



NIH NHLBI ARDS Clinical Network
Mechanical Ventilation Protocol Summary

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 any ventilator mode
3. Set ventilator settings to achieve initial $V_T = 8 \text{ ml/kg PBW}$
4. Reduce V_T by 1 ml/kg at intervals ≤ 2 hours until $V_T = 6 \text{ ml/kg PBW}$.
5. Set initial rate to approximate baseline minute ventilation (not $> 35 \text{ bpm}$).
6. Adjust V_T and RR to achieve pH and plateau pressure goals below.

OXYGENATION GOAL: PaO_2 55-80 mmHg or SpO_2 88-95%

Use a minimum PEEP of 5 cm H_2O . Consider use of incremental FiO_2 /PEEP combinations such as shown below (not required) to achieve goal.

Lower PEEP/higher FiO_2

FiO_2	0.3	0.4	0.4	0.5	0.5	0.6	0.7	0.7
PEEP	5	5	8	8	10	10	10	12

FiO_2	0.7	0.8	0.9	0.9	0.9	1.0
PEEP	14	14	14	16	18	18-24

Higher PEEP/lower FiO_2

FiO_2	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.5
PEEP	5	8	10	12	14	14	16	16

FiO_2	0.5	0.5-0.8	0.8	0.9	1.0	1.0
PEEP	18	20	22	22	22	24

PLATEAU PRESSURE GOAL: $\leq 30 \text{ cm H}_2\text{O}$

Check Pplat (0.5 second inspiratory pause), at least q 4h and after each change in PEEP or V_T .

If Pplat $> 30 \text{ cm H}_2\text{O}$: decrease V_T by 1 ml/kg steps (minimum = 4 ml/kg).

If Pplat $< 25 \text{ cm H}_2\text{O}$ and $V_T < 6 \text{ ml/kg}$, increase V_T by 1 ml/kg until Pplat $> 25 \text{ cm H}_2\text{O}$ or $V_T = 6 \text{ ml/kg}$.

If Pplat < 30 and breath stacking or dys-synchrony occurs: may increase V_T in 1 ml/kg increments to 7 or 8 ml/kg if Pplat remains $\leq 30 \text{ cm H}_2\text{O}$.

pH GOAL: 7.30-7.45

Acidosis Management: (pH < 7.30)

If pH 7.15-7.30: Increase RR until pH > 7.30 or PaCO₂ < 25
(Maximum set RR = 35).

If pH < 7.15: Increase RR to 35.

If pH remains < 7.15, V_T may be increased in 1 ml/kg steps until pH > 7.15 (P_{plat} target of 30 may be exceeded).

May give NaHCO₃

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

I: E RATIO GOAL: Recommend that duration of inspiration be ≤ duration of expiration.

PART II: WEANING

A. Conduct a SPONTANEOUS BREATHING TRIAL daily when:

1. FiO₂ ≤ 0.40 and PEEP ≤ 8 OR FiO₂ ≤ 0.50 and PEEP ≤ 5.
2. PEEP and FiO₂ ≤ 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 ≥ 90 mmHg without vasopressor support.
5. No neuromuscular blocking agents or blockade.

B. SPONTANEOUS BREATHING TRIAL (SBT):

If all above criteria are met and subject has been in the study for at least 12 hours, initiate a trial of UP TO 120 minutes of spontaneous breathing with FiO₂ ≤ 0.5 and PEEP ≤ 5:

1. Place on T-piece, trach collar, or CPAP ≤ 5 cm H₂O with PS ≤ 5
2. Assess for tolerance as below for up to two hours.
 - a. SpO₂ ≥ 90: and/or PaO₂ ≥ 60 mmHg
 - b. Spontaneous V_T ≥ 4 ml/kg PBW
 - c. RR ≤ 35/min
 - d. pH ≥ 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 for at least 30 minutes, consider extubation.
4. If not tolerated resume pre-weaning settings.

Definition of UNASSISTED BREATHING (Different from the spontaneous breathing criteria as PS is not allowed)

1. Extubated with face mask, nasal prong oxygen, or room air, OR
2. T-tube breathing, OR
3. Tracheostomy mask breathing, OR
4. CPAP less than or equal to 5 cm H₂O **without pressure support or IMV assistance.**