

Obstructive Sleep Apnea (OSA) Screening at DOT Exams

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- Co-investigators: P. Parks, G. Durand, A. Tsismenakis, A. Vela-Bueno

Learning Objectives:

- 1) Major risk factors for OSA & screening utility
- 2) Expected prevalence of OSA among DOT-regulated drivers
- 3) Evidence-based OSA screening at DOT exams

Why are Sleepy Drivers Important?

42-54% of all accidents caused by sleep disorders (National Commission on Sleep Disorders, 1988)

At least 7% of truck crashes due to driver falling asleep (DOT)

Why are Sleepy Drivers Important?

Roughly 14 million Commercial Drivers License (CDL) holders in US

Large truck crashes:
50% lead to death or incapacitating injury

2006: over 5,200 deaths and more than 125,000 injuries related to truck crashes. [GAO]

Operator Specific Factors & Sleepy Crashes

- Sleep Deprivation
 - Poor Sleep Hygiene
 - Change circadian rhythm (travel/shift work)
 - Alcohol/Drugs
 - Sleep medication
 - Narcolepsy

 - Obstructive Sleep Apnea
- Can be screened at DOT Exams

Obstructive Sleep Apnea

Sleep-disordered Breathing: due to intermittent upper airway obstruction

Nocturnal symptoms of OSA: disrupted sleep due sleep-disordered breathing

Diurnal symptoms: excessive daytime sleepiness, psychomotor deficits, impaired vigilance, sleep attacks

OSA Dramatically Increases the Risk of Vehicular Accidents

Multiple studies have demonstrated that OSA is associated with an increased rate of MVA's.

The relative Risk is usually on the order of 2-7 times that of persons without OSA.

Who is at Risk for OSA?

Symptoms

- **Chronic Loud Snoring**
- **Gasping, Snorting, Jerking Arousals**
- **Witnessed Apneas, Pauses during Sleep**
- **Morning Headaches**
- **Un-refreshed Sleep**
- **Excess Daytime Sleepiness**

Who is at Risk for OSA?

TABLE 4. RISK FACTORS FOR OBSTRUCTIVE SLEEP APNEA

Obesity
Specific craniofacial disorders (e.g., Treacher-Collins, Pierre-Robin syndromes)
Retroposed mandible/maxillae
Adenotonsillar hypertrophy
Nasal problems: septal deviation, allergic rhinitis
Endocrine abnormalities: hypothyroidism/acromegaly
Polycystic ovarian syndrome
Postmenopause
Down syndrome
Family aggregation
APOe4 allele (in subjects < 65 yr)

From Pack AI Am J Respir Crit Care Med Vol 173, pp 7-15, 2006

Obesity is the most common risk factor.

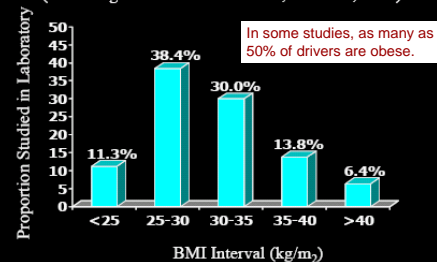
BMI > 29: RR of OSA >10

BMI \geq 32: Chance of OSA ~75% in middle-aged men

Obesity is also a contentious criterion for OSA screening, due to its high prevalence and the misperception among obese persons that they are being "picked on" because of their weight.

Distribution of Body Mass Index in Commercial Drivers

(Gurubhagavatula et al. AJRCCM, 170: 371, 2004)



Dagan et al 2006

Israeli truck drivers with BMI ≥ 32

100% denied all symptoms of OSA/EDS

78% PSG-confirmed OSA
& EDS by MWT

Joint Task Force OSA Guidelines

Drivers meeting one or more of the six criteria are considered to have OSA or probable OSA.

- | | |
|--------------------------------------|---|
| Historical Findings | 1. Snoring, excessive daytime sleepiness, witnessed apneas
2. MVA likely related to sleep disturbance (run off road, at-fault, rear-end collision)
3. Previous OSA diagnosis |
| Epworth Sleepiness Scale | 4. ESS score > 10 |
| Physical Examination Findings | 5. Sleeping in examination or waiting room
6. Two or more of the following
a. BMI ≥ 35 kg/m ²
b. NC > 17 inches in men, 16 inches in women
c. Hypertension (new, uncontrolled, or unable to control with < 2 medications) |

Adapted from "Screening Recommendations for Commercial Drivers With Possible or Probable Sleep Apnea from Hartenbaum et al. J Occup Environ Med 2006;48(9 Suppl):S4-S37.

