APNOEA AND BRADYCARDIA ● 1/4

RECOGNITION AND ASSESSMENT

Apnoea
Pause(s) in breathing >20 sec (or less, when associated with bradycardia or cyanosis)

Central Apnoea is defined as cessation of breathing movements for >20 seconds. Central apnoea will be detected by an apnoea monitor. Any associated desaturation will be detected by a saturation monitor so that babies on a saturation monitor do not usually need an apnoea monitor as well. These are caused by poorly developed neurological control.
Obstructive Apnoea is defined as upper airway collapse (usually at pharyngeal level) leading to cessation of airflow to the lungs. It is recognised clinically as a desaturation with or without associated colour change and bradycardia. Breathing movements will continue during an obstructive apnoea. Obstructive Apnoea will not be detected by an apnoea monitor unless it progresses to a central apnoea.
Mixed Apnoeas are common; they start as obstructive apnoea and progress to central apnoea or vice versa.

Bradycardia
Heart rate <100 bpm for >5seconds, associated with desaturation

Desaturation
An episode of oxygen saturation <85%. They occur for a variety of reasons including both central and obstructive apnoea.

A self limiting desaturation is an episode of desatauration with or without associated colour change (cyanosis or pallor). There is usually no bradycardia (see below). The baby recovers spontaneously without requiring supplemental oxygen nor tactile stimulation. The need for stimulation and /or oxygen will be a matter of clinical judgement. They are very common in well premature babies- one study of well term infants found desaturations to at least 10% below baseline in 59% of babies studied. They have many causes including "short" (ie <20sec) episodes of hypoventilation (central or obstructive).

Significance
- Most babies born <34 weeks' gestation have primary apnoea of prematurity (PAP). Hence babies born <34 weeks should have SpO_2 monitoring until ≥34 weeks' post conceptional age (PCA)
- multiple aetiologic factors can exacerbate apnoea in preterm babies
- sudden increase in frequency warrants immediate action
- Consider causes other than apnoea of prematurity if occurs:
- in term or near-term baby (>34 weeks' gestation)
- on first day after birth in preterm baby
- onset of apnoea after aged 7 days in a preterm baby

Causes
Infection
- Sepsis
- Necrotising enterocolitis
- Meningitis
- Viral inc. RSV

Respiratory
- Inadequate respiratory support
- Upper airway obstruction
- Surfactant deficiency

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CNS
- Intracranial haemorrhage
- Seizure
- Congenital malformations

CVS
- Patent ductus arteriosus
- Anaemia

Other
- Metabolic abnormalities, especially hypoglycaemia
- Haematological: anaemia
- Inherited metabolic disorders e.g. non-ketotic hyperglycinaemia
- Hyperthermia
- Gastro-oesophageal reflux

MANAGEMENT

Terminate episode
- If apnoea not self-limiting (clinician to agree threshold to intervene), perform the following in sequence to try to terminate episode:
  - ensure head in neutral position
  - stimulate baby by tickling feet or stroking abdomen
  - if aspiration or secretions in pharynx suspected, apply brief oropharyngeal suction
- oxygen if desaturating and not responding to stimulation, face mask ventilation may be required for severe episodes.
  - emergency intubation
- Once stable, perform thorough clinical examination to confirm/evaluate cause

Screen for sepsis
- If apnoea or bradycardia increasingly frequent or severe, screen for sepsis as apnoea and bradycardia can be sole presenting sign

TREATMENT
- Treat specific cause, if present
- Primary apnoea of prematurity is a diagnosis of exclusion and may not require treatment unless pauses are:
  - frequent (>8 in 12 hr) or
  - severe (>2 episodes/day requiring positive pressure ventilation)

Pharmacological treatment
- Caffeine citrate 20 mg/kg loading dose oral/IV (over 30 min) followed, after 24 hr, by maintenance dose of 5 mg/kg oral/IV (over 10 min) once daily, increasing to 20 mg/kg if required until 34 weeks' PCA. Not routinely required if born >30 weeks GA.
- If desaturations and bradycardias persist, may continue beyond 34 weeks' PCA. If so, review need for treatment regularly

Non-pharmacological treatment
- CPAP, SiPAP/BiPAP [see **Ventilation: continuous positive airway pressure (CPAP)** guideline]
- If above fails, intubate and ventilate

Monitoring

The type and duration of monitoring required is dictated by both the physiological stability

of the baby and his/her gestational age. The terms apnoea, desaturation and self limiting desaturation, as used in this section, are defined above.

Physiologically unstable
- Apnoeas
- Desaturation requiring stimulation or oxygen
- Acute respiratory disease
- Ventilated, NCPAP

SATURATION, ECG and RESPIRATORY RATE MONITORING.

Physiologically stable in air
- No central apnoea
- Self limiting desaturations only
- Not ventilated or on NCPAP

SATURATION MONITOR until self limiting nature of any desaturations has been established, by discussion between medical and nursing staff on ward round, then APNOEA MONITOR plus daily SATURATION CHECK FOR 5 MINUTES until 34 weeks.

Physiologically stable in oxygen
- As above plus stable or decreasing oxygen requirement
- Oxygen via low or high flow nasal cannulae

SATURATION MONITOR unless approaching discharge home in oxygen and a fixed oxygen flow rate has been established, preferably by overnight recording – see home oxygen guideline, when can be changed to an APNOEA MONITOR.

When to Stop Continuous Monitoring (= ecg, saturations, apnoea monitor)

Born <34 weeks
Monitor according to physiological stability.

All Continuous Monitoring can be stopped when all of the following criteria are satisfied:
1. CGA 34 weeks.
2. Apnoea free for 8 days*, but if caffeine has been given must be off caffeine for 8 days and apnoea free.
3. Minimum of 5 days off Ventilation/ CPAP if it has been used

*No monitoring is needed once well baby reaches 34 weeks post menstrual age irrespective of duration of monitoring already performed. For example a baby born at 33+4 can have monitoring removed, provided he is physiologically stable, once he achieves 34 weeks – he does not need 8 days of continuous monitoring provided he has not had caffeine or respiratory support.

Born >33 + 6 weeks
No routine continuous monitoring if physiologically stable

Vaccinations
Can cause a recurrence of apnoea. This still seems to be true with acellular pertussis. It is much more likely with the first set of vaccinations. The following risk factors have been identified:
- Birthweight < 1.1 kg.
- Gestation at birth < 29 weeks.
- Chronic lung disease.
- More severe apnoea of prematurity initially.
- < 1.7 kg at time of vaccination

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Consider initial vaccination in hospital with 24hrs of monitoring on an Apnoea monitor. Initial vaccination can be in community – consultant decision. If initial vaccinations do not precipitate apnoea subsequent immunisations can be given in the community.

Apnoea monitors at home
Evidence indicates that apnoea is not predictive of, or a precursor to, Sudden Infant Death Syndrome (Cot Death). An apnoea monitor only needs to be supplied in the following circumstances:

- Discharge home on caffeine - via Neonatal Outreach Team
- Previous cot death of a sibling - via CONI (Care of Next Infant)
- Home oxygen therapy - via Neonatal Outreach Team

Apnoea monitors are not routinely supplied by NNU to any other babies. Parents of babies who do not fulfil the above criteria and who wish to have an apnoea monitor will have to purchase it themselves or obtain one via the CONI Plus scheme. The CONI scheme is organised by the Lullaby Trust http://www.lullabytrust.org.uk/coni our local contact can be obtained through this website.