

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

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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).



Figure 1. Albus Home RD bedside device



Figure 2. Reference PSG device with thoraco-abdominal respiratory effort belts

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%).

Bland-Altman plot for participant with mid-range RR accuracy

(95% accurate; n=80 comparisons)

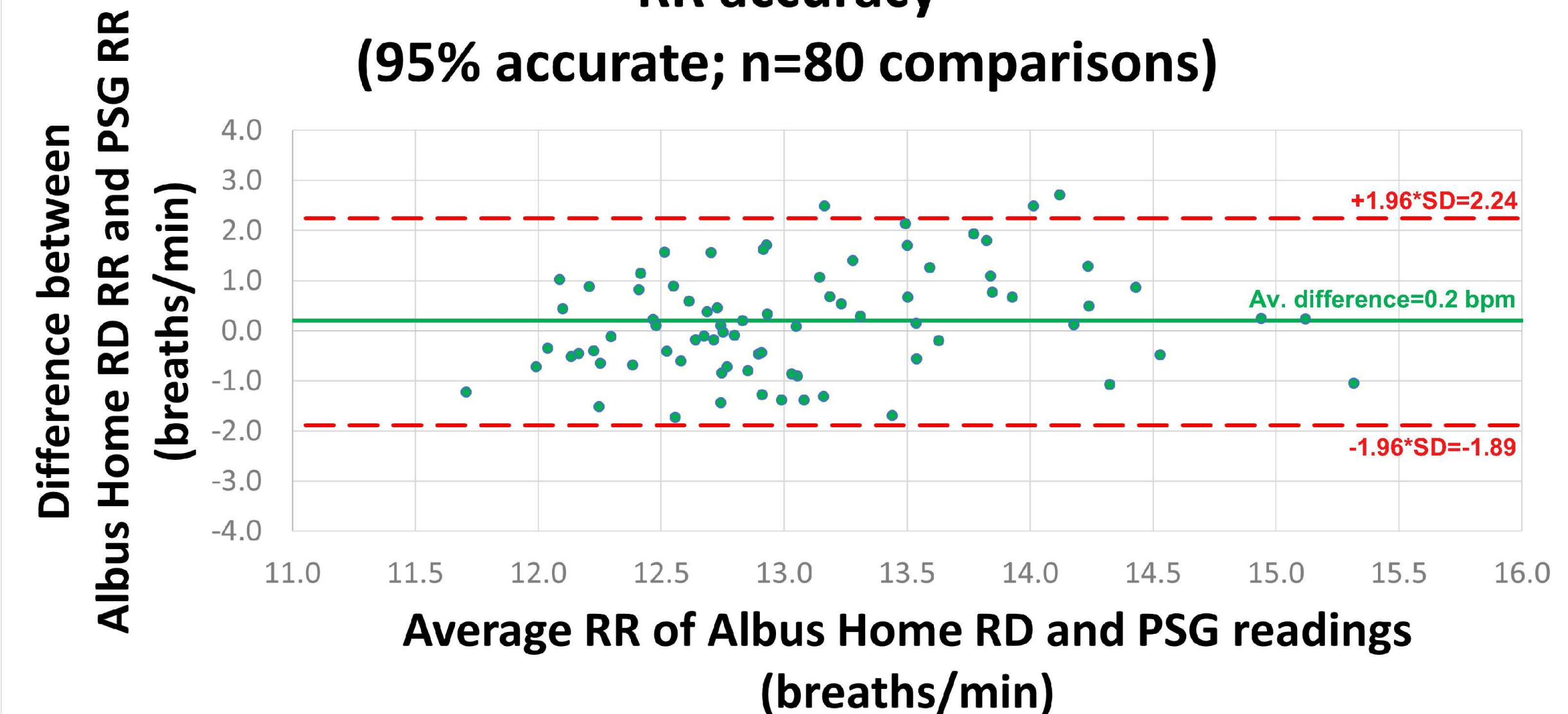


Figure 3: Bland-Altman plot demonstrates agreement of **Albus Home RD** RR with gold-standard for participant with mid-range accuracy (95%); average difference=0.2bpm.

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.**