Tenth International Conference on Managing Fatigue: Abstract for Review

Title: "Identifying Obstructive Sleep Apnea Risk Factors in Commercial Motor Vehicle Drivers"

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Problem: Commercial motor vehicle (CMV) driving is a hazardous occupation, with the third highest fatality rate among common jobs in the United States. Of the estimated 14 million CMV drivers in the United States, the prevalence of obstructive sleep apnea (OSA) among the drivers is said to be 17% to 28%. Despite the identified increased prevalence of OSA in CMV drivers, there is no federal requirement to screen CMV drivers for OSA. This evidence based practice change project that evaluated the effectiveness of an OSA screening tool for evaluating CMV drivers for OSA risk at the time of the commercial driver medical examination (CDME).

Method A comprehensive literature review was conducted to better understand OSA. Occupational health practitioners need to be aware of the signs and symptoms of this condition, and the availability of screening tools to better assess the commercial driver for the potential risk of OSA. Utilizing the American College of Occupational and Environmental Medicine (ACOEM) Joint Task Force Consensus Criteria guidelines, a self-developed OSA screening tool, including measurement of biological parameters (height, weight, BMI, and neck circumference) and the Epworth Sleepiness Scale (ESS), was developed. The participants for this project were CMV drivers who presented to an occupational health clinic in Central Pennsylvania for a certification or recertification CDME over a four week period. The drivers were 18 years of age or older, all races, male or female, and may have had existing co-morbidities. Drivers with a diagnosis of OSA or other sleep disorders, supported with medical data, were not included in the project.

Results: The project participants consisted of a total of 86 commercial truck drivers, 80 male and 6 female (Table 1). Of the 86 commercial drivers, 20% (n=17) had a BMI $\geq 35 kg/m^2$, 24% (n=21) had a systolic BP$\geq$=140 mmHg or diastolic BP$\geq$=90 mmHg and 55% (n=47) had an increased NC ($\geq$17inches in men or $\geq$16 inches in women). In analyzing the project data, 27% (n=23) of the commercial drivers were identified at risk for OSA based on the use of biological parameters only and 13% (n=11) of the commercial drivers were identified at risk for OSA based on the ESS (Figure 1). The proposed OSA screening tool (biological parameters plus the ESS) identified that 32.6% (n=28) of participants would have been missed if only using the ESS or biological parameters. For example, 23% (n=20) commercial drivers would have been missed if only using the ESS and 9% (n=8) would have been missed if only using the biological parameters (Figure 2). When utilizing the combination of both tools, a total of 3% (n=3) commercial drivers were identified at risk. A total of 36% (n=31) were identified as being at risk for OSA utilizing either tool. However, the two tools had low agreement (kappa=0.004, McNemar's test p-value = 0.0233), suggesting that the ESS may be capturing a different subgroup of commercial drivers that are at risk for OSA. Lastly, of the 86 CMV drivers who

participated in the project, 2 CMV drivers were screened positive for OSA risk during the course of the routinely scheduled CDME without using the OSA screening tool. However, when evaluating these two drivers using the OSA screening tool, one screened positive for OSA risk, and one did not.

Table 1: *CMV driver demographics by gender*

		Male n=80	Female N=6
Height (inches)	Mean (SD)	70.6 (2.7)	65.5 (3.4)
	Range	[63, 77]	[60, 69]
Weight (pounds)	Mean (SD)	213.2 (46.5)	190.8 (45.4)
	Range	[117, 360]	[107, 228]
BMI (kg/m^2)	Mean (SD)	30.0 (6.1)	31.4 (8.1)
	Range	[19.7, 50.2]	[18.4, 43.4]
Systolic BP (mmHg)	Mean (SD)	126.5 (11.6)	124.7 (13.1)
	Range	[104, 168]	[110, 138]
Diastolic BP (mmHg)	Mean (SD)	82.5 (7.5)	81.3 (5.8)
	Range	[60, 104]	[74, 90]
Neck Circumference (inches)	Mean (SD)	16.8 (1.8)	15.8 (2.2)
	Range	[13.5, 24.0]	[12.5, 19.0]
CDME 2 year card	Yes, % (n)	63% (n=50)	50% (n=3)
	No, % (n)	36% (n=29)	50% (n=3)
	Unknown, % (n)	1% (n=1)	0% (n=0)
If CDME <2 year, was it due to OSA	Yes, % (n)	10% (n=3)	0% (n=0)
	No, % (n)	90% (n=26)	100% (n=3)

