Acute exacerbation of chronic obstructive pulmonary disease (COPD)

Before the era of SARS, non-invasive positive pressure ventilation (NIPPV) is indicated as the first-line ventilatory strategy for hypercapnic respiratory failure in acute exacerbation of COPD.
The current policy for ventilation of patients with acute exacerbation of COPD in our ICU is "invasive" ventilation via endotracheal tube.

Suggested ventilatory strategy:

Target SpO_2: 88-95%
Initial settings:
SIMV
Tidal volume: 6 ml per kg body weight
Preset CMV rate 20/min (in Servo 900C and Servo 300); breath cycle: 3 s (Servo i)
SIMV rate 10 per min
I:E ratio: 1:4 (in Servo i)
Pause time = 0
PEEP=0
↑ Peak pressure alarm to appropriate level if the plateau pressure is not high eg 60 cm water *

Every 4 hours and after changes in ventilatory settings
Measure

- intrinsic PEEP (if patient is sedated and paralyzed) by pressing the end-expiratory breath hold button
- plateau pressure by pressing the end-inspiratory breath hold button

Aim intrinsic PEEP ≤ 10 cm water and plateau pressure ≤ 20 cm water

Intrinsic PEEP may be decreased by:

1. ↓ respiratory rate
2. ↓ tidal volume
3. ↑ I:E ratio (in Servo i)
4. ↓ cycle time (in Servo i)
5. ↑ the CMV rate in relation to SIMV rate (in Servo 900C or Servo 300)
6. Bronchodilator therapy

If plateau pressure > 20 cm water, tidal volume should be reduced if tidal volume > 4 ml per kg and pH > 7.2

If pH< 7.2, tidal volume or respiratory should be increased as appropriate

PEEP is permitted in patients taking spontaneous breath
Note: High peak airway pressure is commonly observed in ventilating patients with obstructive airway disease (especially in acute phase). The risk of barotrauma is closely related to plateau pressure NOT peak airway pressure.

Pharmacological treatment:

1. Salbutamol
   Nebulized salbutamol* 5 mg. Frequency range from continuous to intermittently according to clinical state.
   Inhaled salbutamol# (100μg per puff) via metered dose inhaler through a spacer (eg aerochamber)
   Intravenous salbutamol 100 – 300 μg loading then 5 – 20 μg/min for severe cases
2. Ipratropium bromide
   Nebulized ipratropium bromide* 0.5 mg q 4 hourly
   Inhaled ipratropium bromide# (20μg per puff) via metered dose inhaler through a spacer (eg aerochamber)
3. Hydrocortisone 100 mg IV stat and then every 6 hours
4. Augmentin 1.2 g IV q8H (if patient has increased sputum volume or purulence)
5. Appropriate sedation and paralysis (especially in acute phase) to facilitate ventilation
6. Prophylaxis against DVT (fraxiparine 0.3 ml- 0.4 ml per day SC) + pressure stockings
7. Prophylaxis against stress ulcer (raniditine 50 mg Q8H iv)

Note: * Nebulization permitted in patients if a) patient is intubated and b) SARS/atypical pneumonia is not suspected.
For spontaneous breathing patients either through endotracheal tube/T-piece or extubated patients, then use metered aerosol inhaler

Investigations:

1) Chest radiograph
    - Look for signs of pulmonary consolidation, pneumothorax or other signs of barotrauma eg pneumomediastinum, surgical emphysema
    - Pulmonary consolidation signifies the presence of pneumonia Augmentin alone may not be adequate in ICU settings – treat then as pneumonia with COPD exacerbation
    - Pneumothorax necessitates the insertion of chest drain even if the pneumothorax is small because patient is on positive pressure ventilation
    - Signs of barotrauma call for vigilance in maintaining a low plateau pressure to avoid further progression of barotrauma

2) Tracheal aspirate for bacterial culture and acid fast bacilli

3) Relevant investigations for screening of SARS

4) ECG: for arrhythmias, myocardial ischaemia and right ventricular hypertrophy