# 3rd SRFAC Townhall (Virtual) Neonatal Resuscitation Guidelines 2021 Update

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On behalf of Neonatology Subgroup - SRFAC

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# *2021 Neonatal Resuscitation guidelines*

- Update of 2016 Singapore Neonatal Resuscitation Guidelines
- 2020-2021 Updates from International bodies (ILCOR, AHA, ERC) used as a framework
- Adapted to local practice and health care delivery
- Drafted by neonatologists from 3 PHIs and Private guided by Neonatology subgroup members of SRFAC

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# *2021 Neonatal Resuscitation guidelines*

Applies to:

- Newborns Transitioning to extra-uterine life
- Newborns who have completed transition but remain in hospital after birth

Need for Resuscitation or stabilization after birth

- Most Preterms
- Up to 10% of Term newborns

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# *2021 Neonatal Resuscitation guidelines*

- Steps of resuscitation and Algorithm remain the same
  - Anticipation and Preparation
  - Umbilical cord management
  - Thermoregulation
  - Airway and Breathing
  - Circulation (CPR, Drugs)
  - Post resuscitation care

- Minor changes in some areas informed by evidence

There are NO Major Changes since 2016 guidelines

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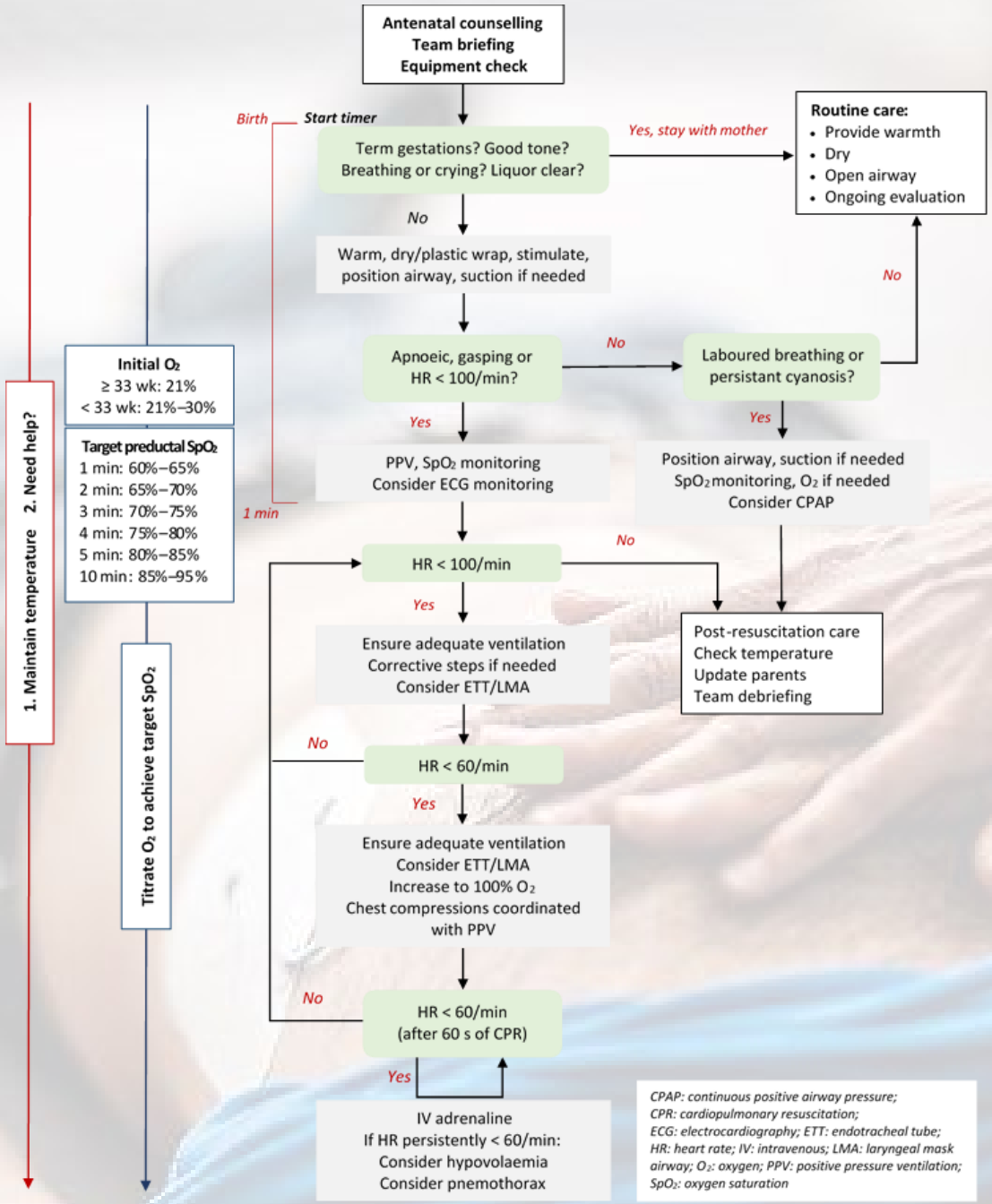


