Newborn Critical Care Center (NCCC) Clinical Guidelines

Guidelines for Initial Ventilation of Infants < 30 Weeks
(During the First Seven Days of Life)

I. Initial Mode and Settings
   A. AC/VC
   B. Vt: 5 mL/kg
   C. RR: 40
   D. PEEP: 6
   E. I-Time: 0.25-0.3
      a. P-max limit setting: 26
      b. Evaluate flow-time curve to determine sufficiency of Ti
         i. If Ti is too long, flow ends but desired volume will remain until expiration
         ii. If Ti is too short, flow is interrupted and desired volume not reached.

Example 1: Inspiratory time too long:

Example 2: Inspiratory time too short:

Example 3: Inspiratory time just right:

II. Increase Ventilation (PaCO2 > 50 mmHg first 72 hours, >55 after 72 hours)
   A. Important to first assess the infant’s breath sounds, chest movement, and evaluate
      pressure readings and pressure/flow/volume tracings on the ventilator. Also take into
      account recent chest radiographs.
   B. Is the infant breathing above the ventilator?
      a. If yes:
         i. If eligible for surfactant consider administering
         ii. Consider the presence of a metabolic acidosis which is causing
             respiratory compensation via tachypnea
         iii. If no acidosis then consider increasing Vt 0.5 mL/kg (max 7)
      b. If no:
         i. Consider increasing the rate to a maximum of 50
         ii. Consider increasing Vt 0.5 mL/kg (max 7)
III. **Decrease or Wean Ventilation (PaCO2 < 50 mmHg in first 72 hrs, <55 after first 72 hrs)**

A. Important to first assess the infant’s breath sounds, chest movement, and evaluate pressure readings and pressure/flow/volume tracings on the ventilator. Also take into account recent chest radiographs.

B. Is the infant tachypneic (RR > 75)?
   a. If yes:
      i. Consider the presence of a metabolic acidosis which is causing respiratory compensation via tachypnea
      ii. If no acidosis then consider extubating if meets criteria, or otherwise:
         1. Changing mode of ventilation (consider SIMV-VG or PSV-VG)
   b. If no:
      i. Consider weaning VT by 0.5 mL/kg
      ii. Minimum VT (mL/kg):
         1. <1 kg: 5
         2. ≥1 kg: 4.5

IV. **If PIP is reading > 26 or at maximum settings (PIPs of up to 28-30 may be appropriate after a team discussion) and PaCO2 > 60, consider High Frequency Jet Ventilation**

V. **Poor Oxygenation (FIO2 > 0.35)**

A. Important to first assess the infant’s breath sounds, chest movement, and evaluate pressure readings and pressure/flow/volume tracings on the ventilator. Also take into account recent chest radiographs looking specifically at expansion. Consider suctioning.

B. If eligible for surfactant administer surfactant

C. If not eligible for surfactant individually consider
   a. Increasing PEEP 1 cm H2O (max 8)
   b. Increasing iTimer 0.05 s (max 0.35)
   c. Increasing VT 0.5mL/kg (max 7)

VI. **If FiO2 < 0.35**

A. If FiO2 < 0.25 decrease PEEP by 1 if normal work of breathing to minimum of 5

B. If FiO2 0.25-0.34 then monitor

VII. **Extubation Criteria**

A. Consider extubation if ALL of the following criteria are met:
   a. Patient receiving Caffeine
   b. Hemodynamically stable
   c. MAP 8-10 cm H2O
   d. PEEP 5-6 cm H2O
   e. FiO2 < 0.35
   f. Rate ≤ 20 bpm
   g. pH ≥ 7.25
   h. pCO2 ≤ 55 mmHg
Mechanical ventilation within first 7 days of life in infants < 30 weeks GA with RDS

**Assist Control with Volume Guarantee (AC/VG)**

**Initial Settings:**
- Tidal volume ($V_t$): 5 mL/kg
- PEEP: 6 cm H$_2$O
- Inspiratory time (iTime): 0.25 s
- Respiratory rate (RR): 40 bpm

**Ventilation**

- $\text{PaCO}_2 \leq 55 \text{ mmHg}$
  - * < 50 mmHg if < 72 hrs
  - Tachypneic? (>75 bpm)
  - NO
  - Consider weaning $V_t$ by 0.5 mL/kg
    - Minimum $V_t$ (mL/kg): <1 kg
    - 5 (SIMV)
    - 4.5 (AC-VG or PSV-VG with spon I-time > 0.2)
  - YES
  - Consider extubation if ALL of the following criteria are met:
    - Patient receiving Caffeine
    - Hemodynamically stable
    - MAP 8-10 cm H$_2$O

- $\text{PaCO}_2 > 55 \text{ mmHg}$
  - * > 50 mmHg if < 72 hrs
  - Breathing above ventilator?
  - NO
  - YES
  - Increase the set rate (max 50 bpm)
  - Or
  - Consider the following:
    1) If breathing above vent; is there a metabolic acidosis?
    2) If not consider:
      1. Increase $V_t$ 0.5 mL/kg (max 7)
      2. Increase PEEP 1 cm H$_2$O (max 8)
      3. Increase iTime 0.05 s (max 0.35)

**Oxygenation**

- $\text{FiO}_2 \geq 0.35$
  - Eligible to receive surfactant?\(^1\)
  - YES
  - Consider increasing PEEP by 1 cm H$_2$O if work of breathing normal (min 5)
  - Give surfactant
  - NO
  - $\text{FiO}_2 < 0.35$
  - $\text{FiO}_2 \leq 0.25$
  - $\text{FiO}_2$ 0.25-0.34
  - Continue to monitor

**Notes:**
- Eligibility for additional surfactant within first 72 hours of life: PIPs consistently > 15 cm H$_2$O or $\text{FiO}_2 \geq 0.35$
- Goal 8-9 ribs expansion