**Topic Expert Group:** Medical care and clinical practice

**Prevention of Bronchopulmonary Dysplasia (BPD)**


**Target group**

Very preterm and particularly extremely preterm infants, small for gestational age infants, and parents

**User group**

Healthcare professionals, neonatal units, hospitals, and health services

**Statement of standard**

Bronchopulmonary Dysplasia (BPD) is prevented using evidence-based strategies including avoiding mechanical ventilation, minimally invasive administration of exogenous surfactant, volume targeted ventilation and early caffeine, and administration of systemic steroids in infants still requiring ventilation during their 2nd postnatal week.

**Rationale**

Bronchopulmonary Dysplasia BPD results from the effects of non-physiologic stimuli (e.g. inflammation, ventilator induced lung injury, high supplemental oxygen levels) in an infant with underdeveloped lungs and defence mechanisms (e.g. anti-oxidant capacity). (1) Interventions that reduce inflammation (e.g. steroids) or any of these non-physiologic stimuli (e.g. mechanical ventilation) are likely to reduce BPD rates. Some of these interventions may additionally promote the survival of the target group; none decreases the chances of survival. (2)

BPD, defined as supplemental oxygen requirement at 36 weeks post-menstrual age, is a risk factor for later respiratory hospitalisation in infancy, compromised lung function in childhood, neurodevelopmental impairment, and a potential risk factor for chronic obstructive pulmonary disease in later life. (1,3)

**Benefits**

**Short-term benefits**

- Reduced risk of BPD by avoiding invasive mechanical ventilation (risk ratio (RR), 0.91; 95% Confidence Interval 0.84-0.99) (2)
- Reduced risk of BPD by use of minimally invasive surfactant administration (RR 0.75; 0.59-0.94) (4,5)
- Reduced risk of BPD by use of volume targeted ventilation (as opposed to pressure targeting) (RR 0.61; 0.46-0.82) (6)
- Reduced risk of BPD by starting caffeine on postnatal day one or two instead of later (RR 0.51; 0.40-0.64) (7,8)
- Reduced risk of BPD by administration of vitamin A intramuscularly for the first four postnatal weeks (RR 0.87; 0.77-0.98) (9)
- Reduced rate of death or BPD by administration of systemic steroids in ventilated infants (RR 0.72; 0.63-0.82) without increasing the risks of cerebral palsy (10)
Long-term benefits

- Reduced adverse neurodevelopmental outcome if BPD can be prevented (3)

Components of the standard

<table>
<thead>
<tr>
<th>Component</th>
<th>Grading of evidence</th>
<th>Indicator of meeting the standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>For parents and family</td>
<td></td>
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<tr>
<td>1. Parents are informed by healthcare professionals about Bronchopulmonary Dysplasia (BPD) and strategies to minimise its risk. (1)</td>
<td>A (High quality)</td>
<td>Patient information sheet</td>
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<tr>
<td>For healthcare professionals</td>
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<tr>
<td>2. A unit guideline on the management and prevention BPD is adhered to by all healthcare professionals, and includes the following advice:</td>
<td>A (High quality)</td>
<td>Guideline</td>
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</table>

- Surfactant is administered via a thin intra-tracheal catheter if FiO₂ is >0.30 or using INSURE (intubate surfactant extubate). (11)

- Volume targeted ventilation (at 5-7 ml/kg) is used plus adequate PEEP level, if intubation cannot be avoided. (6)

- Infants on n-CPAP are switched to synchronised nasal ventilation if respiratory distress visible while on CPAP. (12)

- Caffeine is administered from day 1-2 after birth (10 mg/kg loading, 5 mg/kg/d maintenance for caffeine base). (7,8)

- Vitamin A is considered (5000 IE i.m. three times/week for week 1-4 after birth). (9)

- If mechanical ventilation is still necessary during postnatal week 2, postnatal steroid use is considered (dexamethasone at the lowest effective dose possible. (13,14))

- Efforts to reduce rates of nosocomial infection, as a risk factor for BPD, are
made. (15)

3. Training on the management and prevention of BPD is attended by all responsible healthcare professionals. B (High quality) Training documentation

For neonatal unit

4. A unit guideline on prevention and management of BPD is available and regularly updated. B (High quality) Guideline

For hospital

5. Training on management and prevention of BPD is ensured. B (High quality) Training documentation

6. Institutional BPD rates are monitored together with length of hospital stay and use of supplemental oxygen. B (High quality) Audit report

For health service

7. A national guideline on management and prevention of BPD is available and regularly updated. B (High quality) Guideline

Where to go – further development of care

<table>
<thead>
<tr>
<th>Further development</th>
<th>Grading of evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>For parents and family</td>
<td>N/A</td>
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<tr>
<td>For healthcare professionals</td>
<td></td>
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<tr>
<td>• Investigate in larger numbers whether using synchronised nasal ventilation rather than CPAP is the preferred mode of nasal respiratory support. (6)</td>
<td>A (Moderate quality)</td>
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<tr>
<td>• Evaluate alternative anti-inflammatory strategies, e.g. hydrocortisone, inhaled budesonide, or tracheal instillation of budesonide together with exogenous surfactant to generate more data on their long-term effectiveness and safety. (10,16,17)</td>
<td>A (High quality)</td>
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<tr>
<td>• Investigate the role of eradicating Ureaplasma urealyticum shortly after birth. (18)</td>
<td>A (Moderate quality)</td>
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<tr>
<td>• Investigate oral Vitamin A administration as well as the role of other nutrients. (9,19)</td>
<td>A (High quality)</td>
</tr>
<tr>
<td>• Find the optimal drug and dose for postnatal steroid application. (9)</td>
<td>A (Moderate quality)</td>
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<tr>
<td>• Investigate the potential of mesenchymal stem cells in repairing the injured immature lung. (20,21)</td>
<td>A (High quality)</td>
</tr>
<tr>
<td>• Investigate the effect of various delivery-room practices (e.g. sustained inflations) and of early enteral feeding on the prevention of BPD. (22)</td>
<td>A (Moderate quality)</td>
</tr>
</tbody>
</table>
**For neonatal unit**
N/A

**For hospital**
N/A

**For health service**
N/A

### Getting started

#### Initial steps

**For parents and family**
- Parents are verbally informed by healthcare professionals about BPD and strategies to minimise its risk. (1)

**For healthcare professionals**
- Attend training on management and prevention of BPD.
- Apply exogenous surfactant via less/minimally invasive administration via a thin catheter, i.e. without using an endotracheal tube, or via the INSURE method (intubate, surfactant, extubate).
- Use nasal continuous positive airway pressure (n-CPAP) instead of intubation and mechanical ventilation. (22)
- Start caffeine on postnatal day 1 or 2 instead of later.

**For neonatal unit**
- Develop and implement a unit guideline on management and prevention of BPD.
- Develop information material about BPD for parents.

**For hospital**
- Support healthcare professionals to participate in training on management and prevention BPD.

**For health service**
- Develop and implement a national guideline on management and prevention of BPD.

### Source


5. Stevens TP, Harrington EW, Blennow M, Soll RF. Early surfactant administration with brief ventilation vs. selective surfactant and continued mechanical ventilation for preterm infants with or


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Lifecycle
3 years/next revision: 2021

Recommended citation