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Perceptions of Health Care Professionals of The Medical Aspects of Driving Safety: An Electronic Survey

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Abstract

Background: Driving a motor vehicle is a highly coordinated process involving a series of learned reflexes and carefully made conscious decisions. The evaluation of an individual's ability to drive is a legal and safety necessity. Various factors such as age and illnesses can affect individual's ability to drive. **Objectives:** The aims of the current survey were to ascertain the level of awareness among medical professionals of fitness to drive and to evaluate their perception of some select medical aspects of fitness to drive and regulatory aspects of driving. **Materials and Methods:** This is a survey of 520 health care professionals addressing select clinical and regulatory issues regarding medical aspects of driving. A de novo questionnaire of four domains was developed based on the study objectives. The target population was identified from pooled lists of health care contacts. A widely used web-based commercial survey management service was utilized. **Results:** Out of the 520 respondents, males and females constituted 63.5% and 36.5% respectively. Country of residence of respondents include: UAE (55.2%), other Arabian Gulf countries (13.3 %), rest of MENA region (14.8%), Western Europe and North America (12.3 %) and other regions (1.9%). 47.4% of the respondents were hospital doctors while 16.4% were primary care physicians. 57.3% of the respondents thought the age threshold which requires medical assessment ranged between 60-70 years. There was a wide range of intervals of re-issuing licenses (1-5 years) in countries where restrictions apply above a certain age. 92.5% identified a list of conditions as declarable to authorities. More than half of respondents considered the following conditions as relevant and declarable to the authorities in a descending order of frequency: epilepsy, visual impairment, alcoholism and drug dependency, blackouts and syncope, dementia, stroke with hemiplegia and insulin-treated Diabetes. The principal safety concerns for driving with diabetes were addressed by 94.6% of respondents. 79.3% identified hypoglycemia and 18.1%

identified visual impairment (diabetic retinopathy) as major barriers to safe driving. 85.1% of respondents thought that the driving risks to be higher in insulin-treated (85.1%) than in sulphonylurea-treated (9.6%) diabetic patients. The majority of respondents believe that doctors have an obligation to alert their patients about diseases that risk their driving abilities and drivers have an obligation to provide all required details to their insurance companies. Confidentiality issues were addressed in the questionnaire and 316 (68.4%) thought that both physicians and diabetic patients need to report relevant information to regulatory driving authorities and insurance companies. **Conclusion:** This survey indicates that there is a considerable awareness among health care professionals regarding medical conditions that may affect an individual's ability to drive. Furthermore, it seems that confidentiality issues were not considered a major barrier by health professionals when driving becomes a major threat to patients and public.

Key words: Motor vehicle, Drivers, Transport, Road safety legislation, Hypoglycemia, Diabetes

Introduction

Several hundreds of millions of motor vehicles are in use world-wide. It is predicted they will double in a couple of decades. An obvious link has been observed between economic growth, quality of life and the use of vehicles (1). Driving of motor vehicles is a highly coordinated process. It requires a series of learned automatic actions and carefully made conscious decisions (1). Driving is affected or altered by age and various illnesses, and the driver may not always concede that driving ability is affected by these conditions (2-4). Medical conditions that inhibit cognitive dysfunction, neuromuscular coordination or vision may reduce driving safety (2-4). Road traffic accidents (RTA) are a significant, and potentially preventable, cause of death, disability and economic loss. Motor vehicle injuries are the third most important cause of death in developing countries (5-10).

Physicians have a dual responsibility to drivers of any motor vehicle. The first is their responsibility to educate the drivers with the risk of any recognized conditions that impair safe driving performance (11-12). The second is related to their duty to assess and report on the patients' fitness to drive in countries where licensing is well-regulated (2-4). There has been some ongoing concern concerning the lack of regulation of driving licensure from the medical viewpoint in many developing countries (13-15). To undertake these tasks, physicians must have a working knowledge of how to evaluate and educate patients in line with the clinical best practices as well as regulatory obligations (2-4) and/or professional duties (15).

Therefore, we aimed to explore the ability of physicians to undertake the tasks required for education, care and evaluation of drivers. They mostly come from emerging economies with increasing prevalence of diabetes and busy use of motor vehicles on daily basis.

