

Continuous positive airway pressure treatment for obstructive sleep apnoea: Māori, Pacific and New Zealand European experiences

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ABSTRACT

INTRODUCTION: Continuous positive airway pressure (CPAP) is an effective treatment of obstructive sleep apnoea (OSA), but can be limited by poor adherence. In New Zealand (NZ), ethnicity has been shown to be a predictor of CPAP adherence. This study aimed to explore Māori, Pacific and NZ European patients' experience of CPAP treatment.

METHODS: Patients identifying as Māori, Pacific, or NZ European ethnicity referred for CPAP treatment for OSA attended separate, 1.5-hour group discussions facilitated by a health care worker of the same ethnic group, using an interview template. Thematic analysis was applied to the discussion transcripts independently by two investigators, following published guidelines.

FINDINGS: Five Māori, five Pacific, and eight NZ Europeans participated (mean age 47, range 30–71 years, mean \pm standard deviation CPAP adherence 6.32 ± 1.25 hours/night). Patients in all three groups reported that they had little knowledge of OSA or CPAP prior to treatment initiation. All groups identified barriers to treatment (both at the CPAP initiation phase and long term), reported feelings of being 'overwhelmed' with information during the initial CPAP education session, and discussed the importance of successful role models. Family and friends were generally reported as being supportive of CPAP therapy.

CONCLUSION: The three groups all reported similar initial CPAP experiences, highlighting access barriers to publicly funded assessment and treatment pathways, and sleep health knowledge as key issues. Educational resources to improve access, enable self-management, and increase community awareness of OSA would help overcome some of the issues identified in this study.

KEYWORDS: Continuous positive airway pressure; obstructive sleep apnea; ethnic groups; focus groups

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Introduction

Obstructive sleep apnoea (OSA) is a sleep-related breathing disorder characterised by repeated breathing pauses during sleep, caused by a physical obstruction in the upper airway. The repetitive obstructive events are associated with periods of hypoxaemia/hypercapnia, typically terminating with an arousal from sleep to restore airway patency. Sleep becomes highly fragmented, often resulting in excessive daytime sleepiness or fatigue, while the repeated dips in oxygen saturation accompanied by surges in blood pressure place stress on the cardiovascular system. Patients

with OSA are at a higher risk of accident, as well as cardiovascular diseases, such as hypertension, stroke, and myocardial infarction.^{1–4}

First-line therapy for moderate to severe OSA is continuous positive airway pressure (CPAP),⁵ which delivers air to the upper airway through a mask, at sufficient pressure to prevent airway obstruction and collapse. CPAP is a highly effective treatment for OSA, resulting in improved daytime functioning,⁶ and reduced risk of cardiovascular morbidity and mortality.^{7–9} However, as with most medical treatments, CPAP therapy is only effective if used regularly, so benefit is

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limited in some clinical populations by a high refusal rate and suboptimal adherence.^{10,11} A comprehensive review of international literature reports widely varying rates of suboptimal use, with 29–83% of patients using CPAP less than four hours per night.¹² It has been demonstrated that optimal usage of CPAP for improvement in objective sleepiness and sleep-related quality of life is six or more hours per night.¹³ Behavioural interventions designed to increase CPAP usage, including pre-treatment educational sessions,^{14,15} group discussion sessions,¹⁶ augmented follow-up support,^{17,18} and cognitive behavioural therapy,¹⁹ have been beneficial but are labour-intensive and expensive to implement, and have not been widely adopted. Research has therefore focused on identifying baseline predictors of poor adherence, such as increased age,^{20,21} female gender,^{20,22} and milder disease,^{20,23} in order to target intervention to these subgroups.

