A Pilot Study of CPAP Adherence Promotion by Peer Buddies with Sleep Apnea

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Study Objectives: To evaluate patient ratings of the acceptability of a peer buddy system (PBS). To promote continuous positive airway pressure (CPAP) therapy adherence in patients with obstructive sleep apnea (OSA). To obtain preliminary data on the effectiveness of PBS on sleep-specific health-related quality of life and CPAP adherence.

Design: Prospective, randomized, and controlled study.

Setting: Academic Center.

Participants: Thirty-nine patients with OSA and 13 patients with OSA who were experienced CPAP users.

Interventions: Recently diagnosed patients with OSA were randomly assigned to either the PBS to promote CPAP adherence (*intervention group*) or usual care (*control group*).

Measurements: Patient satisfaction, Functional Outcomes of Sleep Questionnaire (FOSQ), CPAP adherence, vigilance, self-efficacy, and patient activation were measured.

Results: Ninety-one percent of the subjects rated the PBS as very satisfactory (68%) or satisfactory (23%). During the 90 days of therapy, weekly CPAP adherence was greater in the

intervention than the usual care group (MANOVA; $F = 2.29$; $p = 0.04$). Patient satisfaction was positively correlated with CPAP adherence ($R^2 = 0.14$; $p = 0.02$). We did not find any group differences for FOSQ, vigilance, self-efficacy, or patient activation in this pilot study.

Conclusion: Our pilot study suggests that the PBS intervention is feasible and received high patient satisfaction ratings. CPAP adherence may be improved by peer-driven intervention, but a larger, adequately powered study is needed.

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Obstructive sleep apnea (OSA) is a highly prevalent condition in veterans with some estimates as high as 47%.¹ Poor adherence to the primary treatment of OSA—continuous positive airway pressure (CPAP)—therapy is common, with 29% to 93% of patients being non-adherent to therapy when adherence is defined as greater than 4 hours of CPAP use per night. There remains a paucity of reliable and cost-effective interventions that could promote CPAP adherence. Promoting adherence to therapy through peer-driven intervention is cost-effective and has met with modest success in other chronic conditions such as HIV, heart failure, and diabetes mellitus.²⁻⁴ Whether such a peer-driven (“buddy”) system can improve adherence to CPAP therapy is unknown.

We proposed to improve adherence to CPAP therapy using a peer-driven intervention, which, if successful, could have significant impact in improving patient outcomes in OSA. Such a proposal to use trained peers with OSA is both a potentially cost-effective strategy and is grounded on the rationale that veterans as a group are eco-culturally more homogenous than expected for the given level of differences in age, gender, ethnicity, or socioeconomic strata.⁵ Moreover, there are data to suggest that social support has a favorable effect on promoting CPAP adherence.⁶⁻¹⁰

BRIEF SUMMARY

Current Knowledge/Study Rationale: Poor adherence to the primary treatment of OSA—continuous positive airway pressure (CPAP) therapy—is common, and there is a paucity of easily accessible yet cost-effective interventions that could promote CPAP adherence. Promoting adherence to therapy through peer-driven intervention is cost-effective and has met with modest success in other chronic conditions such as HIV, heart failure and diabetes mellitus, but whether such a peer-driven intervention can improve adherence to CPAP therapy is unknown.

Study Impact: Our pilot study involved such a peer-driven intervention (experienced CPAP users called “peer-buddies”) and suggests that such an intervention is feasible, results in high patient satisfaction, and promotes CPAP adherence. A larger, adequately powered study is needed, which, if successful, could potentially improve outcomes in a “patient-centered” and cost-effective manner.