Materials and methods

The specific objectives were to establish the perceptions and attitudes of health care professionals, regarding the medical aspects of driving safety in general and their knowledge of regulatory aspects in general and with special reference to diabetes. A survey of the perceptions of physicians was conducted in the United Arab Emirates, Gulf and MENA regions. Responses from worldwide potential respondents on the database were also included. Select clinical and regulatory issues regarding the medical aspects of driving of motor vehicles on public roads were addressed. The questionnaire was developed *de novo* based on the objectives of the study. There were four domains, comprising basic demographic information of the respondents, general medical aspects of driving, driving and diabetes and some regulatory and educational aspects (Table 1). The survey was conducted in English and was in the form of multiple questions with extra options for comments to be added where needed. The target population was identified from pooled lists of recent CPD delegates, speakers, authors or members of members of various professional groups or forums in various parts of the Middle East region, with a great preponderance of practitioners in the UAE. A widely used web-based commercial survey management service (Survey Monkey, Palo Alto, CA, USA) was employed. They all received an initial e-mail and subsequent three reminder e-mails. A unique e-mail-specific electronic link to the questionnaire was provided. The survey manager automatically blocked repeat submissions from the same link. Survey responses were collected, stored electronically and analyzed anonymously. The results are expressed as deemed appropriate either in actual numbers, as a proportion of total responses per a given question or adjusted as percentages to account for differences of responses between questions or expressed in combination thereof.

Table 1. The survey questions as presented in 4 different domains.

<p>I. Respondents' demographics</p> <ol style="list-style-type: none"> 1. Age? 2. Gender? 3. Country/region of residence? 4. Profession <p>II. General driving questionnaire:</p> <p>This set of questions wishes to get an idea about your knowledge, attitudes and practices on medical aspects on driving. Please answer to the best of your ability.</p> <ol style="list-style-type: none"> 5. In most countries, at what age are licenses reviewed for fitness to drive? This may not be applicable to your country. 6. In countries where restrictions apply above a certain age, how often is the license issued thereafter? 7. Choose the medical conditions that should be reported to the appropriate regulatory authority (s)? <p>III. Driving and diabetes:</p> <ol style="list-style-type: none"> 8. What are the principal safety concerns for driving for people with diabetes? 9. The medication-related risk is greatest in people being treated with which of the following? 	<p>IV. Regulatory and Educational Aspects:</p> <p>These questions are meant to get an idea about familiarity with law and professional issues</p> <ol style="list-style-type: none"> 10. The following are true statements about the responsibilities of patients and doctors/educators: <ol style="list-style-type: none"> a. Doctors have responsibility of advising patients about risk during driving. b. Doctors can never break the confidentiality of patients even if they feel that they may put themselves and others at risk. c. Drivers with diabetes on insulin has no obligation of monitoring more times before driving. d. Drivers have an obligation to provide required details to their insurance companies. e. In most countries driving diabetic people is strictly regulated. 11. Physicians and patients with diabetes need to report information about insulin therapy, diabetes control, risk of hypoglycemia etc. to which entity?
<p><i>The questions were structured as multiple choice questions on an established electronic commercial server (Survey Monkey, USA).</i></p>	

Results

Characteristics of respondents

The total numbers of responders was 520. Males represented 63.5%. 55.2% of the respondents were residing and practicing in UAE, 13.3% were in other Arabian Gulf countries, 14.8% were from the rest of MENA region, 12.3% from participated from Northern Europe and North America and 1.9% of responses came from different other regions. Hospital based doctors represented 47.4%, primary care physicians 16.4% and doctors of specified other status 12.0%. Other responders included pharmacists (4.8%), nurses (6.7%) and other related professionals (11.4%).

General medical aspects of driving:

When asked the age when licenses were reviewed for fitness to drive in various countries and likely knowing that this may not particularly apply to their own country, 435 answered and 85 skipped the question. The age in most responses (298) ranged between 60-70 years (60 years: 22.5%; 65 years: 19.1% and 70 years: 26.9%). A smaller number (76) chose a fairly younger age of 50-55 years (50 years: 13.1%; 55 years: 4.4%) and even smaller number (61) chose an age of 75 years and older (75 years: 9.0%; 80 years 3.0% and 85 years: 2.1%).

Furthermore, respondents were asked about how often the license was re-issued thereafter (in countries where restrictions apply above a certain age). Out of 440 respondents, 35.4% thought it was done yearly, 25.7% every 2 years, 15.5% every 3 years, 1.8% every 4 years and 20.7% every 5 years.

