Managing obstructive sleep apnoea and achieving equity: implications for health services

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Abstract

Sleep occupies a third of life, and poor sleep has wide-ranging consequences for health, safety, and well-being. Recent research suggests significant inequalities in sleep health between Māori and non-Māori adults in New Zealand including self-reported sleeping problems and obstructive sleep apnoea syndrome (OSAS). This paper will outline a series of studies that were designed to assess how many people were affected by OSAS in Aotearoa/New Zealand and specifically sought to prioritise the needs of Māori. It will discuss a number of issues related to the diagnosis and treatment of OSAS in New Zealand and present strategies for reducing inequalities in sleep health.

There are a wide range of causes for inadequate sleep, ranging from intrinsic problems with sleep regulatory mechanisms, through disturbances associated with other physical and mental health problems to social pressures and demands (e.g., having to work non–standard hours). Currently, more than 80 different sleep disorders have been identified. The most commonly diagnosed and treated sleep disorder in New Zealand and internationally is Obstructive Sleep Apnoea (OSA). OSA is part of a spectrum of sleep-related breathing disorders which is primarily categorised by repetitive episodes of airflow reduction (hypopnoea) or cessation (apnoea) due to upper airway obstruction during sleep. OSA accompanied by excessive daytime sleepiness is referred to as obstructive sleep apnoea syndrome (OSAS). Symptoms typically include loud snoring interrupted by breathing pauses, and aetiological risk factors include age, obesity, male gender, smoking, and alcohol consumption.

The international literature reports that OSAS is common in adults, affecting 2% of women and 4% of men. Evidence from sleep clinics in New Zealand indicates that Māori patients often present with more severe OSAS. OSAS is associated with increased risk of high blood pressure, heart disease and stroke, excessive daytime sleepiness, and motor vehicle accidents, all of which disproportionately affect Māori. The prevalence of obesity, one of the strongest risk factors for OSAS, is higher in Māori than non-Māori.

The authors have been involved in a number of community based studies examining the prevalence of sleep problems and sleep disordered breathing, with a particular focus on inequalities between Māori and non-Māori. This paper presents an overview of findings from these studies with a focus on OSAS and discusses the implications for prevention, diagnosis and treatment of OSAS.
Prevalence of OSAS and sleep problems for Māori and non-Māori in New Zealand

Recent New Zealand evidence indicates that Māori have a higher prevalence of OSAS than non-Māori. Results of a national survey on OSAS symptoms and risk factors (5500 participants of Māori descent, 4500 non-Māori, 30–50 years, response rate 71.4%), found that the population prevalence of OSAS symptoms (snoring always, observed apnoeas and excessive daytime sleepiness) was significantly higher among Māori men and women compared with non-Māori (all p<0.001). In addition, Māori men had a significantly larger mean neck size than non-Māori men (41.98 cm vs 40.15 cm, p<0.0001), as did Māori women compared with non-Māori women (36.16 cm vs 34.34 cm, p<0.0001). Neck size (an indicator of central obesity) is a risk factor that has been shown to correlate more closely to OSAS than Body Mass Index.

In this national survey, ethnicity was not an independent predictor of reporting snoring always. However, for observed apnoeas there was an interaction between ethnicity and smoking whereby Māori ethnicity was a significant predictor but only among non-smokers. Increasing neck size was an independent predictor for reporting observed apnoeas and snoring always.

In a parallel study, 364 adults in the Wellington region (Māori=169, non-Māori=195) were monitored overnight in their own homes, using portable recording equipment (MESAM IV) to assess breathing disturbances during sleep. Breathing disturbances were defined as the average number of ≥4% O₂ desaturations per hour of sleep, plus bursts of snoring or >10/min increase in heart rate (the respiratory disturbance index or RDI). OSA was defined at three thresholds of RDI (≥5, ≥10, ≥15) and OSAS was defined as OSA (≥5, ≥10, ≥15) with the addition of daytime hypersomnolence (i.e. a score of >10 on the Epworth Sleepiness Scale).

In this community study, the prevalence of OSA at all RDI thresholds was higher among Māori than non-Māori. In particular, Māori were significantly more likely to have more severe respiratory disturbances (RDI≥10: 10.9% vs. 3.3%, p=0.02; and RDI≥15: 6.5% vs. 1.5%, p=0.03). Māori also had higher prevalence estimates of OSAS (RDI≥5 plus excessive daytime sleepiness): (Māori men=4.4%; non-Māori men=4.1%, Māori women=2.0%, non-Māori women=0.7%). These prevalence estimates are conservative, because the monitoring technology used did not permit reliable identification of hypopnoeas which are usually included in the RDI.

In this study, the higher risk among Māori reduced and became non-significant after adjusting for well-recognised risk factors such as increased body mass index and large neck size.

