



## Improving adherence to PAP therapy: A brief PAP coaching intervention for health care providers

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### ABSTRACT

**Objectives:** To evaluate a training program for non-specialist health care providers in a brief coaching intervention to improve positive airway pressure (PAP) usage in Veterans with sleep apnea.

**Methods:** We conducted a national webinar training designed for non-specialist providers to implement a brief telephone coaching intervention to improve PAP adherence. The curriculum was crafted by experts in sleep medicine and behavioral sleep medicine based on principles of PAP desensitization. Providers who participated in this training were asked to complete evaluations at 30 days and 1 year.

**Results:** Provider surveys indicated that most respondents had incorporated the intervention into their clinical practice and felt comfortable counseling patients about sleep apnea and adherence to PAP. Provider feedback suggested that future training programs should include refresher trainings, more training on PAP equipment specifics, and facilitated collaboration with local sleep medicine staff.

**Conclusions:** This pilot training program demonstrated that a webinar format was a feasible method to increase training in PAP adherence among non-specialist health care providers.

**Innovation:** Non-specialists can be trained as PAP coaches in webinar format, improving patients' access to effective strategies and support to be successful with PAP therapy.

## 1. Introduction

Obstructive sleep apnea (OSA) affects an estimated 1 billion people worldwide [1] and 54 million people in the United States (U.S.) [2]. Untreated sleep apnea is associated with excessive daytime sleepiness, decreased quality of life, increased motor vehicle accidents, decreased workplace productivity, and cardiovascular morbidity and mortality [2]. Positive airway pressure (PAP) therapy is the best proven treatment for sleep apnea and is highly efficacious when used for at least four hours per night [3].

PAP therapy requires consistent nighttime usage to be effective, yet it can take trial and error to find the most comfortable mask and settings [4]. Even after equipment issues have been addressed, there are often behavioral barriers to PAP use including claustrophobia, anxiety,

perception of minimal benefits, negative attitudes towards PAP, low confidence to engage in therapy, and external locus of control [5]. These behavioral barriers can be specifically addressed with an intervention called PAP desensitization, which has shown benefit in improving PAP usage [5,6]. There is no published standard protocol for PAP desensitization, but it typically incorporates education, graded exposure and practice with PAP equipment, problem solving, and motivational support [7]. The U.S. Department of Veterans Affairs (VA) and Department of Defense (DoD) guidelines provide a strong recommendation for use of “educational, behavioral, and supportive interventions” in all patients with OSA [8]. PAP desensitization is usually performed by a psychologist trained in behavioral sleep medicine, ideally performed with close collaboration with the patient's sleep medicine provider and durable medical equipment staff, to ensure concurrent medical as well as mask

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and equipment issues are simultaneously addressed.

Recent data show that 44% of patients do not meet Medicare criteria for PAP therapy usage, a rate that has remained unchanged over the past 20 years [9]. In one study, 46% of patients had stopped using their prescribed PAP therapy after 1 year [10]. In 2019, there were an estimated over 8 million PAP users in the United States [1]. We can therefore estimate there are at least 4 million PAP users at risk for suboptimal PAP usage who could potentially benefit from PAP desensitization. Unfortunately, PAP desensitization is rarely accessible outside tertiary care sleep medicine clinics. As of March 2023, the Society for Behavioral Sleep Medicine lists a total of 206 providers in the United States with active credentials as a diplomate in behavioral sleep medicine [11].

