MEDBUG · CONFERENCE ABSTRACT

A New Contactless Body Position Classification Method to Enable Multi-Night Evaluation of Posture Effects on Obstructive Sleep Apnoea Severity: A Proof-of-Concept Study

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Study Objectives Body position variability is a major contributor to night-to-night variability in obstructive sleep apnoea (OSA) severity in many patients. However, understanding postural influences on OSA severity is challenging because sleep studies are too costly and impractical for multi-night posture and OSA severity monitoring in the home, and more practical methods are lacking. This study sought to develop and validate a non-contact body position classification method to support multi-night home monitoring of sleep position, and to assess feasibility and recording reliability across multiple nights.

Methods Data to support the development of a body position classification algorithm were collected from 19 healthy volunteers who performed predefined body posture shifts during controlled daytime recordings whilst laying on a novel mattress sensor device (Medbug) and wearing an accelerometer for accurate body roll-angle determination. 13 participants also took the mattress sensor device home for multi-night home recordings to evaluate recording reliability.

Results Mattress sensor-based body position classifier algorithm development is still underway. However, preliminary results demonstrate high algorithm performance for detecting body-shift events (event-based recall 98.0%, precision 81.0%, and F1-score of 88.7%), from which to then classify body position. In-home device recordings captured 131 nights from a mean ± SD of 10.1 ± 3.8 nights per participant, with no device setup or recording failures in any participant (100% of nights with attempted recordings successfully recorded). 94.6% of recorded data show sufficient signal quality for future automated body shift detection and posture classification analysis.

Conclusions

This proof-of-concept study supports the feasibility and reliability of non-contact body position signal acquisition and body position shift detection during multi-night in-home assessments. This approach provides a simple, practical and scalable method for investigating the contribution of body position to night-to-night variability in OSA severity towards future larger-scale evaluation of body position influences on OSA severity in clinical practice.