Assessment of Fitness to Drive and Cardiovascular Diseases at the Spanish Medical Traffic Centres

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Background  There is an increased risk of automobile accidents in patients with some cardiovascular disorders and licensing authorities have imposed certain restrictions on such persons. Experience assessing fitness to drive among drivers with cardiovascular disorders, and the relevance of other associated medical conditions among drivers assessed as unfit, are reported here.

Methods and Results  The study included 5,234 drivers attending 2 Spanish Medical Driver Test Centres to assess their fitness to drive. Information regarding sociodemographic aspects, driving patterns, medical conditions, medication use and alcohol consumption patterns was recorded: 11.6% of the drivers had a cardiovascular disorder that potentially impaired fitness to drive, 82.5% were found fit to drive, 15.9% were fit to drive with restrictions and 1.6% were unfit. The 10 unfit patients with cardiovascular disorders were primarily considered unfit because of their associated ophthalmologic and medical comorbidities, but the cardiovascular disorders were a contributing factor.

Conclusion  Most (98.4%) drivers with cardiovascular disorders will be completely fit to drive or fit to drive with restrictions. There is a need for a personalized evaluation of fitness to drive for each driver/patient, taking into account such aspects as the associated pathology, the taking of medicinal drugs and alcohol consumption. (Circ J 2007; 71: 1800–1804)

Key Words: Accidents; Automobile driver examination; Cardiovascular diseases; Traffic

In developed countries, licensing authorities have imposed certain restrictions or conditions on the concession of driving licenses to persons with particular medical conditions.1–7 Within the European Union (EU), Annex III of the EU Directive 91/439/EEC establishes the minimum requirements concerning physical and mental fitness to drive a motor vehicle.8 Although this Directive is obligatory for all EU member states, there are marked differences in its implementation among the various countries.9–11 Spain is the only EU member state that carries out an obligatory fitness test for driving at certain time intervals, depending on age and licence type.11

Here we present the results for the assessment of fitness to drive in 5,234 drivers. The aim of the study was to assess both fitness to drive among drivers suffering from cardiovascular disorders and the relevance of other associated medical conditions among those with cardiovascular disorders who were assessed as unfit to drive.

Methods

Fitness to Drive Assessment

Fitness to drive in Spain is evaluated in Medical Driving Test Centres by an ophthalmologist, a psychologist and a general practitioner who follow EU7 and Spanish regulations.11 The 3 professionals reach a decision concerning fitness to drive. The purpose is to check that the driver complies with the minimum requisites to drive safely. The stringency of the requisites will depend on the type of licence requested (professional or not).

Drivers who do not comply with the necessary conditions to drive safely are declared "unfit"; those who can drive, but with certain restrictions (eg, changes to the vehicle, speed limits or reduced periods of licence validity) are declared "fit to drive with restrictions"; and those found to comply with the necessary conditions are declared "fit".

With respect to the cardiovascular system, a driving licence cannot be given to or renewed for those people suffering from several disorders,8–11 as summarized in Table 1. The criteria for evaluating fitness to drive in patients with certain cardiovascular disorders are made on the basis of the functional criteria of the New York Heart Association and on the risk of suffering either sudden loss of consciousness or sudden death (both of which are frequently related to cardiovascular problems).12

The following psychomotor performance tests (psychotechnical set LND-100©, ASDE, Valencia, Spain), under the supervision of the psychologist, are carried out by all drivers according to legal regulations:11 speed of anticipation and bimanual coordination, as well as multiple reaction times for professional drivers. The result is a valid or invalid test.11 The auditory capacity is evaluated by tonal audiometry in a soundproof cabin.

Subjects

A prospective study was designed that included drivers attending 2 Medical Driving Test Centres to obtain a
Of 5,324 drivers contacted, 90 did not want to participate, so the study included 5,234 drivers: 3,741 males (71.5%) and 1,493 females (28.5%). Drivers’ ages ranged from 14 to 98 years of age. The average age was 44.2 ± 16.46 (mean ± SD), greater in males (46.13 ± 17.15) than in females (39.40 ± 13.56; t=14.973, p<0.001). The sample distribution by age group was as follows: <25 years: 616; 25–34 years: 1,107; 35–44 years: 1,013; 45–54 years: 1,126; 55–64 years: 642; 65–74 years: 533; ≥75 years: 197.