Our overall aim was to assess the feasibility and acceptability of a CPAP adherence program driven by trained “peer-buddies” with sleep apnea.¹¹ Our primary objective was to evaluate patient ratings of the acceptability of the peer buddy system (PBS) in veterans receiving CPAP therapy for OSA. Our secondary objective was to obtain preliminary data on the effectiveness of PBS on sleep-specific health-related quality of life (HR-QOL; Functional outcomes in sleep questionnaire [FOSQ]) in veter-

ans receiving CPAP therapy for OSA. Additional objective was to obtain preliminary data on the effect of PBS on CPAP adherence, vigilance, patient activation, and self-efficacy in veterans receiving CPAP therapy for OSA. Patient activation pertains to improving patients' knowledge, skills, and confidence essential to managing their own health and healthcare.

METHODS

Design and Setting

This prospective, randomized, parallel group, open label, pilot study randomly assigned patients with OSA who had not yet been initiated on CPAP therapy to the peer-buddy system (PBS) to promote adherence to CPAP therapy (*peer-driven intervention group*) or be provided with educational brochures regarding OSA and CPAP therapy (*usual care group*). Both groups received usual care; thus, the only difference between the 2 groups was that the intervention group received interactions with the peer buddy. The study was performed at the Southern Arizona VA Health Care System in Tucson, Arizona (SAVAHCS), with institutional review board approval from the University of Arizona and VA Research and Development Committee. Each participant signed a written informed consent prior to commencing study participation. The duration of the study was one year, although duration of subjects' participation was for only 3 months.

Study Sample

Thirty-nine subjects with OSA who were prescribed CPAP therapy by their physician were recruited from the sleep disorders program at SAVAHCS. Subjects were recruited by posting fliers, distributing brochures at the clinics and sleep laboratory, and by screening clinic attendees following a Health Insurance Portability and Accountability Act (HIPAA) waiver from the Privacy Board. Optimal CPAP pressure was determined by manual titration during a split-night or a CPAP titration polysomnogram. Self-adjusting device was not used for the current study. Subjects were approached if they met the following inclusion and exclusion criteria:

Inclusion Criteria

Inclusion criteria were (i) OSA (defined by apnea-hypopnea index [AHI] > 5 per hour; with hypopneas defined as > 30% reduction in airflow with $\geq$ 4% drop in oxygen saturation as per AASM 2007 criteria¹²). AHI was determined by full-night or split-night polysomnography. (ii) age between 21 and 85 years. (iii) Stable medical history with no change in medications (including antihypertensives and thyroid replacement) in the previous 4 months. (iv) No regular use (> 3 times/week) of sedative or hypnotic medications in the previous 4 months.

Exclusion Criteria

Exclusion criteria were (i) Central sleep apnea (central apnea index > 5 events/h and > 50% of AHI constituted by central apneas and non-obstructive hypopneas¹³). (ii) Complex sleep apnea or CPAP emergent central apnea (central apnea index > 5 events/h during CPAP titration with > 50% of apnea-hypopnea index constituted by central apneas and non-obstructive hypopneas).

(iii) Required oxygen or bilevel positive airway pressure for treatment of OSA or hypoventilation. (iv) Decompensated cardiac (heart failure or angina) or pulmonary (severe COPD or uncontrolled asthma) disease. (v) Chronic narcotic use. (vi) Nasal obstruction (nasal congestion score > 15)^{14,15} or enlarged tonsils. (vii) Diagnosis of another sleep disorder in addition to OSA based on PSG (e.g., periodic limb movement disorder [$\geq$ 15 limb movements/h of sleep with arousal], insomnia, obesity hypoventilation syndrome, or narcolepsy). (viii) Previous treatment with positive airway pressure, home oxygen therapy, tracheotomy, uvulopalatopharyngoplasty, or other surgery for OSA. (ix) Night shift workers in situations or occupations where they regularly experience jet lag, or have irregular work schedules by history over the last 6 months. (x) Routine consumption of > 2 alcoholic beverages per day. (xi) Recent or recurring history of recreational drug use leading to tolerance or dependence. (xii) Unable to perform tests due to inability to communicate verbally, inability to write and read in English; less than a 5th grade reading level; visual, hearing, or cognitive impairment (e.g., previous head injury); or upper extremity motor deficit (e.g., previous stroke that prevents patient from using CPAP treatment).

