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

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Commerical Motor Vehicle Drivers

- Operate vehicles for interstate commerce or operating trucks that weigh >26,000 pounds gross vehicle weight for intrastate commerce.

- These positions require a commercial driver's license and a certification for medical fitness with a commercial driver medical examination (CDME) through the Federal Motor Carrier Safety Administration (FMCSA)

Clinical Background & Problem

- Driver sleepiness has been estimated to cause 20% of all motor vehicle accidents (Pagel, 2008).

- In 2006 in the United States, over 5,200 deaths and more than 125,000 injuries were associated with large truck accidents. The FMCSA states that of those injuries, 80% were the fault of the truck driver (Parks, Durand, Tsismenakis, Vela-Bueno & Kales, 2009).

- Researchers estimate that obstructive sleep apnea (OSA) increases the risk of vehicular accidents by two to seven fold (Parks et. al., 2009).

- 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% (Parks et. al., 2009).

- Despite the identified risk of OSA in CMV drivers, FMCSA does not require formal screening of OSA during the federally mandated commercial driver medical examination unless the examiner identifies a potential health issue that needs examined further (Durand & Kales, 2009).

Research Evidence

- In 2006, the American College of Occupational and Environmental Medicine (ACOEM) developed recommendations for routine obstructive sleep apnea (OSA) screening for the certified driver's medical examination (CDME) (Durand & Kales, 2009).

- Talmage et al. (2008); Parks et al. (2009); and Xie, Chakrabarty, Levine, Johnson, and Talmage (2011) validated the effectiveness of the Task Force consensus criteria for identifying CMV drivers at risk for OSA.

Screening Recommendation for Commercial Drivers with Possible or Probable Sleep Apnea

Medically qualified to drive commercial vehicles if driver meets either of the following	In-service evaluation (ISE) recommended if driver falls into any one of the following five Major categories (3 month maximum certification)	Out-of-service immediate evaluation recommended if driver meets any one of the following factors
1. No positive findings or any of the numbered in-service evaluation factors. 2. Diagnosis of OSA with CPAP compliance documented.	1. Sleep history suggestive of OSA (snoring, excessive daytime sleepiness, witnessed apneas). 2. Two or more of the following: -BMI$\geq$35 kg/m^2 -Neck circumference >17 inches in men, and 16 inches in women -Hypertension (new, Uncontrolled, or unable to control with less than 2 medications. 3. ESS >10 4. Previously diagnosed sleep disorder; compliance claimed, but no recent medical visits/compliance data available for immediate review (must be reviewed within 3-month period); if found not to be compliant, should be removed from service (includes surgical treatment. 5. AHI>5 but <30 in a prior sleep study or polysomnogram and no excessive daytime somnolence (ESS<11), no motor vehicle accidents, no hypertension requiring 2 or more agents to control.	1. Observed unexplained excessive daytime sleepiness (sleeping in examination or waiting room) or confessed excessive sleepiness. 2. Motor vehicle accident (run off road, at-fault, rear-end collision) likely related to sleep disturbance, unless evaluated for sleep disorder in the interim. 3. ESS$\geq$16 or FOSQ<18 4. Previously diagnosed sleep disorder: -Noncompliant (CPAP treatment not tolerated) -No recent follow up (within recommended time frame) -Any surgical approach with no objective follow up. 5. AHI>30

Clinical Question

In assessing commercial vehicle drivers, does the use of the Epworth Sleepiness Scale and measurement of biological parameters lead to increased identification of commercial drivers at risk for obstructive sleep apnea?

Methodology

- 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.

Obstructive Sleep Apnea Tool

- **Page 1**
- Gender: Male / Female
- Height: _____
- Weight: _____
- Body Mass Index: _____
- Blood Pressure:_____
- Neck Circumference (inches): _____
- CDME Card Expiration:
- 2 year card   _____Yes _____ No
-    <2 year card due to sleep disorder ___ Yes ___ No
- **Page 2**
- Epworth Sleepiness Scale

Evaluation of Outcomes

- All data was entered and listed on a spreadsheet without any personal identification information.

- **Page One**: A point will be awarded for drivers with BMI >35kg/m2, neck circumference for men >17inches and women >16 inches, and hypertension (new or uncontrolled). Hypertension will be defined as $\geq$ 140/90 as per the FMCSA medical guidelines. Two or more points would be considered at risk.

- **Page Two**: A score $\geq$ 10 on the Epworth Sleepiness Scale, would also be considered at risk.

- A biostatistician was hired to analyze descriptive statistics for frequency distribution and possible correlation.

Project Design and Timeline

- At the conclusion of the CMV examination, drivers were asked to voluntarily participate in the project.

- Participation in the study did not affect the outcome of the scheduled CDME.

- The project entailed completing the OSA screening tool.