Information Recorded

Any medical condition suffered by any driver, either acute or chronic, was recorded. For the present analysis we considered only chronic disorders (>1 month in duration) for disorders other than of the cardiovascular system. Diseases were recorded according to ICD-10. For the cases of drivers with disorders of the cardiovascular system, special attention was paid to those mentioned in the Spanish regulations11 (Table 1).

The medication taken, the daily doses, the duration of treatment, and the categorization of medicinal products on driving performance was recorded:14 (i) category 1: no or negligible influence; (ii) category 2: minor or moderate influence; (iii) category 3: major influence on driving. For the present study, as well as medical conditions, only chronic medication (>1 month in duration) was analyzed.

Patterns of alcohol intake were assessed: frequency of drinking and quantity of alcohol intake. Alcohol intake was expressed in standard drink units (SDU). Drinkers were classified based on their consumption level as follows: Low consumption: men ≤ 21 units/week and women ≤ 14 units/week; moderate consumption: men 22–50 units/week and women 15–35 units/week; high consumption: men >50 units/week and women >35 units/week. A Spanish SDU is equivalent to 10 g of pure alcohol.

Information was recorded regarding the valuation by the general practitioner, the ophthalmologist and psychologist in their respective fields: fit, fit to drive with restrictions, or unfit.

Statistical Analysis

Statistical analyses were performed using SPSS 12.0 version (Chicago, IL, USA). Chi-square and t-test were applied when appropriate. P values ≤0.5 were considered statistically significant.

