

## **Sleep and Transit in Brazil: a new legislation**

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The National Traffic System (SNT) in Brazil is comprised of a set of organs and entities of the Federal Government, the States, the Federal District, and the Cities. One of these organs is the National Council of Traffic (CONTRAN), which is responsible for creating the Traffic Laws of this system. Its structure involves six Theme Chambers, such as legal effort, health, and environment, which are technical organs comprised of specialists of all those areas that aim at analyzing problems and providing suggestions and technical basis for the creation of Resolutions that are approved by the Council. There is also a higher executive organ that belongs to the system, the National Department of Traffic (DENATRAN), which aims primarily at making sure traffic laws are enforced and the norms and guidelines established by the CONTRAN or the National Congress are put into practice. DENATRAN is also responsible for the supervision and coordination of the delegate organs: the executive traffic organs or entities of the States and Federal District, and the DETRANs, the executive traffic organs or entities of the cities, which control the traffic in each city. However, these organs enforce the determinations, laws, and resolutions approved by the CONTRAN, since it is the responsibility of the Federal Government to legislate on traffic regulations. DENATRAN, following the norms established by the CONTRAN, enables the executive traffic organs or entities of the States and Federal District to instruct and provide licenses to drivers, and to issue National Driver's Licenses. In Brazil, there are levels/categories of licenses for the different kinds of vehicles<sup>1</sup>. Drivers are licensed to drive vehicles according to the number of wheels, weight, size, and type of cargo to be transported. Therefore, there might be differences regarding the evaluation of drivers based on the levels of their licenses, which are classified into five categories: A (vehicles with two or three wheels), B (vehicles that do not exceed 8 seats), C (cargo vehicles), D (vehicles for the transportation of passengers that do not exceed 8 seats), and E (vehicles with an attached unit of six thousand kilograms or more of gross weight). The drivers in categories C, D, and E are informally referred to as "professional" drivers.

In accordance with the structure outlined above, the Discipline of Medicine and Sleep Biology of the Universidade Federal de São Paulo (UNIFESP) was an effective member of the Thematic Chamber of Health and Environment in Traffic of CONTRAN between 2003 and 2007. It was responsible for updating and improving the examination of physical and mental aptitude, and for the psychological evaluation

drivers have to take and pass to obtain their National Driver's License, which is issued by the State.

Therefore, this year, CONTRAN passed Resolution 267/2008<sup>2</sup>, which revokes Resolutions 51 and 80/1998 and requires new medical and psychological exams for all Brazilian drivers. Among many other medical evaluations, the evaluation of sleep disorders was included in this new resolution. The evaluation comprises the following aspects:

Item "f" of Chapter I, which regards the exams of physical and mental aptitude of the psychological evaluation, includes the evaluation of sleep disorders, which is required when a driver renews, upgrades, or changes his/her license to categories C, D, and E. These evaluations are specified in Attachments X, XI, and XII. in Attachments X, XI, and XII. The attachments present the methodology for the evaluation of sleep disorders. The exams will be initially carried out by a physician who specializes in traffic medicine. The physician will decide whether the driver (categories C, D, and E) should be referred to a physician who specializes in sleep disorders if the examinee shows any indication of this kind of disorder, according to the following evaluation:

#### Evaluation of sleep disorders

1. About the evaluation of sleep disorders (CID 10 – G47):

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 perimeter, modified Malampatti classification<sup>3</sup>.

1.1.2. Subjective parameters: excessive sleepiness measured by the Epworth Sleepiness Scale<sup>4</sup> (Attachment XI).

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 > 130mmHg and diastolic pressure > 85mmHg;

1.2.2. Body Mass Index (BMI): > 30kg/m<sup>2</sup>;

1.2.3. Cervical Perimeter (measured at the cricoid cartilage): male >45cm and female >38cm;

1.2.4. Modified Malampatti classification: class 3 or 4 (Attachment XII);

1.2.5. Epworth Sleepiness Scale:  $\geq 12$ .

1.3. An applicant who has a score in the Epworth Sleepiness Scale equal to or higher than 12 and/or has two or more 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).

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 criteria of the physician (who specializes in traffic medicine). If the region does not have professionals prepared to carry out this evaluation, a National Driver's License might be issued on a temporary basis and for a shorter length of time 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, all drivers have to revalidate their medical exams 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. Sleepy driving can be caused by sleep disorders, long work shifts, and fatigue, since extremely long work shifts lead to "Shift Lag" and alterations in the individual's biological rhythm. According to<sup>5</sup>, between 17 and 19% of traffic deaths are the result of sleepy driving. According to the IPEA/Brazilian Federal Government<sup>6</sup>, the average cost of a traffic accident in Brazil is U\$ 5167 overall, U\$ 1919 in accidents with no victims, RU\$ 52942 when someone is injured, and U\$ 247.647 when the accident results in the death of an individual. These estimates by the IPEA involved the following aspects: loss of production (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 in Brazil, according to the Secretary of Sanitary Vigilance of the Ministry of Health, there were 1,024,073 deaths from various causes in 2004. Out of this total, 127,470 deaths or 12% resulted from external causes (such as homicides

and vehicle accidents) and 35,674 deaths or 28% of the causes of death were traffic accidents, 81% of which involved male individuals. 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 U\$ 28.95 billion. If we consider the data from<sup>5</sup>, 6,421.32 of the deaths in traffic 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 U\$ 414.397.997 as a consequence of deaths in traffic in 2004, whose main cause was sleepy driving.

Based on the data presented here, we estimate that 600 thousand drivers are being evaluated by these new criteria, out of the three million “professional” drivers in Brazil (not considering the new professional drivers) who have to renew their driver’s license every 5 years. Consequently, we might substantially reduce the number of traffic accidents that result from lack of sleep, fatigue, and alterations in the biological rhythm, since studies in our laboratory showed that 16% of the Brazilian interstate bus drivers sleep while driving, with an average of 08 naps per trip<sup>7</sup>, and that 38% of these drivers were diagnosed with sleep apnea<sup>8,9</sup>.

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