Figure 1: Distribution of ESS Scores
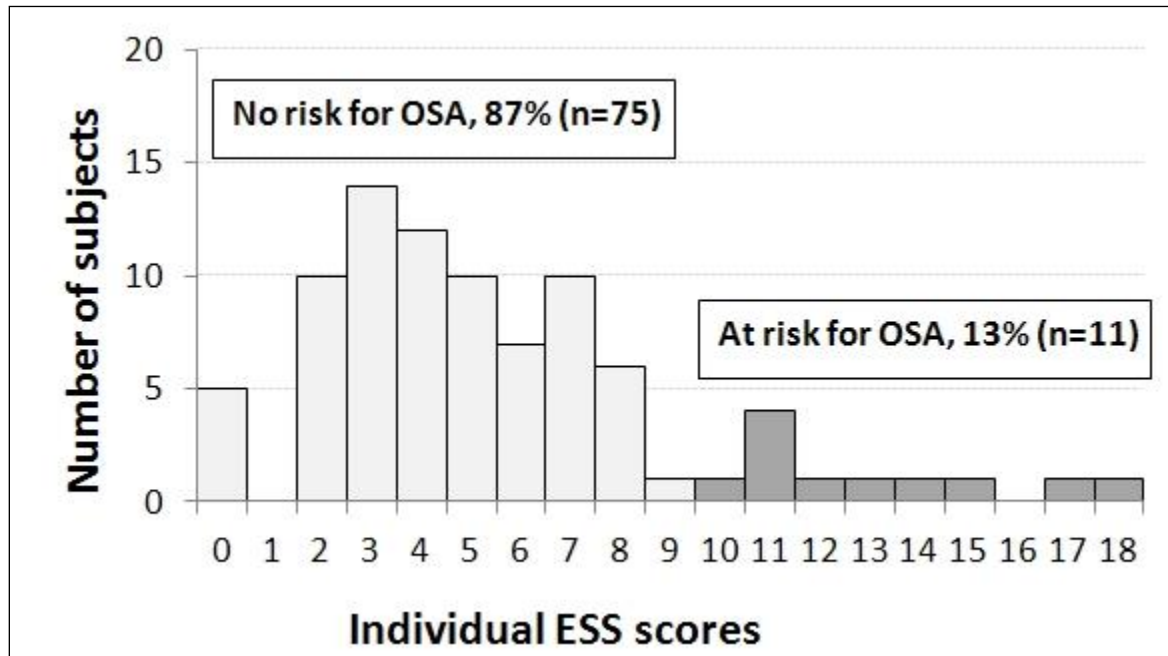

Figure 2: Risk Identification with use of ESS versus the Measurement of Biological Parameters

		Biological Parameter Assessment	
		Not at risk	At risk for OSA
ESS	Not at risk	64.95% (n=55)	23.26% (n=20)
	At risk for OSA	9.30% (n=8)	3.49% (n=3)

Discussion CMV drivers who participated in the evidence-based project had varied comments about the OSA screening tool. Many drivers commented that the screening for OSA is "long over due", and they question how many of the truck drivers are even capable of passing a CDME due to their increased weight. Some CMV drivers stated that providing additional screening will "mean more money out of my pocket if I am required to go for testing" and "all it will do is cost people their jobs". Several drivers had comments about the ESS and questioned the validity of the tool. Some drivers stated they would answer the ESS questions differently depending on what time of day they were asked the questions. One driver commented that he drives during the night and does not "lie down in the afternoon". The project implementer suggests that the CMV driver be directed to complete the questionnaire to the best of their ability. If the question does

not apply, then they should leave the question blank. The office staff at the occupational health clinic had positive comments regarding the project tool. Both the staff and the project implementer found that the OSA screening tool was a user friendly tool that did not increase the amount of time in conducting the CDME.

Summary   Despite the identified increased prevalence of OSA in CMV drivers, there is no federal requirement to screen CMV drivers for OSA. Occupational health practitioners who complete CDME's need to be aware of the signs and symptoms of OSA, and have the availability to use screening tools to better assess the commercial driver for the potential risk of OSA. This evidence-based project evaluated the effectiveness of an OSA screening tool for identifying OSA risk at the time of the CDME.   Based on the ACOEM Joint Task Force Consensus Criteria, the OSA screening tool was found to be effective in identifying OSA risk in CMV drivers that otherwise would not have been identified at risk during the routine CDME. Evaluating practitioners or examiners have the autonomy to request additional testing or conduct additional screenings during the CDME based on the driver's stated history, physical findings, or best practices that are suggested by medical expert panels. Although practitioners are making progress in the area of sleepiness and OSA, practitioners must remain committed to identifying and promptly correcting risk factors for drowsy driving in an effort to reduce crash risk.