Peer buddies were recruited using fliers in the general clinic areas. Peer buddies had the following inclusion and exclusion criteria:

(a) **Inclusion:** (i) Adherent to CPAP therapy (> 4 h/day of CPAP use); (ii) willing to meet with peer-buddy on 2 occasions in person at SAVAHCS; (iii) able to be contacted by telephone; (iv) willing to undergo a brief training and orientation session with research staff. (b) **Exclusion:** In addition to exclusion criteria for subjects (listed above), patients suffering from major depression or other major psychiatric illness; shift-worker or frequent out of town traveler; unwilling to participate in orientation and training session. The peer-buddies were compensated \$300 for the 3-month duration of participation.

Peer Buddy Training

Research staff educated the peer buddies and provided them with guidelines for their interactions with the research participants. They were instructed to share their experiences and not to provide medical advice. The sharing of coping strategies fell broadly into the following categories: promoting self-efficacy, promoting outcome expectancies, improving risk perception, and patient activation. At the end of the training, a mock interaction between the peer-buddy and principal investigator (playing the role of the patient with OSA) was undertaken before "certifying" the peer-buddy as competent.

Protocol

In the PBS-intervention group, trained peers with OSA who were adherent to CPAP therapy were paired with the newly diagnosed subjects over a 3-month period. During this time the trained peers shared their experiences on coping strategies with CPAP device and equipment (promote self-efficacy), shared their positive experiences (motivational effects and outcome expectancies), shared their knowledge of perceived vulnerabilities due to untreated sleep apnea (promote risk perception), shared methods for improving efficacy of CPAP equipment and interface (patient education) and prepared their subjects for upcoming physician or respiratory therapist appointments.

(patient activation). The interaction occurred during supervised “in-person” sessions (2 sessions at day 1 and day 7) and also telephone-based conversations (once a week for one month followed by telephone calls on a fortnightly basis), wherein a research coordinator was either present or facilitated the telephone call. Therefore, a total of 10 interactions were to occur with each peer-buddy and subject pairing over a 3-month period.

Usual Care Description

All participants in the control (usual care) arm received usual care following initiation of CPAP therapy. Usual care consisted of the newly diagnosed patient with OSA attending a CPAP initiation and education class that was conducted by a dedicated respiratory therapist. At this group clinic, patients were educated about the basics of the care and operation of the device, mask and related equipment. Subsequently, they broke-out into individual sessions wherein they tried on their masks and turned on the machine and mask fitting and readjusting was performed by the respiratory therapist. Following this CPAP initiation and education class, they received instructions to mail-in the CPAP adherence monitoring card (“smart card”) by mail to the therapist about 4 weeks following the initial visit. The adherence information was evaluated and posted in electronic medical records. Patients with OSA were then seen in the sleep clinic at 1 and 3 months following initiation of CPAP therapy.

Measurements

(a) Patient ratings of acceptability of PBS: Patients rated their acceptability of the PBS at the end of study participation on a 5-point scale: strongly agree, agree, neutral, disagree, strongly disagree.¹⁵ Additionally, patients in the PBS intervention group responded to a 25-item questionnaire that was used by Heisler and colleagues that evaluated various facets of their interaction with their peer buddies.³

(b) Functional Outcomes of Sleep Questionnaire (FOSQ): a disease-specific quality of life questionnaire collected at baseline and at 90 days.¹⁶

(c) CPAP adherence downloads: Mean number of hours per day of CPAP use was collected for the entire 90 days through downloads on days 30 and 90.

