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Welcome to the latest issue of Sleep Medicine Research Review.

Highlights include a study that provides support for home testing of OSA, and a report of the success our Canterbury colleagues are achieving with primary care-based integrated sleep services. Sound levels and sleep disruption in ICUs throughout Australia and NZ are a concern, and bariatric surgery is shown to cure or improve OSA in a large proportion of patients. We also report the prevalence of sleep complaints in NZ adults, and the potential impact of road traffic noise on sleep quality in children.

We hope you find these and the other selected studies interesting, and welcome your feedback.

Kind regards,

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Physician decision making and clinical outcomes with laboratory polysomnography or limited-channel sleep studies for obstructive sleep apnea

Authors: Chai-Coetzer C et al.

Summary: This non-inferiority study compared the use of laboratory PSG with limited-channel sleep studies for diagnosing OSA. Sleep study information for patients with suspected OSA was disclosed to sleep physicians. 135 patients had level 1 PSG data, 136 had level 3 data (airflow, thoracoabdominal bands, body position, electrocardiography, and oxygen saturation) and 135 had level 4 data (oxygen saturation and heart rate). The primary outcome was change in Functional Outcomes of Sleep Questionnaire (FOSQ) score at 4 months. Non-inferiority was confirmed between levels 3 and 4 versus level 1 data for change in FOSQ score, and between level 3 and level 1 data for change in Epworth Sleepiness Scale score (findings were inconclusive for level 1 vs level 4).

Comment (AN): NZ Sleep Services have been early adopters of home or portable testing in the evaluation of OSA. This important study provides support for home testing pathways but higher physician confidence, greater use of CPAP and improved sleepiness outcomes with level 3 (cardio-respiratory) when compared with level 4 (oximetry) testing. One important caveat is the ‘home study data’ were obtained from an attended in-lab setting so likely to be of better quality with lower signal loss, artefact etc. than actual home data.


Abstract

Independent commentary by Associate Professor Alister Neill

Alister Neill is Associate Professor at the Department of Medicine, University of Otago, Wellington School of Medicine; and Respiratory and Sleep Physician at the Department of Respiratory Medicine, Capital and Coast Health. His research interests include the epidemiology and ethnic distribution of obstructive sleep apnoea in New Zealanders and its relationship to cardiovascular disease, new treatment technologies, sleep assessment pathways and the provision of home non-invasive ventilation for respiratory failure. He directs the University of Otago’s WellSleep Laboratory and Research Group and is an Associated Investigator of the Australasian Sleep Trials Network.

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Development and outcomes of a primary care-based sleep assessment service in Canterbury, New Zealand

Authors: Epton M et al.

Summary: In 2007, primary and secondary care clinicians and healthcare managers in Canterbury, NZ identified the need for a coordinated community-based assessment process for common sleep disorders. This paper described the process of setting up the service, with initial assessment being undertaken in general practice, and linked to a multi-disciplinary meeting process and specialist sleep care at Christchurch Hospital. Establishment of the community sleep assessment service and the multi-disciplinary meeting format led to significantly more assessments, with short waiting times for treatment, especially in high-risk patients with severe OSA. Most patients were able to be assessed without more complex studies or personal review by a sleep specialist.

Comment (AN): Colleagues in Canterbury are leading the charge in the primary care-based integrated sleep services. This paper celebrates the 10-year service evolution from humble beginnings working with one Primary Health Organisation building on dedicated teamwork and the clinical lead's vision to provide assessment and initial testing in primary care whilst maintaining the benefits of integration with secondary care. The primary care assessments are mainly by experienced sleep nurses. The number of patients needing repeat diagnostic testing is an important consideration—the finding that nearly half needed a higher level testing does beg the question as to whether a cardio-respiratory test (level 3 or nasal flow-based level 4) to begin with would have been more efficient. Delays to see the sleep specialist and concerns about under-resourcing remain. The multi-disciplinary meeting format is clearly a strength that would lend itself to inclusion of other sleep professionals (e.g. Ear, Nose and Throat surgeons, oral health/dental specialists, clinical psychologists) and lends itself to the telehealth care models.

Reference: NPJ Prim Care Respir Med 2017;27(1):26

Using clinically accessible tools to measure sound levels and sleep disruption in the ICU

Authors: Litton E et al.

Summary: This multicentre, observational study measured sound levels and sleep disruption in 39 ICUs throughout Australia and NZ. 539 patients aged ≥16 years who were occupying an ICU bed on one of two study days in 2015 were included. Ambient sound was measured for 1 minute using an app on a personal mobile device, and nurses recorded the total time and number of awakenings for each patient overnight. Maximum and mean sound levels were 78 and 62 decibels, respectively. Maximum sound levels were higher in ICUs with a sleep policy than in those without one (p<0.001). Sound levels were not related to single room occupancy, mechanical ventilation status, or illness severity. The median awake time was 3h per night, and there were a median 3 prolonged disruptions per night.

