

AI scoring increases detection of obstructive sleep apnoea in home sleep testing

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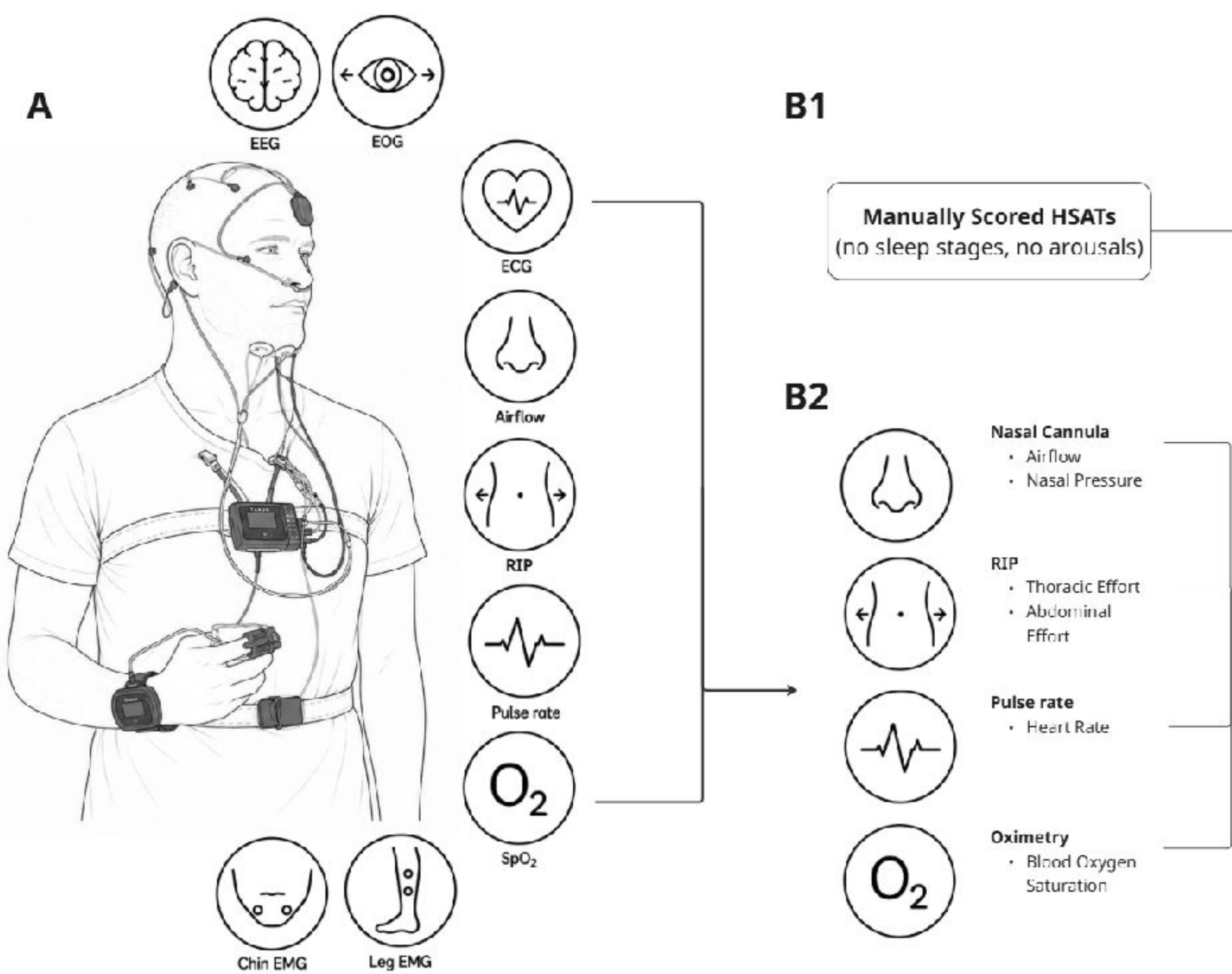


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Introduction

Home sleep apnea tests (HSATs) often underestimate apnoea-hypopnoea index (AHI) due to the absence of sleep staging and arousal detection, leading to false negatives and inconclusive results. DeepRESP v2.0 is an FDA-cleared (K252330) AI-based analysis that derives AHI from HSAT signals by scoring sleep, arousals and respiratory events.

