

**ThinkAskLearn**  
Health Professional Education

## Neonate Emergency

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[www.thinkasklearn.com.au](http://www.thinkasklearn.com.au)

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**OMG I think I need a coffee break right now**

- 27 year old female presents to ED
- You are asked to provide assistant in car on the ramp
- 38/40 pregnant - G<sub>4</sub>P<sub>3</sub>
- On arrival she is delivering a baby
- Another nurse cares of the mother
- You get handed a blue floppy baby
- **What are you going to do now?**

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**Appearance  
Pulse  
Grimace  
Activity  
Respiration**

Virginia Apgar (1909–1974)

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“Slapping, shaking, spanking, or holding the newborn upside down are potentially dangerous and should not be used. During all handling, care should be taken to ensure that the infant’s head and neck are supported in a neutral position, especially if muscle tone is low”

ARC 2021

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**Newborn Life Support**

**At all stages ask: do you need help?**

**1 minute**

**Term gestation? Breathing or crying? Good tone?**

**YES** → Maintain normal temperature. Stay with Mother. Ongoing evaluation

**NO** → Maintain normal temperature. Ensure open airway. Stimulate.

**HR below 100? Gasping or irregular?**

**YES** → Positive pressure ventilation. SpO<sub>2</sub> monitoring.

**HR below 100?**

**YES** → Ensure open airway. Reduce mask. Increase pressure & oxygen. Intubation or laryngeal mask.

**HR below 60?**

**YES** → Three chest compressions to each breath. 100% oxygen. Intubation or laryngeal mask. Venous access.

**HR below 60?**

**YES** → IV Adrenaline. Consider volume expansion.

**Post-resuscitation care**

**Targeted pre-ductal SpO<sub>2</sub> after birth**

1 min	60-70%
2 min	65-85%
3 min	70-90%
4 min	75-90%
5 min	80-90%
10 min	85-90%


**IV Adrenaline 1:10,000 solution**

Gestational (weeks)	Dose
25-36	0.1 mL
27-37	0.25 mL
38-43	0.5 mL

10-30 mcg/kg (0.1-0.3 mL/kg)

Reviewed August 2023

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## The Numbers

- 1 in 10 babies will need some assistance to breath
- Only less than 1% will need extensive resuscitation
- The need for intubation, CPR, medication is 'uncommon' (ARC 2021)

ARC 2021



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## Which neonate is at risk

- Prolonged rupture of membranes (> 18 hours)
- Bleeding in second or third trimester
- Pregnancy-induced hypertension
- Chronic hypertension
- Substance abuse
- Drug therapy (e.g. lithium, magnesium, adrenergic blocking agents, narcotics)
- Diabetes mellitus
- Chronic illness (e.g. anaemia, cyanotic congenital heart disease)
- Maternal pyrexia
- Maternal infection
- Chorioamnionitis
- Heavy sedation
- Previous fetal or neonatal death
- No antenatal care

ARC 2021



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## Which neonate is at risk

- Multiple gestation (e.g. twins, triplets, etc.)
- Preterm gestation (especially <35 weeks)
- Post-term gestation (>41 weeks)
- Large for dates
- Fetal growth restriction
- Alloimmune haemolytic disease (e.g. anti-D, anti-Kell, especially if fetal anaemia or hydrops fetalis is present)
- Polyhydramnios, oligohydramnios
- Reduced fetal movement before onset of labour
- Congenital abnormalities which may affect breathing, cardiovascular function or other aspects of perinatal transition
- Intrauterine infection
- Hydrops fetalis

ARC 2021



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## Which neonate is at risk

- Non-reassuring fetal heart rate patterns on CTG
- Abnormal presentation
- Prolapsed cord
- Prolonged labour (or prolonged second stage of labour)
- Precipitate labour
- Antepartum haemorrhage (abruption, placenta praevia, vasa praevia)
- Meconium in the amniotic fluid
- Narcotic administration to mother within 4 hours of delivery
- Forceps delivery
- Vacuum-assisted (Ventouse) delivery
- Maternal general anaesthesia

