bpm or does not resume rhythmic and regular spontaneous breathing. In this case, check the fit between the face and the mask, the permeability of the airways (by positioning the head, aspirating secretions and keeping the mouth open) and the inspiratory pressure, correcting if necessary. Also check that the mechanical T-hand ventilator is working.properly.

If the patient does not improve after correcting the ventilation technique, the

tracheal tube is indicated as an interface for PPV (Sociedade Brasileira de Pediatria, 2016).

Indications for ventilation through a tracheal tube in the delivery room include: ventilation with a face mask that is not effective, that is, if, after correcting possible technical problems, the HR remains <100 bpm; prolonged face-mask ventilation, that is, if the patient does not resume spontaneous breathing; and application of cardiac massage. The indication of intubation in the resuscitation process depends on the skill and experience of the professional responsible for the procedure. In less experienced hands, there is a high risk of complications such as hypoxemia, apnea, bradycardia, pneumothorax, soft tissue laceration, tracheal or esophageal perforation, in addition to the risk of infection. Each intubation attempt must last a maximum of 30 seconds. In case of failure, the procedure is interrupted and the PPV with mask must be started, A new intubation attempt was made after patient stabilization. The best indicator that the cannula is in the trachea is the increase in HR. In practice, it is customary to confirm the position of the cannula by inspecting the chest, listening to the axillary and gastric regions, and observing the HR. After intubation, ventilation with a self-inflating bag or with a manual T-shaped mechanical ventilator is started at the same frequency and pressure described for mask ventilation (Sociedade Brasileira de Pediatria, 2016).

As for the use of supplemental oxygen during PPV through the tracheal cannula, this depends on the indication for intubation. When intubation was indicated by inadequate face mask ventilation, it is possible to initiate PPV through a tracheal cannula with room air and, after 30 seconds, monitor SatO2 (Chart 1). A period of about 30 seconds is required for the equilibrium of the oxygen concentration offered by ventilation throughout the entire lung area of the NB. Thus, in the rare patients in whom there is a need to increase the supply of oxygen during ventilation, it is suggested to perform increments of 20% and wait for approximately 30 seconds to check the SatO2 and indicate new increments. When, on the other hand, intubation was indicated because the NB remained with HR <100 bpm in ventilation with face mask and proper technique, concentration of O2 that was being offered before intubation, monitoring SatO2 after 30 seconds (Chart 1) (Follett, et al, 2015)

Once ventilation with a tracheal tube is started, after 30 seconds, respiration, HR and SatO2 are evaluated. There is improvement if the NB has HR >100 bpm, spontaneous and regular respiratory movements. In this situation, ventilation is stopped and the NB is extubated. It is necessary to assess the need for supplemental oxygen supply according to SatO2 (Sociedade Brasileira de Pediatria, 2016)

A failure is considered if, after 30 seconds of PPV through the tracheal cannula, the NB maintains a HR <100 bpm or does not resume spontaneous breathing, or even if the SatO2 remains below desirable/undetectable values (Chart 1). In this case, check the position of the cannula, the patency of the airways, and the pressure being applied to the bag or T-ventilator, correcting as necessary. After this correction, the oxygen supply can be increased up to 60-100%. If the NB maintains apnea or irregular breathing, continue tracheal cannula ventilation. If HR is <60bpm, indicate cardiac massage (Sociedade Brasileira de Pediatria, 2016).

Asphyxia can trigger peripheral vasoconstriction, tissue hypoxemia, decreased myocardial contractility, bradycardia, and eventually cardiac arrest. Adequate ventilation reverses this condition

in most patients. But when there is no reversal, even though PPV seems effective, it is likely that hypoxemia and significant metabolic acidosis are depressing the myocardium such that pulmonary blood flow is compromised and blood is not adequately oxygenated by ongoing ventilation. In this case, cardiac massage is indicated. Because chest compression decreases the effectiveness of ventilation and the latter is the most effective action for this group, compressions must only be initiated when lung expansion and ventilation are well established. Thus, in clinical practice, cardiac massage is initiated if the HR is <60 bpm after 30 seconds of PPV with proper technique through the tracheal cannula and use of oxygen concentration of 60-100% (Brazilian Society of Pediatrics, 2016).