These results support clinical observations that suggest a higher prevalence of OSAS amongst Māori. Ethnic inequalities in sleep disordered breathing have previously been reported (e.g.). In the study presented here, OSA prevalence estimates for Māori were closer to the estimates for the Wisconsin Cohort and the Australian population study, whereas prevalence estimates for non-Māori were significantly lower.

Results of a national survey which focussed on insomnia symptoms (response rate 72.5%) showed that Māori were more likely to report chronic sleep problems (lasting
more than 6 months) than non-Māori (28.6% versus 24.6%, p=0.033). In this study people who reported a chronic sleeping problem were more likely to report that their general health, quality of life, concentration, and memory were only fair or poor, that their ability to cope with minor problems, or to accomplish daily tasks was impaired, and that they had difficulty with interpersonal relationships. These findings remained significant after taking into account demographic and socioeconomic factors.

Socioeconomic deprivation, unemployment, and night work were also associated with reporting chronic sleeping problems. These factors are disproportionately higher among Māori and may contribute to inequalities in sleep problems, as well as having an independent effect.

**Diagnosis and treatment of OSAS in Aotearoa/New Zealand**

Specialist diagnostic and treatment services for sleep problems in Aotearoa/New Zealand are currently very limited. Most are hospital-based and focus on sleep-related breathing disorders, primarily OSAS. The New Zealand branch of the Thoracic Society of Australia and New Zealand (TSANZ) has highlighted a need for increased funding, servicing, and consistency of specialist sleep services nationwide, and that decision making at the national level is required to address these issues.

Recent research confirms that current services will be unable to meet the needs of the population, which are expected to increase with the increase in obesity. The prevalence studies presented here were designed to assess the needs of Māori as well as the overall population. It is important that current services and the continued development of services meet Māori needs given the higher risk of OSAS among Māori patients.

Polysomnography (PSG) is the accepted gold standard for the diagnosis of sleep-disordered breathing. PSG consists of monitoring brain electrophysiological activity, eye movements, muscle tone, heart rate, respiration, blood oxygen levels, and leg movements. However it has been criticised as a method of evaluation because it’s high cost limits accessibility. In New Zealand, gold standard diagnostic services (fully attended overnight PSG) are only offered through hospital clinics in major centres. A range of more limited diagnostic studies are also undertaken by these clinics and some other services in smaller centres.

As the general public and health care professionals have become more aware of the importance of sleep disordered breathing, demand for diagnosis and treatment has increased, and a number of alternative diagnostic methods have been developed based on portable monitoring devices. These differ in the number of signals recorded, from the same signals as attended PSG, to only a single oximetry channel.

More limited screening criteria can be used to prioritise patients with a high pre-test clinical probability of OSA, for split-night PSG studies. These utilise the first half of the night to evaluate the presence of OSA and the second half to implement treatment (nCPAP), thus increasing the through-put of specialist services and reducing waiting lists.

In New Zealand, a primary care model has been proposed to facilitate appropriate referral of snorers to specialist sleep services. This model provides guidance on the classification of snorers, based on the patient’s level of daytime sleepiness (i.e. a score
>10 on the Epworth Sleepiness Scale) and nocturnal hypoxaemia (measured using pulse oximetry).

The appropriateness of this model has been debated (see 23) with the need for more evaluation of this model as a screening tool for OSA raised. However, it illustrates a type of approach that could potentially improve referral and promote more effective use of publically funded specialist services. Increased management of OSA at the primary care level, including involvement of Maori health providers, with support from specialist services may enable services to better meet the growing population needs.

Services in New Zealand are also hindered by the lack of a systematic nationwide approach to the management of sleep disorders. There are marked variations among DHBs in the funding allocated for Continuous Positive Airway Pressure, or CPAP, machines, and also differences in terms of the type of clinical problems that services are being asked to investigate. The quality of services offered also varies. The TSANZ and the Australasian Sleep Association (ASA) have established an accreditation process to foster quality care in the management of sleep disorders, however accreditation of services is currently voluntary. On the other hand, the under-developed state of current services offers an opportunity to develop services tailored to population needs.

Rapid advances in sleep disorders medicine have lead to the development of treatment services in many countries being driven primarily by perceived business opportunities. New Zealand has lagged behind in the provision of services, but the epidemiological evidence to date provides a unique opportunity to take an evidence-based approach to the development of services targeted to reach those most in need, as well as contributing to the health of all New Zealanders.