(d) Patient Activation Measure (PAM): a 22-item measure that assesses patient knowledge, skill, and confidence for self-management¹⁷; and Self-Efficacy Measure for Sleep Apnea (SEMSA), a tool with strong psychometric properties and with the potential for identifying patient perceptions that may indicate those most likely to not adhere to treatment with 3 domains that measured perceived risk, outcome expectancies, and self-efficacy with a global score computed from these individual scores was collected at baseline and at 90 days.¹⁸

(e) Nasal congestion score (confounder): a validated questionnaire that assesses nasal congestion using a 5-point Likert scale that was previously administered to patients with sleep disordered breathing¹⁹ and found to be associated with discontinuation of CPAP therapy.¹⁵ This questionnaire was used to screen out patients who may be non-adherent due to excessive nasal congestion. A threshold of 15 was chosen to exclude such patients.

(f) Psychomotor vigilance task (PVT): a reproducible measure of vigilance that has been used as an objective assessment of daytime sleepiness was measured at baseline and at 90 days.²⁰

(g) Other confounders: Confounders that may affect adherence to CPAP therapy were collected, such as age, gender, race, severity of OSA (i.e., AHI), body mass index, CPAP level, and highest level of education received.^{15,21} Another confounder of interest—the Charlson comorbidity index (a well-validated index of comorbid illnesses)—was measured at baseline.²²

Data Integrity and Data Analysis

Besides training the research staff and performing quality assurance checks, the case report forms were programmed using scannable Teleforms (to minimize entry errors). The questionnaire responses were scanned and input directly into a MS Access database. Double entry of data, wrong entry, and incomplete case report forms were checked and corrected if present.

Patient ratings of satisfaction with care delivery, willingness to participate, and attendance of interaction sessions with peer-buddies were analyzed and presented as descriptive data. We hypothesized that patient ratings would indicate that $\geq 90\%$ of the subjects would agree or strongly agree that the PBS was helpful with regards to managing their disease and that a majority of eligible subjects would agree to participate. Multiple analysis of variance (MANOVA) was used to compare repeated measures (CPAP adherence) between the two groups. Generalized linear modeling was undertaken to compare outcome measures with group assignment while adjusting for possible confounders such as age, gender, race, body mass index, nasal congestion score, CPAP level, and level of education. Group comparisons of continuous variables were made by unpaired *t*-tests or nonparametric equivalent (Mann-Whitney U test). *P* values less than 0.05 were considered significant. Group comparisons for proportions were made using χ^2 or Fisher exact tests as appropriate. All data are shown as mean and standard deviation (SD) or median and inter-quartile range (IQR). IBM SPSS Statistics v19.0 (IBM Inc., Armonk NY; for comparisons) and STATA 9.2, College Station, TX (for modeling) was used for statistical analysis.

Sample Size Estimation

For CPAP adherence (h/night of CPAP use), we assumed that a difference of 1 h/day of average CPAP use is clinically significant (SD 1.7 h). Using *t*-test, α of 0.05, and 2-sided, 90% power, we needed 62 subjects per group (a total of 124 patients).²³ Other intervention-based trials aimed at improving CPAP adherence have employed sample sizes ranging from 100 to 373 participants.²³⁻²⁷ However, the current pilot study aimed to recruit much less than that to assess feasibility and obtain preliminary data.

RESULTS

Thirty-nine subjects—22 in intervention arm and 17 in control arm—and 13 “expert” peer buddies were recruited into the study. Baseline characteristics of the subjects are given in **Table 1**. Thirty-nine (80%) of the 49 eligible subjects agreed to participate in the study; there was no difference in baseline characteristics between the participants and non-participants (**Figure 1**). In the subjects randomized to the peer-buddy intervention, 63% (*n* = 14) completed all 10 training sessions; 86% (*n* = 19) completed 9 of 10 sessions; 91% (*n* = 20) completed