ARC 2021



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## The Well Child at Birth

- Must be dried and kept warm
- Provide on the mother's chest and
- Not require separation of mother and baby



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## Neonatal Anatomy

- Lungs change from fluid-filled to air-filled
- Pulmonary blood flow increases dramatically
- Intracardiac and extracardiac shunts initially reverse direction and subsequently close
- May require high pressure ventilation for first few breaths ~80cmH2O
- O2 sats are normally low
  - Takes about 5-10 mins to get to 90%!!!!
  - 25th centile for oxygen saturation is 80% at 5 minutes



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## No routine Suction required

- Normal newborns do not require suctioning
- Very effective self clearing of airway
- May delay ventilation by baby
- Unwell baby may have obstruction by meconium, blood clots, mucous or vernix
- Suctioning may cause local trauma, bradycardia or laryngeal spasm
- Suction if it required need to be brief and undertaken with care
- Suctioning due to Meconium is controversial
  - Benefit vs delayed ventilation



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“That there is insufficient published human evidence to suggest routine use of endotracheal intubation to suction meconium from the trachea in meconium-exposed infants”

ARC 2021



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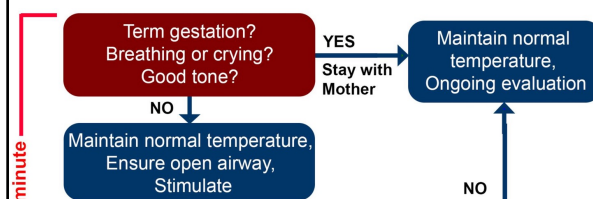
## Cord Clamping

- Delayed cord clamping
- Full term babies - 1mins or pulsating ceases
  - Improved iron status through early infancy, but a greater likelihood of jaundice
  - Increased risk of phototherapy
- Well preterm babies - 30 sec to 3 min
  - Increases blood pressure, reduces risk of intraventricular haemorrhage and need for blood transfusion
  - Greater likelihood of jaundice
- Consideration of deferred cord clamping in preterm infants who do not require resuscitation ARC 2021



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## Initial Assessment



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<http://www.euroimagery.com/2004/02/21/what-the-cord-doctors-said-to-each-other-for-optimal-delivery/>




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## Skin to Skin



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Maintain Normal Temperature  
Vs Avoid Heat Loss

28% increase in mortality for  
every degree below 36.5°C at  
admission

ARC 2021


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"The best things in life  
come in Cellophane"

DU PONT  
Cellophane


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[http://pinkbowseredignails.blogspot.com.au/2011\\_01\\_01\\_archive.html](http://pinkbowseredignails.blogspot.com.au/2011_01_01_archive.html)

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### Airway Opening Procedure



Hyper-extended      Slightly extended      Flexed

The slightly extended, or sniffing position of the baby illustrated in the middle panel results in optimal airway patency for resuscitation

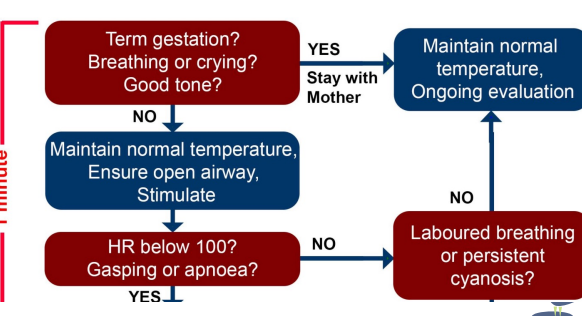
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### Stimulation



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### One minute is a long time!



```

graph TD
    A["Term gestation?  
Breathing or crying?  
Good tone?"] -- YES --> B["Stay with  
Mother"]
    A -- NO --> C["Maintain normal temperature,  
Ensure open airway,  
Stimulate"]
    C --> D["HR below 100?  
Gasping or apnoea?"]
    D -- YES --> E["Laboured breathing  
or persistent  
cyanosis?"]
    D -- NO --> F["Maintain normal temperature,  
Ongoing evaluation"]
    E --> F
    
```

