Accuracy of the *Albus Home* Research Device (RD) for the Non-contact and Passive Monitoring of Nocturnal Respiratory Rate at Home in an Adult Population

Dr W. Do¹, Dr C. Wheeler¹, Prof M. De Vos², Dr R. Russell³, Prof M. Bafadhel³

¹Albus Health (Registered BreatheOx Ltd), Oxford, UK. ²Institute of Biomedical Engineering, University of Oxford, UK. ³Respiratory Medicine Unit, Nuffield Department of Medicine, Oxford, UK.

### Rationale

- Existing methods for remote monitoring are limited by poor adherence, technique, subjectivity or bias.
- Nocturnal respiratory rate (RR) is an important clinical sign. However, current gold-standards – Polysomnographic wearable devices (PSG) – are uncomfortable and unsuitable for more than a few nights.
- *Albus Home RD* is a novel contactless, automated monitor of RR, cough and air-quality metrics.
- **Aim:** to assess accuracy of RR monitoring using *Albus Home RD* (Fig. 1), compared to gold-standard wearable PSG (SOMNOtouch™ RESPIRATORY, Somnomedics; Fig. 2).

### Methods

- The bedside *Albus Home RD* monitored participants overnight in their usual sleeping arrangements. RR data is automatically generated using signal processing algorithms.
- Gold-standard PSG RR data is recorded using time-intensive clinician manual-counts of traces from respiratory-effort belts.
- 10-minute periods free from artefact per hour per night were chosen across participants; both device RR readings were reported in 30-second segments (as breaths/min) and time-synchronized.
- Accurate RR results are within +/−10% or +/−2 breaths/min of the PSG RR.

### Results

- 16 healthy adults (9M:7F) participated in overnight monitoring; ages (20-74) and BMI (19-38).
- *Albus Home RD* RR measurements for 1540 thirty-second segments (770 minutes) were compared against gold-standard.
- **Overall accuracy was 92%** (mean absolute percentage error=0.06 (SD=0.07)).
- **Median participant accuracy was 95%** (IQR=4%).

### Conclusions

- *Albus Home RD* is a novel and accurate method to collect continuous nocturnal RR with negligible patient burden.
- Through wireless sensors, passive monitoring and automated analysis, this enables reliable, long-term home monitoring.
- This system provides new possibilities for remote clinical care and objective data gathering in clinical research.

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