Algorithm remains same as 2016 guidelines

# *2021 Neonatal Resuscitation guidelines* :
## Anticipation and Preparation

- Anticipate and prepare in advance
- Environment: warm, well-lit and draught-free, designated resuscitation area, overhead warmer and equipment for monitoring
- Equipment: well maintained and ready for use.
- Providers: at least trained in Basic neonatal life support
- High risk deliveries: Advanced skilled providers

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# *2021 Neonatal Resuscitation guidelines* : Umbilical cord management

- Facilitation of placental blood transfusion to newborn by delayed cord clamping
  - Term: reduced iron def – no benefit on survival or neurodevelopment
  - Preterm
    - Reduction of transfusion needs, NEC, all grade IVH
    - Unclear on CLD, PVL, ROP, neurodevelopment
    - **Survival advantage:** 2 large sys Rev (RR 0.68[*0.52-0.9*] and 0.73[*0.54-0.98*]); Equivocal in another for <34 wks (RR 1.02 [*1.00-1.04*])
- Cord Milking
  - No advantage over delayed cord clamping
  - Increased risk of severe IVH among <28 wks

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# *2021 Neonatal Resuscitation guidelines* : Delayed cord clamping (DCC)

- *Recommendations*
  - DCC for up to 60 seconds is recommended for newborns who do not require resuscitation at birth
  - DCC should not delay resuscitation in babies who require immediate resuscitation
  - Contraindicated in settings when placental circulation is compromised
  - Cord milking is not recommended in clinical care of preterms

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# *2021 Neonatal Resuscitation guidelines* : Thermoregulation

- Hypothermia at admission strongly predicts survival and morbidity- strengthened by 2018 Cochrane sys rev
- Preterms may require additional thermoregulatory devices
- *Recommendations*
  - Ambient temp of the delivery room at 23°C–25°C
  - Maintain temperature of non-asphyxiated newborns at 36.5°C - 37.5°C
  - **≥ 33 weeks and no resus:** dried, skin-skin contact, cover with blanket
  - **≥ 33 weeks who need resus:** dried under radiant warmer
  - **< 33 weeks:** wrapped in polyethylene without drying under warmer
  - Maintain warm chain during transfer

Must Measure and Record Temperature at Admission

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# *2021 Neonatal Resuscitation guidelines* :

## Initial steps in golden minute

- Ensure warmth
- Gently stimulate to initiate breathing
- Maintain an open airway
- **Avoid routine suctioning**
- Start Assessment
  - Adequacy of breathing
  - HR by Auscultation (**Consider ECG in advanced resus**)
  - Pulseoxymetry
- **Initiate positive pressure ventilation if required**

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# *2021 Neonatal Resuscitation guidelines* :
# Meconium stained amniotic fluid

- No advantage of immediate Laryngoscopy and Tracheal toileting on prevention of meconium aspiration syndrome, survival, pulmonary hypertension, hypoxic ischemic encephalopathy and need for respiratory support – *sys rev 2020&2021*

- *Recommendations*
  - Intrapartum suction of nose or mouth is contraindicated
  - Routine oropharyngeal or nasopharyngeal suctioning is not required. Do it only if airways are obstructed
  - **Follow usual resuscitation steps in a non-vigorous baby to establish regular respiration**

