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EDITORIAL

Sleep apnoea and driving risk

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Obstructive sleep apnoea syndrome (OSAS) represents the most common organic cause of excessive daytime sleepiness. It has a prevalence of at least 1–4% according to different epidemiological studies, and depending on the diagnostic criteria used [1–4]. The prevalence of OSAS is highest among males in the 40–59 yr age group, being ~4–8% [4]. There is considerable evidence that sleepiness is a major contributing factor to road traffic accidents, and furthermore, that road accidents are far more frequent in patients with OSAS than in the general population [5–9]. However, the media and relevant authorities have concentrated on excessive speed and alcohol consumption as potential causes of accidents, and have paid insufficient attention to date on driver sleepiness as a potential cause for accidents. Now that the public is very aware of the accident risk related to speed and alcohol, it seems timely that proper attention be given to the accident risk related to driver sleepiness.

Studies of motorway accidents have indicated that 20–25% appear to be due to drivers falling asleep at the wheel [10], and are particularly likely to occur in the early morning or mid afternoon. Accidents associated with the driver falling asleep tend to be particularly serious because of the lack of reaction of the sleepy driver to the impending collision. Furthermore, sleepy drivers report a high incidence of near-misses on the road while driving, which suggests that they have an awareness of the driving risks related to sleepiness short of being involved in an actual collision. Data are now available from several North American studies [11, 12] in addition to others from Israel [13] and Finland [14] supporting sleepiness as a significant risk factor for road accidents. A recent questionnaire survey by MAYCOCK [15] of 9,000 male drivers in the UK revealed that 29% admitted to having felt close to falling asleep while driving in the previous year, the probability of which depended on a number of factors including Epworth sleepiness scores (ESS), age, motorway driving, and annual mileage. A history of snoring every night increased the likelihood of an accident by 30%.

There is also evidence that occupations such as long-haul truck driving are particularly associated with a risk of sleepiness while driving [16], and an increased risk of accidents, particularly when there is evidence of associated OSAS [7]. These findings may not be surprising given the relative sedentary and monotonous nature of this occu-pation, and the fact that many long-haul truck drivers work very long hours. These findings assume particular significance given the likelihood of a fatal accident where an articulated truck driven by a sleeping driver is involv-ed. Many of the spectacular multiple vehicle collisions that have occurred on motorways throughout Europe have ultimately been traced to a driver falling asleep at the wheel.

The relationship of OSAS to road traffic accidents has been recognized for over a decade. FINDLEY *et al.* [5] in 1988 reported that patients with OSAS had a seven-fold greater risk of road accidents than normal subjects, and furthermore that the automobile accident rate of OSAS patients was 2.6-times the rate of all licensed drivers in Virginia, USA. In addition, 24% of OSAS patients reported falling asleep at least once per week while driving. In a community study of 1,001 males in the UK, STRADLING *et al.* [8] found that regular snorers were significantly more likely to "almost have a car accident due to sleepiness" than others (odds ratio 5.8). HANNING and WELSH [17], in a postal questionnaire survey of 5,000 insured British drivers, found that snorers admitted to being more sleepy than nonsnorers and having to pull over regularly to the side of the road while driving due to sleepiness. However, the accident rate did not differ between the two groups which may have reflected the fact that only subjects with no record of accident insurance claims were included. YOUNG *et al.* [18], as part of the ongoing Wisconsin cohort study of the natural history of sleep-disordered breathing involving 913 employed adults [1], have reported that subjects with an apnoea/hypopnoea frequency >15 events·h^{-1} have a substantially greater risk of motor vehicle accident than those with no sleep disordered breathing (odds ratio 7.3). BARBE *et al.* [19] in a prospective controlled study confirmed the increased risk of road accidents among patients with OSAS compared to a group of matched control subjects. Patients with OSAS also perform worse in simulated driving situations than control subjects [20, 21], and the performance on one of these simulated driving situations (Steer Clear) has been demonstrated to correlate with accident risk.

