

Executive Summary

Long-term Care of Residents with a Tracheostomy

September 2015

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Introduction

An increasing number of ventilator dependent patients are discharged from hospitals to transitional care facilities. It is within the transitional care environment where tracheostomy and ventilation education, support and management are continued in efforts to return the patient to their home environment. The transitional care facilities have become a vital role within the healthcare system as the economic pressure on acute-care-medical facilities (especially those that are ACO affiliated) are held more accountable for infection and readmission rates. These economic pressures, which often result in shorter hospital lengths of stay, create the need for the facility receiving the post-acute care phase of the tracheostomy patient to provide effective, efficient protocols and solutions that support weaning, secretion management and infection control. The Transitional Care Facilities that become known for their positive patient outcomes, such as, reduced hospital readmissions, higher percentage of patient returns back into the community, will surpass their competition and become the market leaders within the communities they serve.

Long-term Care of the Patient with a Tracheostomy

The underlying medical conditions contributing to long-term tracheostomy patients are diverse and at times complicated. These patients require improved and consistent airway management which must include higher levels of heated humidification. Regardless of the underlying condition, patients requiring long-term tracheostomy care face a series of common obstacles and share a set of common needs: weaning, secretion management and infection control.

Humidification

The upper airway serves as an anatomical heat-moisture exchanger for our bodies. It does this by filtering, warming, humidifying inspired air and retaining some warmth and moisture during exhalation.

Bypassing the upper airway produces a detrimental humidity deficit in the airways which creates a drying and cooling effect which is exacerbated by the presence of a tracheostomy tube. The normal process of reabsorption of heat and moisture by the upper airway during expiration is lost. The trachea is an inefficient humidifier when compared to the nose¹ and breathing through a stoma results in 500 mL of extra water loss daily². In comparison to the nose, the surface area of the trachea is smaller, air-flow is less turbulent and the tracheal mucosa does not contain effective blood flow, making it more vulnerable to cooling³. In the intensive care unit, heated humidification of the bypassed airway is a standard of care⁴.

The use of supplemental heated humidity systems in conjunction with long-term-tracheostomy patients varies greatly and is often based more on local practice than on objective scientific evidence.

There are three (3) primary methods used to add heat and humidity to inspired air.

1. Heated humidification – according to the American Thoracic Society, this is the most efficient method⁵.
2. Large-volume nebulizer - driven by large, loud 50 psi compressors (ineffective at delivering optimal humidification). LVN produces aerosol particles that can transmit bacteria, fungi and pathogens and increase the risk of infection⁶. Bacteria and virus particles range in size from .3 to 10 microns and 0.02-.3 microns respectively. With the typical size of a nebulized water droplet at 1-10 microns there can be an increased risk of transmitting bacteria or virus particles using the LVN. Whereas the typical size of water vapor is 0.0001 microns, it is near impossible for the water vapor to transmit bacteria or viruses. LVN is not effective, and when used in double occupancy patient rooms, it is a burden for the roommate and their visitors.

HIGH FLOW HUMIDIFICATION BENEFITS



- Increases airway defense
- Reduces risk of respiratory infection
- Optimizes secretion management
- Decreases secretion volume, suction frequency and trach tube changes
- Decreases/delays readmissions
- Improves patient quality of life and care
- Creates Market differentiation

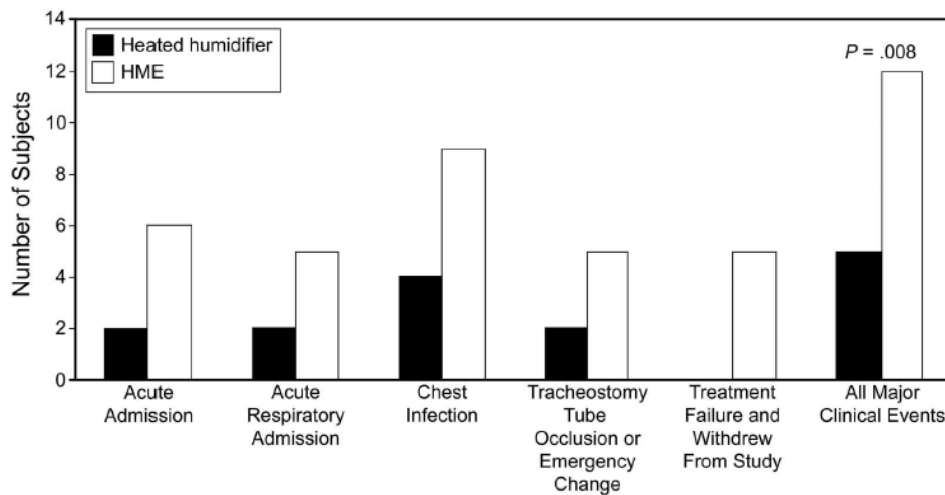


Fig. 2. Numbers of subjects with major clinical events during overnight treatment with heated humidifier or heat and moisture exchanger (HME).

