Long-term efficacy of an education programme in improving adherence with continuous positive airway pressure treatment for obstructive sleep apnoea

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KEY MESSAGE

This randomised controlled trial demonstrated that a motivational enhancement programme composed of a single interview and a follow-up phone call at the initiation of continuous positive airway pressure treatment can improve treatment adherence in subjects with obstructive sleep apnoea, even after 1 year, and lead to better health outcome in terms of reducing daytime sleepiness.

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Introduction

Obstructive sleep apnoea (OSA) is a form of disordered breathing in which the upper airway closes repeatedly and intermittently during sleep. Continuous positive airway pressure (CPAP) treatment provides effective relief of symptoms and prevents health-related consequences. Effective education is important to enhance CPAP use.

In this randomised controlled trial, we compared the longer term efficacy (1 year) of standard care with or without an additional motivational enhancement programme (using a brief motivational interview and negative message framing communication skills) on CPAP adherence. We hypothesised that subjects in the intervention group who received both standard care and motivational enhancement would have better CPAP adherence and greater improvement in OSA-related health outcome in terms of physiological (blood pressure) and neuropsychological (sleepiness, quality of life, and mood) symptoms, compared with those in the control group who received only standard care, even after 1 year.

Methods

Study design

This study was conducted from May 2011 to February 2013. It was an extension of the 3-month randomised controlled parallel-group study. Subjects were reassessed at 1 year after receiving CPAP education.

Chinese subjects aged ≥18 years who attended the Sleep Disorders Centre at Queen Mary Hospital in Hong Kong from May 2010 to October 2011 for OSA (apnoea-hypopnoea index ≥5) and were scheduled for CPAP treatment and in-laboratory auto-CPAP titration for the first time were invited to participate. Subjects were excluded if they had central sleep apnoea, periodic leg movement disorders, coexisting chronic obstructive pulmonary disease, pregnancy, psychiatric illness on treatment, cognitive impairment, illiteracy, unstable health conditions, or dependence in daily care, as were those unable to attend the education session, had been scheduled for OSA follow-up elsewhere, or were participating in another clinical trial. Subjects were randomised to the control group receiving standard care or the intervention group receiving motivational enhancement education and standard care (Table).

Sample size

All 100 subjects recruited in the 3-month trial were invited to participate.[1] The sample size calculation was based on comparison of CPAP adherence between the intervention and control groups. The standard deviation of CPAP adherence at the end of 1 to 6 months ranged from 2 to 3 hours per day.[2-4] Therefore 2.5 hours was taken as the standard deviation. Considering a minimal significant difference of 1.5 hours, 44 subjects in each group were required for a power of 80% and a maximum error of 5% by independent sample *t* test. Assuming a small attrition rate, 50 subjects per group were recruited.

Outcome measures

The primary outcome measure was objective CPAP usage. Secondary outcome measures included daytime sleepiness (Epworth Sleepiness Scale),

TABLE. Standard care with or without motivational enhancement education for continuous positive airway pressure (CPAP) treatment for obstructive sleep apnoea (OSA) [Reproduced from: Lai AY, Fong DY, Lam JC, Weaver TE, Ip MS. The efficacy of a brief motivational enhancement education program on CPAP adherence in OSA: a randomized controlled trial. Chest 2014;146:600-10.]