Previous New Zealand (NZ) studies have found that Māori^{24,25} and Pacific²⁵ patients used CPAP significantly less than non-Māori/NZ Europeans, and that lower levels of education and high socioeconomic deprivation independently predicted low CPAP adherence, after adjusting for ethnicity. Furthermore, there is evidence that OSA is more prevalent and more severe among Māori compared with non-Māori in NZ,^{26–28} highlighting the need for appropriate and improved service delivery, including strategies to optimise treatment in these groups. This study, therefore, aimed to conduct focus group sessions with Māori, Pacific and NZ European patients referred to a tertiary-level clinic for CPAP treatment, in order to gain insight into their experiences with CPAP treatment.

Methods

Ethical approval for the study was granted by the Central Region Ethics Committee (Ref. CEN/09/11/091), and all patients gave written informed consent for participation.

Recruitment

Inclusion criteria were as follows: aged 25 years or older, living in the Greater Wellington region, and referred for CPAP treatment for the first time, at a single sleep clinic, during a nine-month

period in 2010. Self-identified ethnicity information was available from a standard sleep clinic questionnaire; when multiple ethnic groups were identified, prioritised ethnicity was assigned as per NZ Ministry of Health guidelines.^{29,30} Patients had previously agreed to be considered for research protocols and were recruited through community health providers or the sleep laboratory database. Given the small numbers of Māori and Pacific patients meeting the inclusion criteria, all were approached to take part (Māori n=25; Pacific n=14), whereas to manage sample size, a random selection of NZ European patients were approached (n=73).

Initiation of CPAP treatment

Patients were initiated on CPAP at the WellSleep Sleep Investigation Centre following standard clinical practice. Patients referred through the NZ government-funded health system had not contributed financially to the cost of their appointments or CPAP device and mask. Privately referred patients paid for all equipment and appointments.

Educational information provided to all patients was standardised, and included a brochure, a 30-minute verbal overview presented by a technologist, and a video providing information regarding OSA and CPAP. Following the first night of home CPAP use, a technologist phoned all patients to troubleshoot initial problems. A standard follow-up during a home treatment trial consisted of 30-minute appointments with a technologist after two and four weeks of CPAP use, each of which followed a standardised set of interview guidelines. During these appointments, symptoms and patient outcomes were discussed and objective adherence (mean hours/night use) was downloaded from each device.

Focus groups and data collection

Focus groups were conducted by University of Otago researchers according to accepted methodology.^{31,32} Each focus group ran for approximately 1.5 hours and was conducted when attendees had used CPAP at home for up to nine months. Attendees were offered free transport or were reimbursed NZ\$20 for transport costs. One of the

authors (JPB) facilitated the focus group for NZ European patients, which took place in a hospital meeting room; using our established community links, local Māori and Pacific health workers facilitated the other groups at a local marae [Māori meeting place] and church hall, respectively. Two of the authors (JPB and KMO) were present at all three focus groups. Each focus group facilitator followed the same question framework (see Table 1). However, each facilitator ensured that appropriate cultural protocols were undertaken to welcome patients and promote sharing of experiences. For example, the local Māori facilitator welcomed participants in Māori, performed a karakia [prayer] and offered kai [food]. All patients were aware that the sessions were grouped by self-identified ethnicity to provide a comfortable environment for discussion, and were encouraged by the facilitator using additional prompts to vocalise the aspects of treatment initiation that they found challenging. Each focus group was audio-recorded, and transcripts were sent to all focus group attendees for editing.

Qualitative data analysis

Thematic analysis was applied to the qualitative data set by two investigators (JPB and KMO) independently, following published guidelines.^{32,33} All transcripts were coded, which involved adding notation to each sentence summarising the central point. Individual codes were then grouped into internally homogenous and externally heterogeneous themes. These preliminary themes and their encompassing codes were then reviewed by both investigators, who jointly decided on a final set of themes.

Findings

Descriptive information about the attendees in each focus group is summarised in Table 2, with data compared between groups using independent *t*-tests or Mann-Whitney tests where appropriate. All three groups extensively discussed issues around their initial problems with the CPAP equipment, as well as their motivation to use CPAP once these problems had been overcome. Additionally, attendees in all groups highlighted the importance of family and spousal support in getting established on CPAP treatment.

