



NIH NHLBI ARDS Clinical Network  
 Mechanical Ventilation Protocol Summary  
[www.ardsnet.org](http://www.ardsnet.org)

**INCLUSION CRITERIA: Acute onset of**

1.  $\text{PaO}_2/\text{FiO}_2 \leq 300$  (corrected for altitude)
2. Bilateral (patchy, diffuse, or homogeneous) infiltrates consistent with pulmonary edema
3. No clinical evidence of left atrial hypertension

**PART I: VENTILATOR SETUP AND ADJUSTMENT**

1. Calculate predicted body weight (PBW)  
**Males** =  $50 + 2.3 [\text{height (inches)} - 60]$   
**Females** =  $45.5 + 2.3 [\text{height (inches)} - 60]$
2. Select Assist Control Mode
3. Set initial TV to 8 ml/kg PBW
4. Reduce TV by 1 ml/kg at intervals  $\leq 2$  hours until TV = 6ml/kg PBW.
5. Set initial rate to approximate baseline VE (not > 35 bpm).
6. Adjust TV and RR to achieve pH and plateau pressure goals below.
7. Set inspiratory flow rate above patient demand (usually > 80L/min)

**OXYGENATION GOAL:  $\text{PaO}_2$  55-80 mmHg or  $\text{SpO}_2$  88-95%**

Use incremental  $\text{FiO}_2/\text{PEEP}$  combinations below to achieve goal

<b>FiO<sub>2</sub></b>	0.3	0.4	0.4	0.5	0.5	0.6	0.7	0.7
<b>PEEP</b>	5	5	8	8	10	10	10	12

<b>FiO<sub>2</sub></b>	0.7	0.8	0.9	0.9	0.9	1.0	1.0	1.0
<b>PEEP</b>	14	14	14	16	18	20	22	24

**PLATEAU PRESSURE GOAL:  $\leq 30$  cm H<sub>2</sub>O**

Check Pplat (0.5 second inspiratory pause),  $\text{SpO}_2$ , Total RR, TV and pH (if available) at least q 4h and after each change in PEEP or TV.

**If Pplat > 30 cm H<sub>2</sub>O:** decrease TV by 1 ml/kg steps (minimum = 4 ml/kg).

**If Pplat < 25 cm H<sub>2</sub>O:** TV < 6 ml/kg, increase TV by 1 ml/kg until Pplat > 25 cm H<sub>2</sub>O or TV = 6 ml/kg.

**If Pplat < 30 and breath stacking occurs:** may increase TV in 1 ml/kg increments (maximum = 8 ml/kg).

**pH GOAL: 7.30-7.45**

**Acidosis Management: (pH < 7.30)**

**If pH 7.15-7.30:** Increase RR until pH > 7.30 or  $\text{PaCO}_2 < 25$  (Maximum RR = 35).

If RR = 35 and  $\text{PaCO}_2 < 25$ , may give  $\text{NaHCO}_3$ .

**If pH < 7.15:** Increase RR to 35.

If pH remains < 7.15 and  $\text{NaHCO}_3$  considered or infused, TV may be increased in 1 ml/kg steps until pH > 7.15 (Pplat target may be exceeded).

**Alkalosis Management: (pH > 7.45)** Decrease vent rate if possible.

---

**I:E RATIO GOAL: 1:1.0 - 1:3** Adjust flow rate to achieve goal.  
If  $\text{FiO}_2 = 1.0$  and  $\text{PEEP} = 24 \text{ cm H}_2\text{O}$ , may adjust I:E to 1:1.

## PART II: WEANING

### A. Conduct a CPAP Trial daily when:

1.  $\text{FiO}_2 \leq 0.50$  and  $\text{PEEP} \leq 8$ .
2.  $\text{PEEP}$  and  $\text{FiO}_2 \leq$  values of previous day.
3. Patient has acceptable spontaneous breathing efforts. (May decrease vent rate by 50% for 5 minutes to detect effort.)
4. Systolic BP  $\geq 90$  mmHg without vasopressor support.

#### CONDUCTING THE TRIAL:

Set CPAP = 5 cm H<sub>2</sub>O,  $\text{FiO}_2 = 0.50$

**If RR  $\leq 35$  for 5 min.:** advance to Pressure Support Weaning below:

**If RR  $> 35$  in  $< 5$  min.:** may repeat trial after appropriate intervention (e.g., suctioning, analgesia, anxiolysis)  
If CPAP trial not tolerated: return to previous A/C settings

### B. PRESSURE SUPPORT (PS) WEANING PROCEDURE

1. Set  $\text{PEEP} = 5$ , and  $\text{FiO}_2 = 0.50$
2. Set initial PS based on RR during CPAP trial:
  - a. **If CPAP RR  $< 25$ :** set PS = 5 cm H<sub>2</sub>O and go to step 3d.
  - b. **If CPAP RR = 25-35:** set PS = 20 cm H<sub>2</sub>O then reduce by 5 cm H<sub>2</sub>O at  $\leq 5$  min. intervals until RR = 26-35 then go to step 3a.
  - c. **If initial PS not tolerated:** return to previous A/C settings.
3. **REDUCING PS:** (No reductions made after 1700 hours)
  - a. Reduce PS by 5 cm H<sub>2</sub>O q1-3 hr.

- b. If PS  $\geq 10$  cm H<sub>2</sub>O not tolerated, return to previous A/C settings (Reinitiate last tolerated PS level next AM and go to step 3a)
- c. If PS = 5 cm H<sub>2</sub>O not tolerated, return to PS = 10 cm H<sub>2</sub>O. If tolerated, 5 or 10 cm H<sub>2</sub>O may be used overnight with further attempts at weaning the next morning
- d. If PS = 5 cm H<sub>2</sub>O tolerated for  $\geq 2$  hours assess for ability to sustain unassisted breathing below.

### C. UNASSISTED BREATHING TRIAL:

1. Place on T-piece, trach collar, or CPAP  $\leq 5$  cm H<sub>2</sub>O
2. Assess for tolerance as below for two hours.
  - a.  $\text{SpO}_2 \geq 90$ : and/or  $\text{PaO}_2 \geq 60$  mmHg
  - b. Spontaneous TV  $\geq 4$  ml/kg PBW
  - c. RR  $\leq 35$ /min
  - d. pH  $\geq 7.3$
  - e. No respiratory distress (distress = 2 or more)
    - HR  $> 120\%$  of baseline
    - Marked accessory muscle use
    - Abdominal paradox
    - Diaphoresis
    - Marked dyspnea
3. If tolerated consider extubation.
4. If not tolerated resume PS 5 cm H<sub>2</sub>O.

**COMPLETE PROTOCOL ONLINE:** [www.ardsnet.org](http://www.ardsnet.org) or from *National Auxiliary Publications Service (NAPS)*. To order 15 pages of supplementary material, contact NAPS, c/o Microfiche Publications, 248 Hempstead Tpk., West Hempstead, NY 11552 Document # 05542