- There was no personal identification information linking the driver to the study.

- Exempt IRB approval from Chatham University in Pittsburgh, PA

- Project was conducted over a four week period in May/June, 2012.

Results

- The project participants consisted of a total of 86 commercial truck drivers, 80 male and 6 female.
  - 20% (n=17) had a BMI $\geq$35kg/m^2, 24% (n=21)
  - 24% (n=21) systolic BP$\geq$=140 mmHg or diastolic BP$\geq$=90 mmHg
  - 55% (n=47) had an increased NC ($\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
  - 13% (n=11) of the commercial drivers were identified at risk for OSA based on the ESS
  - 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.
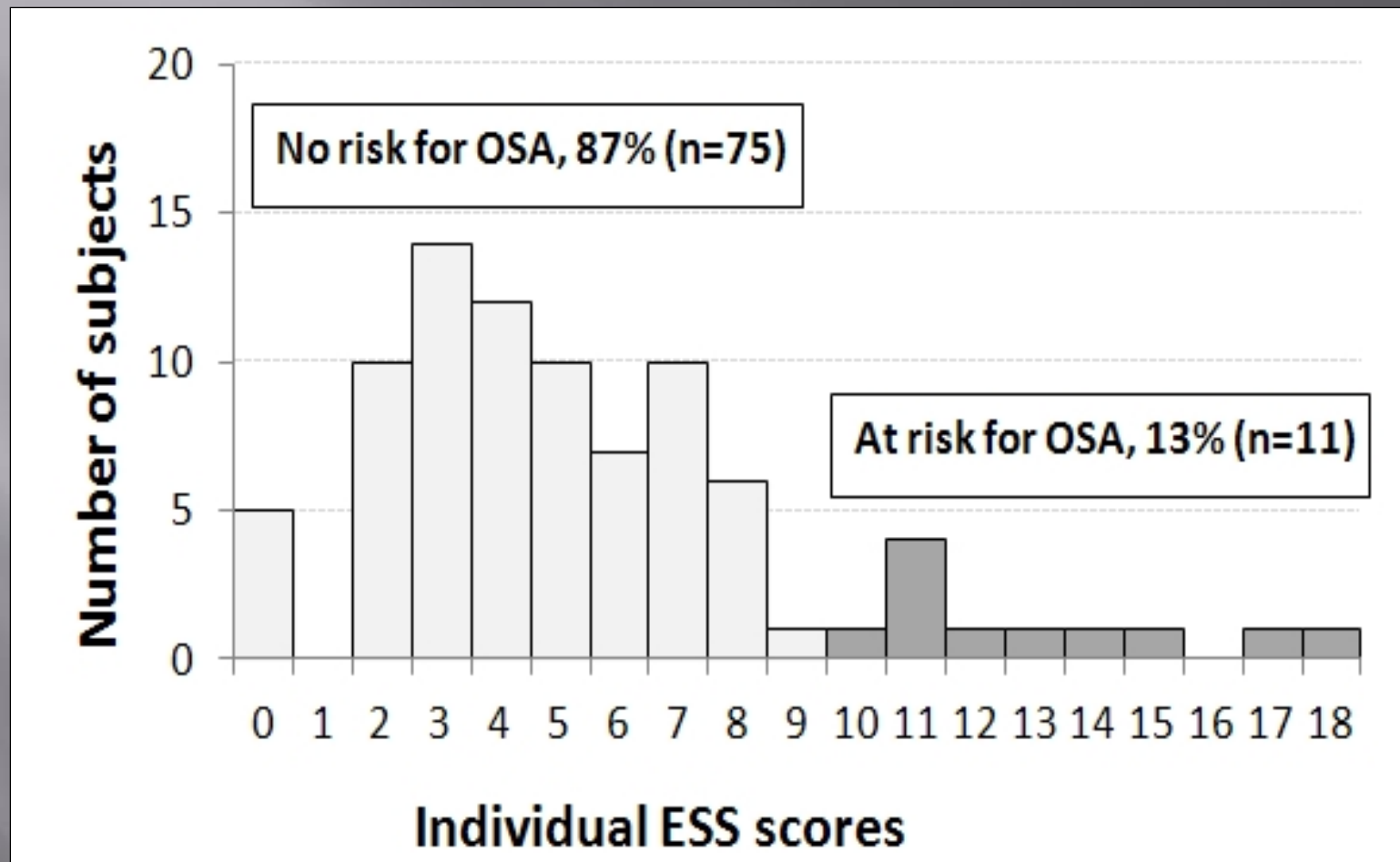
Results

- 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.

- 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.

CMV driver demographics by gender

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

Distribution of ESS Scores

Risk Identification: ESS Scores vs. 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)

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.

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- 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.

- 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.

"we still have miles to go before we safely sleep".

Paraphrased from Robert Frost

Thank you!!

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