Untreated OSAS imposes significant economic and social costs, including costs of treating medical conditions that may be exacerbated by OSAS, diminished work productivity due to direct effects of OSAS or due to complications of associated co-morbidities, and the cost of accidents. 24–26 A New Zealand based economic evaluation indicates that treatment of OSAS is relatively cost-effective in terms of the cost per Quality-of-Life-Year gained.27

The total annual societal costs of OSAS were conservatively estimated at $40 million, or $419 per case. The incremental net cost of treating OSAS was estimated at $389 per case treated. The net direct medical cost per QALY gained with successful treatment of OSAS was $94. Between 1998/99 and 2004/05, new funding decisions by PHARMAC, who routinely use cost-effectiveness analyses, have averaged $6,865 per QALY gained. In comparison, investment in the provision of OSAS treatment would be very cost-effective.27

Primary care plays an important role in the identification of OSAS. However, overseas research indicates that OSAS is grossly under recognised in this setting with primary care physicians relatively under informed about the clinical features and medical and social ramifications associated with OSAS.28 Should this also be the case in New Zealand, many New Zealanders with sleep disorders may be undiagnosed, misdiagnosed or inappropriately treated or referred. Tools have been developed which
may help primary care physicians in recognising sleep disorders, but few have been validated.

There is clearly also a need for effective public health approaches aimed at prevention and mitigation of OSAS and other sleep problems. These include measures to reduce OSAS risk factors such as obesity, smoking, and inequalities in wider determinants of health, as well as the need for measures that mitigate societal impacts on sleep such as shift work. This has implications not only for the health sector but also for other sectors and industry groups. In addition, widespread education of health professionals and the general public is important. An integrated approach, which prioritises Māori needs, is required for the prevention and management of sleep problems.

**Sleep health inequalities**

Māori have on average the poorest health status of any ethnic group in New Zealand, with disparities existing across a range of health, mortality and morbidity indicators, including self-reported sleeping problems.

Māori are also disproportionately affected by a number of risk factors and negative health consequences associated with sleep problems. Disparities in sleep problems may also impact on other health inequalities between Māori and non-Māori such as motor vehicle accidents, work place injuries, cardiovascular disease, and general health and quality of life.

Ethnic disparities in health more widely signal differential access to the goods, services and opportunities of society. They represent unequal access to political, economic, social, and environmental determinants of health and to timely, effective, appropriate, high quality health care. Such disparities can be conceptualised not only in terms of need but as historical and contemporary breaches of the rights of Māori—human, civil, political, and social and the rights of indigenous peoples (from ).

It is acknowledged that the current health system is unable to meet the needs of the total population with regards to the diagnosis and treatment of OSAS. However, within the health sector, the goals are not just to improve the health of the overall population, but to reduce inequalities.

To reduce disparities in sleep health, additional work is needed to develop diagnostic and treatment services that are accessible and appropriate for Māori communities. That disproportionate numbers of Māori patients present at clinics with more severe OSAS (e.g. ) raises concerns about accessibility of services and possibly differential referral.

In addition, a number of clinics are private services, which may result in financial barriers. In 2003, approximately half of specialist sleep services available in New Zealand were privately funded, requiring patients to pay a substantial amount. This is of particular concern given that Māori are over-represented in the most deprived deciles and in lower socioeconomic groups. The mix of public and private services overall may contribute to increasing disparities in OSAS, if they are generally more accessible to non-Māori.

Previous research supports the need for increased sleep services overall in Aotearoa. However, if these services continue to be more accessible to non-Māori, disparities
could paradoxically increase. There is evidence of differential quality of care by ethnicity in other areas of health in New Zealand which also needs to be considered. Service development must ensure that Māori needs are met in order to address both population needs and inequalities, and that such development is monitored adequately to assess this.

In addition to a lack of services is the need for further education on sleep and its impact on health. This should include information on ethnic inequalities in New Zealand and the greater risk among Māori.

It is important to consider the disparities in sleep health in the wider context of ethnic inequalities in health. Prevention, and diagnostic and treatment services designed to meet Māori needs and address inequalities could help reduce the health effects of sleeping problems and thereby other health disparities. In addition, addressing factors underlying disparities in other areas of health is likely to reduce disparities in sleep problems. These include addressing structural inequalities and wider determinants of health (e.g. socioeconomic disparities, discrimination) and individual level risk factors.

A project is currently underway that will provide information on publically-funded service provision for the screening, diagnosis and treatment of OSA in New Zealand. It will include a stock-take of current services and present a framework for service provision that includes an integrated model of care that could improve Māori sleep health. Importantly, this information will be useful for monitoring equity of access and outcomes among Māori and non-Māori in Aotearoa/New Zealand.

Conclusion

Sleep occupies a third of life, and poor sleep has wide-ranging consequences for health, safety, and well-being. Recent research conducted by the authors suggests significant inequalities in sleep health between Māori and non-Māori including self-reported sleeping problems and obstructive sleep apnoea syndrome. To reduce these disparities, additional work is needed to develop diagnostic and treatment services that are accessible and appropriate for Māori communities. An integrated approach to the prevention and management of sleep problems in New Zealand is needed. The higher risk among Māori of the development of sleep problems and their negative consequences indicates Māori needs should be prioritised.

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