Results

For the total sample (n=5,234), 82.7% of the drivers...
<table>
<thead>
<tr>
<th>Age (years)/gender/ activity status</th>
<th>Driver licence/ annual km driven</th>
<th>Medication (&gt;1 month)</th>
<th>Alcohol consumption</th>
<th>Medical condition</th>
<th>Medical evaluation</th>
<th>Hearing test</th>
<th>Eye test</th>
<th>Psychological test</th>
<th>Fitness to drive: final evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>77/M/retired Car/3,000</td>
<td>Enalapril, Acetylsalicylic acid</td>
<td>Once weekly 1 SDU/week</td>
<td>Hypertension, Cervical rigidity, Heart failure</td>
<td>Unfit, Decrease in cervical mobility</td>
<td>Fit</td>
<td>Unfit</td>
<td>Unfit, Cognitive deterioration</td>
<td>Unfit</td>
<td></td>
</tr>
<tr>
<td>78/M/retired Car/1,000</td>
<td>Nifedipine</td>
<td>Daily 21 SDU/week</td>
<td>Hypertension</td>
<td>Fit</td>
<td>Fit</td>
<td>Unfit, Decrease in visual acuity</td>
<td>Fit</td>
<td>Unfit</td>
<td></td>
</tr>
<tr>
<td>79/M/retired Car/2,000</td>
<td>Atenocoumarol, Enalapril, Digoxin</td>
<td>Daily 21 SDU/week</td>
<td>Hypertension, Arrhythmia (auricular fibrillation), Senile tremor, Slow movements, Cervical rigidity</td>
<td>Unfit, Neurological deterioration</td>
<td>Fit</td>
<td>Fit</td>
<td>Unfit, Cognitive deterioration</td>
<td>Unfit</td>
<td></td>
</tr>
<tr>
<td>70/M/retired Car/&lt;1,000</td>
<td>Acetylsalicylic acid, Pravastatin, Propanolol</td>
<td>Daily 14 SDU/week</td>
<td>Stable angina, Hyperlipidemia</td>
<td>Fit</td>
<td>Fit</td>
<td>Unfit, Decrease in visual acuity (cataract right eye)</td>
<td>Fit</td>
<td>Unfit</td>
<td></td>
</tr>
<tr>
<td>65/M/retired Car/10,000</td>
<td>Captopril, Ipratropium bromide, Salbutamol, Continuous positive airway pressure</td>
<td>Daily 14 SDU/week</td>
<td>Hypertension, Respiratory, Insufficiency</td>
<td>Unfit, Dypnea because of respiratory insufficiency</td>
<td>Fit</td>
<td>Fit</td>
<td>Fit with restrictions, Monocular vision</td>
<td>Fit</td>
<td></td>
</tr>
<tr>
<td>53/F/active Car/1,000</td>
<td>Paroxetine, Risperidone, Acetylsalicylic acid, Hidrokin, Calcium, Enalapril</td>
<td>Daily 15 SDU/week</td>
<td>Hypertension, Depression, Osteoporosis, Venous, Insufficiency</td>
<td>Unfit, Depression</td>
<td>Fit</td>
<td>Fit</td>
<td>Unfit, Altered perceptive motor attitude</td>
<td>Unfit</td>
<td></td>
</tr>
<tr>
<td>72/M/retired Car/5,000</td>
<td>Isosorbide mononitrate, Acetylsalicylic acid, Colchicine</td>
<td>Once weekly 2 SDU/week</td>
<td>Angina, Hyperuricemia</td>
<td>Fit</td>
<td>Fit</td>
<td>Unfit, Decrease in visual acuity</td>
<td>Fit</td>
<td>Unfit</td>
<td></td>
</tr>
<tr>
<td>30/F/active Car/10,000</td>
<td>Nifedipine, Salbutamol, Acetylsalicylic acid</td>
<td>Abstainer</td>
<td>Hypertension, Heart failure, Respiratory, Insufficiency</td>
<td>Fit</td>
<td>Fit</td>
<td>Unfit, Decrease in field of vision</td>
<td>Fit</td>
<td>Unfit</td>
<td></td>
</tr>
<tr>
<td>69/M/retired Car/1,000</td>
<td>Insuline, Enalapril, Glucosamine sulfate</td>
<td>Abstainer</td>
<td>Hypertension, Diabetes type II</td>
<td>Fit to drive with restrictions, Diabetes</td>
<td>Fit</td>
<td>Fit</td>
<td>Fit</td>
<td>Unfit</td>
<td></td>
</tr>
<tr>
<td>81/M/retired B/20,00</td>
<td>Atenolol + corticoid, Acetophenac</td>
<td>Abstainer</td>
<td>Hypertension, Bilateral hip protheses</td>
<td>Fit</td>
<td>Fit</td>
<td>Unfit (decrease in visual acuity, monocular vision)</td>
<td>Fit</td>
<td>Unfit</td>
<td></td>
</tr>
</tbody>
</table>

SDU, standard drink unit.
drivers with several disorders is not available, so it is reasonable to expect even higher rates of restricted and unfit drivers. In both studies, cardiovascular disorders were the more frequent medical condition reported by drivers undergoing a fitness to drive evaluation, although much more frequently reported by USA drivers\(^{15}\) (34.6\%) than by Spanish drivers (11.6\%). Again, in our opinion, the difference between the fitness to drive assessment criteria and systems could be the main reason for these differences.

There is a need for a personalized evaluation of fitness to drive for each driver/patient, as can be seen in the present study, in which losing their driving licence has a high negative impact of the patient’s quality of life, limiting their degree of mobility and freedom. An in-depth analysis of these unfit patients showed frequent comorbidity. In order of magnitude, the subjects were evaluated as unfit because of associated ophthalmologic pathology, followed by their medical condition and then by a deterioration of psychomotor performance as detected by the psychometric test. In this study, the cardiovascular disorders were a contributing factor that made some patients unfit. This data should be viewed with caution, as it only refers to 10 cases from a sample of 5,234 drivers. Another 24 drivers were rated as unfit for other ophthalmologic, psychological and medical causes. Other important aspects are alcohol use, and medication use: compliance with the treatment, response to the treatment, and occurrence of side-effects. Only an integrated assessment of the driver/patient can ensure an accurate assessment of fitness to drive. It should be pointed out that only recent studies have shown benefits in fitness to drive evaluation.\(^{16}\) Furthermore, there is the issue of the so-called low mileage bias: independent of age, drivers travelling more kilometres will usually have lower crash rates per kilometre than those driving fewer kilometres, and especially those who drive less than 3,000 km/year. In the present study the unfit drivers showed a low km/year driven, which could be seen as a risky situation rather than a better one in the light of the new knowledge.\(^{17,18}\)