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# *2021 Neonatal Resuscitation guidelines* : Positive pressure ventilation

- Most important step
- Every 30 sec delay – increases morbidity or mortality by 16%
- Use of PEEP during PPV increases survival to discharge without CLD, severe IVH or PVL (OR 1.38, [1.06–1.80]) – *2018*

- *Recommendations*
  - **PPV should be initiated within 60 seconds** after birth in newborns who remain apnoeic, gasping or bradycardic (HR < 100/min) despite the initial steps
  - Initiate PPV with pressure of 20-25 cm H2O
  - Use of PEEP (5 cm H20) is beneficial during PPV- specially for <33 wks
  - **Sustained lung inflation >5 sec is not recommended**

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# *2021 Neonatal Resuscitation guidelines* : Oxygen use

- Metanalysis by ILCOR - NLS taskforce  and CoSTR statement (2019)
  - Term babies: 40 fewer deaths for every 1000 deaths if 21% used instead of 100%
  - Preterms (<35 wk): No diff in survival or morbidity between ≤50% vs. >50% O2

- *Recommendations*
  - **< 33 weeks**: resuscitation should be initiated at **21%–30%;** if blender unavailable use ambu bag without reservoir attached (provides 40%)
  - **≥ 33 weeks**: resuscitation should be commenced at **21%** oxygen
  - Titrate supplemental oxygen to preductal (right hand) minute specific oxygen saturation ranges

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# *2021 Neonatal Resuscitation guidelines* : CPAP

- Death or BPD may be reduced in spontaneously breathing preterms by use of delivery room CPAP (instead of routine intubation)- NNT 25
- Higher (6–8 cm $H_2O$) vs. lower (3–5 cm $H_2O$) PEEP in first 120 hrs: OPTTIMMAL-Trial

- *Recommendation*
  - Support spontaneously breathing preterm newborns in respiratory distress at birth with **CPAP (PEEP of 5–6 cm $H_2O$)**

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# *2021 Neonatal Resuscitation guidelines* : Advanced airway

- Endotracheal intubation can be considered at several time points
  - Consider if mask ventilation is ineffective, chest compressions are initiated, there is a prolonged need for ventilation, there is requirement of tracheal toileting for presumed airway obstruction and in special circumstances (CDH)
  - LMA may be used as an airway device when intubation is not successful or feasible in late preterm and term newborns (≥34 weeks, >2000g)

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# *2021 Neonatal Resuscitation guidelines* : Oral intubation

| Gestational age (wk) | Estimated weight (g) | ETT size: internal diameter (mm) | Depth of insertion at upper lip (cm) | Suction catheter size (Fr) |
|---|---|---|---|---|
| **< 29†** | < 1,000† | 2.5 | **5.5–6.5** | 6 |
| **29–34** | 1,000–2,000 | 3.0 | 7.0–8.0 | 6 |
| **35–38** | 2,000–3,000 | 3.5 | 8.0–9.0 | 8 |
| **> 38** | 3,000–4,000 | 3.5 | 9.0–10.0 | 8 |

***†Tochen's formula:*** *weight (kg) + 6 cm; may overestimate the depth of insertion in extremely preterm infants*

***Nasal-tragus length (NTL)*** *measured as the distance from the nasal septum to the tragus: NTL (cm) + 0.5 cm (< 31 weeks of gestation) and NTL (cm) + 1 cm (≥ 31 weeks of gestation).*

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# *2021 Neonatal Resuscitation guidelines* :
## Circulation- Chest compression

- Comparison of different ventilation- compression ratios in asphyxial porcine models (2016, 2018): no advantage on ROSC
- *Recommendations*
  - Chest compressions should be commenced if the HR remains < 60/min after 30 seconds of effective PPV
  - Increase **inspired oxygen to 100%** and titrate to target
  - Coordinated compression- ventilation: **3:1 ratio**
  - **Two-thumb** with hands-encircling-chest technique
  - Depth of compression: **one-third AP diameter** of chest
  - Reassess after 1 minute of CPR

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# *2021 Neonatal Resuscitation guidelines* : Circulation- Drugs

