Obstructive Sleep Apnea Case Study

Background

Approximately one in four commercial motor vehicle (CMV) drivers in the U.S. are estimated to possess mild or higher levels of obstructive sleep apnea (OSA), the most common sleep-breathing disorder that is associated with significant medical consequences including cardiovascular disease and diabetes. OSA is caused by repetitive collapse of the upper airway during sleep. A major symptom of sleep apnea is excessive daytime sleepiness which is highly correlated to impaired driving performance, and may result in an increased risk of being in traffic- or work-related incidents.

The most prescribed and cost-effective first-line treatment for OSA is nasal continuous positive airway pressure (CPAP). This treatment modality establishes a pneumatic splint for the nasopharyngeal airway which prevents upper airway collapse during sleep. Studies have consistently shown that CPAP therapy reduces overall airway resistance, thus decreasing OSA severity. Newer PAP devices, including automatic and bi-level PAP, are gaining favor as they have been shown equally effective as CPAP in eliminating respiratory events while increasing the comfort level for the user to improve treatment compliance. However, the high cost of PAP treatment (approximately $1500 retail price) may make carriers unwilling to invest in such an expensive treatment without data showing a positive return-on-investment in terms of reduced health care premiums, lower crash rates, and increased driver retention. Further, many carriers are unlikely to possess the resources or knowledge to implement such a program. Carriers might be more willing to implement a sleep apnea program if their organization had information on the health, safety, and financial benefits of treating sleep apnea as well as a manual to follow when implementing such a program.

Research Objectives

Two carriers, Schneider National Inc. (SNI) and J.B. Hunt (J BH), have implemented OSA programs to screen, diagnose, treat, and manage their OSA-positive CMV drivers. This case study provides an overview of these OSA programs, outlines each carrier’s screening, testing, and compliance protocol, and compares and contrasts their approaches. Focus group research was also conducted with drivers and staff involved in each program to assess drivers’ and staff perceptions and opinions of their respective OSA programs. Existing carrier health and safety data are also being evaluated to determine the health, safety, and cost-benefits of treating OSA in CMV drivers.

Methods

The VTTI Research Team will (i) outline each carrier’s OSA program, (ii) visit terminal sites and host focus groups and phone interviews with drivers and staff involved in the project to assess their opinions and perceptions of their OSA program, (iii) evaluate the efficacy of treatment for OSA, including CPAP, while CMV drivers are on the job, (iv) assess the driving safety and health benefits of treating OSA (e.g., reduced crashes, improved health profile), and (v) evaluate the overall return-on-investment.

Sleep apnea is an important preventable cause of motor vehicle accidents. Studies have found that treatment for OSA can lower the accident rate.

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Focus Groups

A total of 32 participants involved in SNI or JBH's OSA programs were included in the focus groups and phone interviews. Each focus group and phone meeting consisted of six parts including: (i) OSA program participation; (ii) screening, testing and education; (iii) recommended treatments; (iv) treatment compliance; (v) program outcomes; and (vi) closing thoughts. All focus groups and phone interviews have been completed.

The resultant data are in the process of being analyzed via content analysis (adapted from a framework analysis methodology by Ritchie, Spencer, & O'Connor, 2003).

Data Analysis

VTTI will work with the University of Minnesota and Harvard Medical School to collect data previously gathered by SNI and Precision Pulmonary Diagnostics (PPD) regarding Schneider's OSA pilot program. These data will be used for data mining and analyses on the effectiveness of their OSA pilot program. Existing data will include: (i) driver health screenings, (ii) OSA diagnostic information, (iii) OSA treatment recommendations, (iv) CPAP compliance information, (v) crash and injury reports, (vi) medical files, (vii) and financial information (e.g., health care premiums, crash costs, man hours needed to run the program, etc.).

Case Study Final Report

A key output from this study will be the development of a set of best practices for implementing and maintaining a successful OSA program which will be essential for the development of the follow-on Commercial Driver Individual Differences Study (CDIDS) sponsored by the Federal Motor Carrier Safety Administration (FMCSA). The collected data from SNI and PPD will provide valuable information regarding the efficacy of CPAP therapy for CMV drivers with OSA, the safety and health benefits of treating OSA, and the return-on-investment for providing drivers with OSA treatment. The final report will culminate in a set of recommendations for next steps involving the collection of new data during a naturalistic driving study.

Findings

In an initial analysis of driver and staff comments, drivers were asked about the benefits and disadvantages they experienced while participating in the OSA program. Staff members were asked what facilitated the implementation and maintenance of their carrier's OSA program, and what barriers they experienced. Drivers reported benefits such as better quality sleep, not falling asleep while driving, and better health. Driver disadvantages included, discomfort from the treatment mask, being "tied" to a machine, and general complaints regarding the PAP device. Staff reported that helpful carrier and OSA provider staff, diligent compliance monitoring, and consistent driver follow-up aided program implementation and maintenance. Staff also reported that logistical challenges, driver acceptance, and delays in testing due to the volume of drivers at risk for OSA were the primary barriers in program implementation and maintenance.

While the protocols share several similarities, such as types of treatment devices, compliance monitoring protocols and modes of follow-up with drivers, significant differences are noted in how the two programs screened and tested for OSA. SNI drivers are primarily screened for OSA via a proprietary web-based screening tool, the Somni-Sage® Screening Questionnaire, developed by PPD. SNI drivers that screen with a high likelihood of OSA undergo a full night polysomnography (PSG) to test for the presence of OSA. JBH drivers are primarily screened for OSA using health records, anthropometric data, and signs and symptoms of OSA. JBH drivers with a high likelihood of OSA are tested for OSA using a portable sleep testing device which they wear overnight while sleeping at home or in their truck. Both SNI and JBH follow similar protocols for providing OSA education to drivers and treating OSA with automated positive airway pressure (APAP) when necessary. Furthermore, both carriers employ a rigorous compliance monitoring program and maintain long-term follow-up with drivers.

VTTI continues to work with the University of Minnesota and Harvard Medical School to evaluate SNI’s existing carrier data.

One of the disadvantages of PAP treatment is its high cost. The average retail price is $1500.