

# MANAGEMENT OF APNOEAS

## Background

### **Definition of Apnoea and Periodic Breathing:**

- There are varying definitions apnoea of prematurity (< 37 weeks) and apnoea of infancy (> 37 weeks).
- For the purpose of this guideline apnoea is defined as **cessation of respiratory flow > 20 s leading to a drop in saturation > 20 % of the pre-existing value.** The classic triad is also associated with bradycardia (usually < 80 BPM)
- Periodic breathing is defined as **three or more respiratory pauses of > 3 s with < (15)20 s** of normal respiration between the pauses; considered normal in term infants, but can be associated with hypoxaemia in premature infants.

### **Incidence of Apnoea:**

- < 30 weeks around 75 %
- < 32 weeks around 50 %
- < 34 weeks < 25 %
- < 35 weeks < 10 %
- > 37 weeks postnatal age most apnoeas in preterm infants resolve, however around 75 % of very low birthweight infants (< 28 weeks) can have apnoeas up to 44 weeks postnatal age.
- Term infants rarely have apnoeas. They are pathologic until proven otherwise.

### **Classification:**

- Central - there is absence of respiratory drive (approx. 40%)
- Obstructive - continued respiratory effort but airflow is restricted due to airway obstruction
- Mixed – persisting obstruction leading to CNS depression due to hypoxia and acidosis (> 50 %)
- “Silent Apnoeas” - closed glottis during a central apnoea

### **Aetio-/Pathophysiology:**

- Apnoea of prematurity is the end result of immaturity of the regulation of breathing, immature response to hypoxia and hypercapnia and an exaggerated response to stimulation of the upper airway.
- Apnoea presents usually in the first 2 – 3 days of life and increases in frequency after the first 2 – 3 weeks of life.
- Apnoea occurs predominantly during active sleep.
- Apnoeas have been associated with many medical conditions (see list below) without evidence of a causal relationship.

### **Associated Problems (list not exhaustive):**

- Ambient temperature fluctuations: hyper- or hypothermia
- Upper airway obstruction: macroglossia, micrognathia, choanal atresia or laryngomalacia or laryngeal oedema, subglottic stenosis
- Chronic lung disease of prematurity
- Cardiac abnormalities: patent ductus arteriosus or heart failure
- Abdominal distention and pathology: Gastro-oesophageal reflux (not clearly proven) and NEC
- Anaemia and hyperbilirubinaemia
- Infection: systemic or localized, sepsis or meningitis

- Post immunization
- Metabolic derangements: glucose and electrolyte imbalances
- Drug administration: opioids, prostaglandin (PGE1), magnesium, general anaesthesia in mother or baby
- Central nervous system lesions: intracranial haemorrhage, seizures

## Management

### **Monitoring:**

- Impedance technology is the most widely used modality for measuring respiration in the hospital setting. It can be obtained from ECG electrodes in a non-invasive manner. However, it only picks up central apnoea cannot distinguish obstructive efforts from normal respiration.
- Graseby Capsule<sup>®</sup> is not produced anymore and is very inaccurate.
- Monitor all preterm infants < 35 weeks and all preterm infants after surgery for at least 12 hours.

### **Assessment and Diagnosis:**

- Apnoea of prematurity (AOP) is a diagnosis of exclusion and therefore thorough maternal and infant history as well as examination and appropriate investigation is essential to diagnose and treat secondary causes.
- Profound or prolonged apnoeas requiring bag and mask ventilation or recurrent apnoeas requiring stimulation should be assessed and treated according to findings

### **Prevention:**

- Thermo-neutral environment
- Head positioning and body positioning (prone and at least 15° cot position)
- Caffeine iv/po (**see algorithm**)

### **Treatment:**

- Treat acute profound or prolonged apnoeas as per general NLS guidance
- Caffeine iv/po (**see algorithm**); note: change to oral Caffeine asap