Table 1—Patient characteristics

	Intervention (n = 22)	Usual Care (n = 17)	p value	All subjects (n = 39)
Age, years	53 ± 14	50 ± 14	0.6	52 ± 14
Gender, % men	100%	100%	1.0	100%
BMI, kg/m ²	35 ± 6	33 ± 5	0.3	34 ± 5
Race, n (%)			0.9	
Caucasian	17 (77%)	13 (76%)		30 (77%)
Black	4 (18%)	3 (18%)		7 (18%)
American Indian/Alaskan Native	1 (5%)	0 (0%)		1 (2.5%)
Other	0 (0%)	1 (6%)		1 (2.5%)
Ethnicity, n (%)			1.0	
Non-Hispanic	19 (86%)	14 (82%)		33 (85%)
Hispanic	3 (14%)	3 (18%)		6 (15%)
Education, n (%)			0.09	
< High school	0 (0%)	1 (6%)		1 (2%)
High school	1 (4%)	4 (26%)		5 (13%)
Undergrad	18 (82%)	12 (71%)		30 (77%)
Masters	3 (14%)	0 (0%)		3 (8%)
Married, n (%)	15 (68%)	10 (59%)	0.8	25 (64%)
Working, n (%)	9 (41%)	7 (41%)	1.0	16 (41%)
AHI, mean ± SD	36.7 ± 28.6	37.5 ± 36.9	0.9	37.0 ± 32.1
AHI, median (IQR)	28 (17, 50)	17 (8, 63)	0.4	26 (11, 56)
CPAP pressure, mean ± SD	10 ± 2	10 ± 3	0.7	10 ± 2
Split night, n (%)	(14) 64 %	(10) 59 %	1.0	62%
NCS, mean ± SD	9.7 ± 4.2	8.6 ± 4.6	0.4	9.3 ± 4.3
Mask interface, n (%)			0.9	
Nasal mask	14 (64%)	10 (59%)		24 (62%)
Nasal pillow	2 (9%)	2 (12%)		4 (10%)
Full face mask	6 (27%)	5 (29%)		11 (28%)
Charlson Comorbidity Index, median (IQR)	0 (0, 0)	0 (0, 1)	0.6	0 (0, 1)
Epworth score, mean ± SD	10.5 ± 5.3	11.2 ± 3.8	0.6	10.8 ± 4.7

AHI, apnea-hypopnea index; BMI, body mass index; kg/m², kilograms/meters²; IQR, interquartile range; SD, standard deviation; n, sample size; CPAP, continuous positive airway pressure; NCS, nasal congestion score.

Figure 1—Patient flow in the protocol as per CONSORT guidelines

≥ 8 sessions; and 22 (100%) completed ≥ 7 sessions. Sessions were facilitated by 2 study coordinators to schedule and to ensure that the interactions occurred.

Patient Ratings

Twenty (91%) of the 22 subjects in the intervention group were either very satisfied (68%) or satisfied (23%) with the peer-buddies being helpful with regards to managing their underlying disease. For patients in both groups, patient satisfaction was positively correlated with their CPAP adherence (n = 39; R² = 0.14; p = 0.02). In the intervention group, patient ratings of their peer buddies were positively correlated with their CPAP adherence, and a majority of patients rated their peer buddies and the telephone based support very highly (**Table 2**).

Outcome Measures

Subjects receiving PBS intervention did not experience greater improvements in disease specific HR-QOL (FOSQ scores) than patients receiving usual care (p > 0.4; **Table 3**).

