



## Editorial



## Sleeping Beauty unravelled – Detection of sleep apnoea in patients with atrial fibrillation

Contemporary treatment of atrial fibrillation (AF) goes beyond the management of the arrhythmia and prevention of thromboembolic complications such as stroke, and includes comprehensive risk factor management and lifestyle modification. Nowadays it is well known that concomitant risk factors significantly contribute to the burden of AF.[1] Obstructive sleep apnoea (OSA) is highly prevalent in patients with AF and considered a crucial risk factor for development or worsening of AF.[2,3] At the same time OSA and AF share important risk factors such as age, gender and obesity, amongst others. In certain situations, cardiac arrhythmias such as AF can develop based on the comorbid risk attributable to OSA, because of e.g., hemodynamic alterations or sympathetic changes affecting underlying electrophysiology.[4] Understanding these interactions may contribute to personalised risk factor assessment and treatment. International guidelines recommend comprehensive risk factor management which may include the assessment and treatment of OSA to reduce symptoms, recurrences, and progression of AF.[5] However, OSA management in clinical practice is often sub-optimal, frequently overlooked, and numerous diagnostic and therapeutic challenges in the treatment of patients with OSA and AF exists.[6] A European survey of 186 health care professionals has confirmed that OSA assessment and testing is often not integrated in the treatment of AF. Only 11% of respondents initiated systematic OSA testing, either using a home sleep test or a respiratory polygraphy, and another 11% reported structured OSA pathways implemented in their cardiology clinic. Crucial barriers exist and prevent structured OSA care being integrated into standard management, examples are a lack of knowledge, non-availability of sleep labs, and the absence of established collaboration between the cardiology department and the sleep laboratories.[7] Although multiple studies have investigated the association between OSA and AF and confirm the importance of diagnosing OSA in patients with AF[8], further research is needed to inform clinical practice guidelines.[9]

International AF guidelines recommend an integrated approach to care and treatment in AF, which fuses fundamental aspects such as patient involvement, a multidisciplinary team approach and the use of technology to support efficient care delivery and improved outcomes.[5] Increased awareness of OSA is essential for both patients and healthcare professionals, and a patient centred approach may contribute to achieving informed or shared decision making in assessment, detection and treatment of OSA as part of comprehensive AF treatment. Multidisciplinary teams with specific roles for nurses and allied professions have been recommended to provide such structured care [10,11] not only for AF patients but also for the treatment of patients with chronic obstructive pulmonary disease.[12] Although long-term sleep-disordered breathing monitoring may reveal more in-depth data

and as may better reflect sleep-disordered breathing AF risk [13], technology has been revolutionary, and accuracy and user-friendliness is continuously improving, and consequently home-based devices for patients to self-monitor their condition is emerging.

Jensen and colleagues investigated the use of NightOwl™ (NO) which is a home-monitoring device for OSA evaluation in patients with AF. [14] The NO consists of a small disposable sensor which is taped to the fingertip and is accessed via a smartphone application that guides the user through every step of the test. The application utilises photoplethysmography (PPG) technology to continuously record physiological information such as actigraphy, saturation of peripheral oxygen, periphery artery tone, and heart rate, and is connected to a cloud-based analytic platform. Jensen et al aimed to assess the prevalence of OSA in patients with AF using the NO. In total, 126 patients with documented AF were recruited from a cardiology outpatient clinic. Patients were instructed on the use of NO and then undertook four consecutive nights of recording with the NO in their home, followed by completion of an online clinical feasibility questionnaire. The study demonstrated a high prevalence of OSA in this population (56% moderate to severe OSA) detected by means of the NO, and the NO to be considered of high validity and accuracy compared to cardiorespiratory monitoring. Such technology tools might thus be a feasible device to be used in the monitoring of OSA, especially with limited access or absence of sleep laboratories.

After having collected sleep data by remote sleep testing devices such as the NO, a structured management pathway is necessary to allow integration of the sleep testing results into the treatment of patients with AF is necessary. Previously, an integrated pathway for OSA assessment and treatment in the work-up of AF management, with close interdisciplinary collaboration between the sleep specialist centre and the cardiology department has been suggested to streamline this process and prevent fragmentation of care. [15] An example is the VIRTUAL sleep apnoea management pathway (VIRTUAL-SAFARI) for patients with AF. In this remote pathway, patients were instructed to use WatchPAT-ONE™, a disposable wrist device that utilizes a PPG-based finger-mounted probe to measure the peripheral arterial tone (PAT) signal and oxygen saturation, to determine respiratory disturbances and overnight sleep. Results were transmitted via an mobile application installed on the patient's mobile phone to a secure cloud, analysed in a virtual sleep lab and explained to the patient during a teleconsultation with the sleep physician.[2] If needed, also adequate OSA treatment is initiated remotely and optimized by home providers. Interestingly the PPG waveforms collected during sleep testing by devices such as NO or the WatchPAT-ONE™ may also incorporate useful and potentially actionable information on heart rate and heart rhythm. Also, the temporal

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relationship between OSA-related respiratory events and episodic desaturation with onset or offset of AF episodes may provide further support for mechanistic involvement of OSA in the AF arrhythmogenesis in the individual patient.

OSA testing by virtual OSA management pathways such as VIRTUAL-SAFARI have demonstrated feasibility and the importance of patient involvement and interdisciplinary collaboration. The interplay between healthcare professionals, patients and novel digital technology is a crucial evolution in aiming to achieve improved clinical outcomes. Moreover it will guide broad and standardized implementation of risk factor modification in patients with AF and optimizes utilization of healthcare resources to reduce the burden of the healthcare system.

#### Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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