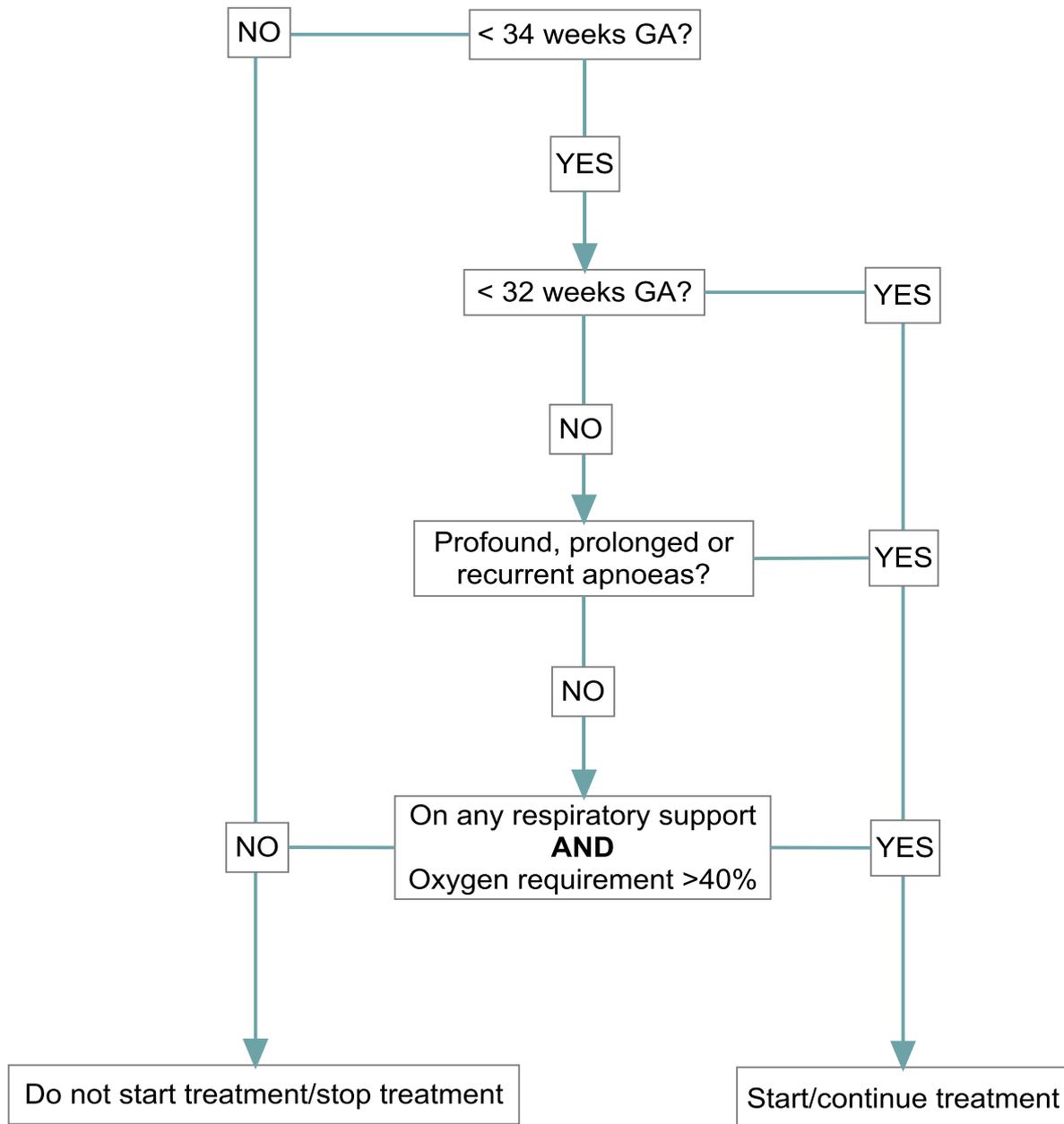
Bodyweight	Caffeine-Citrate Maintenance Dose	Minimum Feeding Volume as per Dilution Required
0.5 kg	5 mg	3 ml per feed
1 kg	10 mg	5 ml per feed
1.5 kg	15 mg	7.5 ml per feed

- HHHFNC, NCPAP and SIPAP (as per NIRS guideline) – can reduce the incidence of obstructive and mixed apnoea, but not central apnoea
- Transfusion (as per anaemia guideline)
- Manual stimulation and stochastic mechano-sensory stimulation (research)
- Kangaroo care (in selected group of patients)
- Refractory apnoeas (Consultant decision only):
  - Consider changing back to iv if on oral dosing
  - High dose Caffeine (double the dose)
  - Normal dose Caffeine plus Doxapram (increased risk of arrhythmias, GERD, seizures)

## Longterm outcome

- Not clearly linked to SIDS, but higher likelihood of sleep disordered breathing at age 8 – 11 years
- Relationship between severity and frequency and long-term neurodevelopmental outcome unclear

## Caffeine Therapy



**Stop Caffeine at least one week before discharge**