

Practice Standards of Respiratory Procedures: Noninvasive Positive Pressure Ventilation

Joint statement of Hong Kong Lung Foundation, Hong Kong Thoracic Society and American College of Chest Physicians (Hong Kong & Macau Chapter)

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1) Introduction

Noninvasive positive pressure ventilation (NPPV) is being increasingly used to treat respiratory failure because of its proven effectiveness in acute and chronic respiratory failure from many causes. NPPV use is associated with reduction of endotracheal intubation and invasive mechanical ventilation, and therefore the potential complications attributable to the latter procedures.¹ Endotracheal intubation, manual ventilation before intubation, tracheotomy and non-invasive ventilation are aerosol-generating procedures that may increase the risk of nosocomial transmission of respiratory infections.² Special infection control precautions are required to reduce infection risks when NPPV is applied to patients with transmissible respiratory infections.

2) Indications

A) Acute respiratory failure

There is good evidence for the use of NPPV in the treatment of acute respiratory failure secondary to COPD, decreasing mortality, need of endotracheal intubation and length of hospital stay. In non-COPD patients, NPPV can also decrease the need for endotracheal intubation.³

Strong evidence (multiple controlled trials)

- COPD
- Acute cardiogenic pulmonary oedema
- Immunocompromised patients with diffuse lung infiltrates

Less strong evidence (single controlled trial or multiple case series)

- Pneumonia
- Asthma
- Postoperative respiratory failure
- Avoidance of extubation failure
- “Do not intubate” patients

Weak evidence (few case series or case reports)

- Upper airway obstruction
- Acute respiratory distress syndrome
- Trauma
- Obstructive sleep apnoea, obesity hypoventilation

B) Chronic respiratory failure

NPPV is also indicated as a long-term ventilatory support for patients suffering from chronic respiratory failure secondary to restrictive lung disease due to neuromuscular or chest wall disease, sleep-related breathing disorders and COPD.⁴

3) Contraindications

NPPV is contraindicated in the following conditions:

- Cardiorespiratory arrest/patients unable to sustain spontaneous breathing
- Cardiorespiratory instability (e.g. hypotension with impaired perfusion, serious dysrhythmia)
- Incooperative patients
- Recent facial, oesophageal, or gastric surgery
- Craniofacial trauma or burns
- High aspiration risk (inability to manage secretion)
- Inability to protect airway
- Fixed anatomic abnormalities of the nasopharynx (e.g. choanal atresia, severe laryngomalacia)
- CSF rhinorrhoea

4) Infection control considerations

A) No potentially infectious disease

Environmental requirement

- Adequate room ventilation with at least 6 air changes per hour (6 ACH).
- Use of a local exhaust suction device if a room with 6 ACH is not available.⁵

Personal protective equipment

- Surgical mask
- Surgical gloves, hand hygiene

B) Transmissible respiratory infections

- Airborne precaution required: An isolation room with at least 12 ACH, achieved by negative pressure ventilation, with air exhausted directly to the outside or recirculated through HEPA filtration before return.⁶⁻⁸
- If an isolation room is temporarily not possible, then a well-ventilated single room with en-suite facilities should be used. Room doors should be kept closed. Positive-pressure, single rooms should **not** be used.⁶ A local exhaust suction device may be used if a room with 6 ACH is not available.⁵
- If no separate room available, cohort patients with the same laboratory-confirmed aetiological diagnosis.⁹
- Do not use any oro-nasal mask that requires connection to the whisper-swivel device as this may facilitate room contamination by exhaled air.¹⁰
- Minimize leaks and avoid excessive inspiratory pressure.^{10,11}
- Avoid heated humidification.¹²
- If available, consider use of double circuit tubes (or special filters for non-rebreathing devices) and use of full face masks or helmets with tight neck air seal in the ICU/HDU setting.¹²

Personal protective equipment

- Airborne precautions with N-95 mask, hand hygiene, protective eyewear, full-face shield, cap, gown and surgical gloves.^{6-8,12}

Cleaning and disinfection

- Discard all masks, circuits, filters and headsets immediately and safely after use according to routine infection control procedures.
- The routine exterior cleaning of NPPV device and replacement of external filters should be sufficient to stop the spread of infection.¹²
- Disposable tubings should be utilized for single patient application.
- Used masks should be soaked in 1000 ppm pre-sept for at least 30 minutes

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Disclaimer

The information and opinions expressed in these guidelines are provided to the best of our knowledge and understanding at the time of updating (First draft January 2004. Updated Feb 2005 & Feb 2014), and must be cross-referred to the most updated literature upon application.

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