Making PAP desensitization broadly available will likely require a stepped care model, including the training of non-specialists outside the sleep center with a vested interest in improving PAP therapy adherence for their patients (for instance, in primary care or mental health). These non-specialist partners may help identify patients who would most benefit from PAP desensitization, provide streamlined interventions for uncomplicated cases, and ensure complex patients get connected with sleep specialists. The basic principles of PAP desensitization are within the scope of practice for a variety of care team members with experience in motivational interviewing – including nurses, social workers, counselors, respiratory therapists, and psychologists. Case studies confirm that desensitization may be feasibly implemented by nurse practitioners [12] or a multidisciplinary inpatient team of respiratory therapists, psychologists, physicians, nurses, child life therapists, and family members [13]. A single publication describes a one-time, 45-min workshop on PAP desensitization for 25 medical residents, who provided positive feedback on the post-seminar survey [14]. A successful PAP desensitization training program should translate to measurable patient outcomes, for example, increasing the number of patients who receive the treatment and improving PAP usage among patients who receive it. Unfortunately, such long-term follow-up data are lacking, and there are no clear standards to define a successful training program in PAP desensitization.

To address this deficit, we performed a quality improvement (QI) project to improve dissemination of PAP desensitization services within VA. Our first Plan-Do-Study-Act (PDSA) cycle began with planning and implementing a national webinar to teach VA staff to provide PAP desensitization. The webinar included real-time, iterative evaluation to assess and improve the educational program. An extended assessment 1 year after webinar completion explored whether this educational program was relevant to patient care. This QI project was performed under the auspices of an existing national virtual education program for VA providers.

In this manuscript, we present data from the first PDSA cycle of this QI project. We conducted a national webinar to teach non-specialist providers to provide a brief telephone coaching intervention to promote PAP usage. The webinar was open to providers from across the VA Healthcare System including psychologists, nurses, social workers, respiratory therapists, polysomnography technologists, advanced practice providers, and physicians, including those without any prerequisite sleep specialty background. Our aims for this PDSA cycle were to: 1) assess the feasibility of providing a national virtual webinar and 2) to assess providers' subjective experience of the training and its impact on their clinical practice and patients. These findings provide crucial insights to inform future training webinars and identifying appropriate measures to evaluate program impact on patient outcomes.

## 2. Methods

### 2.1. Study setting

The VA Healthcare System is the largest integrated healthcare system in the U.S. and is an optimal setting for studying care for sleep apnea. U.

S. military Veterans are diagnosed with sleep apnea at much higher rates than the general population [15,16]. Almost one quarter of VA's 9 million enrollees have a documented sleep apnea diagnosis [16]. Veterans have similar or worse rates of PAP therapy usage at 29 to 47% [17-19] which can be further reduced in presence of PTSD.

### 2.2. Training webinar

The training webinar was created in 2020 as part of the Sleep Veterans Affairs – Extension for Community Healthcare Outcomes (VA-ECHO) program [20]. This training was open to a broad range of VA care providers, as previously noted. Sleep VA-ECHO is based at VA Puget Sound and provides evidence-based, virtual sleep education and telementorship to a national, multidisciplinary VA provider audience. Sleep VA-ECHO has provided over 1000 h of virtual continuing medical education to VA clinicians since 2015. A specific goal of Sleep VA-ECHO is to monopolize sleep medicine knowledge and make it accessible to non-specialists.

The PAP coaching webinar was created by a team of experienced educators in our Sleep VA-ECHO program who have clinical expertise in sleep medicine and behavioral sleep psychology. Our goal was to create a brief PAP support intervention that could be feasibly implemented by a non-specialist. In our experience, training non-specialists to provide a specialist intervention requires the intervention to be focused, feasible, and to include specific selection criteria. We did not identify any published training protocols that met these criteria, so we created and evaluated our own webinar training. Our educators used their years of experience teaching within Sleep VA-ECHO and providing local trainings on PAP therapy to behavioral health providers at our facility, to develop our webinar.

Providers were recruited across VA facilities nationally using a program advertisement sent to the Sleep VA-ECHO email distribution lists. Those who opt into the Sleep VA-ECHO email distribution list are a diverse group of clinical staff with a variety of training backgrounds and from across the VA nationally. Providers were asked to commit to the 4 initial sessions.

