Bronchopulmonary dysplasia

Bronchopulmonary dysplasia (BPD) also know as Chronic lung disease (CLD) is an abnormality of the growth and development of the lungs. BPD is mostly seen in preterm infants but is occasionally seen in mature infants who have required aggressive ventilation for severe acute lung disease. BPD is multifactorial in origin. The most important risk factors are prematurity and low birth weight. The condition is particularly common in severely growth retarded preemies. Many potentially avoidable factors contribute. These include

- Volutrauma
- Oxygen toxicity
- Infection (congenital and acquired)
- Poor nutrition

Infants who develop chronic lung disease are difficult to manage. Many require long term ventilation and supplemental oxygen. Some are prescribed steroids, diuretics or bronchodilators.

See BAPM Quality toolkit: Reducing the incidence of bronchopulmonary dysplasia

Ventilation of Infants with Bronchopulmonary dysplasia

Infants with Bronchopulmonary dysplasia tend to have high airway resistance combined with reasonable lung compliance. This means that their lungs take a long time to fill and empty.

- Gas exchange is most likely to be effective if low ventilator rates (< 40BPM) are combined with generous inspiration times (0.6)
- If ventilation becomes very difficult, increasing the rate may worsen gas exchange rather than improve it
- HFOV tends to be unhelpful
- Some very unstable infants benefit from a period of paralysis with low-rate ventilation (25-30BPM)
- If there is difficulty weaning these infants consider treatment of PDA and/or the use of dexamethasone
- Both of these treatments require consultant approval.

Drug Treatments in BPD

There are no drug treatments that have been proven to alter the outcome of BPD. Lung function is improved by dexamethasone, bronchodilators, and diuretics but these agents are not used routinely because of their potential side-effects and difficulty of administration. In general, decisions about drug treatments in BPD will be made by the consultant. In the acute situation the use of diuretics or bronchodilators can occasionally bring about a rapid and appreciable improvement in clinical condition and these agents may be used without consultation. Steroids usually take 12-72 hours to take effect and will not help in the acute situation.

- Dexamethasone
- Inhaled medication-Budesonide
- Furosemide,Chlorothiazide,Spironolactone (can be associated with acute kidney injury)

Dexamethasone

Dexamethasone has been shown to shorten the duration of ventilation and facilitate extubation of infants with Bronchopulmonary dysplasia. There is some evidence that used prophylactically it may reduce the incidence of Bronchopulmonary dysplasia but there are major concerns about it's effect on neurodevelopment and lung growth and it's use is associated with many side effects.

- Consider checking for ureaplasma/mycoplasma in all infants < 30 weeks gestation before extubation and on days 5 and 7 if they are still ventilated-however there is little evidence treating this affects rates of BPD.
- From day 14 onwards, infants who remain ventilator dependent and whose settings are not weaning may be considered for steroids, however it is not our usual practice to use them this early.
- Those infants on minimal ventilation should have failed extubation before steroids are prescribed
- Consider treating PDA if present before giving steroids
- Infants who are to be started on steroids should ideally be free of new concerns about infection or already on antibiotics (we will usually hope to complete courses of antibiotics before commencing steroids)

Prescribing

- Dexamethasone should only be prescribed with consultant agreement
- We have two different dosing regimens and it is up to consultant discretion which is used.
- Discussion of potential side-effects should ideally occur with the parents before starting.
- Give dexamethasone orally in infants tolerating full enteral feeding, otherwise intravenously
- Adjust doses to a sensible round number to ease preparation
- Infants not responding may have their steroids discontinued early by the consultant
- Infants not extubated after the completed course may have further courses at consultant discretion but will usually be allowed a period of growth between courses
- Infants who showed some response but who remain critically ill at the end of their course may have their ongoing regimen tailored to their individual needs by the attending consultant
- When steroids are prescribed for longer periods than 10 days, the possibility of adrenal suppression should be considered and weaning should be cautious.

Immunisations in steroid treated infants

- Live vaccines (eg. live rotavirus, BCG, MMR) should not be given for at least 3 months after stopping a course of steroid treatment.

Clinical monitoring of infants on steroids

- Daily blood pressure
- Daily blood glucose
- Twice weekly Urea and electrolytes (can include blood gas measures)
- Weekly full blood count
- Standard 3 times weekly weights