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## Heart Rate Assessment

Average HR ~130bpm  
Range 110-160 bpm  
Should >100 after first minute



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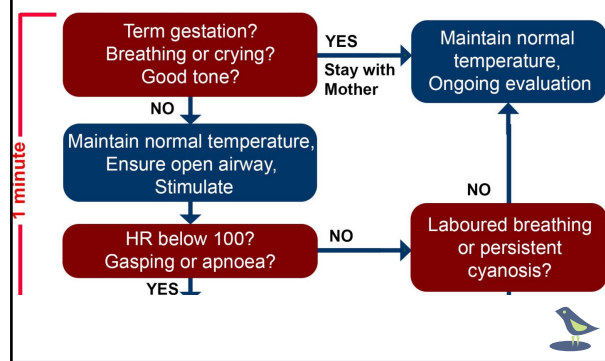
"ECG can be used as an adjunct to auscultation and saturation monitoring, to provide a more rapid and accurate measure of heart rate during resuscitation"

ARC 2021



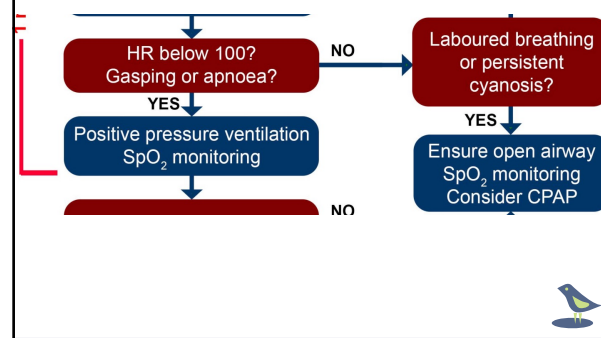
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## One minute is a long time!



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## Each set of interventions are 30 sec



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## Sats achievable after a minute



But focus on Heart Rate



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## Oxygen Saturations Targets

### Targeted pre-ductal SpO<sub>2</sub> after birth

1 min	60-70%
2 min	65-85%
3 min	70-90%
4 min	75-90%
5 min	80-90%
10 min	85-90%

- Initially, resuscitation occurs with air
- Attempt to match newborn O<sub>2</sub> sats
- Even brief exposure to excessive oxygenation can be harmful



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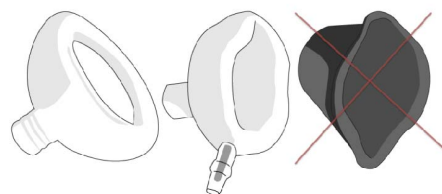


## Effective ventilation is the key to successful neonatal resuscitation



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## Cushioned Rims fit best



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- Most readily available
- Must be available at all times
- Easiest to use



- Difficult to deliver consistent inflating pressures
- Easy to generate unnecessarily high pressures

- O<sub>2</sub> concentrations
- PEEP
- Pressure valve



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## Flow inflating bag/T-piece



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## Settings

- Resp Rate 40-60bpm
- Use in air initially – Match newborns Sats
- Peak inspiratory pressure (PIP):
  - Term newborn 30 cm H<sub>2</sub>O
  - Preterm newborn 20 – 25 cm H<sub>2</sub>O
- May initially need high pressures
- Progressively lower pressures and rates as resuscitation continues
- If available 5cm of PEEP is appropriate
- CPAP maybe useful for ongoing ventilation



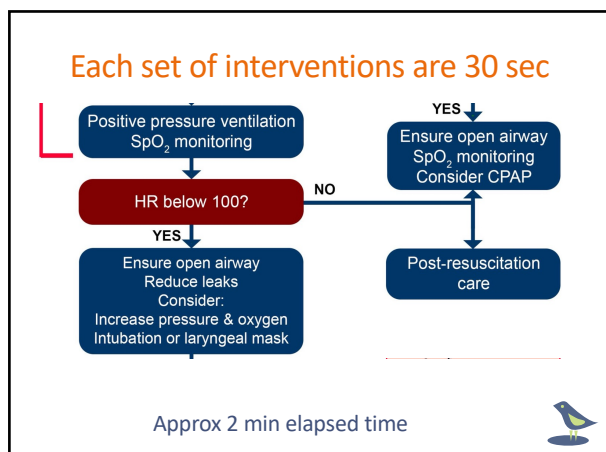
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## Assessment of Effectiveness

