Evaluation of the performances of new generation of heated wire humidifiers (FP950 Fisher&Paykel, VHB20 Vincent Medical)

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INTRODUCTION

Heated wire humidifiers performances are influenced by ambient air temperature. When ambient temperature is high, the humidification performances are significantly reduced, well below 30 mgH_2O/L of absolute humidity with risk of endo-tracheal tube occlusion[1]. These performances are partially improved with specific settings (increased chamber temperature to 40°C or activation of the compensation algorithm)[1]. The aim of the study was to evaluate new generation heated wire humidifiers (FP950 and VHB 20) that add parameters in their algorithm with the objective to maintain a stable humidity delivered to the intubated patients whatever ambient temperature.

OBJECTIVES

To evaluate hygrometric performances of new generation heated wire heated humidifiers for invasive ventilaion.

METHODS

We measured on bench the hygrometry of inspiratory gases delivered by (i) FP950 (Fisher&Paykel Healthcare, Auckland, New Zealand) (ii) VHB20 (Vincent medical, Hong Kong) with recommended settings (36°C at the chamber/39 at the Y-piece) and set at 37/40 (iii) MR850 (Fisher&Paykel Healthcare) with usual settings (37 at the chamber/40 at the Y-piece) (iv) MR850 with no temperature gradient (40/40), and (v) MR850 with compensation algorithm activated.

Hygrometry was measured with the psychrometric method[1] after at least one hour of stability while varying the room temperature from 20 to 30°C, with constant minute ventilation (10 l/min; VT400 x RR25).

RESULTS

We present preliminary data based on 292 hygrometric measurements performed at steady state for the different tested conditions. The main results are shown in the figures 1 and 2. With the new heated wire heated humidifiers (FP950 and VHB20), the mean humidity delivered remained stable above 30 mgH_2O/L of delivered absolute humidity even with ambient temperatures above 25°C. With previous generation of HH (MR850), at high ambient temperature, humidity delivered was adequate when no temperature gradient was set but with high risk of circuit condensation in this situation, in the case of variable ambient temperatures.

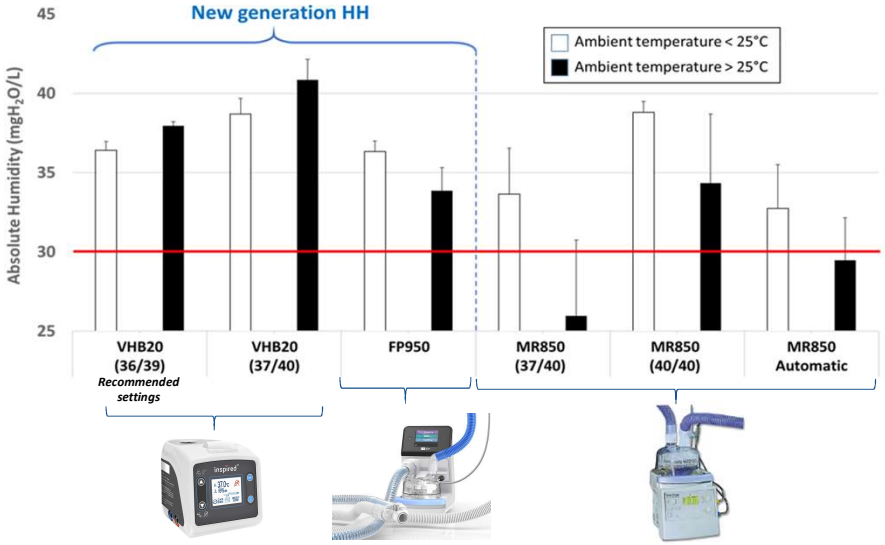

Figure 1: Absolute Humidity at different ambient temperatures (above and below 25°C) delivered by new generation heated humidifiers (VHB20 and FP950) and previous generation (MR850 at different settings: 37/40, 40/40 and with compensation activated).
The minimum recommended absolute humidity (30 mgH_2O/L) is represented by a red line.

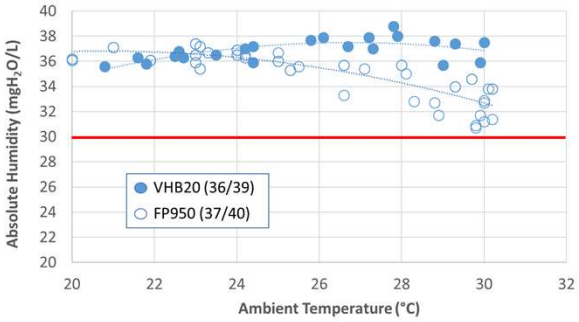

Figure 2: Absolute Humidity at different ambient temperatures (from 20 to 30°C) delivered by new generation heated humidifiers (VHB20 and FP950).

CONCLUSIONS

The new heated wire heated humidifiers FP950 and VHB20 demonstrated stable performances while varying ambient temperature from 20 to 30°C, better than did previous generation of heated humidifiers when ambient temperatures were high.

Bench evaluation showed good performances in terms of humidification but clinical evaluations are required to evaluate the practical utilization and potential issues related to the circuits. There is currently no clinical experience with very high humidity delivered (**>40 mgH_2O/L**).

ACKNOWLEDGEMENTS

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REFERENCES

1-Lellouche F, Taille S, Maggiore SM, Qader S, L'Her E, Deye N, et al. Influence of ambient and ventilator output temperatures on performance of heated-wire humidifiers. AJRCCM. 2004;170(10):1073-1079.