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EDITORIAL

Neonatal Resuscitation: An Update

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At birth, transition from intra to extra uterine life is crucial with rapid physiologic changes involving both the cardiovascular and respiratory systems. Failure of this adaptation results in cardiopulmonary compromise and the need for resuscitation. Most, but not all infants adapt well to extra-uterine life but some require help.[1] Newborn resuscitation programme is intended to provide this help in a structured way. Since 1980s, various societies have been developing guidelines and algorithms for neonatal resuscitation.[2,3] In 1992 International Liaison Committee on Resuscitation (ILCOR) was formed, which provides a common platform for major organizations on resuscitation to work together globally.[4] The guidelines of neonatal resuscitation initially based on common practices, is constantly evolving and now on evidence based.[5] From the year 2000 every 5-year revised guidelines has been published by ILCOR, AHA and AAP. The latest version of neonatal resuscitation guidelines is published by AHA[6] and ILCOR[7] in 2020.

In the 2020 guidelines, there are changes in several practices of the existed 2015 algorithm (Fig. 1). The first and important change noted in the anticipating the need for resuscitation section, addition of team briefing as a mandatory action when anticipating a high-risk birth.[6] This will help to identify potential interventions, assign roles and responsibilities to promote effective teamwork, communication and support patient safety during resuscitation. So, we should carry out predelivery team briefing for high-risk delivery.

This guideline adopted previous recommendation of delayed cord clamping longer than 30s for both preterm and term neonates who do not require resuscitation at birth with more evidence.[6] But cord milking in preterm neonates <28 weeks is not recommended as there was no benefit and concerns of intraventricular hemorrhages.[8] Thus, delayed cord clamping should be universally practiced unless the baby needs active resuscitation.

Interventions before proceeding to ventilation in depressed neonates collectively labelled as initial actions. In this part, there are two changes, one is to avoid hyperthermia (>38.0°C), which is adopted on evidence[9] and the other is to maintain normal temperature of newly born, generalize the use of skin-to-skin contact in all settings which was recommended for only resource limited settings in NRP 2015. In case of clearing the airway of nonvigorous newborn delivered through meconium-stained amniotic fluid (MSAF), routine laryngoscopy with or without suctioning is not recommended. Suction is recommended only for those who have visibly obstructed airway.

For monitoring of heart rate during resuscitation recommendation of use of ECG remains as previous. On the other hand, the current guidelines recommended use of ECG for rapid and accurate assessment of heart rate during chest compression.

2020 guideline restated the previous recommendation to provide positive pressure ventilation (PPV) without any delay, within 60 sec from birth in newborns who are gasping or apnoeic or who are persistently bradycardic (<100/min) despite appropriate initial actions. For applying PPV, previously there was no pressure limit recommendation, but 2020 guideline recommended use of 20-25 cm H_2O peak inflation pressure to inflate the lung. In animal studies, positive end expiratory pressure (PEEP) has been shown to maintain lung volume during PPV, consequently improving lung function and oxygenation in preterm.[10] So, 2020 guideline recommended that it is reasonable to provide PEEP for preterm neonates receiving PPV. Also there is recommendation to initiate PPV with an inspiratory time of ≤1s. Another notable change is, not to perform sustained inflation breath to initiate resuscitation in preterm infants which is potentially harmful.[11] So, we should avoid sustained inflation during initial PPV, if needed start PPV with PEEP within first 60s of birth and inspiratory time of 1 sec or less should be used while giving PPV irrespective of gestation.

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The 2020 guideline reiterated the previous recommendation for initiation of PPV with oxygen; 21-30% for <35 weeks gestation and 21% oxygen for ≥35 weeks. This version labeled use of 100% oxygen harmful[12] and recommended newborns of ≥35 wk, receiving respiratory support at birth should not receive 100% oxygen. However, 2020 guidelines recommended use of higher oxygen concentrations for ventilation during chest compressions. Latest guideline also recommended use of CPAP instead of intubation for spontaneously breathing preterm infants, who require respiratory support immediately after delivery.

