Decreasing Obstructive Sleep Apnea by increasing Continuous Positive Airway Pressure compliance and eating a Diabetic Diet

Kirahn Watson RPSGT, BS

Master of Science and Health Education- student

University of Michigan- Flint

Rie Suzuki PhD- mentor
Abstract

Obstructive sleep apnea (OSA) is one of the most common sleep disorders, affecting an estimated 20 to 30 million Americans. Seventy percent of all patients with OSA are obese and eighty six percent of all obese patients with type 2 diabetes have OSA. The prevalence of OSA increases with age, with a higher prevalence in persons 65 years and older. However, few educational materials have targeted on the Aged Obese Diabetic OSA patient. The purpose of this project is to develop the theory based educational video for patients newly diagnosed with OSA at the University of Michigan Center for Sleep Disorders. The inclusion criteria encompasses patients aged 65 and older, a BMI >30, insulin dependent diabetic, and an apnea hypopnea index>15. The patients also have completed a baseline polysomnogram and are scheduled to return to the lab for a continuous positive airway pressure (CPAP) titration. Social Cognitive Theory was utilized for this project. The video will address not only the knowledge of OSA and diabetic nutrition but also the benefits and the strategies used to increase CPAP compliance and to increase healthy diabetic dieting in patients with OSA. The proposed research design is a pre-posttest to access the impact of watching the developed video at home on wearing CPAP every night and eating 3 healthy diabetic meals per day. Self-efficacy, outcome expectations, social support, and knowledge of OSA, how to use CPAP, and the contents of diabetic diet will be measured.
Decreasing Obstructive Sleep Apnea by increasing CPAP compliance and eating a Diabetic Diet

Obstructive sleep apnea (OSA) is a condition in which the airway is either partially or fully blocked, impeding airflow. In sleep, apnea refers to a cessation of breathing that lasts at least ten seconds (National Sleep Foundation, 2012). Obstructive sleep apnea (OSA) is one of the most common sleep disorders, affecting an estimated 20 to 30 million Americans (Robins, Molgard, & Savage, 2008). The American Academy of Sleep Medicine (AASM) defines the severity of sleep apnea as normal, mild, moderate and severe. Having an apnea hypopnea index (AHI) < 5 as normal or no apnea. Mild apnea is considered an AHI ranging from 5 to 15. Moderate apnea is considered to be an AHI ranging from 15 to 30 and severe is an AHI greater than 30 (Lee, Johan, Wong, Edwards, & Sullivan, 2009). Sleep apnea can cause increased sleep arousals which leads to fragmented sleep. Apnea can also cause blood oxygen saturations to be lowered (Robins, Molgard, & Savage, 2008). OSA is a substantial financial burden on the US (Kapur, 2010). The cost of diagnosis, treatment, and the potential lifetime burden of a lifetime of restless sleep is slowly rising.

One strategy to decrease the prevalence of OSA is implementing a healthy diabetic diet. The importance and success of treating OSA with weight loss have been documented for more than twenty years (Tuomilehto, Seppä, & Uusitupa, 2013). Previous studies examining the effect of diet as a treatment of OSA have concluded that dieting may reduce the severity of OSA, but that it will not cure OSA in most patients (Tuomilehto, Seppä, & Uusitupa, 2013). The majority of the research done in the past has explored the effects of weight loss in OSA patients that were put on either a low calorie diet programs in moderately overweight patients having a BMI ranging from 35 to 40 or the effects of bariatric surgery on severely obese patients (BMI>40) with OSA. (Tuomilehto, Seppä, & Uusitupa, 2013). Research suggests that weight loss along
with increased physical activity and a healthy diet may correct or improve the symptoms of OSA (Tuomilehto, Seppä, & Uusitupa, 2013).

