**Ventilator setup**

- The patient-ventilator interface must be a mask with no bleed holes.
- Set up the ventilator with the circuit as per the operator manual.
- Activate Leak Compensation in the setup menu.
- Breath type—Pressure Control breath type is generally preferred due to the flow response time. This includes Pressure Control or Pressure Support breath types.
- Select the desired mode (Assist/Control, SIMV or PSV/CPAP). If PSV/CPAP is used, verify the apnea settings. In general, comfort objectives and safety factors will dictate the mode used.
- Set the Inspiratory Pressure/Pressure Support level. On the AVEA® ventilator, the set pressure is ABOVE PEEP baseline. Many BiPAP devices have an inspiratory pressure setting equal to the peak inspiratory pressure.
- Set the maximum Inspiratory Time desired. On adult patients, this may be 0.75 seconds to 1.5 seconds, depending on the patient’s breathing pattern.
  
  **Note:** On Pressure Support breaths, this value is PSV TMAX, found in advanced settings within the Pressure Support control.
- Set Bias Flow to 5 L/min.
- Adjust trigger to patient comfort and ease of assisted breaths. Due to the large leaks associated with noninvasive ventilation, consider using the pressure trigger value and set flow trigger to the maximum value. Start at ~2 cmH₂O and adjust as needed.
**Adjustments during ventilation**

- To optimize patient synchrony, use the Flow Cycle control found in advanced settings within the Inspiratory Time setting in Pressure Control, or within Pressure Support. Start at a 25% setting and increase this value to synchronize with the patient’s expiratory efforts.

- Inspiratory Rise Time—Start with a rapid rise time at 1. Rise time is found in advanced settings within the Inspiratory Pressure setting in Pressure Control, or within Pressure Support. A faster rise time may better meet the inspiratory demands of the patient. Adjust this control based on clinical observation.

**Monitoring considerations**

- Patients using noninvasive ventilation may require frequent changes to meet their needs, as mask seal will vary with activity and level of respiratory distress.

- Volume measurements with large leaks may be unreliable. Adjust pressure alarms to appropriate values that will alert you when there are changes.

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*Suggested reading*

Clinical application of noninvasive ventilation

Start

Does patient meet inclusion criteria? (See last page)

Yes

Go to Start on page 2

No

Place patient on a non-rebreather mask with 100% FiO₂

Consider other treatment options, including intubation

End

Important: Guidelines are intended to serve as a reference only. They should be used in conjunction with the instructions and/or protocols set forth by the physician and institution that use noninvasive ventilation (NIV). These guidelines are not intended to override established medical protocols or policies and procedures.
Patients with acceptable limits

Start

Does patient meet inclusion criteria? (See last page)

Yes

Does patient have any exclusion criteria? (See last page)

No (Go to page 3)

Monitor patient

Initial settings:
- Use oronasal mask
- Start with CPAP 5 cmH₂O
- Titrated FIO₂ to SpO₂ ≥ 90%

Is patient’s monitored data within acceptable limits? (See last page)

Yes

Setting adjustments for deterioration in patient condition or until stabilization is reached:

CPAP
- Increase positive airway pressure by 2 cmH₂O until patient condition stabilizes or until 10 cmH₂O is reached

BiLevel
- If CPAP level of 10 cmH₂O is reached, change to BiLevel of peak inspiratory pressure of 10 cmH₂O and 5 cmH₂O of peak end-expiratory pressure
- Increase peak inspiratory pressure by 2 cmH₂O until patient condition stabilizes

FIO₂
- Increase FIO₂ to maintain SpO₂ ≥ 90% or per protocol

Adjustments to improve patient compliance:
- Coaching
- Mask fitting
- Sedating

Setting adjustments for improved patient condition:

CPAP
- Decrease peak end-expiratory pressure by 2 cmH₂O

BiLevel
- Decrease inspiratory pressure by 2 cmH₂O

FIO₂
- Decrease FIO₂ to maintain SpO₂ ≥ 90% or per protocol

Continue to monitor

Does patient meet inclusion criteria? (See last page)

Yes

Does patient have any exclusion criteria? (See last page)

No (Go to page 3)
Continue to monitor and re-evaluate if patient meets criteria for CPAP or BiLevel—Review other considerations.
Inclusion criteria

• Acute COPD or CPE
• Acute hypercapnic respiratory failure
• Clinical impression of impending intubation
• Moderate to severe dyspnea

Exclusion criteria

• Apnea
• Inability to cooperate
• Airway protection need
• Systolic B/P < 90 mmHg
• Recent facial, esophageal or gastric surgery
• Unstable angina

Monitored data

• Patient comfort
• Mask leak
• Dyspnea level
• Respiratory rate
• Heart rate and blood pressure
• \( \text{SpO}_2 \)
• Accessory muscle usage
• Patient/Ventilator asynchrony
• End-tidal capnography (if available)
• Arterial blood gas after 30–60 minutes

Signs of respiratory failure

• Hemodynamic instability
• Pneumothorax
• Gastric distension
• Vomiting
• Decreased mental status
• Respiratory rate > 35/min
• Inability to maintain \( \text{SpO}_2 \geq 90\% \)
• Inability to tolerate mask

Other considerations

• Noninvasive ventilation may be complemented with drug therapies specified per protocol such as:
  - Diuretics
  - Aerosolized bronchodilators
  - Nitroglycerin

References