

SUCTIONING PRIOR TO THE INHALED BRONCHODILATOR THERAPY AMONG MECHANICALLY VENTILATED PATIENTS: A FORGOTTEN CRITICAL CARE NURSES' KNOWLEDGE?

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Inhaled bronchodilator therapy is a common practice for critically ill intubated patients who supported via mechanical ventilation in intensive care units (ICU).^[1] An item of high significance for the scientific community is whether the prescribed dose of the inhaled bronchodilators has been fully administered to patients due to problems regarding the effective delivery of these drugs in mechanically ventilated patients.^[2] It is believed that nebulized drug therapy may be less effective in mechanically ventilated patients compared with those spontaneously breathing.^[3]

From the literature review, several factors seem to affect the satisfactory or not delivery and topical absorption of inhaled bronchodilators among mechanically ventilated patients, that could be classified into the following four categories: a) ventilator-related, b) circuit-related, c) device-related factors, and b) patient-related factors.^[2,3] Parameters such as the mode of ventilation, the tidal volume, the inspiratory time and duty cycle, the flow, the bias flow and the inspiratory waveform could be characterized as factors of the first above mentioned group. Likewise, the size and the diameter of the endotracheal or tracheostomy tube, the use of heated/humidified ventilator circuits, the density of inhaled gas are circuit-related parameters that affect how proportion of the nominal dose of the inhaled medication will reach the patient's lung. Additionally, the type of the used aerosol device, its position in circuit and the intermittent or continuous character of nebulization are also significant device-related factors that affect the effectiveness of the given inhaled bronchodilator therapy.^[2] Lastly, the severe lung disease of the critically ill patients and the presence of an artificial tube that prevents the effective coughing and secretion removal are among the patients-related factors that can moderate the optimal delivery of bronchodilators.^[3,4]

Although the factors that could negatively affect the inhaled bronchodilators delivery have adequately examined and identified giving the framework for the development of protocols and guidance for the proper use of the existing equipment and medications, in parallel, it is observed a paucity of literature on patient-related factors that affect the effective delivery of the inhaled bronchodilators to the tracheobronchial tree. More specifically, the presence of a significant amount of pulmonary secretions in conjunction with their inadequate clearance are paramount for the suboptimal delivery and ineffective absorption of the prescribed inhaled bronchodilators^[1] and the only method in order to eliminate and remove the existing lung secretions from the intubated patients is to perform an endotracheal suctioning, the most common intervention for the clearance of secretions, the maintenance of the patency of the artificial airway and the improvement of gas exchange and patient oxygenation.^[5,6]

Therefore, and given that the problematic clearance of the tracheobronchial tree prevents the optimal pharmacokinetics of inhaled bronchodilators, a significant intervention that could contribute to the better delivery, absorption, distribution and localization of these medicines is to apply endotracheal suctioning prior to medicine administration. Although, this time

association between the administration of the inhaled bronchodilators and the endotracheal suction is of high significance, it seems to be forgotten by both the clinicians and the scientific community. On the one hand and based on our clinical experience, we can confirm this lack of knowledge among the critical care clinicians, including intensive care physicians, nurses and physiotherapists, that negatively affect the evidence-based clinical practice and on the other hand the currently available published research does not emphasize enough the importance of endotracheal secretions' and mucus plugs' suctioning prior to inhaled bronchodilator therapy.

CONCLUSION

All things considered, the above-mentioned literature lack was the trigger for the present perspective, aiming to underline the significance of performing tracheal suctioning prior to inhaled bronchodilator therapy. Needless to say, endotracheal suctioning takes place only when this intervention is clinically indicated and not routinely.^[5,7] This timing association between the endotracheal suctioning and the administration of inhaled bronchodilators in intubated ICU patients contribute to the optimal pharmacokinetic outcome of the given medications. This piece of knowledge is of utmost importance for critical care nurses in order to plan and apply their nursing care plans on mechanically ventilated patients, who received inhaled medications due to their disturbed respiratory function and arterial gases exchange.

REFERENCES

1. Dhand R. How Should Aerosols Be Delivered During Invasive Mechanical Ventilation? *Respir Care*, 2017; 62(10): 1343-67.
2. Ari A, Fink JB. Factors affecting bronchodilator delivery in mechanically ventilated adults. *Nurs Crit Care*, 2010; 15(4): 192-203.
3. O' Doherty MJ, Thomas SHL. Nebulizer therapy in the intensive care unit. *Thorax*, 1997; 52(2): S56-S59.
4. Giakoumidakis K, Kostaki Z, Patelarou E, Baltopoulos G, Brokalaki H. Oxygen saturation and secretion weight after endotracheal suctioning. *Br J Nurs*, 2011; 20(21): 1344-51.
5. American Association for Respiratory Care. AARC Clinical Practice Guidelines. Endotracheal suctioning of mechanically ventilated patients with artificial airways 2010. *Respir Care*, 2010; 55(6): 758-64.
6. Negro A, Ranzani R, Villa M, Manara D. Survey of Italian intensive care unit nurses' knowledge about endotracheal suctioning guidelines. *Intensive Crit Care Nurs*, 2014; 30(6): 339-45.
7. Sole ML, Bennett M, Ashworth S. Clinical Indicators for Endotracheal Suctioning in Adult Patients Receiving Mechanical Ventilation. *Clinical Indicators for Endotracheal Suctioning in Adult*

Patients Receiving Mechanical Ventilation. *Am J Crit Care*, 2015; 24(4): 318-24.