



Early Evaluation of the Sick Child

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Introduction

A sick child presents unique challenges to all including the anaesthetist. This is as a result of their different and unique anatomical and physiological features compared to those of an adult. These unique characteristics impart on the management of their airway, fluid administration, emergency and anaesthetic care. A good understanding of these unique features is necessary for the optimal care of the sick child. It is said that the child is NOT a small adult.

Anatomical and Physiological Features of a Child

The following are some of the anatomical and physiological features of a child. I have this mnemonic useful in considering the unique features of a child, "CHILDREN" [1,2].

- a) The *cricoid cartilage* is the narrowest part of a child's larynx unlike in adults where the narrowest part is the glottis. A small decrease in diameter e.g. caused by oedema or stricture formation following prolonged intubation may lead to airway obstruction in children.
- b) *Cords (vocal)* of a child are angled, so an endotracheal tube passed blindly may easily dislodge in the anterior commissure instead of sliding into the trachea.
- c) *Higher up larynx* (C3-C4) while in adults is lower down (C4-C5) with a large tongue.
- d) *Head is bigger (the occiput)* compared to total body surface area and thus tends to produce neck flexion.
- e) *Increased resistance* to airflow due to the small diameter of the airways thus increasing the work of breathing.

- f) A *larger heart* with less respiratory reserve than in adults due to the cylindrical thorax and large heart.
- g) *Diaphragmatic breathing* and sinusoidal and continuous instead of periodic.
- h) *Right and left main bronchi* arise at equal angles from the tracheal. The length at birth is 4cm which increases to 6cm at 12 years of age. In neonates, the trachea is relatively wider.
- i) *Respiratory muscles are more prone to fatigue* than in adults. This is because the diaphragmatic and intercostal muscles do not achieve the adult configuration of type 1 muscle fibres until the child is approximately 2 years old.
- j) *Epiglottis* of a child is large, stiff and U-shaped. That of the adult is leaf-shaped with a stalk posteriorly.
- k) *Neonates are obligatory nose breathers*; therefore, in choanal atresia, there may be severe hypoxia and even death.

Assessment of the Sick Child

The assessment of a sick child requires a systematic and stepwise approach. A quick assessment of the sick child begins with the pediatric assessment triangle (PAT) [3]. This includes appearance (tone, interactiveness, censurability, look and speech), breathing and circulation. The appearance of the child and assessment of the work of breathing can be used to determine the severity of the child's illness or injury. For instance, a normal appearance plus increased work of breathing is suggestive of respiratory distress while abnormal appearance plus increased work of breathing may reflect respiratory failure.

Assessment of the sick child should continue with primary survey and secondary survey. The primary survey follows the “ABCDE” approach.

Airway Assessment

Assess for airway patency with no signs of obstruction. Rule out any abnormal airway sounds such as snoring, stridor, hoarse speech, audible wheeze, or any signs of increased work of breathing e.g. nasal flaring, grunting, retractions and paradoxical chest movements.

Determine if the patient is able to maintain adequate ventilation and oxygenation with the correct positioning. If airway is not patent, insert an oropharyngeal or nasopharyngeal airway or intubate with an appropriate sized endotracheal tube.

Breathing Assessment

Examine the chest and abdomen for respiratory movement and evaluate the depth of breathing and symmetry of movement with each breath. Count the respiratory rate to rule out tachypnea and give supplemental oxygen as needed. Look for signs of hypoxia, dyspnoea, stridor or signs of increased work of breathing. Determine the arterial saturation of oxygen with a pulse oximeter [4].

Circulation Assessment

Assess the pulse for rate and volume to determine adequate cardiovascular function, tissue perfusion, and perfusion to vital organs. Determine capillary refill time by pressing against the skin for five seconds. A capillary refill time more than two seconds may indicate low perfusion state. Measure the blood pressure adequate cuff size. Rough estimate of the minimum systolic blood pressure is 70+ (2xage).

Disability

Assess for any neurological abnormality with the AVPU scale (Alert; Respond to verbal stimuli; respond to Pain; Unresponsive). The Pediatric Glasgow Coma Scale (PGCS) may also be used as it evaluates eye, verbal and motor responses. Abnormal disability test such as altered or reduced level of consciousness will require immediate resuscitation, endotracheal intubation and ventilation in a patient who is unresponsive with a PGCS less than eight.

Exposure

Adequate exposure of the child may reveal burns, bruising, fractures or evidence of other injuries.

The secondary survey involves obtaining focused history from parents or guardian or caregiver. This includes AMPLE history i.e. allergies, medications, past medical history, last meal (time) and event leading to present situation.

This is followed by a very detailed general and systemic examination.

References

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