There is an increased risk of automobile accidents in patients with cardiovascular disorders.\(^{19-23}\) A meta-analysis showed that the relative risk of involvement in traffic accidents for drivers with cardiovascular disorders included in the European legislation\(^{8}\) was 1.23 (95\% confidence interval; 1.09–1.38).\(^{23}\) A review\(^{21}\) of early studies has shown that sudden death at the wheel because of illnesses is infrequent (<1\%), cardiovascular diseases being the most frequent kind of illness, and coronary artery disease the most frequent cause. Furthermore, arrhythmia, if not appropriately controlled, can induce weakness and loss of consciousness, and can be a cause of serious impairment and traffic accidents.\(^{21}\) There is increasing awareness of the consequences that sudden natural death at the wheel can cause to others.\(^{21}\) In a Finnish and Swiss study\(^{23}\) that investigated 44 cases of sudden natural death at the wheel, 8 passengers were killed.

In the present study, and according to law\(^{11}\) the fitness to drive evaluation should be done in Specific Medical Traffic Centres for patients with a well-established medical condition. This is why the fitness to drive evaluation should not be performed while the subject is suffering from an acute short-lived disorders (eg, flu) and/or while using medication for such (eg, anti-flu medication), but is based on established disorders being appropriately treated. Management and appropriate advice on acute situations (eg, myocardial infarction) should be done according to medical guidelines.
lines\textsuperscript{3–7,12,21} which are an important factor in the evaluation of these patients.

It should be noted that differences between countries regarding fitness to drive are marked, not only between EU member states\textsuperscript{8} but also within the US states\textsuperscript{22} and Canada.\textsuperscript{23–27} For example, in some countries the fitness to drive evaluation is carried out in specified centres (as in Spain, where the present study has been carried out), while in others (such as the UK\textsuperscript{19} some USA states\textsuperscript{24} or Canada\textsuperscript{23–27}), physicians must report patients who may be unfit to drive for medical reasons to the traffic authorities, even in some cases, as in Canada, in a mandatory way with not so satisfactory results\textsuperscript{22} which raises questions about the cost/benefit relationship, and ethical\textsuperscript{26} and legal\textsuperscript{25,27} issues, particularly the degree of protection for the physician who reported a medically impaired driver.

In any case, any physician should provide the patient-driver with adequate information. For example, in the Canadian Cardiovascular Society Consensus Conferences\textsuperscript{3,8,21,28} “the general guidelines recommend that all drivers with coronary heart disease should satisfy with appropriate waiting periods”\textsuperscript{21}. Specific recommendations and waiting periods are specified for several disorders. Guidelines are also provided for disturbances in cardiac rhythm. As previously stated\textsuperscript{24} “The most important issue facing the individual physician dealing with a medically impaired driver is the risk presented by the specific patient-driver, a risk that can almost never be known with certainty”. The reasons to report or not to report to the traffic authorities have been reviewed\textsuperscript{24}. Furthermore, a schema has been proposed for reporting to the traffic authorities depending on the risk of loss of consciousness, driving pattern (frequency of driving, professional drivers, etc), and compliance and response with the treatment: talking with the patient is always a key issue\textsuperscript{24}. The information provided to the patient should take into account the associated pathology, the medical drugs taken, whether or not the patient responds to the treatment, presents with impairing side-effects, and consumes alcohol.

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