The webinar was conducted between April and June 2020. The training webinar consisted of one 75-min introductory didactic session followed by three 60-min weekly consultative sessions (conducted between April 7 and April 28, 2020). Providers were given written materials before the first session including a course syllabus, provider manual, patient manual, and tips for electronic charting and coding. (Appendix) The introductory didactic covered basics of sleep apnea, PAP therapy, and the PAP coaching intervention. Consultative sessions provided mentorship and a supportive learning community for learners to put their skills into practice. Consultative sessions were led by the psychologist faculty. During consultative sessions, learners were encouraged to bring their own patient examples to discuss challenges or successes and to problem solve as a group. An optional 30-min follow up session was held 2 months later (June 2, 2020) for providers to share their experiences implementing the PAP intervention and provide constructive feedback on the training experience.

### 2.3. PAP patient intervention

The PAP patient intervention is a brief telephone coaching intervention designed for implementation by non-specialist providers in uncomplicated patients. Eligible Veterans had a diagnosis of sleep apnea, none or very limited PAP use, and willingness to engage in the PAP intervention. Veterans were excluded from PAP coaching if they had a severe mental health disorder (posttraumatic stress disorder, insomnia, depression, schizophrenia, or bipolar disorder) or severe cognitive deficits (dementia). Excluded Veterans were encouraged to seek evaluation with a sleep medicine or behavioral sleep specialist.

The PAP patient intervention is a focused, 2-to-4-week protocol of telephone-based coaching and Veteran self-study using an internally

developed workbook. Telephone call duration was limited to 30 min or less, focusing on motivational interviewing, education, and structured goal setting. Assignments were provided at each telephone encounter to encourage stepwise progression with PAP usage. Subsequent weekly calls (minimum 2, max of 4) focused on reviewing previously set goals, engaging in problem solving, encouraging progress made, and reinforcing structured goal setting. After a maximum of 4 weeks, providers were advised to recommend an appropriate course of action (relapse prevention planning, provide information to reengage pending future interest, referral to another service for continued support).

#### 2.4. QI program evaluation

A program evaluation was issued at approximately 30 days and 1 year after the last session. Both evaluations included the same 6 questions. Providers were asked to rate the following on a 5-point Likert scale (ranging from completely uncomfortable to completely comfortable): “What is your comfort answering patient questions about PAP devices?” and “What is your comfort answering patient questions about sleep apnea?” Providers were invited to provide free text responses to the following questions: “How have you incorporated this training in your clinical care of Veterans with sleep apnea on PAP therapy?” “What roadblocks have you encountered coaching Veterans in PAP usage?” “What additional training/support could Sleep VA-ECHO provide to address these roadblocks?”. Finally, providers were asked if we could invite them to participate in a long-term learning community of PAP usage coaches (yes/no).

Due to HIPAA rules for data access, the Sleep VA-ECHO program could not directly measure patient outcomes. We asked providers to volunteer non-identifiable outcomes for their patients, including specific barriers to PAP usage (anxiety, overnight mask removal, mask leak, discomfort, other reason), pre and post intervention Epworth Sleepiness Scale (ESS) [21] and self-reported hours and days of PAP use in the past 30 days. Pre- and post-intervention data were collected by providers at the first telephone encounter and last telephone encounter, respectively.

Providers completed program evaluations using Research Electronic Data Capture (REDCap). Response was voluntary and identifiable. We generated descriptive statistics for provider demographics, provider responses, and Veteran pre/post-intervention outcomes. This approved quality improvement initiative was conducted under the auspices of VA Offices of Specialty Care and Rural Health. In accordance with Veterans Health Administration (VHA) Handbook 1058.05, we obtained approval of non-research status from the VA program office. In addition, we

secured written concurrence of non-research status from VA Puget Sound's Director of Human Research Protection Program, Associate Chief of Staff for Research & Development, and Director of Quality, Safety and Values.

