## NIH ARDSNet Ventilator Protocol

**This protocol does not apply to mechanically ventilated patients being treated by the Lung Tranplant Service.**

A. Use patient's ideal body weight to set patient's tidal volume with formula below:

B. Ideal Body Weight (IBW):

Male = 50 + 2.3 ( ht in inches - 60 );

Female = 45.5 + 2.3 (ht in inches - 60)

Chart on website: http://www2.uch.edu/tools/Critical_Care/IBW-Vt%20table.pdf

C. The following goals are targeted: **SpO2: 88% - 95%; PaO2: 55 - 80** (PO2 takes precedence); **pH: 7.30 - 7.45**; **Plateau Pressure: less than or equal to 30cmH2O**.

D. Initial ventilator settings:

1. Mode -- volume targeted, pressure regulated volume control (PRVC)
2. Tidal volume -- Set initial tidal volume to 6 ml/kg IBW.

If airway pressure remains below the PEEP level during inspiration or the ventilator delivers frequent (greater than or equal to 3/min) double breaths because airway pressure falls below trigger threshold at the end of inspiration, increase TV 1 ml/kg up to 8 ml/kg provided plateau pressure less than or equal to 30 cmH2O.

3. Plateau Pressure Goals: less than or equal to 30 cm H20.
4. Rate --Set to patient's required minute volume (*Do not exceed 35*).
5. Inspiratory: Expiratory (I:E) Ratio --1:1--1:3
6. FIO2/PEEP -- Use combination from table below to maintain PaO2 55--80 or SpO2 88 - 95 %. If patient's PEEP/FIO2 is not compatible with scale adjust FIO2 in increments of .10 and/or PEEP in increments of 2 until on scale.

| FIO2 | .30 | .40 | .40 | .50 | .50 | .60 | .70 | .70 | .70 | .80 | .90 | .90 | .90 | 1.0 | 1.0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PEEP | 5 | 5 | 8 | 8 | 10 | 10 | 10 | 12 | 14 | 14 | 14 | 16 | 18 | 18 | 20-24 |

E. Ventilator Management

1. Every 4 hours measure and record SpO2 and plateau pressure. Use 0.5 sec pause (in patients with significant obstruction or significant tachypnea, consider using waveforms to measure Pplat).
2. Adjust ventilator according to ventilator goals: plateau pressure, pH, and oxygenation
3. Evaluate for ventilator sedation wake up between 0300 and 0600
4. Evaluate for ventilator wean daily after 0500.

F. Ventilator Goals

1. Plateau Pressure: the plateau pressure should be less than or equal to 30 cm H2O.

a. If Plateau pressure exceeds 30:

b. If no exceptions (See below), decrease TV 1 ml/kg every 2-3 hours keeping pH greater than 7.15; Adjust RR to max of 35 to keep minute volume constant and flow rate for I:E ratio of 1:1--1:3. Minimum TV is 4 ml/kg IBW. Notify MD Fellow/Attending for pH <7.25.

c. **Exceptions*:*** If any of the following conditions occur, then no decreases in TV should be made: 1. RR = 35, pH less than 7.15 & bicarb infused or considered; 2.TV = 4 ml/kg.

d. If Plateau pressure less than 30: Changes only need to be made if TV less than 6 ml/kg and plateau pressure less than 25. Increase TV 1 ml/kg IBW until TV = 6 ml/kg; Adjust RR to keep minute volume constant;

Maintain I:E 1:1 --1:3.

2. PH GOALS are 7.30–7.45

pH greater than 7.45 -- decrease RR if possible

pH = 7.30 - 7.45 -- may maintain current settings

pH = 7.15 - 7.30 -- RR to maximum of 35

Bicarbonate may be given if RR 35

pH less than 7.15 -- Increase RR to 35;If RR = 35 and bicarb infused or considered, increase TV 1 ml/kg IBW until pH greater than or equal to 7.15. Notify MD Fellow/Attending for pH <7.25.

(Plateau pressure may exceed 30)

3. Oxygenation goals:

Use table below for FI02 and PEEP settings with goals of PaO2: 55 - 80 (PaO2 takes precedence) or SpO2 88 - 95%. If patient's PEEP/FIO2 is not compatible with table and not an exception (See exceptions in next section), adjust FIO2 in increments of .10 and/or PEEP in increments of 2 until on scale.

| FIO2 | .30 | .40 | .40 | .50 | .50 | .60 | .70 | .70 | .70 | .80 | .90 | .90 | .90 | 1.0 | 1.0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PEEP | 5 | 5 | 8 | 8 | 10 | 10 | 10 | 12 | 14 | 14 | 14 | 16 | 18 | 18 | 20-24 |

4. Exceptions To Oxygenation Scale

a. Brief periods (less than or equal to 5 minutes) of SpO2 less than 88 or greater than 95 may be tolerated without making changes in PEEP or FIO2.

b. FIO2 = 1.0 may be used for brief intervals (less than or equal to 10 minutes) of transient desaturation or to prevent desaturation during treatments.

c. Plateau pressure greater than 30 AND oxygenation less than goal (PaO2 less than 55 or SpO2 less than 88) and TV = 4 ml/kg IBW (or the minimum TV necessary for pH control), do not increase PEEP. Increase FIO2 in increments of 0.1 until PaO2 greater than or equal to 55 or SpO2 greater than or equal to 88 or FIO2 = 1.0. After FIO2 = 1.0, increase PEEP in increments of 2 if necessary.

G. Higher PEEP Scale

1. For patients that remain on FIO2 > 0.60 with PEEP = 10 for > 4 hours:

a) **Contact MD** for consideration of higher PEEP or alternative methods.

b) Patients may be switched to the high PEEP arm according to the scale below **with order from MD**:

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| FIO2 | 0.3 | 0.3 | 0.4 | 0.4 | 0.5 | 0.5 | 0.6-0.8 | 0.8 | 0.9 | 1.0 |
| PEEP | 12 | 14 | 14 | 16 | 16 | 18 | 20 | 22 | 22 | 24 |

Increase PEEP in increments of 2 until on scale.

2. If FIO2 = 1.0, PEEP = 24, and oxygenation less than goal, consider other methods to improve oxygenation

a) Prone ventilation. See policy available on website prior to its implementation. Potentially inappropriate for patients with active surgical issues including: recent chest or abdominal procedure with drains/open wounds, other active abdominal issues resulting in abdominal distension.

b) iNO therapy. See policy available on website. Needs approval by

c) Oscillator use. See policy available on website.