

APPENDIX B: ARDSNET VENTILATOR MANAGEMENT FOR PATIENTS WITH ARDS²³

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 = $50 + 2.3$ [height (inches) - 60]
Females = $45.5 + 2.3$ [height (inches) - 60]
2. Select any ventilator mode
3. Set ventilator settings to achieve initial $V_T = 8$ ml/kg PBW
4. Reduce V_T by 1 ml/kg at intervals ≤ 2 hours until $V_T = 6$ ml/kg PBW.
5. Set initial rate to approximate baseline minute ventilation (not > 35 bpm).
6. Adjust V_T and RR to achieve pH and plateau pressure goals below.

OXYGENATION GOAL: PaO₂ 55-80 mmHg or SpO₂ 88-95%

Use a minimum PEEP of 5 cm H₂O. Consider use of incremental FiO_2/PEEP combinations such as shown below (not required) to achieve goal.

Lower PEEP/higher FiO₂

| | | | | | | | | |
|------------------------|-----|-----|-----|-----|-----|-----|-----|-----|
| FiO₂ | 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 |

| | | | | | | |
|------------------------|-----|-----|-----|-----|-----|-------|
| FiO₂ | 0,7 | 0,8 | 0,9 | 0,9 | 0,9 | 1,0 |
| PEEP | 14 | 14 | 14 | 16 | 18 | 18-24 |

Higher PEEP/lower FiO₂

| | | | | | | | | |
|------------------------|-----|-----|-----|-----|-----|-----|-----|-----|
| FiO₂ | 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 |

| | | | | | | |
|------------------------|-----|---------|-----|-----|-----|-----|
| FiO₂ | 0,5 | 0,5-0,8 | 0,8 | 0,9 | 1,0 | 1,0 |
| PEEP | 18 | 20 | 22 | 22 | 22 | 24 |

PLATEAU PRESSURE GOAL: ≤ 30 cm H₂O

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

If Pplat > 30 cm H₂O: decrease V_T by 1ml/kg steps (minimum = 4 ml/kg).

If Pplat < 25 cm H₂O and $V_T < 6$ ml/kg, increase V_T by 1 ml/kg until Pplat > 25 cm H₂O or $V_T = 6$ ml/kg.

If Pplat < 30 and breath stacking or dys-synchrony occurs: may increase V_T in 1ml/kg increments to 7 or 8 ml/kg if Pplat remains ≤ 30 cm H₂O.

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 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 (Pplat target of 30 may be exceeded).

May give NaHCO_3

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

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

PART II: WEANING**A. Conduct a SPONTANEOUS BREATHING TRIAL daily when:**

1. $\text{FiO}_2 \leq 0.40$ and $\text{PEEP} \leq 8$ OR $\text{FiO}_2 \leq 0.50$ and $\text{PEEP} \leq 5$.
2. 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 ≥ 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 $\text{FiO}_2 \leq 0.5$ and $\text{PEEP} \leq 5$:

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. $\text{SpO}_2 \geq 90$: and/or $\text{PaO}_2 \geq 60$ mmHg
 - b. Spontaneous $V_T \geq 4$ 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.**