481 responses considered a provided list of conditions as being relevant and which should be reported to the appropriate regulatory authorities (Figure 1). More than half of respondents considered as relevant and declarable to authorities in order of decreasing frequency epilepsy, visual impairment, alcoholism and drug dependence, blackouts and syncope, dementia, stroke with hemiplegia and insulin-treated diabetes. Less than half of the respondents considered the following as relevant and reportable: Parkinson's disease, sleep apnea, coronary artery disease and multiples sclerosis. Even less than a quarter of respondents considered the remaining conditions as relevant and perhaps reportable: any form of diabetes, depression, peripheral neuropathy, hypertension and primary hypothyroidism. Few suggestions were made including infections, glaucoma, brain tumors, dizzy spells, severe obesity, uncontrolled asthma, deafness and vertigo

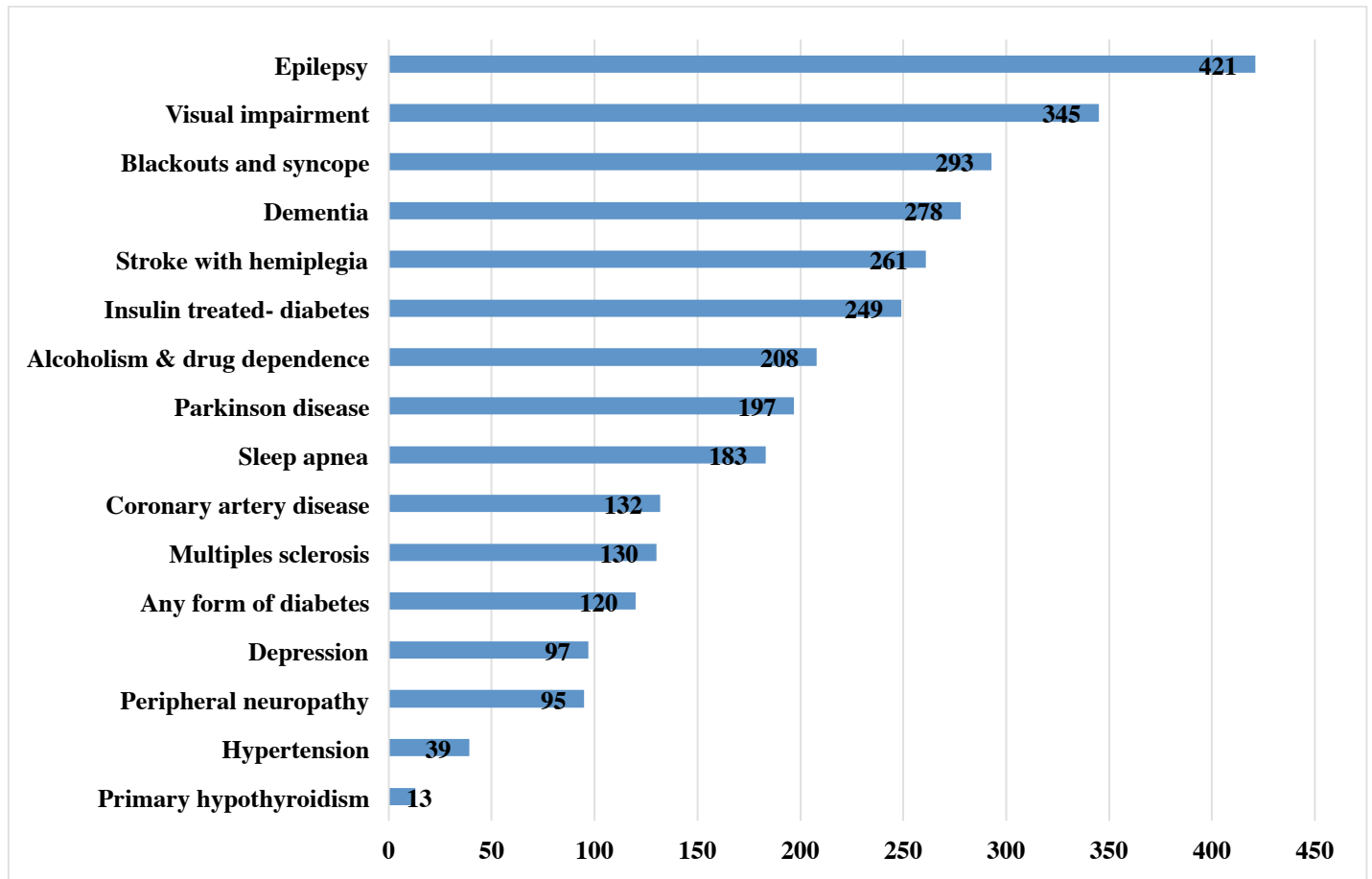


Figure 1. The frequency of medical conditions identified by respondents as relevant to driving and should be declared to the licencing authorities. Respondents could have made as many choices as they wished from a given list of conditions.