WHAT GAP THIS FILLS

What we already know: Continuous positive airway pressure (CPAP) is an effective treatment of obstructive sleep apnoea (OSA), but can be limited by poor adherence and high rejection rates. Ethnicity is associated with lower treatment adherence. The reasons are likely to be multi-factorial. New Zealand studies have found that Māori and Pacific patients used CPAP significantly less than non-Māori/NZ Europeans.

What this study adds: Focus groups with Māori, Pacific and NZ Europeans have highlighted the need for carefully timed and comprehensive preparatory education, and greater coordination of care between primary, secondary and tertiary sleep service providers. Patients may need enhanced resources to enable self-management of care.

Table 1. Focus group question template*

What was your understanding or prior knowledge of obstructive sleep apnoea?
Information provided by family doctor
Information provided by sleep/respiratory specialist
Information provided by other people (e.g. family or friends)
Information gained from other sources (e.g. books or internet)
What was your understanding or prior knowledge of CPAP?
Information provided by family doctor
Information provided by sleep/respiratory specialist
Information provided by other people (e.g. family or friends)
Information gained from other sources (e.g. books or internet)
How useful was the information provided by the sleep clinic?
Educational brochure sent in the mail
Video watched during first sleep clinic appointment
Verbal information given by technologist during first sleep clinic appointment
Verbal information given during follow-up appointments
What kinds of external support were available to you during your CPAP trial?
Spouse/partner
Immediate/external family members
Wider circle of friends/colleagues
Other sources of support
What was your experience of the CPAP trial structure?
Phone call after first night of CPAP at home
Follow-up appointments: number, frequency, duration
Follow-up appointments: feeling of support, solving problems, improving quality of life
What would your ideal CPAP trial consist of?

CPAP Continuous positive airway pressure

* The wording of each question was chosen by the facilitator of each focus group. The five major questions were asked in order; the topics listed under each question were used as prompts if these topics were not discussed as part of the initial group discussion.

Service delivery

All groups expressed some confusion regarding the current local treatment model, which involves referral from primary care to specialty sleep services at the WellSleep Centre clinic, and also about which health providers were responsible for each aspect of their care. Attendees were often not aware of the limitations of the government-funded service, or that sleep services could be accessed through either the government-funded service or with private funding.

And I didn't even realise I could have, sort of, appreciate that I could have done it through the district health board. (NZ European; female)

Additionally, attendees noted that there was a considerable focus by secondary/tertiary-level health service providers on objective measures of

CPAP 'use', rather than patient-based goals. As an alternative, many identified their preference for working towards personal goals of treatment, which included positive lifestyle changes and improvement in symptoms, such as daytime sleepiness.

Knowledge of OSA and CPAP prior to and during treatment period

Only NZ Europeans reported some understanding of OSA and CPAP prior to referral, although attendees in all groups identified that increased knowledge would have been beneficial. All groups sought additional information after starting treatment. Māori and Pacific patients sought information from family and friends, whereas NZ European patients sought external information using the internet.

Table 2. Descriptive information of focus group attendees*

	Māori (n=5)	Pacific peoples (n=5)	NZ European (n=8)
Number of males (%)	3 (60%)	3 (60%)	5 (63%)
Number of privately referred patients (%)	0	1 (20%)	2 (25%)
Age in years (mean ±SD)	39.3 ±6.2	43.5 ±11.2 [†]	58.1 ±8.5 [‡]
Number of days in CPAP trial [§] (mean ±SD)	37.0 ±87.9	22.5 ±7.6	28.6 ±9.5
Number of days on CPAP at time of focus group [§] (mean ±SD)	90.0 ±87.9	198.0 ±27.7 [†]	116.4 ±30.9
Baseline apnoea hypopnoea index (events/hour; mean ±SD)	93.0 ±45.8	67.9 ±52.6	59.1 ±29.4
Baseline ESS (score /24; mean ±SD)	15.0 ±8.3	13.5 ±4.4	11.5 ±5.9
End-trial ESS [§] (score /24; mean ±SD)	5.8 ±6.4	5.0 ±2.0	7.0 ±3.8
CPAP pressure (cm H ₂ O; mean ±SD)	14.1 ±5.3	14.0 ±4.2	10.8 ±1.6
End-trial CPAP adherence (hours/night; mean ±SD)	5.1 ±0.9	6.8 ±1.5	6.7 ±1.0 [‡]

