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Comparative analysis of the effects of bronchial hygiene maneuvers on respiratory mechanics of adult patients under invasive mechanical ventilation: a randomized clinical trial

Samantha de Freitas Campos¹, Renata do Prado Brazão Marinho², Rodrigo Moreira Campos², Carolina Fu¹

¹ Universidade de São Paulo, São Paulo, SP, Brazil.

² Secretaria de Estado da Saúde de Rondônia, Porto Velho, RO, Brazil.

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Corresponding author

samfreitascampos@hotmail.com

Introduction In bedridden patients, the integrity of the respiratory system may be compromised, leading to increased secretions and airway obstruction, which can cause atelectasis, impaired ventilation, and prolonged hospital stay. Bronchial hygiene maneuvers are used to optimize secretion removal; however, their repercussion are not fully understood.⁽¹⁾ Including the behavior of static compliance of the respiratory system, peak airway pressure and airway resistance.⁽²⁾

Objective: Analyze the effects of flow and oscillatory secretion removal maneuvers followed by airway suctioning compared to isolated airway suctioning on respiratory mechanics of mechanically ventilated adults. **Methods:** A blind, randomized clinical trial was conducted with 50 participants. Inclusion criteria were: patients ≥ 18 years old with diagnosis of pneumonia, under controlled invasive mechanical ventilation. We excluded patients with hemodynamic

or neurologic instability, with contraindication to the bronchial hygiene maneuvers and with patient-ventilator asynchrony. The participants were allocated into five groups, and for statistical analysis, they were regrouped into three macro-groups (oscillatory maneuvers, flow maneuvers, and Control Group) (Table 1). Intervention was performed once, by the same physiotherapist, who was experienced in intensive care units. The primary outcomes were respiratory system compliance, airway resistance, and peak airway pressure, and the secondary outcomes included heart rate, blood pressure, and peripheral oxygen saturation. All the variables were measured before, immediately after, and 1 h after the intervention. **Results:** There were no significant differences in the primary or secondary outcomes among the flow maneuver, oscillatory maneuver, and control groups in any evaluation time point. Neither flow maneuvers nor oscillatory maneuvers were superior to isolated aspiration for improving ventilatory mechanics. Nevertheless, our results demonstrate that these maneuvers are hemodynamically safe, because interruption of these maneuvers due to hemodynamic changes was not observed in in any of the participants and there was no effect on the secondary outcomes. **Conclusions:** The bronchial hygiene maneuvers followed by airway suctioning have similar effects compared to isolated airway suctioning on respiratory mechanics and do not pose risks to patient hemodynamics. This clinical trial is registered in the Brazilian Clinical Trials Registry under the identifier RBR-3qyt32y.

REFERENCES

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Table 1. Within-group comparison of primary outcome variables at the three assessment time points

	Oscillatory	Flow	Control
Static compliance (ml/cmH ₂ O), mean (SD)			
Before intervention	31.8±13.3	53.4±29.7	41.3±21.6
Immediately after intervention	30.7±15.0	49.7±23.8	36.5±15.8
1 hour after intervention	32.1±15.5	61.1±42.7	36.5±17.6
p-value	0.76	0.24	0.54
Peak pressure (cmH ₂ O)			
T0	28.5±8.1	22.3±5.1	26.8±13.8
T1	28.1±7.5	22.9±6.0	23.9±7.7
T2	27.8±8.5	21.1±5.9	25.5±11.0
p-value	0.75	0.11	0.27
Airway resistance cmH ₂ O/l/seg			
T0	14.2±7.8	14.4±7.2	16.4±11.5
T1	11.9±4.1	14.4±8.7	11.0±5.2
T2	12.5±4.9	12.8±7.7	13.5±3.5
p-value	0.15	0.11	0.20

T0: before; T1: immediately after the procedure; T2: 1 h after the procedure; SD: standard deviation.