Another strategy used to decrease OSA is by improving CPAP compliance. CPAP compliance research suggests that patient education is directly related to adherence (Jean Wiese et al., 2005). By improving patient education, patients will have a better understanding of the severity of their condition, and may be more motivated to comply with the CPAP therapy. The American Academy of Sleep Medicine (AASM) recommends that sleep professionals stress the importance of patient education (Sawyer et al., 2011). Past research has focused on patient education before the initial CPAP use, resulting in little to no change in compliance. Videos offer an opportunity for patients to have ongoing education and a reference tool to aid in compliance. Wiese et al (2005) found that both patients and staff prefer using a video to convey the information. Videos offer the patient the convenience of being able to watch at their own pace, in privacy, with family, and review the knowledge, insurance options, who to contact, and strategies to improve self-efficacy as frequently as possible. Past research on CPAP patient education suggests several characteristics essential to making a successful educational tool. Answering the questions and concerns of patients can lead to increased adherence to CPAP (Wiese et al., 2005).

Purpose

The purpose of this project is to develop an educational video that explains how to diet, OSA, and CPAP in patients newly diagnosed with OSA. The video will address the benefits and some of the strategies used to increase CPAP compliance and to increase healthy dieting in patients with OSA (See table 1, 2, and 3). The overall study is designed to meet the performance
objectives of wearing CPAP and eating a diabetic diet to decrease OSA. These objectives will be met by increasing the knowledge of eating a healthy diabetic diet, OSA, and CPAP in patients newly diagnosed with OSA. The next objective is to increase self-efficacy and outcome expectations from wearing CPAP and eating a diabetic diet. The final objective is to increase social support from bed partner/care giver for patients wearing CPAP and/or trying to eat a diabetic diet.

Rationale

The previous video that was used for patient education at the University of Michigan Center for Sleep Disorders is now out dated and unavailable. The video focused on patient education and did not address any CPAP compliance issues. Patients not only need to be educated on what OSA and CPAP are, but also need to be aware of the severity, benefits, and how to address compliance issues. Patients with OSA also need to know how important it is to maintain a healthy BMI. When a patient maintains a healthy diet it can lead to weight loss, which can also lower CPAP pressure and improves compliance.

Health Education Rationale

Research suggests that patients that receive education prior to wearing CPAP are more likely to be compliant for the first 3 months. (Wiese et al., 2005). Using a cognitive based philosophy, increasing the knowledge of the patient can lead to the patient being better equipped to make decisions and to intervene in their own health status. There is initial evidence that social-cognitive variables are associated with CPAP adherence in first-time CPAP users during the first month of treatment. (Stepnowsky, Marler, Palau, & Annette Brooks, 2006). The social cognitive theory (SCT) suggests that patients with an increased perception that they can perform
the action, higher outcome expectancy for CPAP, better support at home, and greater education will have better adherence to CPAP” (Jean Wiese et al., 2005). When patients go to a sleep lab, the patient is typically diagnosed and brought back for a CPAP titration if found to have OSA. This period between diagnosis and CPAP titration can be used for patient education to prepare them for CPAP and therefore improve compliance.

**University of Michigan Center for Sleep Disorders needs**

The University of Michigan Center for Sleep Disorders treats patients of all ages with OSA. Over the past 5 years the University of Michigan Center for sleep disorders has ran 15,523 adult diagnostic studies (Ummcnexus, 2013). 11,041 of those patients were diagnosed with OSA. Of these diagnosed patients 32.8% were mild, 24.8% moderate, and 42.4% were severe (Ummcnexus, 2013). This program is specifically designed to be used with patients that are 18 years of age and older. The main objectives of the program are to increase knowledge about OSA and give strategies to reduce OSA by increasing CPAP compliance and encouraging dieting amongst newly diagnosed patients. Research shows that CPAP compliance in the first few weeks is a predictor for long-term CPAP adherence (Wiese et al., 2005). It is imperative that patients understand the importance of CPAP, eating a healthy diet, maintaining a health BMI, and the severity of OSA, in order to decrease the prevalence of OSA.

**Target Population**

The target population includes patients who have completed a baseline polysomnogram (psg) at the University of Michigan Center for Sleep Disorders. The inclusion criteria includes patients that are ages 65 and up, with a BMI >30, and insulin dependent diabetic. These patients have been diagnosed with OSA, having an AHI>15 and scheduled to return to the lab for a
CPAP titration. Patients that have tried CPAP in the past or diagnosed with Insomnia will be excluded from this program.