Talmage et al 2008

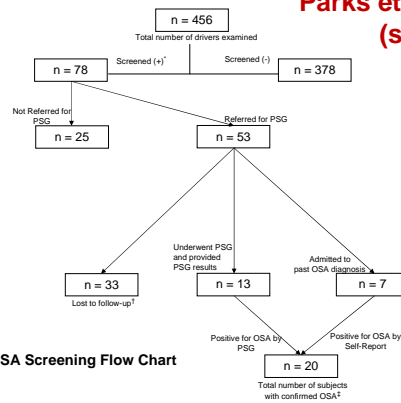
198 (13%) of 1443 CDME's OSA screen +

Subjective / Symptom Criteria low utility

134 underwent PSG, 95% had OSA

64 lost to f/u (32%)

Parks et al (submitted)



Comparison of subjects with + OSA screen: confirmed diagnosis vs. no confirmation of diagnosis by polysomnography. (Parks et al)

Characteristic	Screened (+) for OSA and Diagnosis Confirmed [†] (n = 20)	Screened (+) for OSA [†] but Diagnosis Unconfirmed Referred for PSG but Lost to Follow-Up [‡] (n = 33)	Not Referred for PSG (n = 25)	p-value
	Min – n (%)	18 (94.7)	33 (100)	
Independent Drivers – n (%)	2 (10.5)	3 (9.1)	7 (28.0)	0.105
Age range – years	20-67	25-66	27-61	–
Mean age – years (± SD)	43.25 (11.43)	43.12 (11.26)	42.80 (8.57)	0.989
Mean BMI – kg/m ² (± SD)	37.52 (5.22)	36.92 (3.86)	32.14 (3.69)	<0.001
Mean NC – inches (± SD)	17.97 (0.78) (n = 19)	17.9 (1.01) (n = 32)	17.27 (0.98) (n = 23)	0.026
Mean SBP – mm Hg (± SD)	128.40 (15.24)	126.73 (10.95)	129.68 (13.05)	0.682
Mean DBP – mm Hg (± SD)	79.30 (9.14)	81.39 (6.07)	84.56 (6.89)	0.052
Mean ESS – (± SD)	3.35 (3.17)	3.35 (3.02) (n = 31)	4.04 (3.36) (n = 23)	0.688

Results – Summary (Parks et al)

- Estimated PPV of JTF Criteria = 20/20 = 100%
- Subjective Criteria – little value
- Estimated prevalence of OSA in the study population:
 - 12% (95% CI, 8.68-14.56%) – JTF criteria (BMI ≥ 35 kg/m²)
 - 18% (95% CI, 14.86-21.98%) – BMI ≥ 32 kg/m²
- Loss to follow-up rate 33 of 53 (62%);
- 95% diagnosed drivers non-compliant with CPAP

Survey of ACOEM Members

(Durand, Kales in preparation)

N=552 MD's performing CDME's

OSA Screening of Drivers

92% "important or very important"

6% "moderately important"

2% "slightly important or not important"

Survey of ACOEM Members

Only 42% using the consensus guidelines or other formal protocol.

Reasons for not applying guidelines:

not aware (36%)

too complicated (12%)

potential to lose clients (10%)

driver inconvenience (10%)

Survey of ACOEM Members

Most physicians would consider applying consensus guidelines going forward

39% would do so only based on additional data

22% only if they became the "standard of practice"

Using BMI as a Screen for OSA

(Gurubhagavatula et al, AJRCCM, 170: 371, 2004)

- Best cut-point $\geq 33\text{kg/m}_2$
- Sensitivity – 0.77
Specificity – 0.71
- AUC under receiver operating curve = 0.80
(perfect = 1.0)



United States Department of Transportation
FEDERAL MOTOR CARRIER SAFETY ADMINISTRATION
MEDICAL REVIEW BOARD

Meeting Summary Jan 2008

MRB recommended:

BMI cut point >30 trigger referral for PSG

Motion carried four to one.

Conclusions

- OSA prevalence consistently high across studies.
- Drivers under-report sleep disorders
- Low compliance with PSGs referrals and CPAP treatment suggest doctor-shopping

Most OSA cases go unreported, undiagnosed, or untreated contribute to significant public safety risks

Conclusions

**FMCSA should mandate objective OSA criteria
& Prohibit Doctor-shopping**

**Cost, access, wait times, and insurance status are
significant barriers to many commercial drivers**

**Education of MD's, Drivers & Trucking Companies
Needed**