CPAP Continuous positive airway pressure

ESS Epworth Sleepiness Scale

SD Standard deviation

* Data were compared using independent *t*-tests or Mann-Whitney tests where appropriate. No significant differences between Māori and Pacific groups were found on any variable.

† Significant difference between Pacific and NZ European groups; *p*≤0.05

‡ Significant difference between Māori and NZ European groups; *p*≤0.05

§ The 'number of days in the CPAP trial' refers to the time that the patient was under the care of the sleep clinic. The focus groups took place at some point after each patient had been discharged from the sleep clinic; this is indicated as the 'number of days on CPAP at time of focus group'. 'End-trial CPAP adherence' was measured at the time of discharge.

|| This is the standard index by which obstructive sleep apnoea severity is assessed, and is the average number of apnoeas and hypopnoeas occurring per hour during the diagnostic sleep study. In general, an apnoea hypopnoea index <5 events/hour is considered normal while an apnoea hypopnoea index ≥30 events/hour is considered severe.

I used the resources; I had a person that's been on this machine for 16 years so she weaned me into what I'm supposed to do. (Māori; female)

Members of all groups reported feeling overwhelmed with the amount of information delivered at the WellSleep Centre clinic immediately prior to, and during, their first sleep/CPAP appointment. Māori and NZ European patients also reported that the timing of the information provided was not optimal. A preference was expressed for early access to information about 'healthy sleep' and CPAP initiation from a patient perspective.

There's a lot of information especially with pamphlets and that, the video... some people might find it a bit [of] overkill. (Pacific; male)

I think it was just a lot of information at the time and it kind of went right past me if you know what I mean. It was not the right time... I didn't take it on board. (NZ European; male)

Motivation to use CPAP

All groups reported that complaints of snoring, witnessed apnoea and daytime sleepiness improved with CPAP, contributing to their motivation to use the treatment. Māori and Pacific attendees shared stories regarding recent exercise and dieting behaviours, motivated and enabled by the start of CPAP treatment. The NZ European and the Māori focus group participants repeatedly expressed an emotional attachment to their CPAP device.

Mine's like a security blanket... I feel so secure with it. (Māori; female)

You've got to practically love your machine, knowing that it's there to keep you alive. (NZ European; female)

Many identified that improvement of OSA symptoms, such as increased alertness, were significant motivators for using CPAP. This motivation was extended to making additional lifestyle changes, such as improved diet and exercise.

In turn it's giving me a bit more energy which I... I'm in the gym, losing weight,... I've changed my diet. (Māori; male)

Treatment barriers

Patients in all focus groups discussed technical problems with equipment extensively, and/or side effects, such as mask discomfort and nasal congestion, and a lack of improvement of some symptoms. Financial cost when considering starting treatment and of long-term use was mentioned by the privately referred NZ European and Pacific patients. The Māori focus group, which comprised only government-funded patients, discussed financial barriers to long-term treatment in the context of having to replace a device if broken or stolen. Māori patients also reported difficulties arranging transport to appointments.

Māori patients reported some initial embarrassment in shared sleeping arrangements that they have since overcome.

If there's a tangi [funeral] I'll take it with me. I don't care who's watching. At least I'll wake up feeling good. (Māori; female)

Pacific patients reported an unwillingness to complain about something that had been provided without cost, emphasising that this was part of Pacific culture. They also expressed appreciation of an explanation of OSA and CPAP by health professionals 'in a Samoan way', which then promoted better understanding of the condition and its benefits, and in turn establishment on treatment.

