

Sleep and Transit in Brazil: New Legislation

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Sleep disorders are common throughout the world and have profound effects in industrialized 24-hour societies. Consequences of these problems include impaired social and recreational activities, increased human errors, loss of productivity, and elevated risk of accidents.¹ Conditions such as acute and chronic insomnia, chronic insufficient sleep, excessive sleepiness, shift-work, jet lag, narcolepsy, and obstructive sleep apnea warrant public health attention, inasmuch as residual sleepiness during the day may affect performance of daily activities including driving a motor vehicle. There is a considerable body of evidence that sleepiness contributes to the cause of various accidents in industries and in transport systems.²

According to Garbarino et al.,³ between 17% and 19% of traffic deaths are the result of sleepy driving. Sleepy driving can be caused by both sleep disorders and also long work shifts. Extremely long work shifts can lead to both insufficient sleep and alterations in individual biological rhythms.

SLEEP DRIVING IN BRAZIL

In Brazil, sleepy driving represents a costly problem. According to the IPEA/Brazilian Federal Government (IPEA, 2003),⁴ the average cost of a traffic accident in Brazil is US\$ 5,167 overall, US\$ 1,919 in accidents with no victims, US\$ 52,942 in accidents resulting in injury, and US\$ 247,647 in accidents resulting in death. These estimates by the IPEA involved the following aspects: loss of productivity (42% of the cost); damage to property (vehicles, city equipment, traffic signs, and property of a third party—30% of the cost); medical/hospital expenses (rescue, medical treatment and rehabilitation—15.9% of the cost); and other costs (legal, traffic jams, social security, removal of the vehicles, other means of transportation, police assistance, traffic officers, impact on the family—11.30% of the cost). Another important aspect to highlight is that according to the Brazilian Secretary of Sanitary Vigilance of the Ministry

of Health, of 1,024,073 deaths in 2004, 127,470 deaths (12%) resulted from external causes (such as homicides and vehicle accidents), and 35,674 deaths (28%) were the result of traffic accidents; 81% of these accidents involved males. These data show that in Brazil in 2004, there were 97.74 deaths per day, 4.072 deaths per hour, or 1.018 deaths every 15 minutes resulting from traffic accidents, with a total financial cost of US \$28.95 billion. If we consider the data from Garbarino et al.,³ 6,421.32 of the traffic-related deaths in Brazil resulted from sleepy driving (17.60 deaths per day or 0.73 deaths per hour). If we incorporate the data from the IPEA, there was a total financial cost of US \$414,397,997 as a consequence of traffic-related deaths in 2004, a major cause of which was sleepy driving.

Data from our laboratory indicate that professional drivers account for a large percentage of traffic accidents. For example, we have found that 16% of the Brazilian interstate bus drivers sleep while driving, with an average of 8 naps per trip,⁹ and that 38% of these drivers were diagnosed with sleep apnea.^{1,10}

INITIATIVE TO IMPROVE DETECTION OF SLEEP DISORDERS IN PROFESSIONAL DRIVERS

Given this costly problem, we collaborated with governmental bodies to improve detection of sleep disorders in Brazilian drivers. The National Traffic System (SNT) in Brazil is comprised of a set of organizations and entities of the Federal Government (CONTRAN, DENATRAN). The States, the Federal District, and the Cities belong to DENATRAN and provide licenses to drivers, and issue National Driver's Licenses (Figure 1).

In Brazil, there are various levels/categories of licenses for different kinds of vehicles.⁵ Drivers are licensed to drive vehicles according to the number of wheels, weight, size, and type of cargo to be transported. There are 5 different categories of licenses: A (vehicles with 2 or 3 wheels), B (vehicles that do not exceed 8 seats), C (cargo vehicles), D (vehicles for the transportation of passengers that exceed 8 seats), and E (vehicles with an attached unit of $\geq 6,000$ kilograms of gross weight). The drivers in categories C, D, and E are informally referred to as "professional" drivers. Therefore, there might be differences regarding the evaluation of drivers based on the levels of their licenses.

