Evidence-based Humidification

Patient Indications

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There are no contraindications to heating and humidifying inspired gases to physiological conditions or using a heated humidifier to achieve this. There are instances where heat and moisture exchangers (HMEs) are contraindicated and contexts where significant concerns over their use have been expressed in the literature, precluding recommendations for their general use.[1]

These contraindications to HME use can be classified into two main categories of concerns:

Sub-optimal humidity

- Passive devices result in a net loss of moisture from the respiratory tract, which increases the risk of mucosal dysfunction and airway occlusion.
- Any situation that reduces the delivery of expired gas to the device or reduces the heat and humidity in expired gas further impacts performance.

Sub-optimal ventilation

- The position of a passive device in the circuit increases dead space, resistance to flow and work of breathing (WOB).
  - Without compensation, this means reduced alveolar ventilation and increased $PaCO_2$.
- Any condition which increases the risk of fluids contacting the HME risks occlusion and further elevation of both resistance to flow and WOB.

Using a heated humidifier assists natural defenses in the airway, promotes efficient gas exchange and ventilation, supports lung-protective strategies and can improve comfort with noninvasive respiratory support.

Absolute contraindications to HME use

- Secretions that are thick, copious, bloody or tenacious[1–7]
- Bronchopleural fistula[1,4,7,8]
- Large mask leak[1,9]
- Incompetent or absent endotracheal tube cuff[1,4,7,10,11]
- Expired tidal volume (Vt) < 70% of delivered Vt[1]
- Neonates and infants[12]
- Hypothermia (body temperature < 32 °C)[1,3,5–8]
- Nebulized medications, including during aerosol treatments[1,3,5]
- High minute volume (> 10 L/min)[1,8,15]

Relative contraindications* to HME use

- Noninvasive ventilation[1,7,9,13]
- Low tidal volumes, including lung-protective ventilation[1,6,7,14]
- Acute respiratory distress syndrome (ARDS)[6,8,9,11,16,17]
- Hypercapnia management[6,13]
- Long-term ventilation[2,5,8,9]
- Airway burns[6,8,18]
- Dehydration
- Acute respiratory failure[1,9,13,19,20]
- Chronic respiratory failure[21]
- Asthma[18]
- Atelectasis[8]
- Chronic obstructive pulmonary disease (COPD)[6,8]
- Difficult to wean patients[7,8,21]
- Airway hemorrhage or trauma[8,18]
- Pulmonary edema[3,7]
- Immunocompromise[8]

* Relative contraindications refer to those contexts in which concerns about the use of HMEs have been expressed throughout the clinical literature.

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