

POSTER PRESENTATION

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Efficiency of quality of triggering system and pressurization of home care ventilators. a bench

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From ESICM LIVES 2015

Berlin, Germany. 3-7 October 2015

Introduction

Turbine home care ventilators can be used in the hospital to manage patients with hypercapnic acute respiratory failure. The goal of this study was to assess efficiency of quality of triggering system and pressurization of these ventilators.

Methods

Astral 150, Elisée 150, Trilogy 200, Monnal T50 (double limb circuit) and Evita XL were set in pressure support (PS) 15 cm H₂O with positive end expiratory pressure (PEEP) 5 cmH₂O. In each ventilator the specific leak compensation system was activated. Each ventilator was used with its optimal inspiratory triggering system facing leaks. Inspiratory trigger was set at maximum sensitivity avoiding autotriggering. The ventilators were connected to ASL 5000 lung model set in a condition mimicking COPD patient (compliance 75 ml/cmH₂O, inspiratory and expiratory airways resistance 15 and 25 cmH₂O/L/s, respectively). We compared low, moderate and strong inspiratory efforts (-3, -6 and -12 cm H₂O muscular pressure, respectively) with and without calibrated non intentional leak (NIL 20 L/min at 15 cm H₂O). Pressure time product (PTP) of the triggering system (PTP_{trig}) was measured over 10 breaths as the area subtended by the pressure over the time spent between onset of inspiratory effort and start of pressurization (time unsupported). PTP₅₀₀ was measured between onset of inspiratory effort and 500 ms after. When time unsupported was greater than 500 ms (delayed effort) PTP₅₀₀ was set to 0. Measured PTP₅₀₀ was compared to ideal PTP₅₀₀, which is equal to PS level achieved at the end of inspiration x 500 ms (PTP%_{ideal}).

Values were expressed as mean ± SD. Comparisons were made by using one-factor ANOVA and multiple

comparisons between ventilators by using Tukey test. Significant statistical threshold was set to $P < 0.001$ to take into account the number of statistical tests performed.

Results

For PTP_{trig} with NIL, there were marked differences across ventilators for low and moderate efforts that were no longer present for strong effort (Figure). Without NIL, the results were in the same direction. Significant differences were observed between ventilators for PTP₅₀₀ at each effort with or without NIL. The same was true for PTP₅₀₀%_{ideal}. As an example, for strong effort without NIL, PTP₅₀₀%_{ideal} averaged $70 \pm 1\%$ for Astral, $70 \pm 2\%$ for Elisée, $55 \pm 1\%$ for Evita XL, $50 \pm 1\%$ for Monnal T50 and $34 \pm 4\%$ for Trilogy ($P < 0.001$ between ventilators). With NIL, these values were 73 ± 12 , 32 ± 40 , 66 ± 29 , 58 ± 26 and 35 ± 21 ($P < 0.001$ between ventilators), respectively.

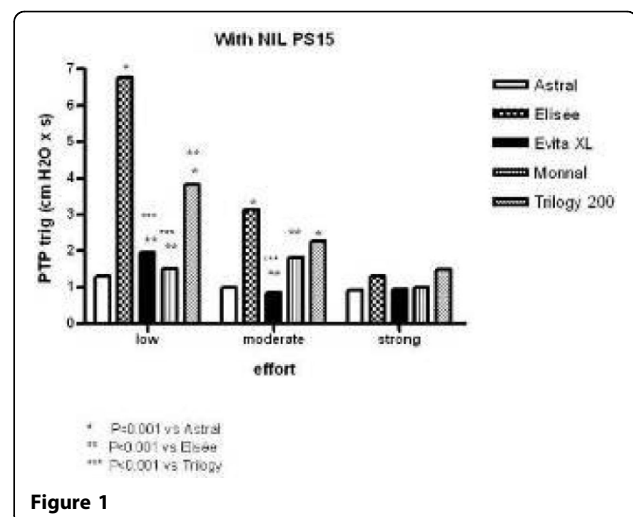


Figure 1

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Conclusions

There were marked differences in PTP_{trig} between ventilators that were also dependent on intensity of effort. The overall quality of PS mode as assessed in present study, was significantly different across the ventilators tested, with the Astral ventilator exhibiting best performance.

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Published: 1 October 2015

doi:10.1186/2197-425X-3-S1-A272

Cite this article as: Baboi *et al.*: Efficiency of quality of triggering system and pressurization of home care ventilators. a bench. *Intensive Care Medicine Experimental* 2015 **3**(Suppl 1):A272.

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