Safety concern for diabetic drivers

The principal safety concerns for driving for people with diabetes were considered by 492 respondents. 79.3% identified the risks of hypoglycemia and some 18.1% identified visual impairment due to diabetic retinopathy as a major risk. Diabetic ketoacidosis was identified as a risk by 1.6% and a smaller proportion 1.0% associated diabetic neuropathy 1.0%. 470 respondents identified the medication-associated risks to the drivers. In order of frequency, more respondents (85.1%) thought the risk to be the greatest in people treated with Insulin (85.1%) than with sulphonylureas (9.6%).

Albeit very small, some respondents still included metformin (2.8%), DDP-IV inhibitors (1.1%), GLP-1 agonists (0.6%), alpha-glucosidase inhibitors (0.6%) and SGLT2 inhibitors (0.2%).

Regulatory and educational aspects:

473 responders considered 5 statements about the responsibilities of patients and health care professionals such as doctors or diabetes educators, regarding the management, monitoring and reporting obligation (Table 2). The majority opinion was that doctors have responsibility of advising patients about the risks associated with driving and that drivers have an obligation to provide the required details to their insurance companies. However, there was a less favorable response to the notion that doctors should never break the confidentiality of patients, even if they felt that they may put themselves and others at risk. Many respondents thought that most countries strictly regulate driving by people with diabetes. Most respondents thought that physicians and patients with diabetes need to report information about Insulin therapy,

Table 2. The reactions of 473 respondents to statements about the regulatory/legal responsibilities of patients and doctors/educators.

Statement	Agree numbers (%)
Doctors have responsibility of advising patients about risk during driving.	451 (95.4%)
Drivers have an obligation to provide required details to their insurance companies.	244 (51.6%)
Doctors can never break the confidentiality of patients even if they feel that they may put themselves and others at risk.	37 (7.8%)
Drivers with diabetes on insulin has no obligation of monitoring more times before driving.	58 (12.3%)
In most countries driving diabetic people is strictly regulated.	74 (15.6%)

diabetes control, risk of hypoglycemia etc. to both the regulatory driving authority and insurance companies (68.4%). Under one third thought reporting is only needed to regulatory authorities (27.1%) and a smaller number thought reporting is only needed to the insurance companies (4.6%) (Table 2). The majority opinion was that doctors have responsibility of advising patients about the risks associated with driving and that drivers have an obligation to provide the required details to their insurance companies. However, there was a less favorable response to the notion that doctors should never break the confidentiality of patients, even if they felt that they may put themselves and others at risk. Many respondents thought that most countries strictly regulate driving by people with diabetes. Most respondents thought that physicians and patients with diabetes need to report information about Insulin therapy, diabetes control, risk of hypoglycemia etc. to both the regulatory driving authority and insurance companies (68.4%). Under one third thought reporting is only needed to regulatory authorities (27.1%) and a smaller number thought reporting is only needed to the insurance companies (4.6%)

Discussion

There has been an increasing interest in the medical aspects of driving safety on public roads (1,13-15). Though different aspects have been regulated in many parts of the world (2-4), concern has been expressed about the lack of adequate regulations in other parts (13-16). Physicians should be able to decide on the fitness to drive of a given patient in most medical circumstances. The ability of an elderly individual to drive, patients addicted to alcohol or drugs, under current psychotropic drug treatment, or having diabetes, are a few pertinent examples where a health care provider can provide an informed decision based on the individual circumstances

(2-4). However, in specific cases, expert opinion would naturally be required (10-11).

In the present paper, we report on results of an electronic survey of a large sample of health care professionals, mostly physicians, predominantly from the Middle East and North Africa. This region is known for several peculiar characteristics namely new wealth, slow development, wide geography, multiple sovereign entities and a relative lack of international cooperation (16). We are not aware of any prior study done to gain an insight into the prevailing perception of health care professions regarding the select medical aspects of safety of driving of motor vehicles in this region. We have used a well-established electronic survey provider and invited a large convenience sample from health care professionals who attended CPD activities and agreed to be contacted for future studies. Reminders were sent at 3-4 weekly intervals before closing the survey. Electronic surveys are more reliable than hard copy surveys as they give the recipient's time to answer honestly with no pressure or embracement. Therefore, we believe that the responses we obtained are representative of their own true views and those of the background population. The questionnaire was developed based on the objectives of the study.