Family and social motivators

All three focus groups reported experiences of both positive and negative reactions from family members regarding their use of CPAP, but the impact of CPAP on bed-partners was overwhelmingly positive.

The benefits to me have not been as great as I might have hoped, but my wife loves that mask. (NZ European; male)

It doesn't actually just help you, it helps the whole house. It does make a difference... once it's normal in your household then it's easier to feel less embarrassed about it with other people. (Pacific; female)

Some Māori patients reported receiving encouragement to use CPAP from people other than family or friends, including employers.

The use of a role model during the trial was felt to be a positive step in terms of helping patients with the acceptance of treatment, as well as the practicalities of using CPAP.

Have somebody who's been through it and has used CPAP for a while come in to talk to somebody for 10 or 15 minutes that's about to start the process... can assure somebody that you do get used to it. (NZ European; female)

Many Māori and Pacific patients had deliberately sought to inform family members and friends about OSA and the impact of CPAP, and now saw themselves as role models for others in their social networks.

You're a role model for other people... just the change in your life and people say, 'Hey what happened there?' and you know, 'How did you do that?' (Māori; male)

I'm not ashamed anymore, aye... I tell as many people as I can... 'specially a lot of my bigger friends that I play American football [with]... they are quite big so I make sure I tell them. (Pacific; male)

Emotional issues

Attendees at each of the three sessions reported a mix of emotions including fear, denial, apprehension and embarrassment, surrounding the diagnosis of OSA and CPAP treatment, as well as a sense of relief, realisation, or acceptance once the diagnosis was confirmed.

I felt like it was a double-edged sword. I felt relief that we were finally going to get something done, but sad that I would have to wear this for the rest of my days. (NZ European; female)

Discussion

Within NZ and internationally there is differential access to health care and differences in the determinants of health between ethnic groups.³⁴ Contributors include lifestyle factors,

socioeconomic status and health care structures,³⁵ which lead to substantial disparities in health outcomes. Drawing from our previous research on CPAP treatment,^{24,25} the current study aimed to gain insight into CPAP experiences to identify any inequities in sleep service provision. The qualitative data collected during separate focus groups of Māori, Pacific and NZ European patients using CPAP treatment indicate that, although some experiences were specific to particular cultural groups, most elements of discussion were common to all three groups. All groups discussed lack of initial awareness about OSA, feeling overwhelmed during the CPAP education session, early challenges with treatment, the impact of family support, uncertainty about pathways of care, and the importance of being successful role models for others.

Several large population studies of New Zealanders with sleep problems have highlighted that socioeconomic deprivation is a consistent and independent predictor of increased prevalence of poor sleep, OSA and insomnia.^{26,27,36-38} This aligns with our previous work, which has identified socioeconomic deprivation as an independent predictor of poor CPAP adherence.²⁴ Further work is needed to better understand additional predictors of poor sleep health and treatment outcomes. These may include education, health literacy, family support and income.

OSA is a chronic illness and usually associated with other chronic conditions. Therefore, obtaining successful outcomes for patients involves productive and integrated interactions between patients, clinicians and other health care professionals. Diagnostic sleep studies and treatment in NZ are provided in a variety of settings in different centres. Wellington's sleep service is delivered in a model using both secondary- and tertiary-level providers, with long-term follow-up provided in primary care. In Wellington, well-established processes ensure interservice communication, and education/specialist support between local secondary and tertiary sleep services. It is acknowledged that this model is not used throughout NZ. However, regardless of the sleep service pathway, it is important that networks be increasingly expanded to utilise primary care expertise, and that support and edu-

cation programmes are available to assist health care professionals in the specialised delivery of long-term care. The focus groups in this study have highlighted that there is confusion for patients regarding aspects of service delivery in the local model, and that improvements could be made in coordination of care.