During the 90 days of therapy, the average CPAP adherence measured in minutes was greater in the intervention group when

Table 2—Patient evaluations of their peer buddy system

Patient evaluation of their peer buddy (intervention group only; total sample = 22)	Proportion that agree or strongly agree, n (%)	Correlation of Likert scores [§] with CPAP adherence (minutes/night), R ²	
			p value
My peer-support partner listened to me talk about my concerns.	21 (95%)	0.3	0.008*
My peer-support partner gave me feedback on how I was doing.	21 (95%)	0.3	0.008*
My peer-support partner helped me solve my problems or concerns.	20 (91%)	0.27	0.01*
I felt comfortable sharing my feelings with my peer-support partner.	20 (91%)	0.26	0.01*
My peer-support partner understood my point of view.	19 (86%)	0.27	0.01*
My peer-support partner pressured me to change.	6 (27%)	0.0	0.8
My peer-support partner provided me with practical information.	21 (95%)	0.40	0.002*
My peer-support partner invested time to help me.	21 (95%)	0.50	< 0.0001*
I was able to talk to my peer-support partner when I needed to.	21 (95%)	0.27	0.01*
I liked the support over the telephone.	18 (82%)	0.55	< 0.0001*
My peer-support partner helped me make progress in addressing the self-care issue I had identified as a problem at the beginning of this program.	17 (77%)	0.13	0.09
I helped my peer-support partner as much as my partner helped me.	7 (32%)	0	0.8
I helped my peer partner more than he/she helped me.	2 (9%)	0	0.9
My peer partner helped me in ways that added to the help from my nurse/doctor.	15 (68%)	0.18	0.04
It was hard to let my partner know when I had something I wanted to talk about.	16 (73%)	0.07	0.2
The peer support was very helpful for managing my symptoms.	18 (82%)	0.34	0.004*
I learned something new about how to take care of myself from conversations with my peer-support partner.	19 (86%)	0.22	0.02*
My partner learned something new about how to take care of himself/herself from talking with me.	5 (23%)	0	0.8
The calls were a hassle.	10 (45%)	0.34	0.005*
My peer-support partner helped me do things I need to do to stay healthy.	15 (68%)	0.1	0.15
I helped my peer-support partner do things he/she needs to do to stay healthy.	3 (13%)	0	0.6
The messages I heard on the Peer-Support Line were easy to understand.	21 (95%)	0.22	0.02*
In general, it was easy to use the Peer-Support Line to contact my peer-support partner.	21 (95%)	0.37	0.003*
It was frustrating to use this system to get through to my peer-support partner.	5 (23%)	0	0.5
I would be more satisfied with my health care if a peer-support service like this were available to patients.	16 (73%)	0.15	0.07

*Statistically significant, [§]Likert scores were derived from the respective questions: strongly disagree = 1, disagree = 2, neutral = 3, agree = 4, and strongly agree = 5.

Table 3—Outcome measures

	Intervention (n = 22)			Usual Care (n = 17)		
	Baseline	90 days	Change	Baseline	90 days	Change
FOSQ (global)	15.2 ± 3.7	17.1 ± 3.5	1.9 ± 3.4	15.9 ± 2.5	17.1 ± 3.0	1.1 ± 3.1
Activity	3.1 ± 0.8	3.5 ± 0.7	0.4 ± 0.7	3.3 ± 0.6	3.5 ± 0.6	0.2 ± 0.7
Vigilance	2.9 ± 0.8	3.4 ± 0.7	0.5 ± 0.7	2.9 ± 0.6	3.1 ± 0.7	0.2 ± 0.6
Social	3.2 ± 0.8	3.5 ± 0.7	0.3 ± 1.0	3.6 ± 0.6	3.6 ± 0.8	0.1 ± 1.0
Intimacy	3.2 ± 1.0	3.3 ± 0.9	0.3 ± 1.0	3.2 ± 0.8	3.5 ± 0.6	0.3 ± 0.6
Mean	3.0 ± 0.7	3.4 ± 0.7	0.4 ± 0.7	3.2 ± 0.5	3.4 ± 0.6	0.2 ± 0.6
PAM	68 ± 14	73 ± 14	5 ± 15	71 ± 14	70 ± 16	-1 ± 11
SEMSA (global)	8.0 ± 0.1	7.5 ± 0.9	-0.5 ± 1.1	8.3 ± 0.9	8.0 ± 1.2	-0.2 ± 1.0
Risk	2.3 ± 0.5	1.9 ± 0.6	-0.4 ± 0.7	2.3 ± 0.5	2.1 ± 0.6	-0.2 ± 0.7
Outcomes	3.0 ± 0.5	2.9 ± 0.7	-0.1 ± 0.8	3.1 ± 0.4	3.1 ± 0.4	0 ± 0.3
Self-efficacy	2.7 ± 0.5	2.7 ± 0.6	0 ± 0.6	2.8 ± 0.5	2.8 ± 0.5	0 ± 0.5
Epworth score	10.5 ± 5.3	7.1 ± 4.7	-3.4 ± 5.0	11.2 ± 3.8	8.1 ± 4.3	-3.0 ± 3.5
PVT	307 ± 111	287 ± 57	-20 ± 100	327 ± 103	316 ± 108	2 ± 40

