MEDBUG · CONFERENCE ABSTRACT

A novel mattress sensor device to improve MND care through comprehensive nightly sleep and breathing assessments: A feasibility study

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Objectives People living with motor neurone disease (MND) exhibit worsening sleep and ventilation over time. This study sought to evaluate the feasibility of nightly monitoring of sleep and ventilation in MND via a novel unobtrusive in-home mattress sensor system.

Methods This ongoing case-control trial is deploying (via post), a contact-free mattress sensor (MedBug), for 2-weeks to record respiratory and body motion signals from people living with MND (pwMND) and their cohabitating caregiver, with bed-sensor setup by the participants. A multi-task deep learning model is used to infer sleep architecture, sleep fragmentation, ventilation disturbance and effort metrics from device data with case-control differences evaluated using independent t-tests. Data are shown as mean [95%CI].

Results Preliminary data from the first MND-carer dyad showed 26/26 (100%) attempted versus successfully recorded nights (MND: 14 nights on NIV; caregiver: 12 nights on CPAP). Compared to the caregiver, the pwMND showed severely reduced REM sleep (4.6 [1.2, 8.7] vs. 15.4 [11.0, 17.8]% of sleep time, p=0.002) and increased wake time (21.0 [14.9, 29.5] vs. 7.5 [4.7, 10.1]%, p<0.001). Ventilation disturbances were low for both (4.7% vs. 6.7%) and the pwMND (on NIV) showed significantly less respiratory effort (15.3 [10.2, 20.4] vs. 33.2 [27.7, 38.7]%, p<0.001). Both demonstrated relatively low arousal (4.8 vs. 7.6 events/hr) and AHI (7.9 vs. 8.4 events/hr).

Conclusions Early data support the feasibility of non-contact mattress-sensor monitoring of MND. This low-burden approach shows significant potential for simplified large-scale, longitudinal use to track MND progression, optimise timely clinical interventions, and simultaneously monitor caregiver sleep health.

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