Multidisciplinary approach to the causes of chronic respiratory failure in severe bronchopulmonary dysplasia

| Disorder | Airway/Lung | Neuromuscular | Cardiac | Endocrine | Nutrition | Infection |
|----------|-------------|---------------|---------|-----------|-----------|-----------|
| Parenchymal disease | Small airway disease | Large airway disease | Upper airway disease | Hypoxic ischemic encephalopathy | Pulmonary hypertension | Hypothyroidism | Failure to thrive |
|          |             |               |         | Respiratory muscle weakness | Intra-cardiac shunt | | Feeding intolerance |
|          |             |               |         |            |           | | Gastroesophageal reflux |
|          |             |               |         |            |           | | Aspiration |
|          |             |               |         |            |           | | CLABSI |
|          |             |               |         |            |           | | CAUTI |

Primary assessment

- Ventilator: Flow-time loops, pressure-volume curve
- High-resolution chest CT (non-contrast)
- Brain MRI
- EEG
- Echocardiography
- BNP
- Thyroid function test
- Check growth and nutrition status
- Tracheal aspirate, urine, blood culture identification of bacterial colonization

Advanced assessment

- Flexible bronchoscopy
- Suspension examination
- VFSS
- UGIS

Intervention

- Optimize and individualize ventilator setting
  - Volume-guarantee ventilator mode
  - Consider alternative ventilator mode (NAVA)
  - Keep moderate to high PEEP
- Gradually wean to CPAP or T-piece
- Minimize irritability ("spell"): sedation, central-line insertion
- Inhaled b2 agonist, mucolytic, steroid
- Add intravenous or oral mucolytics
- Start bedside rehabilitation as soon as possible
- Trial of diuretics
  - According to the severity of PHT
  - add or dose-up medication
  - trial of iNO
  - sedation until PHT is controlled
- Consider thyroid hormone supplement
- Consult to nutritional support team (EN and/or PN support for catch-up growth)
- Keep nasogastric tube feeding until VFSS
- Trial of anti-reflux medication
- Trial of continuous feeding
- Consider antibiotics

Chest physiotherapy (percussion, prone position)

- Add inhaled bronchodilator (Ipratropium)
- Systemic steroid
- PEEP adjustment (for air-stenting effect)
- Consider great vessel pexy
- Systemic steroid
- Consider early tracheostomy

BNP, brain natriuretic peptide; CAUTI, catheter-associated urinary tract infections; CLABSI, Central line-associated bloodstream infections; CPAP, continuous positive airway pressure; CT, computed tomography; EEG, electroencephalography; EN, enteral nutrition; iNO, inhaled nitric oxide; MRI, magnetic resonance imaging; NAVA, neurally adjusted ventilator assist; PHT, pulmonary hypertension; PN, parenteral nutrition; UGIS, upper gastro-intestinal study; VAP, ventilator-associated pneumonia; VFSS, videofluoroscopic swallowing study