Submitted for publication June, 2008

Submitted in final revised form January, 2009

Accepted for publication January, 2009

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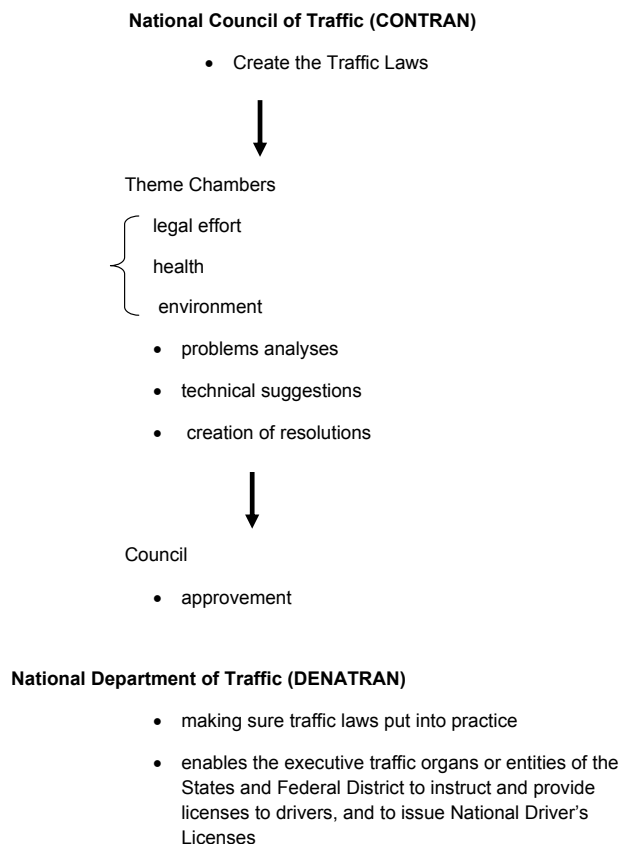


Figure 1—Brazilian organization of the government authorities of driving licenses.

In accordance with the structure outlined above, the Discipline of Medicine and Sleep Biology of the Universidade Federal de São Paulo (UNIFESP) was a member of the Thematic Chamber of Health and Environment in Traffic of CONTRAN between 2003 and 2007. This organization was responsible for updating and improving the examination of physical and mental aptitude, and for the psychological evaluation each professional driver is required to pass to obtain a state-issued national driver's license. This year, CONTRAN passed Resolution 267/2008,⁶ which revoked previous driving-related Resolutions 51 and 80/1998 and required new medical and psychological examinations for all Brazilian drivers. Evaluation of obstructive sleep apnea was included in this new resolution.

The evaluation is specified in Item “f” of Chapter I, which pertains to the examination of physical and mental aptitude and includes the evaluation of obstructive sleep apnea. It is required when a driver renews, upgrades, or changes his/her license to categories C, D, or E. The examinations are initially carried out by a physician who specializes in traffic medicine. The physician will decide whether the driver (categories C, D, or E) should be referred to a sleep medicine physician if the examinee shows indication of this kind of disorder (as specified in Figure 2). However, some aspects of this evaluation should be emphasized. Brazil is a country with continental dimensions, and not all of the cities have the structure in place to perform polysomnographic evaluations. Therefore, it was established that the prescription and requirement of such an evaluation will depend on the expertise of the physician who specializes in traffic medicine. If the region does not have professionals prepared

Figure 2—Evaluation of Obstructive Sleep Apnea in Professional Drivers

1. About the evaluation of obstructive sleep apnea (ICD 10: G47.3):
 - 1.1. The drivers of motor vehicles, when they renew, add, or change to categories C, D, and E should be evaluated with regard to Obstructive Sleep Apnea Syndrome (OSAS) according to the following parameters:
 - 1.1.1. Objective parameters: systemic arterial hypertension, body mass index, cervical circumference, modified Mallampati classification⁷;
 - 1.1.2. Subjective parameters: excessive sleepiness measured by the Epworth Sleepiness Scale⁸;
 - 1.2. According to the aforementioned parameters, the following results will be considered indicative of sleep disorders:
 - 1.2.1. Systemic arterial hypertension: systolic pressure > 130 mm Hg and diastolic pressure > 85 mm Hg;
 - 1.2.2. Body Mass Index (BMI): > 30 kg/m²;
 - 1.2.3. Cervical circumference (measured at the cricoid cartilage): male > 45 cm and female > 38 cm;
 - 1.2.4. Modified Mallampati classification: class 3 or 4 (Attachment XII);
 - 1.2.5. Epworth Sleepiness Scale: ≥ 12 .
 - 1.3. An applicant who has a score in the Epworth Sleepiness Scale ≥ 12 and/or has ≥ 2 objective indications of sleep disorders might, according to the physician's criteria, be approved temporarily or referred to specific medical evaluation and undergo a polysomnographic exam (PSG).

to carry out this evaluation, a national driver's license can be issued on a temporary basis, until the driver can undergo specific evaluation of his/her sleep disorder in a city where there is a specialist in this area. In Brazil, each driver is required to revalidate his or her medical examination every 5 years.

With this new perspective for the evaluation of sleep disorders in “professional” drivers, we expect a reduction in the number of accidents and deaths resulting from sleepy driving. Based on the data presented here, we estimate that 600,000 drivers are being evaluated by these new regulations out of the three million “professional” drivers in Brazil (not considering new professional drivers) who are required to renew his or her license every 5 years. Consequently, we expect to substantially reduce the number of traffic accidents that result from lack of sleep, fatigue, and alterations in the biological rhythm.

ACKNOWLEDGMENTS

CEPID-SONO/FAPESP, AFIP, CEMSA, DENATRAN, CONTRAN, Instituto do Sono/AFIP, FADA/UNIFESP, CNPq.

DISCLOSURE STATEMENT

This was not an industry supported study. The authors have indicated no financial conflicts of interest.

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