The professional responsible for compressions must be positioned behind the head of the PIs, while the physical therapist moves to one side to ventilate the patient. This position facilitates the approach to the umbilical cord, if venous catheterization is needed (Sociedade Brasileira de Pediatria, 2016)

Cardiac compression is performed on the lower third of the sternum, where most of the left ventricle is located (You, 2009). Two techniques for performing cardiac massage are described: The two-thumb technique and the two-finger technique. The most efficient is the two thumbs, as it generates a higher peak systolic pressure and coronary perfusion, in addition to being less tiring (Christman, et al, 2011). In the two thumbs technique, the thumbs can be placed superimposed or juxtaposed on the lower third of the sternum. Overlapping thumbs generate higher peak pressure and pulse pressure, while juxtaposed thumbs increase the chance of injury to the lungs and liver. Thus, apply the two overlapping thumbs on the lower third of the sternum, that is, just below the intermamillary line and sparing the xiphoid process. The rest of the hands encircle the chest, supporting the back during the massage. It is important to allow full re-expansion of the chest after compression to fill the ventricular and coronary chambers; however, fingers must not be withdrawn from the lower third of the chest (Lim, 2013; Lee, 2011).

Ventilation and cardiac massage are performed synchronously, maintaining a ratio of 3:1, that is, 3 cardiac massage movements for 1 ventilation movement, with a frequency of 120 events per minute (90 massage movements and 30 ventilations). The coordination of ventilation and massage is important in neonatal resuscitation, as it ensures full lung expansion, which plays a central role in the cardiocirculatory transition at birth (Solevas, 2010; Hemway, 2013). It is recommended to use 100% O2 in NB who are receiving PPV and chest compression, to avoid deleterious effects related to hypoxia and, to avoid effects related to hyperoxia, it is necessary to reduce the supply of supplemental oxygen as soon as there is recovery of HR, and can be adjusted according to the target saturations (Perlman, et al, 2015).

Coordinated cardiac massage must be applied to ventilation for 60 seconds before reassessing HR, as this is the minimum time for effective cardiac massage to restore coronary perfusion pressure. Massage must continue as long as the HR is <60 bpm (Kapadia, Wyckoff, 2012). Remember that PPV, during cardiac massage, must be administered through the tracheal cannula to ensure full lung expansion. Improvement is considered when, after PPV accompanied by cardiac massage for 60 seconds, the NB has HR >60 bpm. At this point, only the massage is interrupted. If the patient has regular spontaneous breathing and the HR reaches values >100 bpm, ventilation can be

stopped. The procedure is considered to have failed if, after 60 seconds of PPV with tracheal cannula and 100% oxygen accompanied by cardiac massage, the NB maintains HR <60 bpm. In this case, check the position of the cannula, the permeability of the airways and the technique of ventilation and massage, correcting what is necessary. If, after correction of the PPV technique and massage, there is no improvement, urgent umbilical venous catheterization is considered and adrenaline is indicated (Sociedade Brasileira de Pediatria, 2016).

When HR remains < 60bpm, even with effective ventilation by tracheal cannula with 100% oxygen, accompanied by adequate massage, the use of epinephrine, volume expander or both is indicated (Kapadia, Wyckoff, 2013) Adrenaline has the function of increasing coronary perfusion pressure, mainly through peripheral vasoconstriction. If bradycardia has not been reversed with intravenous epinephrine, even with adequate PPV and cardiac massage, repeat epinephrine administration every 3-5 minutes and consider using a volume expander (Weiner, Niermeyer, 2012). The volume expander may be necessary to resuscitate the PTNB with hypovolemia and the recommended is the Saline Serum, expecting as a result the increase of the HR and improvement of the pulses and pallor. (Kapadia, Wyckoff, 2013).

CONCLUSION

The birth of a baby represents the most dramatic physiological transition in human life. At no other time is the risk of death or brain injury is so high. One in every 10 newborns needs help making the transition from intrauterine to extrauterine life. Pulmonary ventilation is the simplest, most important and effective procedure in resuscitation in the delivery room and, when necessary, it must be started within the first 60 seconds of life ("Golden Minute").

The information described above is a general guideline for physiotherapists and health professionals for neonatal management in the delivery room. Each service must adapt them to its infrastructure and human resources conditions. More important than a rigid protocol is the experience and practice with education and continued training of health professionals who participate in the care of the NB, in addition to community awareness of the importance of assistance in this critical period of transition to the environment extrauterine.

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