### 3. Results

A total of 37 providers attended the webinar; two trainees (a psychology intern and a graduate psychologist) were excluded from this analysis. Our analysis cohort included 35 independent practicing providers who attended at least 1 session. Nine providers attended 1 session, three attended 2 sessions, seven attended 3 sessions, and sixteen attended all 4 sessions. Providers came from 7 disciplines and 32 unique VA facilities. The greatest disciplinary representation was from psychologists ( $N = 17, 49\%$ ), respiratory therapists/polysomnography technologists ( $N = 7, 20\%$ ), and nurses/nurse practitioners ( $N = 6, 17\%$ ). Remaining providers included 1 kinesiotherapist, 2 physicians (from specialty care cardiology and pulmonary), and 2 social workers (Fig. 1). Providers worked in a variety of service lines, with the highest representation from mental & behavioral health (54%), followed by specialty medicine (40%), rehabilitation (3%) and surgery (3%). (See Fig. 2.)

An initial program evaluation was issued 30 days after the consultation session, in June 2020. Twelve providers (34%) completed the post-training survey, including 7 psychologists, 4 respiratory therapists/polysomnography technologists, and 1 nurse. Of the 12 survey respondents, 10 (83%) had attended all 4 training sessions. At 30 days post training, 67% of survey respondents reported being completely comfortable with answering patient questions about sleep apnea; 42% reported being completely comfortable answering patient questions about PAP devices (Fig. 3). Providers also provided responses to the questions about implementing this skillset into their practice. Nine providers had incorporated this skillset into their clinical repertoire, while the remaining three had not or were unable to enroll patients. Providers identified specific roadblocks to PAP coaching implementation including: inability to enroll Veterans before the consultative sessions ended, lack of Veteran interest in PAP, Veteran exhibiting poor motivation and quickly giving up, or PAP usage affected by health problems or device issues. When asked about what additional support attendants might need to successfully implement PAP coaching, they suggested additional education about PAP equipment, on-demand coaching resources, and live support from behavioral sleep medicine experts.

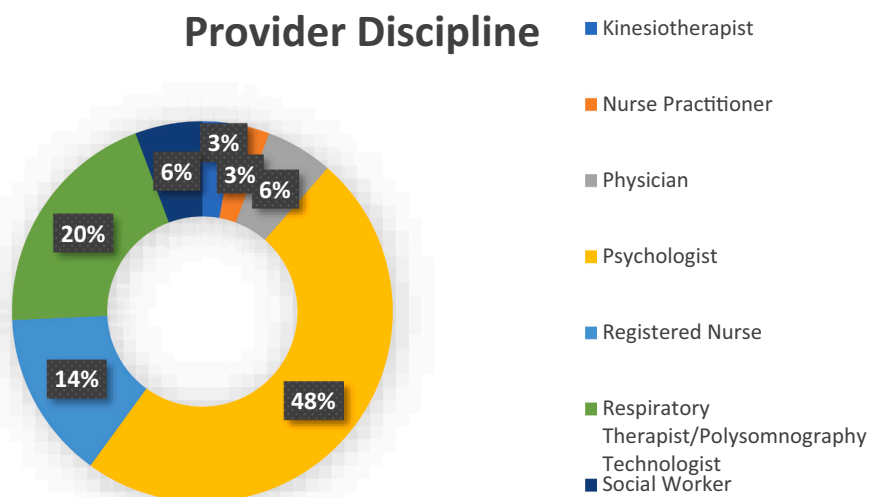


Fig. 1. Provider discipline ( $n = 35$ ).

