Simplified Diagnostic and Management Strategies for the Diagnosis and Delivery of Health Care to those with Obstructive Sleep Apnea

by

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ABSTRACT

Obstructive sleep apnea (OSA) is a prevalent disease. Often resources to provide care for OSA are inadequate, leading to long patient waiting times. Simpler validated methods of care are needed.

In the first study in Chapter 2, the utility of a new high-sampling rate oximeter to diagnose OSA was explored. The home oximetry data collection was robust, with few failures and the data allowed the “rule in” or “rule out” of moderate-severe OSA with high degree of certainty. It is concluded that home oximetry could replace polysomnography (PSG) as a diagnostic test in a significant proportion of patients, thus allowing limited resources available for the care of those with OSA to be re-directed e.g. towards providing therapy.

In Chapter 3, the diagnostic information from the oximeter was used to underpin a study designed to demonstrate that a nurse-led model of care could produce health outcomes in moderate-severe OSA not inferior to physician-led care.

A randomised controlled multi-centre non-inferiority clinical trial was performed. 1,427 patients referred to 3 sleep medical centres with possible OSA were assessed. 195 patients were randomised to 2 models of care. Model A, a simplified model, involved home oximetry to diagnose moderate-severe OSA, auto-titrating constant positive airway pressure (APAP) to set a therapeutic constant positive airway pressure (CPAP), with all care supervised by an experienced nurse. Model B involved 2 laboratory PSG’s, to diagnose OSA then titrate CPAP, supervised by a sleep physician. The

primary endpoint was change in Epworth Sleepiness Score (ESS) measured before and after 3 months of CPAP. A range of other outcome measures were collected.

The change in ESS for nurse-led management (Model A) was not inferior to the physician-led service (Model B) since the lower limit of the two-sided 95% CI did not include -2, the margin of equivalence (difference 0.13, 95% CI -1.52 to -1.25). 11 patients in Model A and 10 in Model B were lost to follow up during the trial. There were no significant differences between Model A and Model B after 3 months of CPAP in any of the other outcome measures, including CPAP adherence at 3 months.

It is concluded that a simplified nurse-led model of care can produce non-inferior results to physician-directed care in the management of moderate-severe OSA.

In Chapter 4 the efficacy of CPAP in normalising or improving subjective and objective sleepiness, quality of life and selected neurocognitive measures was explored. It was shown that only a proportion of patients (60% on ESS, 35% on FOSQ) normalised their scores after 3 months of CPAP therapy. This is important information. As new health care delivery strategies evolve as a result of the data presented in Chapter 3 and elsewhere, it will be crucially important to train new health care professionals in the complexities of OSA management, such that they are aware that the symptoms of patients presenting for OSA investigations can have multiple aetiologies, and may not always resolve by simply applying CPAP.

The data presented in this thesis add to the evidence base in treatment of moderate-severe OSA and will help further evolve health care delivery for this important disease.

PUBLICATIONS ARISING FROM THIS THESIS

Nick A. Antic, Catherine Buchan, Adrian Esterman, Michael Hensley, Matthew T. Naughton, Sharn Rowland, Bernadette Williamson, Samantha Windler and R. Doug McEvoy**.** A randomised controlled trial of nurse led care for obstructive sleep apnea. American Journal of Respiratory and Critical Care Medicine (in review)

Publications (published Conference Proceedings) arising from this thesis

Antic N, Catcheside P, Hansen C, McEvoy RD. Utility of a new high sampling oximeter at the diagnosis of moderate to severe obstructive sleep apnea. ASA 2003 (Finalist New Investigator award).

Antic N, Catcheside P, Hansen C, McEvoy RD. Utility of a new high sampling oximeter at the diagnosis of moderate to severe obstructive sleep apnea. TSANZ 2004 Respirology (9) A1-75 2004 (Finalist Young Investigator Award).

Antic N, Catcheside P, Hansen C, McEvoy RD. Utility of a new high sampling oximeter at the diagnosis of moderate to severe obstructive sleep apnea. ATS 2004.

Antic N, Clark R, Hansen C, Hensley M, Naughton M, McEvoy RD. Assessing neurocognitive function in moderate-severe obstructive sleep apnea. ASA 2004.

Antic N, Clark R, Hansen C, Hensley M, Naughton M, McEvoy RD. Assessing neurocognitive function in moderate-severe obstructive sleep apnea. ATS 2005.

Nick Antic, Richard Clark, Michael Hensley, Matthew Naughton, Sam Windler, Sharn Rowland and R. Doug McEvoy. Assessment of Neurocognitive Function in moderate-severe OSA in a multi-centre trial. Australasian Sleep Association 2006.

Antic N, Hensley M, Naughton M, Rowland, S Windler S, McEvoy RD. A RCT to investigate a simplified diagnostic and management strategy for moderate-severe OSA. ATS 2007.

AWARDS

2003 Finalist Young Investigator Award Australasian Sleep Association.

2004 Finalist Ann Woolcock Young Investigator Award Thoracic Society of Australia and New Zealand.

2005 Nominated as Thoracic Society of Australia and New Zealand Young Investigator Representative to Japan Respiratory Society Annual Scientific Meeting.

DECLARATION

I certify that this thesis does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any university; and that to the best of my knowledge and belief it does not contain any material published or written by another person except where due reference is made in the text

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Nick Antic 31/03/08

GLOSSARY

+LR - positive likelihood ratio

AASM - American Academy of Sleep Medicine

AHI - Apnea-hypopnea index

APAP - autotitrating CPAP

CPAP - continuous positive airway pressure

EDS - excessive daytime sleepiness

EEG - electroencephalogram

EMG - electromyogram

EOG - electrooculogram

ESS - Epworth Sleepiness Scale

FOSQ - Functional Outcomes of Sleep Questionnaire

-LR - negative likelihood ratio

MAP - multivariate apnea index

MAS - mandibular advancement splint

MVA - Motor vehicle accident

MWT - Maintenance of Wakefulness Test

NPV - Negative predictive value

ODI - oxygen desaturation index

OSA- Obstructive sleep apnea

PPV - positive predictive value

PSG - polysomnogram

QALY - quality adjusted life years

SaO_2 - arterial oxygen saturation

SF-36- Short Form 36 (SF-36).