Time	Standard care with or without motivational enhancement
On CPAP titration night	**Standard care:** - Describe titration procedure and provide instructions on how to use the CPAP device - Help patient to choose an appropriate CPAP mask and acclimatise to its use - Demonstrate simple relaxation techniques to help reduce any possible anxiety when using CPAP - Give advice about the care of the CPAP device and mask, and mention the importance of CPAP therapy
On the morning after titration	**Motivational enhancement:** Part 1: video education with booklet (25 mins) - Enhance knowledge on (1) OSA (symptoms, health consequences and treatment options) and (2) CPAP (therapeutic effects, side-effects and suggested solutions to the possible problems and care of the CPAP device) - Share the experience of a current CPAP user for (1) the reasons of using CPAP such as reduced daytime sleepiness and increased daytime energy level, (2) the problems and solutions with CPAP use, and (3) the expected time required to adapt to the CPAP device. Part 2: face-to-face interview (20 mins) - Set an agenda and discuss a typical day - Assess the patient's understanding of OSA and CPAP treatment - Review noticeable and less noticeable symptoms - Review subject's pre-treatment sleep and titration reports - Assess readiness for change (use importance and confidence rulers) - Explore the costs and benefits of change (use decisional matrix) and provide a summary statement - Ask permission to provide information - Encourage subject to change and show empathy - Ask evocative questions and end with a summary - Help subject to set realistic goals and develop an action plan
On days 1 to 3 after CPAP use	Part 3: telephone follow-up (10 mins) - Ask subject about his/her experience of CPAP use - Help subject to identify any problems in using CPAP for discussion - Encourage subject to seek professional help if needed - Highlight the positive changes to subject; if no positive change, tell subject that positive changes are likely to come with regular use of CPAP over time - Remind subject of the negative consequences that may experience or may not be aware of - Inform subject that things seem to be going as expected - Inform subject that therapist has confident on him/her

health-related quality of life (Calgary Sleep Apnoea Quality of Life Index, Short Form Health Survey), functional outcomes of sleep questionnaire, mood (Depression Anxiety Stress Scale), and blood pressure.

Subjects were assessed at four time-points: baseline, 1 month, 3 months, and 1 year. At 3 months, all subjects had to return their CPAP machine and buy/rent their own for long-term use.

Results

Patient recruitment

100 subjects were randomised to the control (n=51) or intervention (n=49) group. Two subjects withdrew within the first 3 months and four refused to participate; 94 subjects (47 in each group) completed the 1-year assessment. The two groups did not differ significantly at baseline.

Treatment adherence

After adjusting for OSA severity, subjects in the intervention group had higher mean daily CPAP usage by 2.2 (95% confidence interval [CI]=1.2-3.2, P<0.001) hours/day; more subjects bought/rented the CPAP device (86% vs 52%, P<0.001, Figure 1) and were CPAP compliants (62% vs 28%, P<0.001), compared with those in the control group.

Daytime sleepiness

After adjusting for baseline values and OSA severity, subjects in the intervention group had a higher reduction in Epworth Sleepiness Scale score from 9.5±5.8 to 7.3±4.8 (P=0.001) by 2.2 (95% CI=4.2-0.1, P=0.033), compared with those in the control group from 8.9±5.0 to 8.9±4.7 (P=0.913) [Fig 2].

Blood pressure, health-related quality of life, mood

At 1 year, the two groups did not differ significantly in terms of change in blood pressure, health-related quality of life, or mood, after adjusting for baseline values and OSA severity.

Discussion

The education programme composed of a single session and a follow-up phone call at the initiation of CPAP treatment enhanced treatment adherence with a large effect size (Cohen's d=0.89) even after