Comment (AN): Getting any sleep at all in a busy ICU/high dependency unit is a real challenge. Critically ill patients sleep poorly and major circadian disruption is common—often 50% of sleep occurs during daylight hours. Survivors of critical illness often remember difficulties sleeping while in ICU and the vast majority of these patients recalled being either moderately or extremely bothered by these problems. The authors of this important research collaboration found that noise levels are high and are not reduced by having a sleep policy. Future research to test sleep-promoting interventions is planned.

Reference: Crit Care Med 2017;45(6):966-71

Short-term expiratory muscle strength training attenuates sleep apnea and improves sleep quality in patients with obstructive sleep apnea

Authors: Kuo Y et al.

Summary: This study investigated the effects of expiratory muscle strength training (EMST) on sleep apnea, sleep quality, and respiratory muscle strength in patients with OSA. 25 patients were assigned to either the EMST group or a control group for 5 weeks. Patients in the EMST group trained at 75% of the maximum static expiratory (PEmax) score on 5 days a week. EMST reduced AHI by 40%, increased PEmax by 68%, and decreased the Pittsburgh Sleep Quality Index (PSQI) by 28%. PSQI scores were reduced in the moderate OSA subgroup but not the mild OSA subgroup. Improvements in PEmax scores were correlated with a decrease in sleep apnoea.

Comment (AN): Building on the legendary medical digeridoos study by Puhan et al. (2006) these authors used an expiratory muscle training device (EMST150®, Aspire) in a group of relatively trim (average BMI 25 kg/m²) mild to moderate OSA participants. The target pressure was 75% of each participant’s PEmax for 5 days/week, 25 breaths/day, 5 breaths/cycle for a total of 5 cycles/day. The measured OSA improvements were greater in the moderate severity group. The lack of a musical output for all of this huffing and puffing was not discussed.

Reference: Respir Physiol Neurobiol 2017; published online May 25

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Research Review publications are intended for New Zealand health professionals.
Bariatric surgery is an effective treatment for morbid obesity and the metabolic syndrome. I have heard proponents claim that it cures OSA. This multicentre case series of one of the most effective bariatric procedures shows substantial improvement but persistence of moderate to severe OSA in 20%. A postoperative sleep study is needed once weight loss stabilises to assess this.

Reference: Sleep Med 2017;35:85-90

Abstract

Self-reported sleep complaints are associated with adverse health outcomes

Authors: Paine S et al.

Summary: This cross-sectional analysis of the 2002/03 NZ Health Survey investigated the prevalence of self-reported sleep complaints in NZ adults and determined their association with adverse health outcomes. Data for 12,500 adults were analysed, and the prevalence of self-reported sleep complaints was estimated by ethnicity. The prevalence of each sleep complaint measure was highest for Māori, with 23.6% reporting any sleep complaint and 10.3% reporting multiple sleep complaints. Reporting ‘any’ sleep complaint was associated with a high risk of poorer mental health, high blood pressure, diabetes, heart disease, poor/fair self-rated health, obesity, current smoking, and hazardous drinking.

Comment (KF): Previous NZ research has shown that insomnia symptoms, OSA syndrome, and daytime sleepiness are more common amongst Māori than non-Māori adults. This current research shows sleep complaints are an important health indicator and therefore it is important that we know about any sleep problems in our patients. It is particularly important that we know how well (or poorly) our Māori patients are sleeping.

Reference: Ethn Health 2017; published online Apr 15

Abstract

Independent commentary by Dr Karen Falloon

Dr Karen Falloon completed her medical training at the University of Auckland Medical School in 2001. She became a fellow of the Royal New Zealand College of General Practitioners in 2009. In 2014 Karen completed her PhD in General Practice for which she investigated the effectiveness of a behavioural treatment for insomnia. She works as a GP specialising in insomnia and as a senior lecturer in the Department of General Practice and Primary Health Care at the University of Auckland. Karen is a member of the Australasian Sleep Association and serves on the GP education subcommittee.

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Obstructive sleep apnea: the effect of bariatric surgery after 12 months

Authors: Peromaa-Haavisto P et al.

Summary: This prospective, multicentre study investigated the effect of a laparoscopic Roux-en-Y gastric bypass on OSA. Standard overnight cardiorespiratory recording was conducted 1 year after bariatric surgery in 132 patients who had OSA prior to the operation. The main outcome measures were changes in the prevalence of OSA, and AHI. The prevalence of OSA decreased from 71% at baseline to 44% one year after surgery (p<0.001). OSA was cured in 45% of patients and cured or improved in 78%. However, moderate or severe OSA persisted in 20% of patients 1 year after the operation. Total AHI decreased from 27.8 events/h to 9.9 events/h (p<0.001).

Comment (AN): Bariatric surgery is an effective treatment for morbid obesity and the metabolic syndrome. I have heard proponents claim that it cures OSA. This multicentre case series of one of the most effective bariatric procedures shows substantial improvement but persistence of moderate to severe OSA in 20%. A postoperative sleep study is needed once weight loss stabilises to assess this.

Reference: Sleep Med 2017;35:85-90

Abstract
Nocturnal road traffic noise exposure and children’s sleep duration and sleep problems

Authors: Weyde K et al.