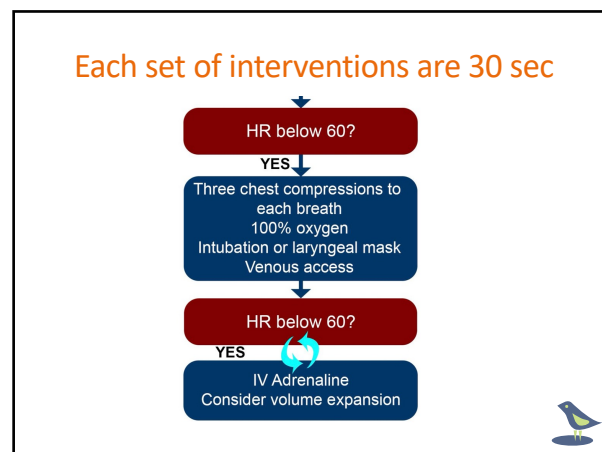
- Ventilation effectiveness is confirmed by observing:
  - Heart rate greater than 100 bpm
  - Slight rise of chest and upper abdomen with each inflation
  - Improving oxygenation (preferably assessed using pulse oximetry)
- Reassess technique if the:
  - Chest and abdomen do not rise with each inflation
  - Heart rate does not rise above 100 bpm
  - Oxygenation does not improve
- Consider tracheal intubation or use of laryngeal mask if face mask ventilation remains ineffective despite corrective intervention



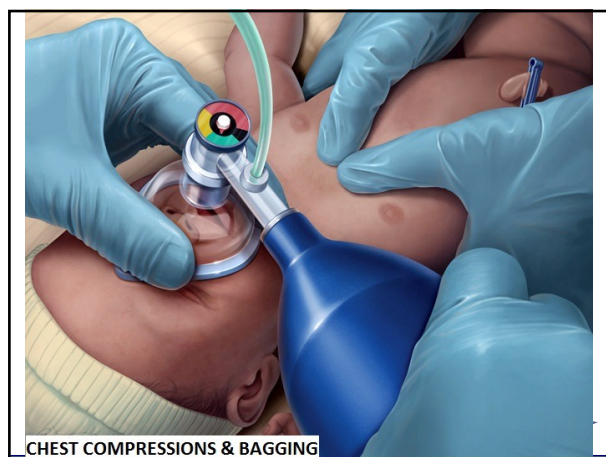
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Assessment of Effectiveness

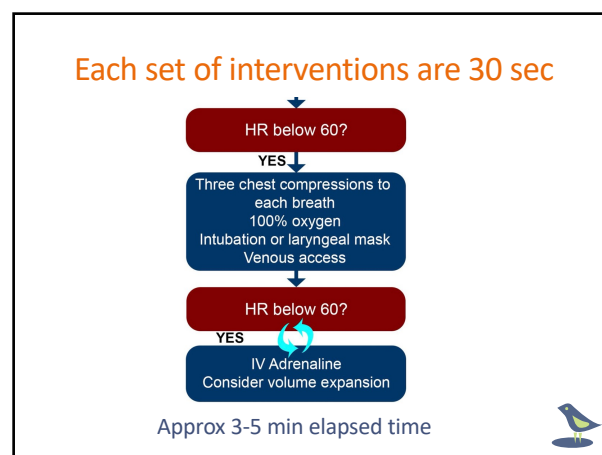
- If pulse < 60 b/min despite 30 sec effective IPPV
- 3:1 ratio at rate of 120/min (90 compression/30 ventilation)
- Depth 1/3 of chest AP diameter