The local identification of patients, requiring proactive provision of care and more intensive follow-up once commenced on CPAP treatment, is currently via the WellSleep Centre clinic, which is available to see and assess these patients regularly. The majority of patients are then asked to self-manage their condition and use primary care as their main provider of support. However, it is proposed that successful self-management of any chronic condition requires strong relationships between patient, community and the range of health service providers, with primary care as a key anchor.³⁹ In particular, patients require suitable resources to make informed decisions about their ongoing care and effective support strategies, including assessment, goal setting and follow-up. Given the lack of awareness prior to referral identified in this study, it would appear that general information about sleep, OSA and CPAP is not readily available in the community. Alongside this, the patient experience may be enhanced with carefully timed delivery of information, and increased patient involvement in goal setting.

To our knowledge, this is the first study that has aimed to summarise the experience of CPAP amongst patients of different cultural groups. Our results are consistent with a recent comprehensive review, which emphasised the contributions of patient care and government health policy to CPAP adherence.⁴⁰ A qualitative study based on individual interviews found that patients who were CPAP-adherent, placed importance on the sharing of their experience with other CPAP users.⁴¹ The concept of a CPAP role model draws further support from two papers that have reported that attendance at a group CPAP discussion session had contributed to patients becoming established on treatment, with other CPAP users acting as a source of both motivation and practical information.^{16,42} These strategies were raised and supported by participants in all three focus groups in the current study.

Limitations of this research study include the relatively small number of attendees in each session, and the fact that all attendees had demonstrated good adherence during initiation of CPAP. Study constraints, such as the number of participants meeting inclusion criteria, and the ethnic diversity of the group of Pacific people, may have influenced the depth and richness of the data collected. Steps were taken to mitigate this. Notably, a Pacific health worker with significant experience interacting with patients of various Pacific ethnic groups was used to facilitate the Pacific focus group. English was predominately the language used for discussion in all focus groups, which may have created cultural limitations for some participants. Further work is needed to investigate the experiences, and therefore aspects of care, in patients who do not accept or adhere to treatment during initiation of CPAP, and long-term.

In conclusion, the data gathered during these focus groups with Māori, Pacific, and NZ European patients concerning their experiences with CPAP can be used to develop resources to support patients starting CPAP treatment. Moreover, these findings identify areas of service delivery, particularly integration of care between primary, secondary and tertiary services, that may be improved in order to maximise patient outcomes with CPAP. There is a need to involve the wider community, including well-coordinated care between community-based primary care providers and the specialist sleep clinic, to support patients during their initial experience with CPAP.

References

1. Rodenstein D. Sleep apnea: traffic and occupational accidents—individual risks, socioeconomic and legal implications. *Respiration*. 2009;78(3):241–8.
2. Mulgrew AT, Ryan CF, Fleetham JA, Cheema R, Fox N, Koehoorn M, et al. The impact of obstructive sleep apnea and daytime sleepiness on work limitation. *Sleep Med*. 2007;9(1):42–53.
3. Marshall NS, Wong KK, Liu PY, Cullen SR, Knuiman MW, Grunstein RR. Sleep apnea as an independent risk factor for all-cause mortality: the Busselton Health Study. *Sleep*. 2008;31(8):1079–85.
4. Marin JM, Carrizo SJ, Vicente E, Agusti AG. Long-term cardiovascular outcomes in men with obstructive sleep apnoea-hypopnoea with or without treatment with continuous positive airway pressure: an observational study. *Lancet*. 2005;365(9464):1046–53.
5. Sullivan CE, Issa FG, Berthon-Jones M, Eves L. Reversal of obstructive sleep apnoea by continuous positive airway pressure applied through the nares. *Lancet*. 1981;1(8225):862–5.