**Proposed Research**

The patient will come to the sleep center to have a baseline polysomnograph study performed to determine the diagnosis for sleep apnea. Once diagnosed, the patient will be given a pre-test to measure their knowledge, self-efficacy, outcome expectations, and social support. The patient will be given a video to take home to watch in the privacy of their homes before they come back within 2 weeks to have their CPAP titration study performed. A post-test will be given to measure their knowledge, self-efficacy, outcome expectations, and social support strategies they learned and retained from the video. In six weeks a follow-up post-test will be given to again test measure their knowledge, self-efficacy, outcome expectations, social support strategies they learned and retained from the video, and also their CPAP compliance status will be checked on their machine’s data card.

**Theory**

The Social Cognitive Theory (SCT) suggests that people learn from watching others. Self-efficacy may be increased by making sure that the patient is confident they can wear CPAP and have the skills to make it comfortable to wear. SCT is comprised of four constructs: self-observation, self-evaluation, self-reaction and self-efficacy (Bandura, 2004). Outcome expectancies that the patient can expect from wearing CPAP each night may include feeling more rested, less snoring, and having more energy throughout the day. SCT research suggests that patients with a higher perceived self-efficacy, higher outcome expectancy, better social...
support, and greater knowledge will be more likely to adhere to CPAP (Stepnowsky, Marler, & Ancoli-Israel, 2002).
Table 1  Wear CPAP every night for at least 4 hours

<table>
<thead>
<tr>
<th>Performance Objective</th>
<th>Internal Determinants</th>
<th>External Determinants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wear CPAP every night for at least 4 hours</td>
<td><strong>Skills and Self-Efficacy</strong></td>
<td><strong>Knowledge</strong></td>
</tr>
<tr>
<td></td>
<td>A. State confidence that they can wear CPAP regularly</td>
<td>A. Understand CPAP and OSA</td>
</tr>
<tr>
<td></td>
<td>B. Know how to use CPAP and comfort settings</td>
<td>B. Understand severity and risk of OSA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>C. Know importance of wearing CPAP</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Table 2. Wear CPAP every night for at least 4 hours performance method

<table>
<thead>
<tr>
<th>Transcripts</th>
<th>Method</th>
<th>Who</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Knowledge</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. What is OSA and CPAP</td>
<td>PowerPoint</td>
<td>Narrator</td>
</tr>
<tr>
<td>B. Risk associated with OSA</td>
<td>PowerPoint</td>
<td>Narrator</td>
</tr>
<tr>
<td>C. Importance of wearing CPAP</td>
<td>PowerPoint</td>
<td>Narrator</td>
</tr>
<tr>
<td>D. How to use CPAP</td>
<td>Modeling</td>
<td>Patient</td>
</tr>
<tr>
<td>E. How to make It comfortable</td>
<td>Modeling</td>
<td>Patient</td>
</tr>
<tr>
<td><strong>Outcome Expectations</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. May reduce daytime sleepiness</td>
<td>Verbal Persuasion</td>
<td>Patient</td>
</tr>
<tr>
<td>B. May stop or reduce snoring</td>
<td>Verbal Persuasion</td>
<td>Patient</td>
</tr>
<tr>
<td>C. May be more alert</td>
<td>Verbal Persuasion</td>
<td>Patient</td>
</tr>
<tr>
<td><strong>Self-Efficacy</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. State confidence that they can wear CPAP</td>
<td>Verbal Persuasion</td>
<td>Patient</td>
</tr>
<tr>
<td>B. Show they can use CPAP and comfort settings</td>
<td>Modeling</td>
<td>Patient</td>
</tr>
<tr>
<td><strong>Social Support</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. Encourage CPAP use</td>
<td>Verbal Persuasion</td>
<td>Daughter</td>
</tr>
<tr>
<td>B. Check on patient every 2 hours</td>
<td>Modeling</td>
<td>Daughter</td>
</tr>
</tbody>
</table>
**Video Contents**

The videos uses power point, pictures, and narration to educate the patient on the causes and risks associated with OSA to meet the performance objectives, wear CPAP at least 5 of 7 days per week and at least 4 hours per night. Through modeling the video shows how to use the CPAP machine and how to properly wear the CPAP mask. It shows step by step how to turn on the machine, put the mask on, and also goes through the comfort features. It shows some strategies to address common problems, like mask leak, pressure tolerance, and facial discomfort. Instructions to check compliance data including the average usage, used hours, days used, run hours and pressure will be shown through modeling. This helps to ensure that the patient knows how to check to make sure they are compliant by Medicare standards, wearing CPAP 70% of 30 days for at least 4 hours per night (Medicare Learning Network, 2010). The character in the video displays an increase in self-efficacy as she reaches each of her outcome expectancies. The daughter/character in the video shows social support by checking on the patient every 2 hours and by setting a daily reminder to help encourage CPAP usage (See table 2).

