



Are Questionnaires A Useful Supplement To Medical Examinations Or Not Worth The Paper They Are Written On?



M J Marshall^{1,2}, A D G Dawson³ & R S Bucks⁴

1. Department of Systems Engineering and Human Factors, Cranfield University, Bedfordshire UK. 2. Research Centre for Primary Health Care and Equity, UNSW, Australia. 3. Department of Anaesthesia, Bradford Teaching Hospitals, NHS Foundation Trust, UK. & 4. School of Psychology, UWA, Australia.

Introduction

In the 4 decades since Obstructive Sleep Apnoea (OSA) has been clinically treated it still remains an under-recognised and under-diagnosed disorder. In addition, capacity to diagnose and treat OSA within the UK healthcare sector is limited. To support existing resources, various sleep related questionnaires have been developed and are now routinely used in a variety of settings when assessing individual potential for Obstructive Sleep Apnoea (OSA). Most of these questionnaires are used to 'rule out' performing more complex diagnostic sleep studies in individuals presenting to secondary care.

Evidence shows that commercial vehicle drivers have a higher prevalence of OSA than the general population¹ and that OSA increases the risk of a motor vehicle collision (MVC) by 2- to 7-fold¹. A major concern for medical practitioners and driving license authorities is the ability to identify drivers (applying or renewing a vocational license) who have undiagnosed OSA. Whilst completion of a sleep related questionnaire would appear to be a logical solution, at the time of the medical exam, the question remains -

Are current questionnaires sufficiently robust in this setting to offer any clinical guidance ?

Aim

The aim of this study was to identify the accuracy of screening questionnaires against a 7-channel polysomnography device in a cohort of UK Large Goods Vehicle (LGV) drivers, which could potentially supplement the current examination process.

Methods

Previously validated questionnaires (1. Berlin Questionnaire, 2. The Functional Outcomes of Sleep Questionnaire (FOSQ), 3. Epworth Sleepiness Score (ESS) for the individual, 4. ESS for the bed partner) were sent to 940 current LGV personnel at 20 depots from 5 UK haulage companies. Completed questionnaires were analysed using accepted scoring criteria. The questionnaires were also analysed by a priori algorithm, classifying participants into 4 categories:

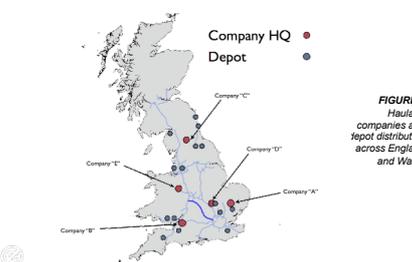
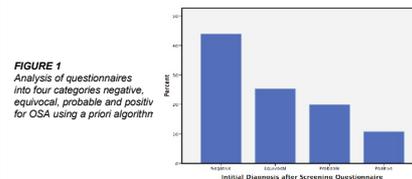
Methods cont

negative, equivocal, probable and **positive**, for OSA.

Participants were then asked to use an overnight 7 channel polysomnography device. The studies were analysed by a blinded, qualified RSPGT and a sleep physician who confirmed the diagnosis. These data were subsequently categorised using the Scottish Intercollegiate Guidelines Network (SIGN)² guidelines for the analysis of sensitivity, specificity, positive and negative predicted values. Individuals were segmented into negative/mild OSA (no treatment) or moderate/severe OSA (treatment).

Results

Of the 940 drivers who agreed to provide their details, 371 LGV drivers (39.5%) returned questionnaires. All were diagnostically naïve.



Discussion

In the UK there are approximately 440,000 active LGV drivers. Medical examinations are required when first applying for a vocational license and on or after the age of 45, and every 5 years until the age of 65, when licenses are then renewed on an annual basis. However, the UK licensing medical examination report (D4) form only includes one specific question relating to OSA (Does the applicant have sleep apnoea syndrome?). Given low awareness in both the general and medical population regarding OSA, a single question with a binary answer is extremely unlikely accurately to capture individuals with this disorder. This is also hampered by drivers denying a history or symptoms of a sleep disorder due to the legal implications of holding a LVG license if found to suffer from OSA. To validate this point, the Driver and Vehicle Licensing Agency (DVLA, 2002), reported only 551 LGV drivers identifying themselves as having OSA, suggesting an incidence rate of 0.125%, which is clearly unrealistic (see abstract 'Killer in the Cab' Marshall et al.).

Identifying a solution which does not burden already limited healthcare resources poses many issues. In this population sample, the commonly used questionnaires appear of limited value when used in isolation. However, the development of an algorithm to score the questionnaires in combination appears to give greater utility to medical practitioners involved in the licensing process.

References

1. Parks P.D., Durand G., Tsismenakis A.J., et al. Screening for Obstructive Sleep Apnea During Commercial Driver Medical Examinations. *JOEM*. March 2009; 51 (3): 275-282.
2. Scottish Intercollegiate Guidelines Network. Management of Obstructive Sleep Apnoea/Hypopnoea Syndrome in Adults. <http://www.sign.ac.uk/> 2009.

Statistical analyses of these data for individuals requiring treatment are shown in Table 1.

TABLE 1

Sensitivity (Se), Specificity (Sp), Positive (PPV) and Negative Predicted Values (NPV)

Questionnaire	Se % (95% CI)	Sp % (95% CI)	PPV % (95% CI)	NPV % (95% CI)
Berlin	63.0 (56.1-68.8)	73.9 (62.9-83.0)	79.3 (70.5-86.5)	55.7 (47.4-62.6)
FOSQ	24.7 (20.6-24.7)	100 (93.6-100)	100 (83.7-100)	45.5 (42.6-45.5)
Individual ESS	12.3 (8.8-12.3)	100 (94.4-100)	100 (71.5-100)	41.8 (11.0-41.8)
Partner ESS	4.1 (1.8-4.1)	100 (96.4-100)	100 (44.5-100)	39.7 (38.2-39.7)
Combination	78.1 (72.6-80.7)	93.5 (84.7-97.7)	95.0 (88.3-98.2)	72.9 (66.1-76.1)