3. Disposable heat-moisture exchangers (HME) – this system, although convenient, results in inadequate humidification leading to an increase in secretions and work of breathing. As the graph shows there is an increase in adverse clinical events when using an HME.⁷ (Fig. 2)

A prospective randomized controlled study in intensive-care patients reported 6 episodes of tracheostomy tube occlusions in 31 patients using HME while no patients receiving humidification via a heated humidifier with a heated wire circuit experienced this complication ($p < 0.01$).⁸

The goal of supplemental heated humidity in long term tracheostomy patients is to target the normal physiology, which includes a temperature at the carina of approximately 34°–37°C and approximately 100% relative humidity. By delivering optimal humidity, drying of the airway is reduced, function of the mucociliary transport system is maintained allowing effective secretion clearance and reduced risk of complications such as respiratory infection.²

However, the reality and challenges of care, including insurance coverage guidelines, environmental obstacles, technology obstacles, and cost constraints, may prevent some patients from achieving such ideal clinical goals. Ensuring airway patency, effective secretion management, and patient comfort are additional clinical goals and practical end points.

Optimal humidification for effective secretion management is often very difficult to achieve due to the current treatment plans. Lack of adequate humidification and prolonged exposure to dry ventilatory gases can lead to a myriad of complications. The sequelae associated with poor humidification are listed and referenced in Table 1.

Table 1. Complications Associated with Poor Humidification in Chronic Tracheostomy^{2, 5, 8-15}

- Thick, tenacious, crusted secretions
- Excessive sputum production
- Tracheostomy tube occlusion
- Frequent stoma cleaning
- Local infection (due to damaged mucosal barriers)*
- Pulmonary infection (due to impaired mucociliary clearance)*
- Frequent forced expectoration, coughing*
- Disrupted social contact*
- Poor voice quality*

Suctioning

Assuring a patent airway and effective management are vital components of long-term tracheostomy care. The AARC clinical practice guideline “Suctioning of the Patient in the Home”¹³ is a relatively complete document that provides guidance that includes patient preparation, the actual suctioning event, and post-suction care⁵. Suctioning is a frequent and vital part to maintaining a patent and clear airway; if there is an increase in secretions or thickness of secretions it will lead to an increase in the work of breathing and a

more traumatic suctioning event. The complications resulting from frequent suctioning are noted with an (*) in Table 1. It is important to maintain optimal levels of heated humidification, by doing this there will be less suctioning and less trauma to the airway. By utilizing high flow humidification it can deliver optimal levels of humidification and reduce the complications associated with poor humidification in the chronic tracheostomy patient. Data from reports for both children and adults shows that providing optimal humidification (gas conditioned to 37° C and 100% RH) to patients with chronic tracheostomies results in a reduction in secretion volume, suctioning frequency and tracheostomy tube changes, thereby improving atelectasis and quality of life.^{1, 14}

It is not uncommon in transitional care that respiratory services are not provided 24/7 and patient care is supplemented by the nursing staff. Effective and efficient secretion management maintains pulmonary hygiene and promotes natural secretion clearance for the patient, and as noted in the literature, reducing suctioning frequency will minimize the amount of nursing intervention. If suctioning is required it typically requires less time and is far more comfortable for the patient.

Summary

In an era promoting cost controlled healthcare, the objective science governing the procedures and outcomes associated with long-term management of patients with tracheostomies need to be considered more closely. With the combined goal of returning the patient to the home environment and enhanced patient care, long term care facilities may benefit from considering updating current care plans by adding High Flow Humidification to the treatment plan for their tracheostomy patients. The adoption of High Flow Humidification has been known to create market demand for beds within facilities that employ the technology due to the lower infection and reduced readmission rates of their patients.

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