- Most newborns with prolonged asystole require at least one IV adrenaline for ROSC
- ROSC faster with IV adrenaline compared to ET (Animal model 2017)
- No significant difference in efficacy between initial ET or initial IV dose –sys rev 2020
- A saline flush delivers IV adrenaline better (animal model 2021)

- Recent animal studies support use of crystalloids over colloids as initial choice for volume expansion (2017,2018)

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# *2021 Neonatal Resuscitation guidelines* : Circulation- Drugs

- *Recommendations*
  - If HR remains < 60/min after one minute of CPR, IV adrenaline (1 in 10,000; 0.1 mg/mL) is recommended at a dose of 0.1–0.3 mL/kg administered rapidly followed by a 3-mL saline flush
  - Continue CPR if HR< 60; Adrenaline every 3-5 minutes
  - ETT adrenaline if IV access not available – administer IV when secured
  - Early volume administration if non response to advanced resus
  - 10 ml/Kg of 0.9% saline over 5-10 min
  - Uncrossmatched O neg blood preferred if blood loss is obvious

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# *2021 Neonatal Resuscitation guidelines* :
## Post resuscitation care

- Prevent and Correct hypothermia (unless clinically indicated TH)
  - Evidence on rate of correction <0.5 °C/Hr vs. >0.5 °C/Hr equivocal
- Maintain SpO2, BP, pCO2 based on clinical targets
- Glucose control
  - Monitor blood glucose
  - Identify and treat hypoglycemia early
  - Avoid swings of hypo-hyperglycemia

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# *2021 Neonatal Resuscitation guidelines* : Therapeutic Hypothermia (TH)

- TH reduces the risk of death or major neurodisability at 18 months in term and near-term newborns with moderate to severe perinatal asphyxia (RR 0.75, 95% CI 0.68–0.83) *(2013 sys rev)*
- Recent evidence not convincing to extend TH as a clinical service to
  - Newborns <36 weeks
  - Newborns with mild HIE
  - Delayed initiation after 6 hours
  - Longer period of cooling or core temp <33 °C
- *Recommendations*
  - TH should be performed as per established protocols in centres with appropriate expertise
  - **Core temperature should be maintained between 33°C and 34°C for 72 hours**

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# *2021 Neonatal Resuscitation guidelines* : Withholding and Discontinuing resus

- Best to approach with a Shared Decision Making (SDM) framework
  - **< 23 Weeks :** not recommended
  - **$23^{+0}$ to $23^{+6}$ Weeks:** decisions guided by parental views and goals as well as certainty of gestation age assignment and presence of additional risk factors
  - **$24^{+0}$ to $24^{+6}$ Weeks:** offer resuscitation unless a shared decision made against it; consider additional clinical information
  - Redirection to palliative pathway: Clinical conditions are associated with certain early death or unacceptable burden on the survivor

- Discontinuing resuscitation: Small but definite possibility of ROSC and acceptable outcome despite an Apgar score of 0 at 10 minutes (2019)
  - If 20 minutes of optimal resuscitation and correction of all reversible causes do not result in ROSC or cardiac activity, resuscitation may be discontinued
  - Individualise decisions; Discuss with parents

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# *2021 Neonatal Resuscitation guidelines* :
## Briefing- Debriefing and Training

- Recommendations
  - Briefing before delivery should be conducted where possible.
  - In a multimember team, a team leader should assign roles and orchestrate
  - Debriefing after neonatal resuscitation is encouraged

  - Individual providers attend regular focused retraining of skills and knowledge at two-yearly intervals or more frequently
  - Singapore Neonatal Resuscitation Course (SNRC) run at KKH,NUH and SGH

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# *2021 Neonatal Resuscitation guidelines* :
# 5 Take home messages

- Newborns transition well and respond to resuscitation when Normothermic
- Aeration of the newborn lungs is the most important step and should be initiated within the golden minute. Prevent hypoxia as well as hyperoxia
- Use delivery room CPAP o support spontaneous breathing of preterm babies with respiratory distress
- Provide early and good quality co-ordinated chest compression and ventilation at a ratio of 3:1 to a newborn who needs it
- Ensure timely and efficacious administration of  Adrenaline and or crystalloids when required

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