This study compared DeepRESP to conventional respiratory analysis and evaluated potential impact on obstructive sleep apnoea (OSA) diagnosis in a real-world dataset.



Methods

Two retrospective analyses were performed. First, clinical polysomnography (PSG) recordings (N=5,771) previously manually scored per AASM criteria were used as a reference. HSAT signal configurations were extracted from these recordings. DeepRESP and conventional respiratory analysis were applied to generate AHI and respiratory event index (REI), respectively. Confusion matrices show the classification performance of DeepRESP and conventional respiratory analysis against gold-standard PSG at AHI ≥ 5 and ≥ 15 events/hour. Second, 3,094 previously scored HSATs were reclassified from REI-based to DeepRESP-derived AHI categories. The proportion of inconclusive (REI<5) tests reclassified to AHI ≥ 5 and shifts from REI<15 to AHI ≥ 15 were quantified.

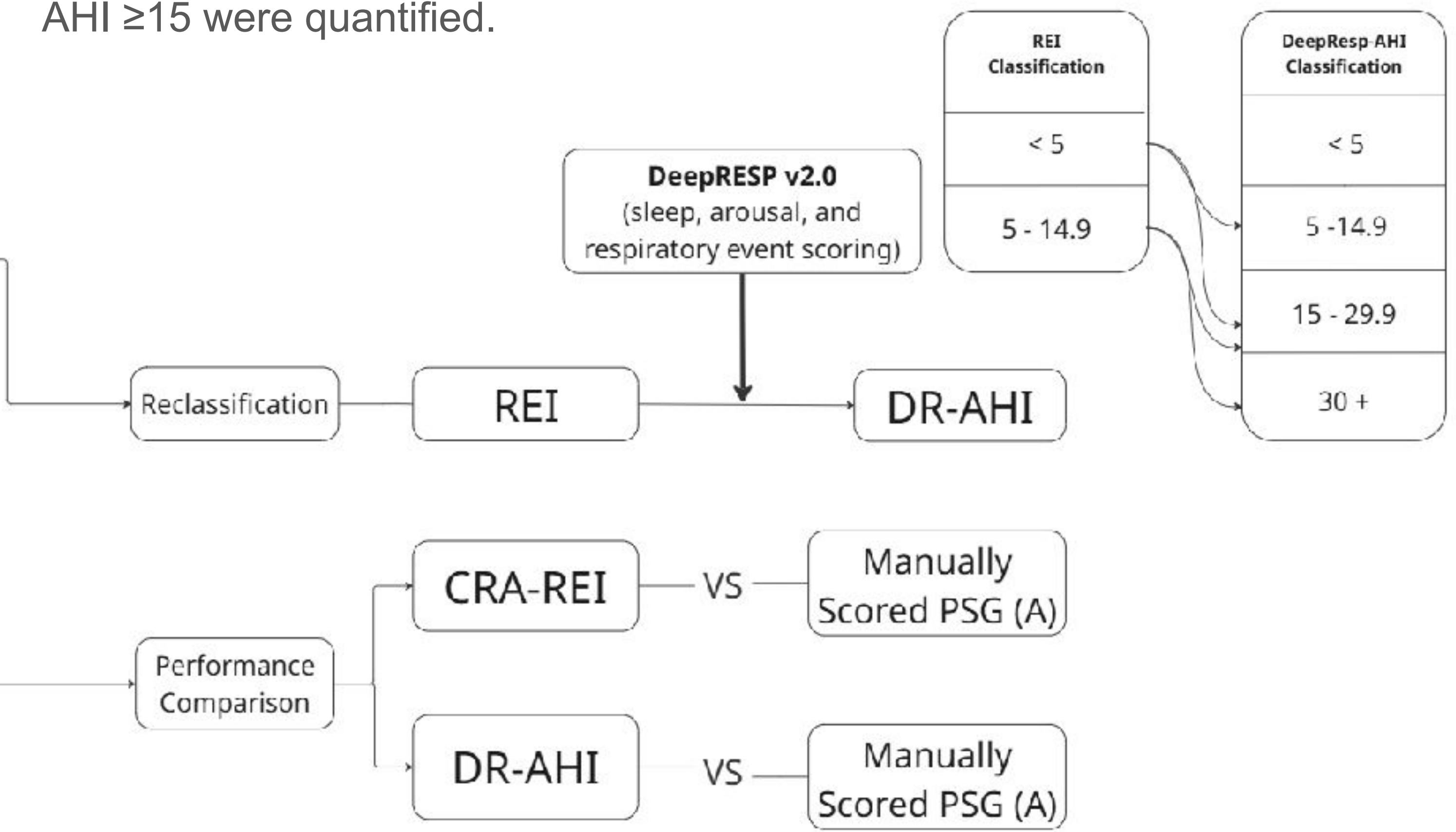


Figure 1. (A) PSG signals, with respiratory and oximetry signals extracted to simulate HSATs (B2). (B1) Previously scored HSATs (n=3,094) were reanalyzed using DeepRESP v2.0 to assess reclassification from REI to