FOSQ, Functional Outcomes Sleep Questionnaire (global and domain scores); SEMSA, self-efficacy in management of sleep apnea (global and domain scores); PAM, patient activation measure; PVT (psychomotor vigilance test; reaction time). None of the baseline or differences achieved statistical significance.

Figure 2—Adherence to continuous positive airway pressure (CPAP) therapy

Expressed as the mean (SD) minutes of CPAP use per day. Subjects assigned to peer buddy system (PBS, closed circles) versus usual care (open circles) is shown for each week of therapy during the 3 months of follow-up. During the 90 days of therapy, Wilks lambda multivariate test of overall differences revealed greater CPAP adherence in the intervention than the usual care group (MANOVA; $F = 2.29$; $p = 0.04$).

compared to the usual care group (MANOVA; Wilks Lambda multivariate test of overall differences; $F = 2.29$; $p = 0.04$; **Figure 2**). Differences between groups were apparent at end of first week of therapy wherein, CPAP adherence was 313 ± 119 min/day (5.2 ± 2.0 h/day) in the intervention group tended to be greater than that in the usual care group (238 ± 142 min/day or 4.0 ± 2.4 h/day; $p = 0.08$). Adherence defined as a categorical variable based upon a threshold of average 4 h (240 min) per day of CPAP use, revealed that 14 (63.6%) of 22 patients in the intervention group were adherent to CPAP, whereas only 6 (40%) of 15 in the usual care group were adherent ($p = 0.15$; χ^2 test). CPAP adherence was not related to any of the confounders (**Table 4**). We did not find any group differences for self-efficacy or patient activation in this small pilot study (**Table 3**).

In the intervention group alone, attendance of the sessions with the peer buddy was associated with greater CPAP adherence ($R^2 = 0.36$; $p = 0.003$). Essentially, each peer buddy contact was associated with an additional 88 min/day of CPAP adherence (95% confidence interval 33, 143; standard error = 26; $p = 0.003$).

DISCUSSION

Our pilot study suggests that the PBS intervention is a feasible and acceptable program with high patient satisfaction ratings. Preliminary data suggest that the peer-buddy system (PBS) was associated with greater CPAP adherence, but a larger adequately powered study is needed.

The acceptability of the PBS intervention was quite high, with 39 of 49 eligible subjects (80%) agreeing to participate in

Table 4—Univariate regression of CPAP adherence as a dependent continuous variable

	Coefficient	SE	p value
Age	-0.1	1.9	0.9
BMI	2.3	4.8	0.6
Ethnicity	-30	75	0.7
AHI	0	0.8	0.9
CPAP level	-3.3	11.8	0.8
Epworth score	-2.3	5.5	0.7
Log of NCS	71	46	0.12
Race	-8.3	6.6	0.21
Education level	6.1	30.6	0.8
Charlson Comorbidity Index	7.0	15.5	0.7

AHI, apnea-hypopnea index; BMI, body mass index.; NCS, nasal congestion score; CPAP, continuous positive airway pressure.

