

Supplementary Online Content

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eMethods. Secondary Outcomes: Questionnaires

eTable 1. Baseline characteristics of patients who withdrew from the study compared to those who completed the study protocol to 6 months

eTable 2. Visit-specific Satisfaction Questionnaire-9 (VSQ-9) responses at 6 months

eTable 3. Within-trial sleep diagnostic and treatment costs in the Australian and US context (average cost per randomised patient)

eReferences

This supplementary material has been provided by the authors to give readers additional information about their work.

eMethods. Secondary Outcomes: Questionnaires

The Functional Outcomes of Sleep Questionnaire¹ (FOSQ) [ENREF 17](#) is a disease-specific quality of life instrument which assesses the impact of excessive daytime sleepiness on a patient's ability to perform multiple activities of daily living. It is composed of a total of 30 items within five subscales which rate the difficulty of performing a given activity on a scale of 1 (extreme difficulty) to 4 (no difficulty), and has a total score out of a possible 20 points with higher scores indicating higher levels of functioning. The Sleep Apnea Symptoms Questionnaire² (SASQ) consists of 14 possible symptoms of obstructive sleep apnea (OSA) and asks a patient to rate the frequency of each symptom on a 10cm visual analogue scale with a measurement taken from between 0cm (never) to 10cm (always), giving a total score out of a possible 140 points with higher scores indicating more frequent obstructive sleep apnea (OSA) symptoms. The Short-Form 36 Health Survey³ (SF-36) is a general quality of life instrument which measures the health status of a patient and consists of 36 items within 8 subscales, each of which are scored from 0 to 100, with higher scores indicating higher levels of functioning. In the Visit-Specific Satisfaction Questionnaire⁴ (VSQ-9), patients are asked to rate their level of satisfaction with nine different aspects of management by health care professionals from 0 (very dissatisfied) to 5 (very satisfied), giving a total out of a possible 5 points for each of the nine items.

Within-Trial Costs

Within-trial sleep diagnostic and treatment costs were collected and compared during the 6 month follow-up period and included: (1) nurse consultations, based on recorded contact time with patients; (2) Primary care physician (PCP) and sleep physician consultations based on 2011 schedule fees for related Medicare Benefits Schedule⁵ (MBS, Medicare Australia) item numbers; (3) travel costs, estimated from approximate distance from the patients' geographical region and location of the health care professional or sleep centre; (4) sleep study costs (i.e. home oximetry, laboratory-based full night diagnostic polysomnography [PSG], split night PSG and full night continuous positive airway pressure [CPAP] titration studies) based on 2011 schedule fees for related MBS item numbers; and (5) treatment-related costs (i.e. CPAP hire or purchase, humidifiers, masks and chin straps used, and mandibular advancement splint [MAS] costs). In Australia, it is usual practice for patients to hire CPAP equipment for a period of time after initiation of therapy until acceptance of therapy, at which time a CPAP device is purchased. Therefore, we assumed a CPAP hire cost for patients who ceased CPAP use prior to study completion, and a CPAP purchase cost for patients who continued to use CPAP beyond the 6 month study period.

Within-study costs were also calculated for the US context and reported in US dollars. Costs for PCP and sleep physician consultations and sleep studies were based on equivalent item numbers reported within the US Centers for Medicare and Medicaid Services 2011 Medicare Fee Schedule⁶. The cost for nurse consultations were based on the average standard hourly rate for a registered nurse in the US and CPAP equipment costs were based on US recommended retail prices provided by Philips-Respironics and ResMed. All other costs were directly converted from Australian to US dollars at a conversion rate of AUD1.00 = USD1.05⁷.

eTable 1. Baseline characteristics of patients who withdrew from the study compared to those who completed the study protocol to 6 months

Baseline characteristics	Primary care		Specialist Sleep Center	
	Completed (n=64)	Withdrew (n=17)	Completed (n=68)	Withdrew (n=6)
Age, years	56.9 ± 10.5	58.2 ± 12.4	54.4 ± 11.5	55.7 ± 16.0
Males	54 (84%)	15 (88%)	53 (78%)	4 (67%)
Region				
Metropolitan	20 (31%)	7 (41%)	14 (21%)	4 (67%)
Rural	44 (69%)	10 (59%)	54 (79%)	2 (33%)
BMI, kg/m ²	33.0 ± 5.5	33.4 ± 5.6	33.7 ± 5.5	34.4 ± 7.2
Waist circumference, cm	111.3 ± 13.5	110.9 ± 14.5	113.3 ± 14.5	109.5 ± 14.1
ESS	12.7 ± 4.0	13.0 ± 4.0	12.6 ± 3.9	11.7 ± 3.2
OSA50 score	8.4 ± 1.5	7.8 ± 1.5	8.3 ± 1.6	6.0 ± 1.5
ApneaLink 3%ODI, events/hr	33.3 ± 19.0	30.8 ± 15.7	36.6 ± 17.2	25.5 ± 17.9

Data are presented as mean ± SD or n (%)

BMI = body mass index; ESS = Epworth Sleepiness Scale; 3%ODI = 3% oxygen desaturation index

eTable 2. Visit-specific Satisfaction Questionnaire-9 (VSQ-9) responses at 6 months