Summary: This analysis of data from the Norwegian Mother and Child Cohort Study examined the association between nocturnal road traffic noise exposure and children’s sleep quality. Parental reports of children’s sleep duration and sleep problems at age 7 were linked to modelled levels of residential night-time road traffic noise for 2665 children living in Oslo, Norway. There was no association between road traffic noise and sleep duration or sleep problems in the total study population. However, a significant association was observed in girls.

Comment (KF): This study is interesting more because it highlights the potential issue of road traffic noise disrupting sleep than for its results as there are some important limitations to the study. Importantly, the study showed a statistically significant association between road traffic noise and maternal report of sleep duration in girls (but not boys). In girls, per 10 decibel increase in road traffic noise exposure, the odds for sleeping 10h or less, as compared to more than 10h, increased by 21% (10h being the approximate mean duration of sleep for a 7-year-old). It may be that road traffic noise causes many more sleep-associated problems in both genders than this study is able to show. The main outcome was maternal report of sleep duration so there may have been inaccurate estimates of this. It is also very possible that road traffic noise disturbs sleep without necessarily affecting sleep duration (e.g. by disrupting sleep stages). So it is important to avoid the conclusion that boys are not affected by road traffic noise. It would have been interesting to look at any associations between noise and daytime effects (sleepiness, behaviour, cognitive function) too. The impact of noise on children’s sleep may be particularly important to consider in children living close to noisy roads, railway tracks, living in apartments and closer to the city centre.

Abstract

The association between insomnia symptoms and risk of cardio-cerebral vascular events

Authors: He Q et al.

Summary: This meta-analysis of cohort studies examined the association between insomnia symptoms and risk of cardio-cerebral vascular events. A search of PubMed, Web of Science and the Cochrane Library identified 15 studies (23 cohorts) suitable for inclusion. Meta-analysis of the data found that difficulty initiating sleep, difficulty maintaining sleep and non-restorative sleep were positively associated with risk of cardio-cerebral vascular events (pooled relative risks: 1.27, 1.11 and 1.18, respectively). However, there was less evidence to support an association between early-morning awakening and cardio-cerebral vascular events.

Comment (KF): The results of this study are rather alarming given that the meta-analysis identifies an association between difficulty falling asleep or staying asleep and non-restorative sleep and increased risk of future cardio-cerebral vascular events. It seems you may be safe from this fate if your difficulty with sleep is early morning awakening. What this paper can’t tell us though is anything about the frequency, duration or severity that might confer this risk. Nevertheless, it highlights this potentially significant health impact of insomnia.

Abstract

Impact of mandibular advancement therapy on endothelial function in severe obstructive sleep apnea

Authors: Gagnadoux F et al.

Summary: This French study investigated whether treatment with a mandibular advancement device (MAD) improves endothelial function (a major predictor of late cardiovascular events) in patients with severe OSA. 150 patients (86% male) were randomised to use an effective MAD or a sham device for 2 months. Intention-to-treat analysis showed that effective MAD therapy was not associated with improvement of endothelial function compared with the sham device. However, it did improve AHI, microarousal index, and symptoms of snoring, fatigue, and sleepiness. Blood pressure outcomes did not differ between the two groups at study end. Mean objective compliance was 6.6 h/night with the MAD and 5.6 h/night with the sham device (p=0.006).

Comment (KF): There have been conflicting results in studies looking at changes in endothelial function in response to CPAP therapy for OSA so it is not especially surprising that no dramatic effect was shown with the use of MAD in this study. The patients in this study had severe OSA but fairly normal blood pressures at baseline so it is perhaps also not surprising that no blood pressure-lowering effect of the MAD was seen. Patients with a history of cardiovascular disease, obesity, or severe daytime sleepiness were also excluded so it may be that any effects of MAD on endothelial dysfunction are smaller or not apparent in this lower risk group of patients. The follow-up time was 2 months which potentially could have been too short to pick up changes measured by the reactive hyperaemia index used in the study as a measure of endothelial dysfunction. What the study can tell us though is that the MAD reduced OSA severity over 2 months and is more effective than a sham device.

Reference: Am J Respir Crit Care Med 2017;195(9):1244-52
Abstract

Correlates of nocturia and relationships of nocturia with sleep quality and glycemic control in women with type 2 diabetes

Authors: Chang C-J et al.

Summary: This study investigated the prevalence of nocturia in women with diabetes and determined its association with sleep quality and glycaemic control. 275 women with type 2 diabetes completed a structured questionnaire. 124 (45.1%) of them reported that they had experienced nocturia (≥2 voids per night). Waist circumference, parity, time since diagnosis of diabetes, sleep quality, and increased daytime urinary frequency were all correlated with nocturia after adjusting for age. Women with nocturia had poorer sleep quality than women without nocturia. There was a significant correlation between sleep quality and the number of nocturnal episodes.

Comment (KF): This article is a good reminder to explore the effects of any nocturia in our diabetic patients. Waking at night to void causes sleep disturbance. It is also important to explore how long it might take to then fall back to sleep and to look at any management strategies that can be implemented to improve both nocturia and sleep.

Reference: J Nurs Scholarsh 2017; published online May 23
Abstract