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Indications for Intubation

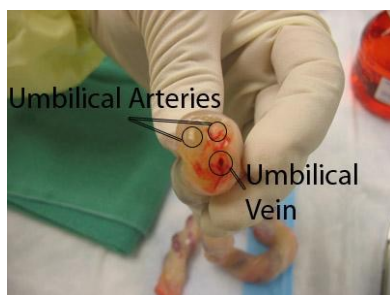
- Tracheal suctioning in a non vigorous newborn exposed to meconium
- Unsuccessful ventilation via a facemask (e.g. heart rate remain slow, oxygen saturation falling or failing to rise or prolonged)
- Special circumstances (e.g. diaphragmatic hernia, extremely low birth weight)
- Newborns born without a detectable heart rate
- Administration of endotracheal medications (e.g. Adrenaline or artificial surfactant)
- Expected need for continued or prolonged ventilation

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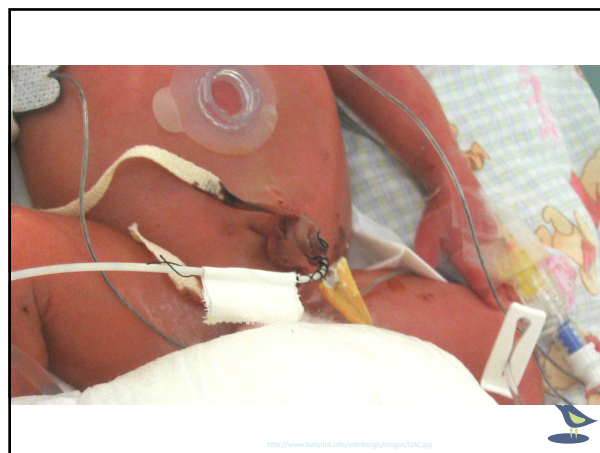
## Venous Access



2021 – Greater emphasis of Umbilical Catheterisation first, if available



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<http://www.babylink.info/edinburgh/images/UAC.jpg>



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## Adrenaline – OMG!

### IV Adrenaline 1:10,000 solution

Gestation (weeks)	Dose
23-26	0.1 mL
27-37	0.25 mL
38-43	0.5 mL

10-30 mcg/kg (0.1-0.3 mL/kg)

Use adrenaline 1:10000  
10-30 microgram/kg  
(0.1-0.3 mL/kg of a  
1:10,000 solution)  
Avoid high doses



UVC, three-way stopcock & syringe prepared for use.



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## Fluids

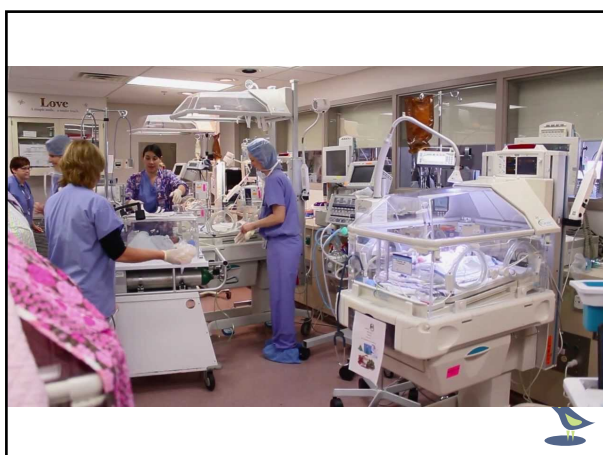


10mL/kg over several minutes

Term baby ~3.5kg  
Total push – 35ml  
Reassess and repeat as necessary

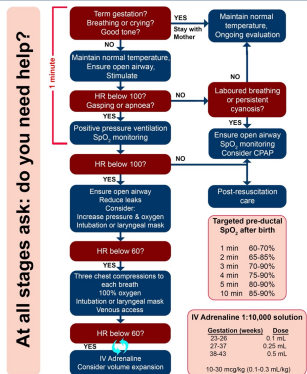


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## Newborn Life Support



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