APLS: SIMULATION with SKILLS: Intubation. CASE C-2

History *{initial candidate briefing}*

You are called to the children's ward as one of the bronchiolitis babies' saturations are dropping.

Initial Impression *{to tell candidate on first sight of child}*

The nurse has increased the oxygen flow to the infant but the baby (2 months old) has severe retractions and a gasping, slow respiration rate. The saturation monitor is not now registering so the heart rate is not recording.

Clinical Course *{to be given to candidate as he/she progresses through the assessment and treatment of the child}*

An ECG monitor is placed and is showing a rate of 100bpm. Saturations are 82% on oxygen.

After the airway is opened and the infant is ventilated with bag/mask, the chest expansion is ineffective even with trying different airway manoeuvres and an oro-pharyngeal airway. The baby now shows no signs of life. The ECG monitor now shows a heart rate of 50 and falling. Once chest compressions have been established and the infant intubated (with difficulty; because of copious secretions, a Yankauer sucker is required), ventilations are successful although the lungs are "stiff". The pulse/signs of life are re-established, saturations are >92%. Guide weight 5 kgs.

INSTRUCTORS INFORMATION

Key Treatment Points

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Airway	Establish airway patency	
	Oral tracheal intubation	
Breathing	Bag and mask with added O_2	
	Bag and tracheal intubation with added O_2	
Circulation	IV or IO access	
	Asystole protocol	
General Therapy	Continuous BLS after intubation	
Specific Therapy	Consider PICU transfer	

Diagnosis

Cardiorespiratory arrest – Asystole, severe bronchiolitis

Skills to be assessed in this simulation: BLS in an infant, airway opening, tracheal intubation and bagging through a tracheal tube. Candidates should be informed that the skill will be assessed when they prepare to perform it.

During the simulation, the initial candidate should manage the airway and breathing "in real time" and the chest compression should similarly be performed correctly by one or more candidates and assessed. The Guedel airway insertion should be simulated and is not part of skills assessment in this simulation with skills.

Following the closure of the simulation with any teaching points clarified as necessary, all candidates should perform the airway management and ventilation skills and infant chest compression until competent.

Instructors' note: in this simulation with skills unless advanced manikins are available, use a combination of BLS baby and infant intubation head.

EQUIPMENT REQUIRED

BLS baby/Infant intubation head or
ALS baby
Monitor with Heartsim and interface
Oropharyngeal airways
(000, 00, 0, 1, 2, 3) x 2
Oxygen Tubing x 2
Oxygen masks with reservoir x 2
Face Masks with and without reservoirs
BVM masks infant - circular 01, 1, 2.
Self-inflating bags 500 ml x 2 with reservoir and oxygen tubing
Endotracheal tube introducers x 2
Endotracheal tubes
2.5 – 5.0 mm uncuffed (in 0.5 increments) x 2
Adult curved blade x 2
Paediatric straight blade x 2
Laryngoscope handles x 2
Paediatric Magills
Paediatric Yankauer suckers x 2 Connectors
Soft suction catheters
Spare batteries for laryngoscopes
Spare bulbs for laryngoscopes
Stethoscopes x 2
Syringes 2ml, 5ml, 10ml
Cleaning swabs
Tape to tie in endotracheal tube
Tongue depressors x 4
End-tidal CO_2 monitor

BASIC AIRWAY POSITIONING AND CLEARANCE

Head tilt/chin lift

- Place the hand nearest to the child's head onto the forehead
- Apply pressure to gently tilt the head back to achieve the following degrees of tilt:

INFANT	CHILD
Neutral	Sniffing

- Place the fingers of the other hand under the chin and lift gently upwards.

Jaw thrust

- Place two or three fingers under the angle of the mandible bilaterally.
- Lift the jaw upwards.