	Primary Care n = 64	Specialist Sleep Center n = 66	p value
	Mean (95%CI)	Mean 95%CI	
1. Time waited until first appointment	3.66 (3.54 to 3.78)	3.53 (3.39 to 3.67)	0.17
2. Time waited to see HCP	3.73 (3.61 to 3.85)	3.56 (3.44 to 3.68)	0.04
3. Personal manner of ancillary staff	3.74 (3.62 to 3.86)	3.65 (3.53 to 3.77)	0.30
4. Personal manner of HCP	3.88 (3.80 to 3.96)	3.71 (3.59 to 3.83)	0.03
5. Competence of HCP	3.88 (3.80 to 3.96)	3.76 (3.66 to 3.86)	0.09
6. Time spent with HCP	3.86 (3.78 to 3.94)	3.71 (3.59 to 3.83)	0.04
7. Adequate explanation	3.83 (3.73 to 3.93)	3.67 (3.55 to 3.79)	0.04
8. Sufficient information to make choices	3.80 (3.70 to 3.90)	3.62 (3.48 to 3.76)	0.047
9. Overall satisfaction with treatment	3.78 (3.66 to 3.90)	3.71 (3.59 to 3.83)	0.42

95% CI = 95% confidence interval; HCP = health care professional

Higher scores for VSQ-9 items, which have a maximum score of 5 points, indicate increased levels of patient satisfaction

eTable 3. Within-trial sleep diagnostic and treatment costs in the Australian and US context (average cost per randomised patient)

	Australia (AUS\$)		United States (US\$)	
	Primary Care n=81	Specialist Sleep Center n=74	Primary Care n=81	Specialist Sleep Center n=74
Nurse consultations*	123.15	119.02	116.67	112.76
PCP Consultations**	91.77	-	109.00	-
Sleep Physician Consultations**	4.66 [#]	260.40	5.86 [#]	317.62
Travel	25.37	316.75	26.64	332.59
Home oximetry	152.85	-	97.13	-
Full night diagnostic PSG	6.98 [#]	298.17	8.57 [#]	365.83
Split or full night CPAP titration	-	305.81	-	404.96
Treatment costs				
CPAP Hire	122.69	85.30	128.82	89.57
CPAP Purchase	624.69	637.16	806.67	822.77
Humidifier	128.40	118.58	177.38	163.82
Mask	203.33	189.73	213.50	199.22
Chin strap	4.07	7.70	4.75	8.99
MAS	118.52	237.84	124.44	249.73
TOTAL AVERAGE COST PER PATIENT	1606.48	2576.47	1819.44	3067.86

PCP = primary care physician; PSG = polysomnography; CPAP = continuous positive airway pressure; MAS = mandibular advancement splint

Australian costs: Sleep study and physician costs based on Medicare Australia Medicare Benefits Schedule⁵ (2011) item numbers: 12203 for laboratory-based diagnostic polysomnography (PSG), split night study or full night CPAP titration (\$565.75); 11503 to estimate the cost for home oximetry (\$136.06); 23 for level B (<20 minute) consultations with PCP (\$34.90); 110 for initial sleep physician visits (\$125.90); and 116 for subsequent sleep physician visits (\$72.65). Nurse costs were based on the average standard hourly rate for a registered practice nurse in Australia (\$38.00/hour). Travel costs were based on the 2011 Australian Taxation Office guidelines for reimbursement of travel costs. CPAP hire costs were estimated from costs provided by several CPAP retail outlets in Adelaide, South Australia, Australia. CPAP device (fixed pressure), humidifier, mask and chin strap costs were estimated from Australian recommended retail prices provided by Philips-Respironics and ResMed. MAS costs were provided by co-author (N Vowles), a dentist experienced in providing treatment with SomnoDent MAS for OSA.

US costs: Sleep study and physician costs based on US Centers for Medicare and Medicaid Services Medicare Fee Schedule⁶ (2011) item numbers: CPT 95810 for laboratory-based diagnostic PSG (\$694.14), CPT 95811 for split or full night titration (\$749.18), CPT 95801 to estimate the cost for home oximetry (\$96.83); CPT 99212 for consultations with PCP (\$41.45); CPT 99204 for new patient visit to sleep physician level 4 (\$158.33), CPT 99214 for subsequent patient visit to sleep physician level 4 (\$102.27). Nursing costs were based on the average standard hourly rate for a registered nurse in the US (\$36.00/hour). CPAP device (fixed pressure), humidifier and chin strap costs were estimated from US recommended retail prices provided by Philips-Respironics and ResMed. All other costs were directly converted from AUD to USD using the conversion rate of AUD1.00=USD1.05 (<http://www.xe.com>, accessed on 27 November 2012).

*Based on recorded contact time with patients during the trial

**Based on actual patient visits at baseline, 3 and 6 months.

[#]3 patients in the primary care arm were referred to see a sleep physician during the study, 1 of whom underwent a laboratory-based full night diagnostic PSG.

eReferences

1. Weaver TE, Laizner AM, Evans LK, et al. An instrument to measure functional status outcomes for disorders of excessive sleepiness. *Sleep* 1997;20:835-43.
2. Goudge R, Goh N, Barnes M, Howard M, Worsnop C. Validation of a sleep apnoea symptom questionnaire [abstract]. *Am J Respir Crit Care Med* 2001;163:A933.
3. Brazier JE, Harper R, Jones NM, et al. Validating the SF-36 health survey questionnaire: new outcome measure for primary care. *BMJ* 1992;305:160-4.
4. Visit-Specific Satisfaction Questionnaire (VSQ-9). American Medical Group Association. (Accessed 2 March 2012, at http://www.rand.org/health/surveys_tools/vsq9/.)
5. MBS Online Medicare Benefits Schedule. 2011. (Accessed at <http://www.mbsonline.gov.au/>.)
6. Medicare Physician Fee Schedule Search. 2011. (Accessed 27 November, 2012, at <http://www.cms.gov/apps/physician-fee-schedule/search/search-criteria.aspx>.)
7. Universal Currency Converter. 2012. (Accessed 27 November, 2012, at <http://www.xe.com/>.)