## Provider Service Line

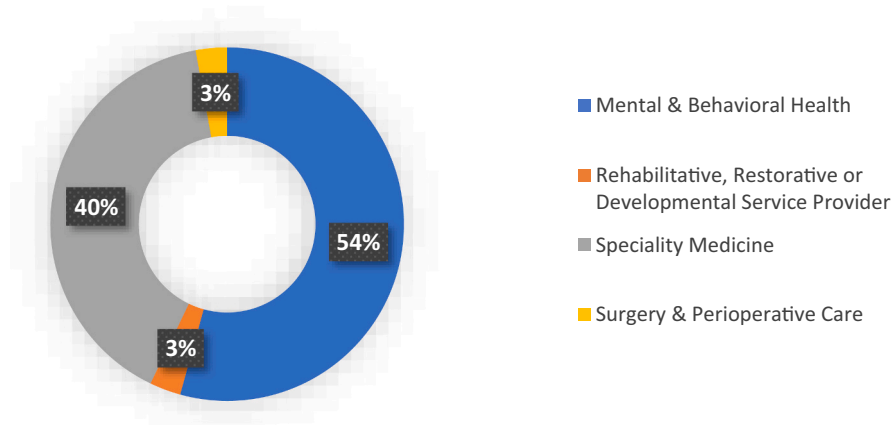


Fig. 2. Provider service line (n = 35).

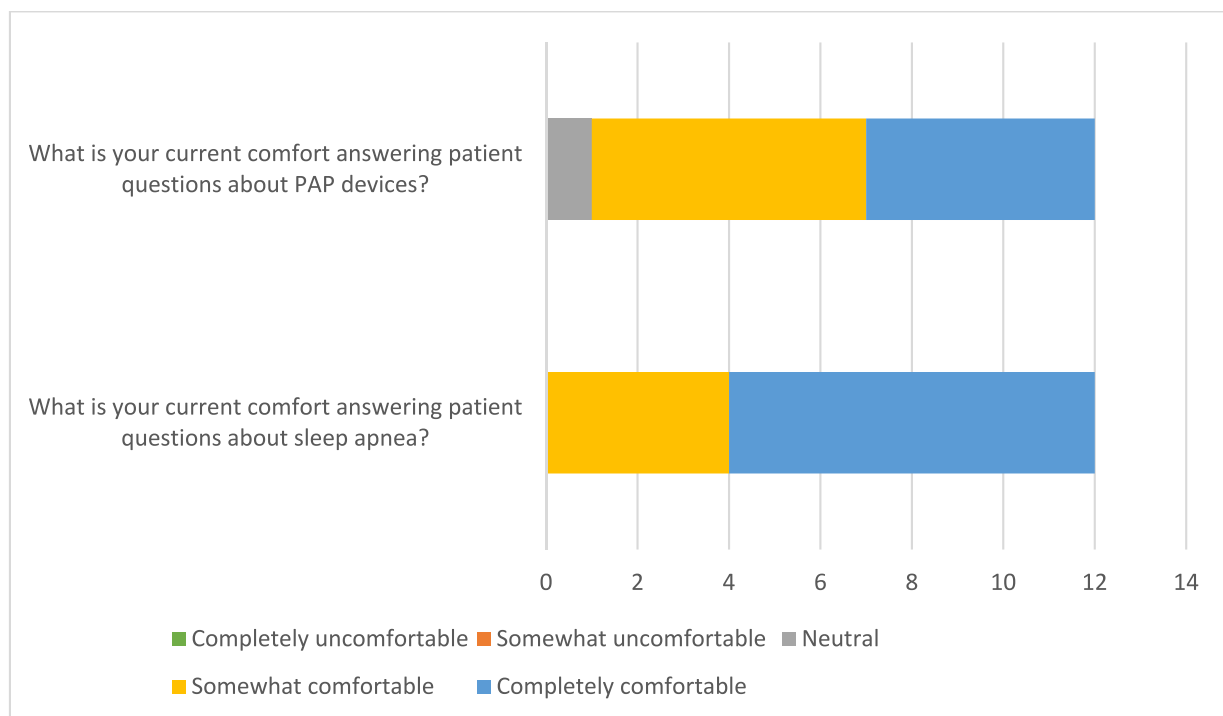


Fig. 3. Provider subjective ratings at 30-day program evaluation (n = 12).

