Basics of Respiratory Support in Neonates

Infants in the NICU often require **respiratory support**. Different types of **invasive** and **noninvasive** respiratory support are used depending on the severity of respiratory distress and the etiology. While using invasive respiratory support can be life-saving, it may **increase the risk for bronchopulmonary dysplasia** in preterm neonates. Hence, **noninvasive respiratory support forms should be considered when able**, following local institution policies.

Selected Examples of Conditions That May Require Respiratory Support*

Preterm Infants (< 37 weeks)	Both Preterm & Term Infants	Term Infants (≥ 37 weeks)
▪ Respiratory distress syndrome (RDS) ▪ Pulmonary hemorrhage (PH) ▪ Necrotizing enterocolitis (NEC)	▪ Persistent pulmonary hypertension of the newborn (PPHN) ▪ Pneumothorax ▪ Sepsis ▪ Pneumonia	▪ Transient tachypnea of the newborn (TTN) ▪ Meconium aspiration syndrome (MAS)

Overview of Common Modes of Respiratory Support Used in Neonates

Type of Ventilation	Type of Support★	Parameters (Common Range)	What to do if O_2 Saturation is Low◆	What to do if CO_2 Levels are High◆
Noninvasive Respiratory Support	Low-Flow Nasal Cannula (LFNC)	Flow rate (variable)	Increase flow rate	n/a
	High-Flow Nasal Cannula (HFNC)	Flow rate (1-2 L/min/kg) FiO_2	Increase flow rate Increase FiO_2	n/a
	Continuous Positive Airway Pressure (CPAP)	PEEP (5-8 cmH_2O) FiO_2	Increase PEEP Increase FiO_2	n/a
	Bilevel Positive Airway Pressure (BiPAP)◁	PIP (8-12 cmH_2O) PEEP (4-6 cmH_2O) RR (20-30/min) & FiO_2	Increase PEEP Increase FiO_2	Increase RR Increase Δ P
	Noninvasive Positive Pressure Ventilation (NIPPV)	PIP (12-19 cmH_2O) PEEP (5-9 cmH_2O) RR (20-30/min) & FiO_2	Increase PEEP Increase FiO_2	Increase RR Increase Δ P
⚠ **Before moving to invasive ventilation, intubation is required. Indications for intubation include failure to oxygenate, failure to ventilate, and apnea.**				
Selected Invasive Respiratory Support/ Ventilation	Assist-Control Pressure Control (ACPC)	PIP (12-20 cmH_2O) PEEP (5-8 cmH_2O) RR (30-60/min) & FiO_2	Increase PEEP Increase FiO_2	Increase RR Increase Δ P
	ACPC with Volume Guarantee (VG)	VG (4-6 mL/kg) PEEP (5-8 cmH_2O) RR (30-60/min) & FiO_2	Increase PEEP Increase FiO_2	Increase RR Increase volume

Notes: *Understanding pathogenesis is essential for best support
★No shading (lack of PEEP), light shading (requires device), dark shading (requires ventilator)
◆Performing opposite changes in parameters will lead to the opposite effect on O_2 saturation or CO_2 levels
◁Pressures for NIPPV (delivery by ventilator) are higher than BiPAP

Legend:
PIP = Peak Inspiratory Pressure,
PEEP = Positive End-Expiratory Pressure,
Δ P = Difference Between PIP and PEEP
FiO_2 = Fraction of inspired oxygen
RR = Respiratory rate on ventilator/device

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