Evaluation of the Performance of CPAP Heated Humidifiers for use in Sleep Apnea Therapy; A Comparative Study of Humidification Effectiveness

R. Virag, Trifid Medical Group, United States.
In submission

**KEY FINDINGS:**

- *ThermoSmart®* is the only CPAP humidifier in this study to deliver average absolute humidity greater than 27 mg/L.
- *ThermoSmart®* is the only CPAP humidifier in this study to deliver high levels of humidity, without causing any condensate.

**AIM:**

To compare the temperature and humidity performance of different CPAP humidifiers under simulated real-use conditions.

**METHODS:**

- Four humidified CPAP devices from different manufacturers were side-by-side bench-tested over seven hours.
- Test conditions included a CPAP pressure of 12 cmH₂O, 40 L/min airflow, maximum humidifier settings, ambient temperature of 67.3 °F (19.6 °C), and ambient humidity of 9.3 mg/L.
- End-of-hose temperatures were recorded hourly for each device.
- Two methods were used to record humidity: a) Gravimetric method using ISO 8185; b) Hygrometry.

**Humidity Output Delivered by Different Manufacturers**

```
<table>
<thead>
<tr>
<th></th>
<th>FPH</th>
<th>ResMed 1</th>
<th>ResMed 2</th>
<th>Respironics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absolute Humidity (mg/L)</td>
<td>30.0</td>
<td>25.0</td>
<td>25.0</td>
<td>24.0</td>
</tr>
</tbody>
</table>
```

**Condensation Levels in Breathing Tube**

```
<table>
<thead>
<tr>
<th></th>
<th>FPH</th>
<th>ResMed 1</th>
<th>ResMed 2</th>
<th>Respironics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Condensation in tube (mL)</td>
<td>0.0</td>
<td>3.5</td>
<td>5.9</td>
<td>0.0</td>
</tr>
</tbody>
</table>
```

* Data displayed from Gravimetric results

**KEY:**

- **FPH** – Fisher & Paykel Healthcare SleepStyle™ 608 with *ThermoSmart®*
- **Respironics** – REMstar® Pro M-Series with heated humidifier

*REMstar® is a registered trademark of Respironics Inc
ResMed 1 – S8 Elite™ HumidAire 3i™ version 1
ResMed 2 – S8 Elite™ HumidAire 3i™ version 2
S8 Elite™ and HumidAire 3i™ are trademarks of ResMed Ltd

**CONCLUSION:**

- *ThermoSmart®* outperformed the other devices in this study in all areas of heat and humidity delivery, with zero condensation.