DR-AHI, focusing on shifts from REI <5 to DR-AHI ≥ 5 and from REI <15 to DR-AHI ≥ 15 events/hour. (B2) In 5,771 PSG recordings, CRA-REI and DR-AHI were compared with manually scored PSG at AHI thresholds of ≥ 5 and ≥ 15 events/hour. DeepRESP incorporates sleep, arousal and respiratory event scoring. REI = Respiratory Event Index, AHI = Apnea Hypopnea Index, CRA = Conventional Respiratory Analysis, DR = DeepRESP, GS = Gold standard, HSAT = home sleep apnea testing, PSG = polysomnography

Results

Relative to conventional analysis, DeepRESP improved OSA detection. At AHI ≥ 5 , DeepRESP correctly identified 5,097 of 5,600 (91%) PSG-positive patients versus 3,981 (71%) with conventional analysis, indicating a 20% reduction in false-negatives; false-positives increased by 12.9% (from 16 to 38 patients). At AHI ≥ 15 , DeepRESP correctly identified 3,448 versus 2,138 patients with conventional analysis, reducing false-negatives by 29.6% and increasing false-positive rate by only 5.3% (from 11 to 83 patients). In the operational dataset, DeepRESP detected previously missed cases, with ~90% of inconclusive HSATs reclassified to AHI ≥ 5 and 23.5% of patients with REI<15 reclassified to AHI ≥ 15 .

