Table 6: Protocol for Performing a Systematic PEEP Trial in a Patient with Hypoxemic Acute Respiratory Failure

1) Obtain baseline respiratory and hemodynamic data before initiating PEEP and at each level employed in trial

    a) Respiratory data (all patients): FIO_2, PEEP level, corrected tidal volume, respiratory rate (mandatory; total), peak inspiratory pressure, end-inspiratory plateau pressure, arterial blood gases (PO_2, pH, PCO_2)

    b) Additional respiratory data (in extremely ill or unstable patients, or for more aggressive management approach): mixed venous PO_2 and saturation, arterial and mixed venous O_2 contents

    c) Hemodynamic data (all patients): heart rate, blood pressure, continuous electrocardiographic monitoring

    d) Cardiac output measurement: consider if PEEP > 15 cm H_2O, or suspected hypovolemia [unexplained tachycardia], or coexistent cardiac disease

2) Change only one variable at a time (i.e. PEEP level)--keep tidal volume, FIO_2, and other ventilator settings the same at each level; avoid transfusion, position changes, changes in pressor infusions during trial if possible

3) Keep time intervals between PEEP increments short, e.g. 15-20 minutes, to minimize confounding data from changes in patient's underlying condition

4) Apply PEEP in sequential increments, e.g. 5 cm H_2O (smaller increments may prolong trial; larger increments increase likelihood of adverse effects)

5) Monitor for immediate adverse effects at each new PEEP level (e.g. after 3-5 min):

    a) Hypotension or > 20% fall in cardiac output

    b) Fall in respiratory system compliance

    c) Cardiac arrhythmias or increased intracranial pressure, where appropriate

6) Assess arterial oxygenation and other respiratory data collection as in (1) above once patient has stabilized at each new PEEP level (e.g. 15 minutes)

Table 6, continued:

7) Evaluate overall cardiorespiratory response at each PEEP level used:

   a) Favorable: improved oxygenation; improved compliance

   b) Unfavorable: hypotension; decreased cardiac output; decreased compliance; decreased oxygenation

8) Assess results in light of overall goals for PEEP therapy:

   a) If O_2 delivery has improved without adverse effects, leave patient on current PEEP level, reduce FIO_2 if possible, and reevaluate frequently as indicated

   b) If oxygenation is still inadequate or FIO_2 is still unacceptably high, and no adverse effects have occurred, increase PEEP sequentially, applying steps 4-7 above.

   c) If O_2 delivery has decreased or compliance has fallen significantly at new PEEP level, return patient to previous PEEP level and reevaluate:

      i) If deterioration is due to decreased PO_2, reassess indications for PEEP

      ii) If deterioration is due to decreased cardiac output, consider volume loading or administration of pressor drugs

      iii) If compliance has fallen but O_2 delivery has not decreased, consider reducing tidal volume to reduce risk of alveolar rupture and ventilator-induced lung injury