



Critical Care Therapy and Respiratory Care Section

Category:	Clinical
Section:	Ventilator Management
Title:	Humidification During Mechanical Ventilation
Policy #:	04
Revised:	11/00

1.0 DESCRIPTION

1.1 Definition: Humidification during mechanical ventilation is necessary to prevent inspissation of airway secretions, hypothermia, and atelectasis. This can be accomplished using either a heat and moisture exchanger (HME) or a heated humidifier. A humidification device should provide a minimum of 30 mg H₂O/L of delivered gas at $33 \pm 2^{\circ}\text{C}$. HME's are passive humidification systems that retain heat and moisture from the patient's exhaled gas via a hygroscopic filter. Heated humidifiers (or active humidification systems) operate actively to increase the heat and water vapor content of the inspired gas.

1.2 Indications: Humidification is mandatory for all patients requiring mechanical ventilation via an artificial airway.

1.2.1 HME's may **ONLY** be used in the Surgical Intensive Care Unit on post-operative admissions for the "first 24 hours" of mechanical ventilation. An active humidification system **must** be initiated if the patient requires mechanical ventilation > 24 hours or develops contraindications for use of a HME.

1.2.2 An active humidifier is to be used on **all** patients in the Medical Intensive Care Unit.

1.2.3 HME's may be used during transport if necessary.

1.3 Contraindications

1.3.1 There are no contraindications to providing humidification of inspired gas during mechanical ventilation.

1.3.2 A HME is contraindicated for patients with the following conditions:

1.3.2.1 Thick, copious, or bloody secretions

- 1.3.2.2 An expired tidal volume less than 70% of the delivered tidal volume (i.e., those with large bronchopleurocutaneous endotracheal tube leaks.)
- 1.3.2.3 Body temperatures less than 32°C.
- 1.3.2.4 High spontaneous minute volumes (> 10 L/min.)

NOTE: The HME must be removed when delivering medication via nebulizer or metered dose inhaler in-line with the patient circuit.

1.4 Potential Complications

- 1.4.1 Hypothermia
- 1.4.2 Hyperthermia - heated humidifier only
- 1.4.3 Underhydration and mucous plugging
- 1.4.4 Hypoventilation due to increased deadspace - HME
- 1.4.5 Thermal injury to airway - heated humidifier only

1.5 Precautions

- 1.5.1 The humidification device should be visually inspected with every patient ventilator system check and condensate removed from patient circuit as necessary.
- 1.5.2 HMEs should be inspected with each patient ventilator system check and replaced if secretions have contaminated the filter.
- 1.5.3 The inspiratory gas temperature should not exceed 37°C at the airway threshold.
- 1.5.4 Condensate in the patient circuit is considered infectious waste and should not be drained back into the humidifier reservoir.
- 1.5.5 Any device which fails to perform according to the manufacturer's specifications should not be used for patient care. Refer all equipment failures and malfunctions to appropriate service personnel.

1.6 Adverse Reactions and Interventions

- 1.6.1 An active humidifier should replace a HME if secretions become copious or appear increasingly tenacious.

- 1.6.2 If a malfunction of the device is suspected, remove the device from the patient and ensure appropriate oxygenation and ventilation. Do not reinstitute mechanical ventilation with the device until troubleshooting maneuvers validate proper function.
- 1.6.3 Device-specific interventions may exist. Refer to the operator's manual and/or procedure.

2.0 REFERENCES

- 2.1 AARC Clinical Practice Guideline "Humidification During Mechanical Ventilation."
- 2.2 AARC Clinical Practice Guideline "Ventilator Circuit Changes."
- 2.3 AARC Clinical Practice Guideline "Transport of the Mechanically Ventilated Patient."
- 2.4 CCTRCS "Equipment Change Policy."
- 2.5 CCTRCS "Standard of Practice: Care of the Mechanically Ventilated Patient"

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