A final program evaluation was issued approximately 1 year after the final session, in May 2021, to the 24 providers who had attended at least 1 session and still had an active VA email address. Nine providers (7 psychologists and 2 respiratory therapist/polysomnography technologists) completed the one-year program evaluation (response rate 38%). Five of these providers had previously completed the 30-day survey, and all had attended at least 3 training sessions. At one year post training, 44% of respondents felt completely comfortable answering patient questions about sleep apnea and 22% felt completely comfortable answering questions about PAP devices (Fig. 4). All final evaluation respondents reported incorporating this skillset into their clinical repertoire. They reported similar roadblocks to implementation as in the 30-day survey. Additional roadblocks identified at this timepoint included lack of familiarity with PAP equipment and lack of collaboration with PAP clinic. When asked what additional training support Sleep

VA-ECHO could provide to support PAP coaching implementation, respondents cited additional education about PAP equipment, training on how to interpret PAP device data, periodic meetings and refresher training, and additional consultative support from sleep medicine and PAP equipment experts.

Lastly, we invited providers to share feedback with us, on a voluntary basis, about their patients' experience with the coaching intervention. We provided suggestions for information they could collect including the specific problems their patients described with PAP, and a few suggested outcome measures (ESS, data download usage hours) that could be easily collected at the first and last telephone encounters, respectively. The goal of this feedback was to establish feasibility and proof of concept for these measures. Four providers (3 psychologists, 1 polysomnography technologist) voluntarily provided specific outcomes data for 6 Veterans that received the intervention, which we show in

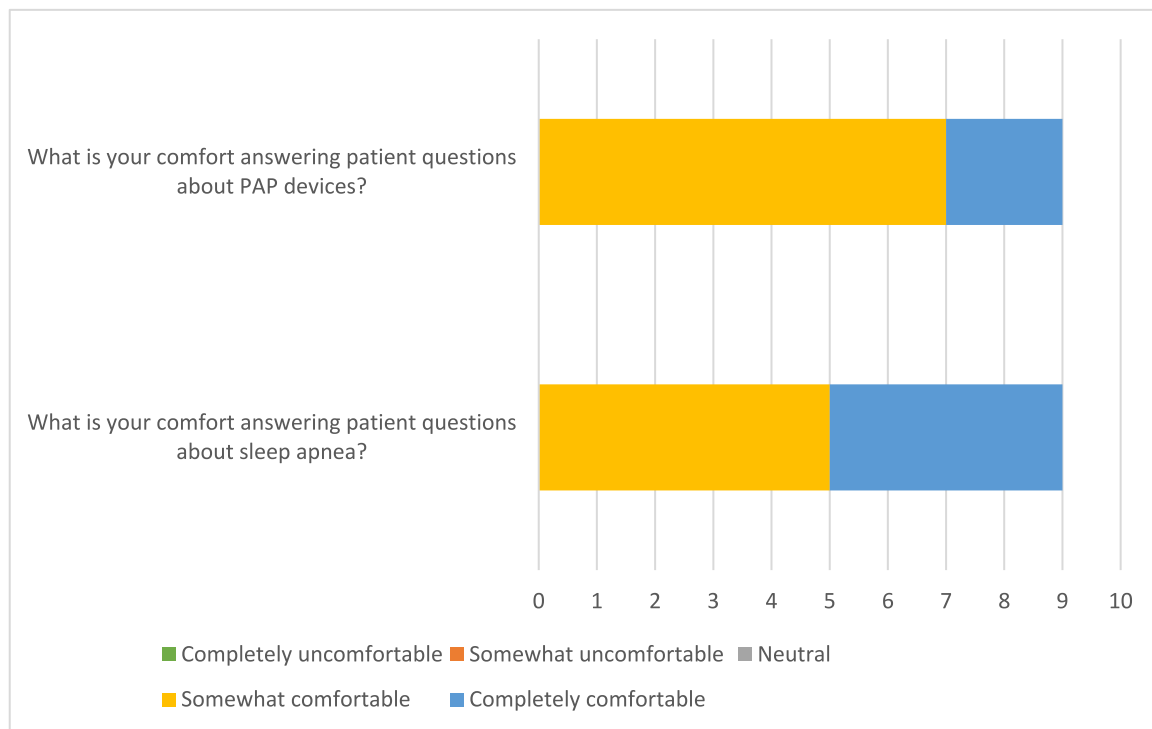


Fig. 4. Provider subjective ratings at one-year program evaluation (n = 9).

descriptive format only (Table 1). The trend towards reduced ESS and increased hours of PAP usage suggests these variables may be useful in future studies to systematically evaluate patient response to PAP coaching.