6. Montserrat JM, Ferrer M, Hernandez L, Farre R, Vilagut G, Navajas D, et al. Effectiveness of CPAP treatment in daytime function in sleep apnea syndrome: a randomized controlled study with an optimized placebo. *Am J Respir Crit Care Med*. 2001;164(4):608–13.
7. Barbe F, Duran-Cantolla J, Capote F, de la Pena M, Chiner E, Masa JF, et al. Long-term effect of continuous positive airway pressure in hypertensive patients with sleep apnea. *Am J Respir Crit Care Med*. 2010;181(7):718–26.
8. Young T, Finn L, Peppard PE, Szklo-Coxe M, Austin D, Nieto FJ, et al. Sleep disordered breathing and mortality: eighteen-year follow-up of the Wisconsin sleep cohort. *Sleep*. 2008;31(8):1071–8.
9. Martinez-Garcia MA, Soler-Cataluna JJ, Ejarque-Martinez L, Soriano Y, Roman-Sanchez P, Illa FB, et al. Continuous positive airway pressure treatment reduces mortality in patients with ischemic stroke and obstructive sleep apnea: a 5-year follow-up study. *Am J Respir Crit Care Med*. 2009;180(1):36–41.
10. Engleman HM, Wild MR. Improving CPAP use by patients with the sleep apnoea/hypopnoea syndrome (SAHS). *Sleep Med Rev*. 2003;7(1):81–99.
11. Weaver TE. Adherence to positive airway pressure therapy. *Curr Opin Pulm Med*. 2006;12(6):409–13.
12. Weaver TE, Grunstein RR. Adherence to continuous positive airway pressure therapy: the challenge to effective treatment. *Proc Am Thorac Soc*. 2008;5(2):173–8.
13. Weaver TE, Maislin G, Dinges DF, Bloxham T, George CF, Greenberg H, et al. Relationship between hours of CPAP use and achieving normal levels of sleepiness and daily functioning. *Sleep*. 2007;30(6):711–9.
14. Lewis KE, Bartle IE, Watkins AJ, Seale L, Ebdon P. Simple interventions improve re-attendance when treating the sleep apnoea syndrome. *Sleep Med*. 2006;7(3):241–7.
15. Meurice JC, Ingrand P, Portier F, Arnulf I, Rakotonanahary D, Fournier E, et al. A multicentre trial of education strategies at CPAP induction in the treatment of severe sleep apnoea-hypopnoea syndrome. *Sleep Med*. 2007;8(1):37–42.
16. Likaar LL, Panciera TM, Erickson AD, Rounds S. Group education sessions and compliance with nasal CPAP therapy. *Chest*. 1997;111(5):1273–7.
17. Chervin RD, Theut S, Bassetti C, Aldrich MS. Compliance with nasal CPAP can be improved by simple interventions. *Sleep*. 1997;20(4):284–9.
18. Hoy CJ, Vennelle M, Kingshott RN, Engleman HM, Douglas NJ. Can intensive support improve continuous positive airway pressure use in patients with the sleep apnea/hypopnea syndrome? *Am J Respir Crit Care Med*. 1999;159(4 Pt 1):1096–100.
19. Richards D, Bartlett DJ, Wong K, Malouff J, Grunstein RR. Increased adherence to CPAP with a group cognitive behavioral treatment intervention: a randomized trial. *Sleep*. 2007;30(5):635–40.
20. McArdle N, Devereux G, Heidarnejad H, Engleman HM, Mackay TW, Douglas NJ. Long-term use of CPAP therapy for sleep apnea/hypopnea syndrome. *Am J Respir Crit Care Med*. 1999;159(4 Pt 1):1108–14.
21. Budhiraja R, Parthasarathy S, Drake CL, Roth T, Sharief I, Budhiraja P, et al. Early CPAP use identifies subsequent adherence to CPAP therapy. *Sleep*. 2007;30(3):320–4.
22. Lewis KE, Seale L, Bartle IE, Watkins AJ, Ebdon P. Early predictors of CPAP use for the treatment of obstructive sleep apnea. *Sleep*. 2004;27(1):134–8.
23. Yetkin O, Kunter E, Gunen H. CPAP compliance in patients with obstructive sleep apnea syndrome. *Sleep Breath*. 2008;12:365–7.