There was no mention regarding vascular access in 2015 version. In 2020 guideline vascular access by umbilical vein catheter is added as a new recommendation based on expert opinion and with intraosseous access being the next best option as per the availability. Insertion of umbilical venous catheter is included in the algorithm and this is the only change from NRP 2015 algorithm. Previous recommendation about use of intravenous epinephrine during resuscitation remains unchanged. In addition, 2020 guideline recommend a larger dose of epinephrine (0.05 to 0.1 mg/kg) administration via ET tube while vascular access is being obtained and if the response is inadequate give an intravascular dose as soon as vascular line is established. Give further doses of epinephrine (10-30 μg/kg) every 3-5 min, preferably intravascularly, if the heart rate remains <60/min.

The time for discontinuation of resuscitative efforts changed from 10 minutes to 20 minutes is a major modification in 2020 guideline. In newly born babies receiving resuscitation, if there is no heart rate and all the steps of resuscitation have been performed, continuation or discontinuation of resuscitation efforts should be discussed with the team and the family around 20 min after birth considering individual patient and contextual factors.

The last but important change in 2020 NRP is to provide individual or team booster training more frequently than every 2 years to individuals who have been trained in neonatal resuscitation. More frequent training was revealed to improve procedural skills (especially endotracheal intubation), decrease the use of bag-and-mask ventilation and decrease neonatal mortality at 24 hours of age.[13]

There are several important concerns while applying NRP 2020 guidelines in a developing country like Bangladesh. These are: 1. For administering oxygen with 21-30% FiO_2 additional requirements are compressed air and blender machine; 2. For monitoring oxygen status pulse oximeter is needed and HR monitoring during chest compression ECG machine is required; 3. For PPV with PEEP T-piece resuscitator is needed; 4. Laryngeal mask airway (LMA) is an emerging alternative to endotracheal intubation especially when the personnel are not skilled in intubation, is not available in our market. 5. Inserting umbilical venous catheter for venous access during resuscitation, umbilical venous catheter (UVC) with skill to introduce UVC is not available. To make this guideline in practice in our country first we have to make the instrument available and then we have to develop skills to use those. Another problem is trained manpower and individual or team booster training is very limited, so training facilities should make available round the year to solve this problem. Though we have various limitations, GoB with professional bodies like BPA, BNF and development partners is working to improve services through HBB progarmme. To implement standard NRP and 2020 revised guideline we need to adopt 2020 NRP guidelines in our country context by combined efforts.

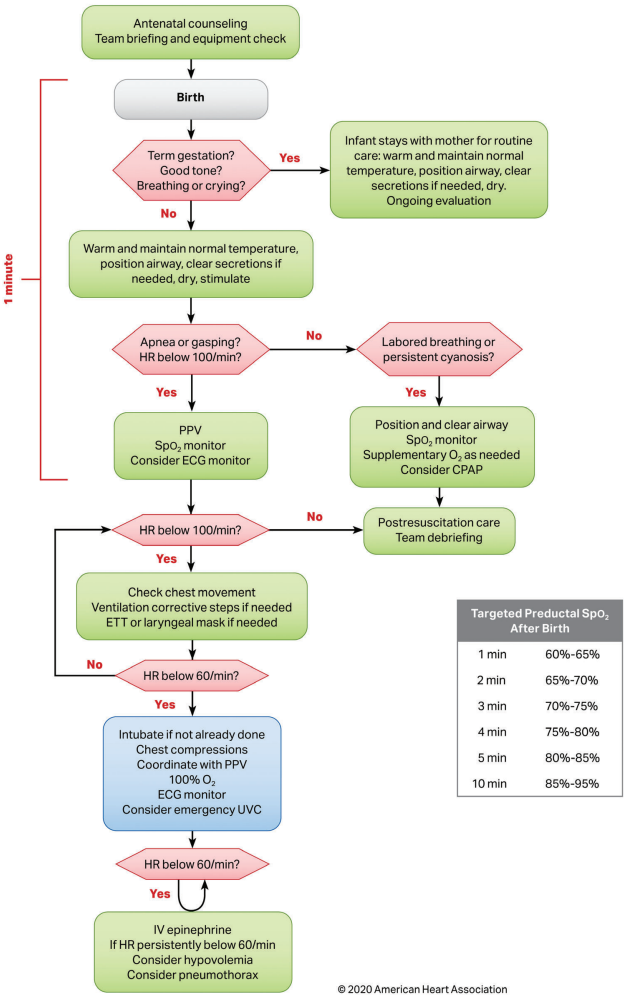

Fig.-1 *Neonatal resuscitation algorithm*

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