#### 4. Discussion and conclusion

##### 4.1. Discussion

This QI project demonstrates that it is feasible to use a national webinar format to train a variety of clinical staff in a PAP coaching intervention. These findings build upon previous literature showing that PAP desensitization principles [12,13,22] in a virtual care model [23,24] can be used by a variety of clinical staff. We recruited volunteer providers across 7 health disciplines and 32 VA facilities, in the midst of the coronavirus (COVID-19) pandemic, which speaks to the high clinical need for this training. Majority representation at this training was from psychologists, with the plurality of all providers attending all 4 sessions. At one year program evaluation, providers were at least somewhat comfortable answering questions about sleep apnea and PAP devices. The majority incorporated learned skills into their clinical work. Veteran data collected by their providers, and shared anonymously with the project team, demonstrates a trend towards favorable outcomes of decreased sleepiness and increased PAP usage, consistent with available literature [12,13,22,25-27].

Our results should be evaluated within the context of certain limitations inherent to a national webinar training and QI project. Our PAP coaching intervention was designed for uncomplicated patients; patients with severe mental health disorders or cognitive concerns were excluded. In a stepped care model, non-specialists could provide basic PAP coaching to uncomplicated patients, referring patients with complex needs to an experienced sleep specialist. The program team did not have access to Veterans' medical charts or PAP device download data to perform a comprehensive evaluation of the effectiveness of the intervention across facilities. The program team was also unable to coordinate referrals on a national scale, so providers needed to develop their own local infrastructure to receive referrals. Several providers found it challenging to solicit referrals at their local facility, and sharing referrals across facilities was not feasible. Our training program also did not ultimately include the amount of continued education and supervision that we had initially planned. Due to low attendance at the initial consultation session, the following 2 consultation sessions were canceled. Low attendance at the first consultation is somewhat puzzling, given the major feedback from providers at 1 year was a request for continuing education. We hypothesize that providers may have had scheduling conflicts or may have simply needed more time between the webinar and consultation sessions to obtain referrals and start practicing the intervention. Finally, our provider survey was voluntary; respondents may reflect a particularly motivated subgroup of providers. The majority of providers providing feedback were psychologists and

Table 1  
Variables identified by learners to be of interest in assessing outcomes.

	Apnea Hypopnea Index (events/h)	Epworth Sleepiness Scale		Usage (total hours) in past 30 days		Usage (days) in past 30 days		Primary Barrier to Usage
		Pre	Post	Pre	Post	Pre	Post	
Subject 1	–	–	–	0	–	0	10	Discomfort
Subject 2	–	–	–	0	–	0	20	Anxiety, discomfort
Subject 3	22	7	3	2	116	1	25	Taking mask off
Subject 4	18	11	4	10	133	4	28	Discomfort
Subject 5	7	6	2	80	100	21	29	Taking mask off
Subject 6	10	10	8	0	4	0	4	Anxiety



respiratory therapists/polysomnography technologists, who may in fact be ideal candidates to receive this training given their existing clinical expertise.

#### 4.2. Innovation

We found a single prior online publication describing how to train staff in PAP desensitization [14]. A 45-min seminar for medical residents (from primary care and psychology) focused on behavioral techniques and provided a 2-page patient handout. After the seminar, 56% of respondents agreed to the statement “I feel comfortable solving clinical problems on this topic.”