The questions were simple, easy to manage and took less than 12-15 minutes by most serious respondents. The questionnaire had three domains in addition to its demographic data as shown in table 1. Both medical and regulatory aspects were included and in addition, a focus on diabetes was made driven by the increasing emergence of diabetes as major health problem in the GCC and MENA regions (17) the recent interest in safety concerns of drivers on insulin therapy (18-20). Respondents from UAE were over represented, however

there was still good representation from the rest of the GCC and MENA region for the results to be generalized.

We have shown that most respondents thought the age threshold after which medical assessment is required ranged between 60-70 years with a wide range of the interval (1-5 years) between the subsequent renewals of such licenses. The wide ranges offered suggest lack of clear knowledge on the part of the HCP's. Considering a list of conditions for relevance to driving and possibly reporting to authorities, more than half of the respondents identified as relevant and reportable to authorities obvious conditions such as epilepsy, visual Impairment, alcoholism and drug dependence, blackouts and syncope, dementia, stroke with hemiplegia and Insulin-treated diabetes. The principal safety concerns for driving in people with diabetes as identified by respondents included hypoglycemia and visual impairment due to diabetic retinopathy (21). More respondents thought the risk to be greatest in people treated with insulin, much greater than with sulphonylureas. This is expected but the difference is too great suggesting lack of appreciation of the risk of sulphonylureas-induced hypoglycemia (22). The majority opinion was that doctors have a responsibility of advising such patients about risk during driving and that the drivers have an obligation to provide required details to their insurance companies. This is *too idealistic* knowing that most of the countries in the region has no strict rules with the exception of the Emirate of Dubai, UAE (15), but this may infer a degree of preparedness if and when rules are passed elsewhere in the future. Furthermore, there was a less favorable response to the proposition that doctors should never break the confidentiality of patients, even if they feel that they may put themselves and others at risk. Most respondents thought that physicians and patients with diabetes need to report all relevant information to both the regulatory driving authority and the insurance companies. However, this may not be practically relevant as these are not required currently in most of the countries involved in the study and no mechanisms for reporting exist. Naturally, with passing of rules and regulations, physicians need to be educated about the ethical and legal grounds for their obligations.

Any medical condition or substance use that can influence a person's ability to control a vehicle or make the correct split second decision to avoid a potential accident should be identified and if present, should stop that person from operating any such vehicle (2-4).

Respondents in the present study have reasonably identified high-risk conditions such as epilepsy, syncope, dementia, and least relevant conditions such as primary hypothyroidism and hypertension. Strangely, not so many recognized insulin-treated diabetes as a relevant and reportable condition whereas they almost unanimously associated insulin therapy with elevated risk.

Inability to make the right decision at the right time or a physical limitation that limits the ability to carry out such an action immediately when required should preclude the right to drive (2-4). Driving should be considered in its entirety, which means that there are risks to self as well as others. In case of an accident, the driver may not only injure himself but also others, as well as cause material damage. Therefore it is a professional responsibility for physicians and educators to inform and empower patients with knowledge and practical skills for driving safely and it is the duty for regulatory authorities to put the required procedures for licensing or restricting individuals with specific medical condition. A great deal of collaboration between health services and driver and vehicle licensing agents is needed to propose the needed legislations, develop the bylaws and pathways towards their implementation. This study provided some baseline data on the perceptions of health care professionals. Adoption of comprehensive systems that have been tried and tested elsewhere (2-4) should speed the transition (15).

Limitations of the study include 1) cross sectional "open" nature of the study so selection bias could influence the findings 2) the questionnaire being developed de novo for this study and has not been used before though most of its contents was based on previously published literature may have omitted some relevant conditions such as obstructive sleep apnea. However, despite this the fairly large number of professional included gives it an added value as a new contribution from the developing world. The special focus on diabetes is understandable taking into consideration the increasing numbers of patients with diabetes in the targeted region of middle east and north Africa.

In conclusion, based on the data generated from this concise survey, it was evident that the majority of the participating health care providers had a good level of knowledge about the important medical conditions that influence the ability of an individual to drive.

Hypoglycemia was correctly identified as having the highest significance and insulin was identified as the most relevant medication. At the same time, most of the respondents also were convinced that reporting these conditions took precedence over patient confidentiality. However, what is unknown at this time is that despite the recognition of these factors and the willingness to report, whether this is actually being done, particularly outside of Europe and North America. An evaluation of the database of the relevant regulatory authorities as well as the insurance companies can help figure out the actual number of such reported cases in those regions. A better understanding and increased awareness of the relevant rules and regulations should also be encouraged in a manner that these are not deemed punitive in any manner for the collective welfare of all.

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