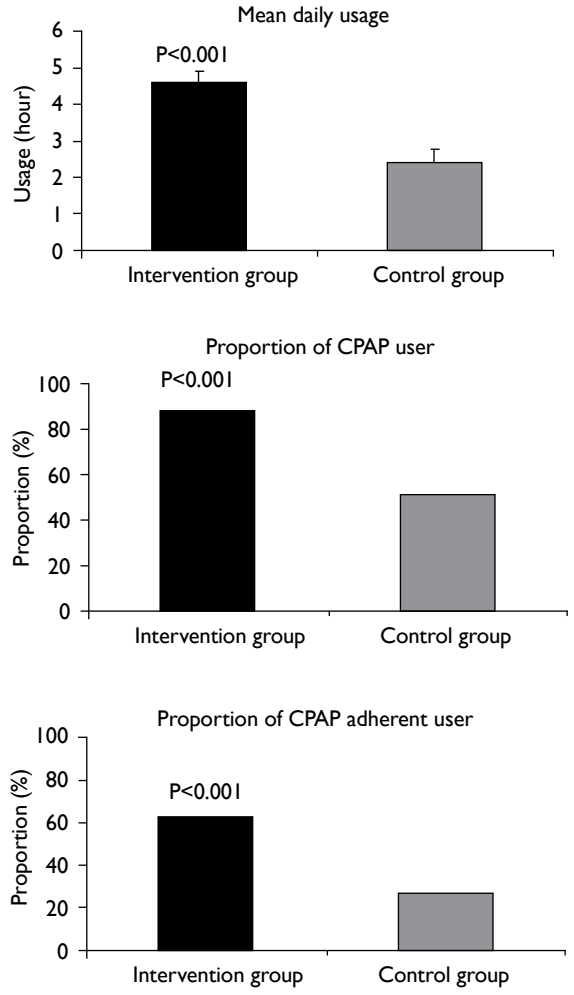

FIG 1. Adherence with continuous positive airway pressure (CPAP) treatment in both groups*

* Mean daily usage = the number of hours of CPAP use divided by the total number of study days in the last 3 months of 1-year assessment; proportion of CPAP users = proportion of subjects who used CPAP after completion of the 3-month study; proportion of CPAP compliant users = proportion of subjects who used CPAP ≥4 hours per day for at least 70% of the time in the last 3 months of 1 year assessment

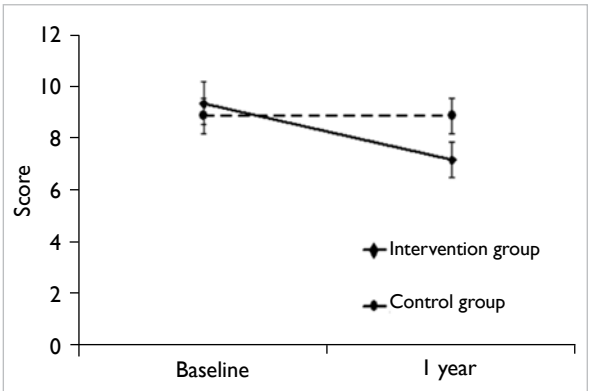

FIG 2. Mean±standard error of the Epworth Sleepiness Scale score across time for both groups (P=0.033)

one year. The intervention group had 34% more CPAP users and compliant users and achieved a greater reduction in daytime sleepiness.

The motivational enhancement programme was designed to address the psychosocial and behavioural barriers to CPAP use. The interviewer used motivational interviewing skills to help the patient assess the costs and benefits of change by using a decisional matrix to compare use and non-use of CPAP. The interviewer used reflective listening, summarisation, and value exploration to help the subject consider his/her behaviours in a non-judgemental context and raise his/her intrinsic motivation for CPAP use. We also incorporated video education to enhance knowledge and share the experience of current CPAP users and negative message framing to emphasise the consequence of untreated OSA following failure to use CPAP.

There was significant improvement in daytime sleepiness but not quality of life in the intervention group. Daytime sleepiness is one of the most noticeable complaints of OSA subjects and any improvement can be easily appreciated. The subjects did not have hypertension at baseline, and the effect of CPAP treatment on lowering of blood pressure may not be prominent.

There were some limitations to this study. First, it was not blinded. A double-blind study is difficult to implement in any study of behavioural education. Second, not all bed partners of subjects were invited to participate, as intervention was implemented on the same day of enrolment. Only those who were present at enrolment were invited. The two groups did not differ significantly in the number of family members who participated in the education programme. Third, this was not a time-matched study. The time that health care workers were involved with subjects was approximately 1 hour longer in the intervention group. Fourth, the effectiveness of the education programme may have been affected by the communication skills of the interviewer. The interviewer completed an intensive training course provided by a registered motivational trainer. This may have played a key role in the education programme. CPAP is usually a lifelong therapy; it would be valuable to see if the effects on CPAP adherence will continue for a longer period of time. Our results may not be generalised to subjects who undergo home CPAP titration. It would

be interesting to determine if such a programme is similarly effective.

Conclusion

The motivational enhancement programme was more effective in promoting CPAP adherence and achieved better relief of daytime sleepiness than standard care/advice alone.

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