P144 | Large sample feasibility study showing smartphone-based screening of sleep apnoea is accurate compared with polysomnography

N. Partridge1; J. May1; V. Peltonen1; J. Wood1; T. Keating1; U. Abeyratne2; P. Currie2; S. Lenstra2; L. Ling2
1Resapp Health Ltd., Brisbane, Australia, 2Hollywood Private Hospital, Nedlands, Perth, Australia

Introduction: Obstructive Sleep Apnoea (OSA) affects up to three in ten men and nearly two in ten women. Untreated OSA is associated with increased risk of heart disease, hypertension, stroke and type 2 diabetes. It is estimated that 80% of people suffering from moderate and severe OSA remain undiagnosed. The current standard of diagnosis, attended laboratory polysomnography (PSG), and its portable variants are not feasible for mass screening or long-term monitoring due to high cost, complexity of instrumentation and inconvenience to patients. Accurate and low-cost OSA screening technologies appropriate for mass deployment are urgently needed. We conducted a large sample feasibility study of a smartphone based screening tool for OSA.

Methods: Consecutive patients undergoing PSG at two sleep laboratories in Perth, Western Australia were approached for participation in this feasibility study utilising machine-learning algorithms developed to characterise the severity of OSA from a patient’s overnight breathing and snoring sounds recorded using a smartphone placed on a bedside table. The algorithms were trained and validated using sounds recorded during simultaneous AASM Type 2 PSG. PSG data were scored per 2012 AASM criteria and the Apnoea Hypopnoea Index (AHI) was used as the reference metric for comparison of results. Ten-fold cross validation was used to test the performance of the method.

Results: 731 subjects were recruited, 62% males; age range 18-87 years (mean 53) and an AHI range 0-196/h (mean 24). The algorithms achieved 86% sensitivity and 83% specificity in identifying OSA at the diagnostic threshold of AHI=15/h. The area under the receiver operating characteristic curve was 0.91. Similar results were obtained at the threshold AHI=30/h.

Discussion: Results obtained on this large cohort of subjects indicate that snoring and breathing sounds carry vital information, which can be used to screen for or diagnose OSA. It illustrates the feasibility of using sound analysis to develop a smartphone based scalable and accurate OSA screening tool suitable for mass deployment. Recruitment for a blinded prospective study to further validate performance is currently underway.

P145 | Technical validation of a positive pressure-biased anterior rhinomanometry test for CPAP therapy pre-assessment

N. Malagutti1,2; B. Liston2; D. Inman1; S. Miller1
1The Canberra Sleep Clinic, Deakin, Australia, 2The Australian National University, Canberra, Australia

This study investigates the technical feasibility of a novel method for performing anterior rhinomanometry under a “positive pressure-bias” condition, that is, while maintaining the upper airway at a pressure comparable to that of CPAP treatment (5-20cmH2O). This technique is being investigated as potentially more informative than traditional ambient pressure testing as regards the assessment of the relationship between CPAP therapy and nasal airway obstruction.

The patient interface for a NR6 rhinomanometer (both from GM instruments, Kilwinning, UK) was modified to allow for the seamless connection of standard CPAP equipment (VPAP s9 TX, ResMed, Bella Vista, Australia), which was used as a controllable pressure source. An in-vitro test bench system was assembled, which allowed for the application of a controlled pressure bias and airflow to the patient interface, as well as the simulation of varying degrees of airflow resistance. Data acquisition was performed using the Naris software (GM instruments, Kilwinning, UK) for a number of static pressure and flow conditions representative of the normal human range. The Naris data were compared with simultaneous readings taken from a water manometer (Fisher and Paykel Healthcare, Auckland, New Zealand) and a mass flowmeter (TSI Inc., Shoreview, MN, USA) to detect any measurement errors induced by the addition of the pressure generator. Our results showed that the externally imposed pressure bias did not introduce any significant changes in the accuracy of the measurements for the acoustic rhinometer (pressure measurement error 0 ± 10 Pa, flow error 0.0 ± 0.7 cm3/s). Our research indicates that there are no adverse impacts on the accuracy of anterior rhinomanometry testing under positive pressure-bias conditions, and that a common laboratory CPAP device can be utilised as a viable pressure generator for the purpose. This result opens the way for subsequent studies on patients which will investigate the clinical potential of the newly proposed methodology.

P146 | Identifying upper airway obstructions using wide band analysis of snore sounds

M. Markandeya; U. Abeyratne
University of Queensland, Brisbane, Australia

Introduction: Upper airway (UA) obstructions accompany several respiratory dysfunctions including Obstructive sleep apnoea(OSA). Snoring is the commonest symptom of OSA. Narrowing of the airways produce snoring sounds that carry information on airway patency. In a complete collapse of UA, a large pressure differential