the study. Previously, a system that could promote self-management by the patient—such as group education from a peer-support group or program—has been shown to have the potential to improve adherence to CPAP therapy.²⁸ However, this approach is limited by the logistics of the patient attending the group sessions and receiving personalized care. We proposed a telephonic system that allowed multiple communications between the patient and the peer buddy over a 3-month period in addition to two face-to-face meetings in the first week following CPAP initiation. Such a telephonic system resulted in good attendance of the sessions, with 100% of subjects in the intervention group completing at least 7 of the 10 interaction sessions with their peer buddies. Moreover, the attendance of sessions with peer buddies was associated with a “dose-effect,” wherein each contact (or session) was associated with an extra 88 minutes per day of CPAP adherence. Interestingly, the adherence in the intervention group tended to be greater at the end of the first week than at the end of the 3-month period (**Figure 2**), which would suggest that the face-to-face meetings may have had a more favorable effect than the telephonic interactions. However, this is speculative on our part.

There is a paucity of reliable and cost-effective interventions to promote CPAP adherence. While prior intervention-based trials using cognitive-behavioral therapy plus standard education achieved improvement in adherence to PAP therapy when compared to standard education alone,^{24,29} such therapies require a behavioral sleep specialist or health professional, which, in turn, incurs additional costs, and is limited by a shortage of behavioral therapists. If proven by a larger well-powered study, our peer-buddy system would conceivably help promote CPAP adherence while minimizing the burden placed on system resources.

We did not find any statistically significant between group differences in disease-specific health-related quality of life scales, patient activation measures, self-efficacy, or subjective and objective measures of sleepiness. However, this was a small pilot study meant to obtain measures on feasibility, acceptance, and obtain preliminary data that would provide information on efficacy of the intervention, and was underpowered to conclusively test the peer-driven intervention. Of note, the magnitude of changes in the above-mentioned outcome measures was greater

in the intervention than the control group even though they were not statistically significant (**Table 3**). Based upon our preliminary data of proportion of subjects who are adherent to CPAP therapy, we would need 75 subjects per group (total of 150 subjects) to be adequately powered to demonstrate an effect of PBS intervention on CPAP adherence (assuming 80% power; $\alpha = 0.05$). In all, our preliminary data would suggest different sample sizes for each of the outcome measures that range from 85 (for patient activation measure) to 230 (for FOSQ) subjects per group.

Limitations

This small pilot study suggests that PBS improves CPAP adherence. Larger adequately powered randomized controlled studies are needed to provide proof that this method of promoting CPAP adherence is effective. Moreover, our proposal to use trained peers with OSA can be a potentially cost-effective strategy, but is grounded on the rationale that veterans as a group are eco-culturally more homogenous than expected for the given level of differences in age, gender, ethnicity, or socioeconomic strata. The generalizability of these findings to other populations (such as women and non-veterans) needs to be tested. This is a preliminary experimental study on the feasibility and acceptability of this peer-driven intervention that targeted a homogenous specific population in an experimental study and cannot be as yet generalized to clinical setting.

CONCLUSIONS

Our pilot study suggests that the PBS intervention is feasible and received high patient satisfaction ratings. CPAP adherence may be improved by peer-driven intervention, but a larger, adequately powered study is needed. While the magnitude of effect of our peer-driven intervention may not be clinically relevant in our pilot study, the small sample size prohibits us from drawing firm conclusion of the real potential for this intervention. Perhaps greater proportion of face-to-face interactions and rigorous fidelity assessments of the interactions between the peer-buddy and subject may conceivably potentiate the magnitude of benefits on CPAP adherence in such an adequately powered study. Our long term objectives are to build on this pilot project and initiate a randomized, controlled, multi-site, peer-driven, intervention study for enhancing CPAP adherence in veterans with OSA. The ultimate goal of this research is to develop a cost-effective, efficacious, and exportable system of care to promote CPAP adherence in patients with OSA.

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