24. Bakker JP, O'Keefe KM, Neill AM, Campbell AJ. Ethnic disparities in CPAP adherence in New Zealand: Effects of socioeconomic status, health literacy and self-efficacy. *Sleep*. 2011;34(11):1595–603.
25. Campbell A, Neill A, Lory R. Ethnicity and socio-economic status predict initial continuous positive airway pressure compliance in New Zealand adults with obstructive sleep apnoea. *Intern Med J*. 2012;42(6):e95–e101.
26. Gander PH, Marshall NS, Harris R, Reid P. The Epworth Sleepiness Scale: influence of age, ethnicity, and socioeconomic deprivation. *Sleep*. 2005;28(2):249–53.
27. Mihaere KM, Harris R, Gander PH, Reid PM, Purdie G, Robson B, et al. Obstructive sleep apnea in New Zealand adults: prevalence and risk factors among Māori and non-Māori. *Sleep*. 2009;32(7):949–56.
28. Firestone RT, Mihaere K, Gander PH. Obstructive sleep apnoea among professional taxi drivers: a pilot study. *Accid Anal Prev*. 2009;41(3):552–6.
29. Ministry of Health, New Zealand. Ethnicity data protocols for the health and disability sector. Wellington: Ministry of Health; 2004.
30. Ministry of Health, New Zealand. National Health Index data dictionary Version 5.3. Published online 1 July, 2009. [cited 2014 July 15]. Available from: <http://www.health.govt.nz/publication/national-health-index-data-dictionary>
31. Barbour R. Doing focus groups. London: Sage Publications Ltd; 2008.
32. Bender DE, Ewbank D. The focus group as a tool for health research: issues in design and analysis. *Health Transit Rev*. 1994;4(1):63–80.
33. Braun V, Clark V. Using thematic analysis in psychology. *Qual Res Psychol*. 2006;3:77–101.
34. Reid P, Robson B. Understanding health inequities. In: Robson B, Harris R, editors. *Hauora: Māori standards of health IV. A study of the years 2000–2005*. Wellington, New Zealand: Te Rōpū Rangahau Hauora a Eru Pōmare; 2007.
35. Robson B, Cormack D, Cram F. Social and economic indicators. In: Robson B, Harris R, editors. *Hauora: Māori standards of health IV. A study of the years 2000–2005*. Wellington, New Zealand: Te Rōpū Rangahau Hauora a Eru Pōmare; 2007.
36. Harris R. Obstructive sleep apnoea syndrome: Symptoms and risk factors among Māori and non-Māori adults in Aotearoa. (Master of Public Health thesis). University of Otago, Wellington; 2003.
37. Paine SJ, Gander PH, Harris R, Reid P. Who reports insomnia? Relationships with age, sex, ethnicity, and socioeconomic deprivation. *Sleep*. 2004;27(6):1163–9.
38. Paine SJ, Gander PH, Harris RB, Reid P. Prevalence and consequences of insomnia in New Zealand: disparities between Māori and non-Māori. *Aust N Z J Public Health*. 2005;29(1):22–8.
39. Barr VJ, Robinson S, Marin-Link B, Underhill L, Dotts A, Ravensdale D, et al. The expanded Chronic Care Model: an integration of concepts and strategies from population health promotion and the Chronic Care Model. *Hosp Q*. 2003;7(1):73–82.
41. Shapiro GK, Shapiro CM. Factors that influence CPAP adherence: an overview. *Sleep Breath*. 2010;14:323–35.
42. Sawyer AM, Deatrick JA, Kuna ST, Weaver TE. Differences in perceptions of the diagnosis and treatment of obstructive sleep apnea and continuous positive airway pressure therapy among adherers and nonadherers. *Qual Health Res*. 2010;20:873–92.

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COMPETING INTERESTS

None declared.