**Measures**

A research study of CPAP self-efficacy using Social Cognitive Theory (SCT) found that perceived outcome expectancies before treatment and self-efficacy during treatment along with knowledge and social support were predictors of the CPAP compliance in the first week of wearing CPAP (Weaver et al., 2003). A questionnaire was developed to assess the effectiveness of the videos based on SCT. The questionnaire will take approximately 15 minutes to be completed.
Self-efficacy

Self-efficacy will be assessed using two measures designed to determine the participant’s confidence level in wearing CPAP according to Medicare’s compliance standards. They must wear CPAP at least 5 of 7 days for at least 4 hours per night. Diabetic dieting self-efficacy was measured using five items, asking the participant to gage their confidence level of eating, preparing, and measuring components of a healthy diabetic diet.

Knowledge

Knowledge of OSA will be measured using five items and knowledge of CPAP was measured using four items. The questionnaire will gage the patient’s knowledge of risk of high blood pressure, heart attack, daytime sleepiness, car accident, and difficulty concentrating. Also assessing their knowledge of how to wear and use CPAP along with its importance. Eight items were used to gage the participant’s knowledge of eating, preparing and measuring three diabetic meals each day. The questionnaire will also assess knowledge of how to measure and how many carbohydrates, proteins, and fat servings to eat each meal.

Outcome expectations

Outcome expectations will ask participants to gage how effective they believe CPAP is, in helping to improve their everyday lives. Four measures were used to assess their confidence that wearing CPAP may improve energy throughout the day, alertness, snoring and concentration. Diabetic dieting outcome expectancies will be measured using four items that gage if the patient believes that they could expect positive results from eating a diabetic diet. Specifically, the questionnaire will assess the participant’s confidence that eating a diabetic diet may help with weight loss, feeling better, managing diabetes, and decreasing CPAP pressure.
Social support

Social support will be assessed using one measure to gauge the likeliness of the patient having someone to help encourage their CPAP use. Diabetic dieting social support will be measured using one measure to assess how confident the patient is that they will have someone to give support in their effort to eat a healthy diabetic diet.

Methodology

The transcript, handout, and PowerPoint were each modified three times to ensure the comprehension of the material. A 17 year old female, with no knowledge of obstructive sleep apnea or diabetic dieting was used to ensure that the literacy rate was at an accurate level. It was found that the material used too much medical jargon. For example, the word sugar was substituted for the word glucose. The transcript was then amended to get rid of most of the terms that were unfamiliar, without losing the message being relayed. The transcript was also read by a 40 year old male, to ensure that the material could be put to use. After having the transcript reviewed by a medical doctor/surgeon, the transcript was altered one last time. It was changed to ensure that we only suggest a possible association instead of implying causation. For instance, CPAP may decrease risk, instead of CPAP will decrease risk.

The original handout for the diabetic diet material was found to contain excess information. The final handout was narrowed down to only include only pertinent information that related to the knowledge objectives. For example, the handout had information on how to count calories for a specific meal plan for 1300 calories per day. The new handout gives the participant a reference sheet that will help them when they are putting their skills into action and also flows well with the video content.
References


Kapur, V. K. (2010, 09; 2014/2). Obstructive sleep apnea: Diagnosis, epidemiology, and economics.55, 1155+. Retrieved from http://libproxy.umflint.edu:2176/ps/i.do?id=GALE%7CA237135449&v=2.1&u=lom_umichflint&it=r&p=AONE&sw=w&asid=4b01f3b4292c13dd56aa0515c52e8428


Salt Lake City, UT: American Sleep Academy, LLC.

Sawyer, A. M., Canamucio, A., Moriarty, H., Weaver, T. E., Richards, K. C., & Kuna, S. T.