BASIC LIFE SUPPORT

- Initial S, S, S approach:
  1. Safety
  2. Stimulate: Are you alright?
  3. Shout
- Airway opening manoeuvres
- Look, listen, feel
- 5 initial rescue breaths
- Check for signs of life (see note below). In addition, the absence of a central pulse for up to 10 seconds or the presence of a pulse at an insufficient rate may be detected (see note below).
- Chest compressions (see note below)
  1. hand position
  2. technique
- Ventilation
  1. mouth to mouth
  2. mouth to mouth-and-nose
- Ratio 15:2 for 1 minute, with a compression **rate** of 100-120 per minute
  Once intubated, ventilations can be uninterrupted for compressions if expansion is satisfactory and should be at a rate of 12-20 bpm
- Call emergency services

Instructor notes:

Look for signs of life:

The signs are:

- Cough/gag in response to breathing
- Normal breathing
- Movement

These observations can be made during the look listen feel, 5 initial breaths, and the pulse check stages. They should not take any additional time, but the candidate should indicate that they are seeking them. Even experienced health professionals can find it difficult to be certain that the pulse is absent within 10 seconds. Therefore, the absence of signs of life is the primary indication to start chest compressions.

Chest compressions

Ensure that candidates are clear about the technique for chest compressions – lower half of the sternum. Two fingers or thumbs for an infant and the heel of one or two hands for a child. The number of hands is the candidate's choice, but should be adequate to depress the chest by at least one third of its diameter.

TECHNIQUE OF TRACHEAL INTUBATION

Infant or small child

- Ensure that adequate ventilation and oxygenation by face mask are in progress. The patient should be monitored by ECG and pulse oximeter throughout and after the procedure. Adequate pre-oxygenation should always be carried out if possible. However, it should be realised that as one of the indications for intubation is failure to ensure adequate patency by any other means, this may not always be possible.
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Technique 1: using the straight-bladed laryngoscope

- Prepare and check equipment. (before inducing RSI if used under these circumstances)
- Ensure manual immobilisation of the neck by an assistant if cervical spine injury is possible. Because of the relatively large occiput, it may be helpful to place a folded sheet or towel under the baby's back and neck to allow extension of the head.
- The laryngoscope should be held in the left hand and inserted initially into the right-hand side of the mouth thereby displacing the tongue to the left. Lift the epiglottis forward. The vocal cords should be sought in the mid-line directly underneath. One key to success is to keep the laryngoscope blade in the midline. It is easy to obscure the view by either looking too far to the left or too far to the right into either piriform fossa or by inserting the blade too far past the larynx and down into the oesophagus. In the circumstance where the laryngoscope blade has been inserted too far into the oesophagus, if the

blade is cautiously and slowly withdrawn the vocal cords may suddenly pop into view

- In the unconscious baby being intubated by the relatively inexperienced doctor, it is often easiest to place the laryngoscope blade well beyond the epiglottis. The laryngoscope blade is placed down the right-side of the tongue into the proximal oesophagus. With a careful lifting movement, the tissues are gently tented up to "seek the midline". The blade is then slowly withdrawn until the vocal cords come into view. In some situations, it may be better to stay proximal to the epiglottis to minimise the risk of laryngospasm. This decision must be based on clinical judgement.
- The tube should then be inserted through the cords with due attention to the fact that in small children the trachea is very short. Whilst it is important to not insert the tube too far, thereby avoiding inadvertent bronchial intubation, it is much, much more dangerous to have a tube which is too short as this maybe displaced at any time by movement of the child's head.
- Following intubation, placement of the tube should be confirmed by both inspecting the chest for equal bilateral movement and by auscultating the chest. It is also worth listening over the epigastrium for the **absence** of air entry into the stomach following oesophageal intubation.
- If intubation is not achieved within 30 seconds discontinue the attempt, re-establish pre-oxygenation and try again. If precise timing is not available, then the procedure should not be attempted for longer than the operator can comfortably hold their own breath.
- The definitive test for successful placement is the presence of expired CO_2 in the exhaled air. This can be tested by either chemical colour change devices or even better, by definitive end-tidal CO_2 measurement. This is not yet accepted in neonates. A large randomised trial is underway. [Note that CO_2 may be low or absent in the exhaled breath in cardiac arrest.]
- Once the tube is inserted and fixed firmly into place arrangements should be made to obtain a chest x-ray to confirm correct tube length. The end of the tube on x-ray should be below the level of the vocal cords, but above the carina.