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Usability and accuracy of polygraphy devices as a screening tool for obstructive sleep apnea in an atrial fibrillation population.

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Background: Obstructive sleep apnea (OSA) is an important modifiable risk factor in patients with atrial fibrillation (AF). Unfortunately, it is underdiagnosed in daily clinical practice, although up to 62% of AF patients may have OSA. Early detection of OSA is essential for rhythm control in AF patients. Currently, the gold standard for diagnosing OSA is polysomnography (PSG), but besides being an expensive method, it also requires a supervised hospitalization of one night. There is a lack of accurate and easy-to-use tools to test for OSA that can be implemented in daily ambulatory care.

Purpose: This study examined the accuracy and user-friendliness of several (cardiorespiratory) polygraphy devices (PG) as a simple screening tool for OSA in an outpatient AF population.

Methods: This prospective cohort study determines the accuracy of 4 PGs [ApneaLink Air (ALA), SOMNOtouch RESP (STR), SpiderSAS (SpS), and Noxturnal T3 (Nox-T3)] in AF patients who underwent a PSG evaluation at two Belgian sleep clinics. All the patients were instructed and asked to use a PG for one night at home. The Apnea-Hypopnea Index (AHI) was used to identify if moderate to severe OSA was present, i.e. AHI ≥15. Moreover, specific AHI cut-off values for each PG were derived based on the receiver operating characteristics (ROC) curves (best Youden's J Index and an accuracy of more than 0.7 compared to PSG). In addition, patients completed a Comfort Questionnaire (CQ) in order to assess the PG's user-friendliness.

Results: In total, 130 AF patients undergoing a PSG were included (100 who tested the three devices ALA, STR, SpS and 30 patients who only tested Nox-T3). Only the successful measurements (i.e. ≥4 hours of data on automated analysis; n=250, 75.8%) were examined. The success rate for the ALA, STR, SpS, and NOX-T3 devices was 72.0%, 73.0%, 79.0% and 86.7%, respectively. The optimal AHI cut-off value for each PG in screening for clinically relevant OSA (i.e. AHI ≥15 on PSG) was 7.0, 10.0, 19.5, and 11.1 for the ALA, STR, SpS, and Nox-T3, respectively. The Nox-T3 PG had the highest sensitivity (92.9%), specificity (75.0%) and accuracy (0.85) in comparison to the other three PGs (Table 1). In addition, the scores of three important questions of the CQ were higher for the patients with Nox-T3 compared to the other PGs (Table 2).

Conclusion: Our results demonstrate the usability of PGs as early OSA screening tools in AF patients. The Nox-T3 with an optimized AHI cut-off value of 11.1 seems to be the best option for ambulatory OSA screening, based both on accuracy and user-friendliness.

Table 1: Accuracy of the different PGs based on optimised AHI cut-off values for each device. AHI: Apnea-Hypopnea Index; PPV: Positive predictive value; NPV: Negative predictive value

AHI ≥ 15	Apnealink Air	SOMNOTouch RESP	SpiderSAS	Noxturnal-T3
	n=72 Cut-off: 7.0	n=73 Cut-off: 10.3	n=79 Cut-off: 19.5	n=26 Cut-off: 11.1
Sensitivity (%)	89.6	90.2	87.3	92.9
Specificity (%)	58.3	50.0	58.3	75.0
PPV (%)	81.1	80.7	82.8	81.3
NPV (%)	73.7	68.8	66.7	90.0
Youden's J Index	0.479	0.402	0.460	0.679
Accuracy	0.79	0.78	0.78	0.85

Table 2: User-friendliness of the different PGs based on the Comfort questionnaire.

	Apnealink Air	SOMNOTouch RESP	SpiderSAS	Noxturnal-T3
Was this device easy to attach?	8.82	6.71	8.53	9.41
Did you experience any discomfort during your sleep due to this device?	2.55	2.66	2.69	1.83
In general, what score would you give based on (the difficulty of attachment and) comfort of this device?	8.25	6.63	7.97	8.72