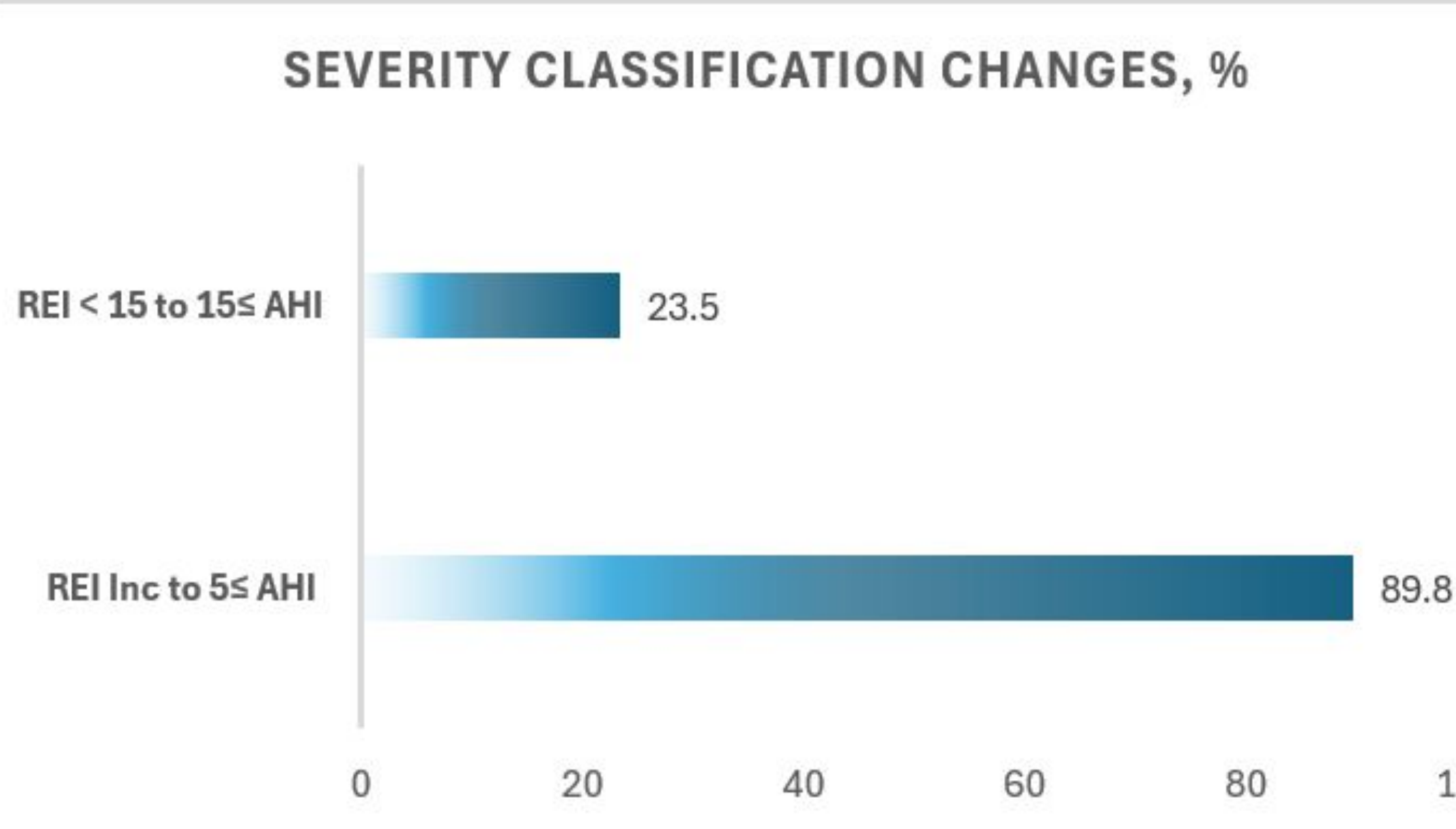


Figure 2: By using DeepRESP to estimate AHI it was possible to detect previously missed OSA cases. 89.8% of inconclusive HSATs were reclassified to AHI ≥ 5 , and 23.5% of cases with REI<15 were reclassified to AHI ≥ 15

Conclusions

DeepRESP enables AHI by scoring sleep and arousals, reducing false negatives relative to conventional HSAT. Overall, the observed reclassification pattern was similar between datasets. These findings support DeepRESP as a clinically informative approach for HSAT interpretation.

3A

DeepResp derived AHI - HSAT signal configurations

Classification Confusion Matrices

AHI ≥5

AHI ≥ 15

	Pred. Neg	Pred. Pos		Pred. Neg	Pred. Pos
Act. Neg	TN 133	FP 38	Act. Neg	TN 1268	FP 83
Act. Pos	FN 503	TP 5097	Act. Pos	FN 972	TP 3448
91% correctly classified as AHI ≥5			78% correctly classified as AHI ≥15		

3B

Conventional Respiratory Analysis - REI

Classification Confusion Matrices

AHI ≥5

AHI ≥ 15

	Pred. Neg	Pred. Pos		Pred. Neg	Pred. Pos
Act. Neg	TN 155	FP 16	Act. Neg.	TN 1341	FP 11
Act. Pos	FN 1617	TP 3981	Act. Pos	FN 2279	TP 2138
71.1% correctly classified as AHI ≥5			48.4% correctly classified as AHI ≥15		

Figure 3A: At AHI ≥ 5 DeepRESP correctly identified 5,097 of 5,600 (91%) PSG-positive patients versus 3,981 (71%) with conventional analysis. Figure 3B: At AHI ≥ 15 DeepRESP correctly identified 3,448 of 5,600 (78%) PSG-positive patients versus 2,138 (48.4%) with conventional analysis

Disclaimer

Project was conducted by Nox Health. These analyses are investigational and were not part of the 510(k) submission; they are not intended to represent official device performance, support promotional claims, or modify product labelling.