Our training program and PAP coaching intervention are innovative in several ways. Our program is the first curriculum specifically crafted for large-scale webinar training. Second, our program goes beyond PAP desensitization principles to incorporate real-world, practical content about PAP devices for both patients and providers. Our PAP coaching program is the first to leverage resources such as the PAP device manufacturers' patient portal. This is a cloud-based platform that interfaces with their PAP device and provides tutorials, troubleshooting, real-time feedback on usage and mask fit, and options to set reminders for use or supply refills. Patient engagement in the patient portal has been shown to predict improved PAP usage [28,29]. Unique provider resources include practical content about PAP equipment and maintenance, coordinating with sleep medicine and PAP clinics, and navigating potential safety concerns. We also specifically assessed providers' barriers to implementation and ongoing learning needs. Lastly, our program is the first to offer case consultation for additional provider support.

Our brief telephone-based PAP coaching intervention has the potential to greatly increase access to PAP desensitization, thereby improving care for sleep apnea. Our intervention is brief, focused, and designed for non-specialists to use in uncomplicated patients. The telemedicine format makes the intervention accessible to patients who have challenges accessing care at a specialist center due to geographical location, work or caregiving duties, or transportation challenges. Our program was timely, coinciding with the onset of restricted in-person care from the COVID-19 pandemic. Offering the training in webinar format makes the training itself more accessible to a variety of clinical staff.

Our QI project is the first to reveal that non-specialists want ongoing support and education to provide PAP desensitization. By one year there was some attrition in comfort levels, but all respondents remained at least somewhat comfortable in answering questions about sleep apnea or PAP devices. All respondents at 1 year had at some point tried to implement the coaching intervention. Reported provider challenges, mainly dropout due to poor patient interest and motivation, were similar at 30 days and 1 year. The most consistent request by providers was for periodic educational follow up and availability of on-demand support from content experts.

#### 4.3. Conclusion

Improving access to PAP desensitization for the millions of PAP users who could potentially benefit will require a multifaceted approach. Our results show that non-specialists, including nurses and psychologists working outside sleep medicine, can be motivated and effective partners. Our program results do highlight several potential pitfalls of designing large-scale training programs for PAP desensitization. National trainings reach more providers, but they are less facile at providing local support and infrastructure.

This QI project yielded valuable learner perspectives about how to disseminate PAP desensitization to more patients within VA. First, learners identified an interest in refresher trainings and longitudinal mentorship. Second, some of our learners had limited opportunities to use this new skillset because of their patient population. To address both points, we believe future webinars will benefit from targeting specific

learner groups. Ideal learners would be those who have a high volume of patients on PAP therapy and could incorporate PAP coaching principles into existing visits. Targeting staff or care teams involved in chronic disease management, where comorbidities like OSA impact other chronic conditions [30], may be a promising target audience for future trainings.

Finally, connecting the education to measurable patient outcomes is important to justify the time and cost of a training program. A systematic evaluation of patient outcomes was outside the scope of this QI project. However, our learners identified several practical variables for future projects to measure such as the Epworth Sleepiness Scale and average hours of PAP device usage per night to determine the patient impact of PAP coaching. Future studies are needed to help delineate patient factors that may predict those most likely to benefit from the intervention.

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#### Author disclosures

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#### CRediT authorship contribution statement

**Ken He:** Conceptualization, Methodology, Formal analysis, Investigation, Data curation, Writing – original draft. **Tara Crouch:** Conceptualization, Methodology, Resources, Formal analysis, Investigation, Data curation, Writing – original draft. **Jenesse Kaitz:** Writing – review & editing. **Angela D. Oien:** Conceptualization, Methodology, Investigation, Resources, Data curation, Visualization, Project administration, Writing – review & editing. **Nicola De Paul:** Conceptualization, Methodology, Investigation, Resources, Formal analysis, Writing – review & editing. **Brian N. Palen:** Conceptualization, Methodology, Writing – review & editing. **Elizabeth C. Parsons:** Conceptualization, Methodology, Formal analysis, Data curation, Writing – review & editing, Visualization, Project administration, Supervision.

#### Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

#### Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.pecinn.2023.100230>.

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