Indirect evidence linking OSAS, sleepiness and driving accidents comes from studies of the impact of nasal continuous positive airway pressure (CPAP) therapy on accident risk. ENGLEMAN *et al.* [22] found that patients with OSAS reported 0.93 sleep-related driving incidents (including accidents and near accidents) per 10,000 miles pre-CPAP and 0.14 post-CPAP. CASSEL *et al.* [23] also

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reported a similar reduction in accident rate in OSAS patients after one year of nasal CPAP therapy, as have KRIEGER *et al.* [24]. Other forms of therapy for OSAS such as uvulopalatopharyngoplasty also appear to be associated with a reduction in accident risk [25]. These data underline the potential benefit in reducing accident risk by appropriate therapy of OSAS, and further emphasize the practical benefit to both patient and community of measures to recognize and treat the syndrome.

The above data clearly identify OSAS as a significant independent contributing factor to road traffic accidents with important consequences for public safety, particularly since accidents involving a patient with OSAS are more likely to be associated with major injury. These considerations raise the question of the suitability of patients with OSAS to hold a valid driving licence unless the condition is adequately treated. This question has previously been addressed by an *ad hoc* committee of the American Thoracic Society, who in their report [26] emphasized the difficulty in formulating rigid criteria to determine the suitability of a patient with OSAS to hold a valid driver′s licence. These difficulties are underlined by the widely accepted view that the diagnosis of OSAS should not depend on a particular level of apnoea/hypopnoea index (AHI) alone, but should also take into account the degree of functional impairment associated with the condition, particularly sleepiness. The objective assessment of sleepiness by multiple sleep latency testing (MSLT) or maintenance of wakefulness testing (MWT) is cumbersome and not practical for widespread clinical use, which further complicates the issue of adequately assessing driving risk. While there are validated subjective measures of sleepiness such as the ESS [27] which are easy to administer, these measures are open to manipulation by a patient who does not wish to have their driving licence endorsed.

There are no uniformly accepted regulations within Europe concerning driving licensing and OSAS, and indeed many national European licensing authorities make no specific mention of sleep apnoea in this matter. These deficiencies underline the importance of the need for adequate measures being taken and regulations put in place to protect both the patient with OSAS and the wider community from death or injury related to road traffic accidents caused by sleepy drivers with untreated OSAS. Any such regulations concerning driver licensing in OSAS must be based on a definition of the condition that relates to likely driving risk rather than some arbitrary AHI level. Particular attention needs to be given to certain high-risk driver occupations such as commercial long-haul truck drivers. Furthermore, given the fact that such a definition should include some measure of sleepiness, care must be taken that unrealistic demands are not made on either the sleep disorders centre that establishes the diagnosis of OSAS or on the primary physician responsible for the patient′s management to determine an individual patient′s suitability to hold a valid driving licence. While such a decision would be unlikely to present difficulties in patients with severe OSAS, this may not be the case in many patients with mild-to-moderate disease, where moderately high AHI levels may not be associated with significant levels of sleepiness and *vice versa*. These considerations indicate that education of those concerned with implementing driving licence policy to produce a greater level of awareness of the problem would be more important and more likely to be successful than arbitrary regulations dictating licensing policy based on certain subjective or objective criteria of either sleep apnoea or sleepiness.

Regulations concerning driver licensing in obstructive sleep apnoea syndrome should include a shared responsibility between the physician, patient and licensing authority. A distinction can be drawn between private and professional drivers, and it seems appropriate that more strict regulations should be applied to the professional driver because of the increased risk to the general public from sleepiness in this category of driver. Given the high prevalence of obstructive sleep apnoea syndrome in Europe, public health and safety make it imperative that practical and realistic guidelines be implemented, preferably on a Europe-wide basis to ensure that patients with obstructive sleep apnoea syndrome who present a driving risk are precluded from driving unless given adequate treatment for their condition.

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