

Diabetes and driving recommendations among healthcare providers in Saudi Arabia

A significant gap that requires action

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ABSTRACT

الأهداف: تهدف هذه الدراسة إلى تقييم المعرفة لدى مقدمي الرعاية الصحية ووعيهم بالتوصيات الخاصة بالسائقين المصابين بالسكري المعالج بالأنسولين في المملكة العربية السعودية.

الطريقة: أجريت دراسة مستعرضة بين مقدمي الرعاية الصحية العاملين في أربع مستشفيات في الرياض، بالمملكة العربية السعودية بين أبريل 2016 وديسمبر 2016م باستخدام استبيان ذاتي الإستخدام.

النتائج: تم اكتمال الاستبيان من 285 من مقدمي الرعاية الصحية (معدل الاستجابة 88.5%). معظمهم (70.2%) كانوا على دراية بالتوصيات للسائقين الذين يعانون من مرض السكري الذي يعالج بالأنسولين والقيادة الآمنة. ومع ذلك، فإن ما يقرب من الثلث (30.2%) قللوا من شأن أهمية الحاجة إلى التحقق من مستويات السكر في الدم قبل القيادة. فقط ربع (24.6%) تمكن من تحديد المستوى الصحيح لمستوى السكر في الدم الآمن للمريض عند القيادة، 28.4% تمكن من تحديد الوقت الموصى به لفحص مستوى السكر في الدم قبل القيادة. وكان المشاركون الذين كانوا على اطلاع على توصيات القيادة الآمنة أعلى بكثير في متوسط درجة المعرفة (68.8%) من أولئك الذين لم يكونوا على اطلاع (58.8%) ($p < 0.001$). كان هناك أيضا فرق كبير في متوسط درجات المعرفة بين التخصصات الطبية ($p = 0.002$) ومستويات الوظيفة ($p > 0.001$).

الخلاصة: وقد حدد معظم مقدمي الرعاية الصحية أهمية تقييم مرضاهم لقدرتهم على القيادة، ولكن وجدنا نقص المعرفة في بعض النقاط الهامة. التدخل المهني لتحسين وعي مقدمي الرعاية الصحية والمعرفة بشأن مرض السكري والقيادة هو الخطوة الأولى في تحسين الكشف، والإبلاغ عن السائقين ذوي المخاطر من مرض السكري لمنع حوادث القيادة في المستقبل.

Objectives: To assess healthcare providers' knowledge and awareness of the recommendations for drivers with insulin-treated diabetes in Saudi Arabia.

Methods: A cross-sectional study was conducted among healthcare providers working at 4 tertiary hospitals in

Riyadh, Saudi Arabia between April 2016 and December 2016 using a self-administered questionnaire.

Results: A total of 285 healthcare providers completed the survey (response rate 88.5%). Most (70.2%) were aware of the safe driving recommendations for patients with insulin-treated diabetes. However, the need to check blood glucose levels before driving was underestimated by almost one-third (30.2%). Only one-quarter (24.6%) identified the correct level of blood glucose level that is safe for a patient when driving, and 28.4% identified the recommended time for checking blood glucose before driving. Participants who were aware of the recommendations for safe driving had a significantly higher average knowledge score (68.8%) than those who were not aware (58.8%; $p < 0.001$). There was a significant difference in the average knowledge score among medical specialties ($p = 0.002$) and job levels ($p < 0.001$).

Conclusions: Most healthcare providers identified the importance of evaluating their patients for ability to drive safely, but we found some important areas of knowledge deficit. Professional intervention to improve healthcare providers' awareness and knowledge regarding diabetes and driving is the first step in improving detection and reporting high-risk drivers with diabetes to prevent future driving mishaps.

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Driving is an essential mode of transport for people in most countries. It is a common essential daily task that requires visual, motor, and cognitive skills to be carried out safely. Safe driving has always been a top priority worldwide, and it has gained medical research attention because it has a considerable effect on the public's physical, social, and financial satisfaction.¹ A driver's medical conditions, such as diabetes, as well as an increasing age, both reduce driving safety and may contribute to an increase in the number of accidents.² The majority of individuals with diabetes are capable of driving safely. However, the ability to drive safely can sometimes be compromised by symptoms or complications of the disease.³ Several studies have shown that diabetes might influence driving fitness in numerous ways, including but not limited to hypoglycemia, hyperglycemia, visual impairment, and other diabetes complications.^{2,4} Hypoglycemia, which is a common side effect of insulin or insulin secretagogue therapy, is known to have deleterious effects on cognitive function.⁵ In addition, driving requires a high metabolic demand, which could contribute to hypoglycemic events in patients with Type 1 diabetes.⁶ This can lead to driving mishaps and cause road traffic accidents. Therefore, most Western countries have specific restrictions on commercial licenses for drivers with diabetes, which may impair their ability to drive.⁷ The Australian Diabetes Association recommend that patients with diabetes should ensure their blood glucose level is above 5 mmol/L every 2 hours while driving, and advise keeping a fast acting carbohydrate food or drink item in the vehicle.⁸ Similarly, the American Medical Association (AMA) suggest that physicians should evaluate each patient's fitness to drive. They should also contact the department of motor vehicles to report any evidence of substantial driving impairment where such impairment may increase the threat to the safety of the patient and the public.⁹

Currently, diabetes mellitus is a prevalent disease worldwide. The number of people with diabetes was 382 million in 2013, and this is expected to rise to an estimated 592 million by 2035.¹⁰ The prevalence of diabetes in the Kingdom of Saudi Arabia has recently

been ranked as the second highest in the Middle East, and seventh in the world, with approximately 7 million people having diabetes and almost 3 million having pre-diabetes.¹¹ This prevalence has also increased 10-fold in the last 3 years.¹¹ Motor vehicle accidents in Saudi Arabia are considered to be one of the most common causes of mortality and morbidity. In 2014, the statistical yearbook reported 478,450 accidents, with 35,843 people injured and 7,486 people killed.¹² The risk of being involved in a motor vehicle accident in Saudi Arabia is expected to rise, as the number of drivers with diabetes continues to increase.

Despite this alarming figure, most Middle Eastern countries, even the most developed ones, have no restrictions on driving and diabetes.¹³ Unfortunately, this issue has not been addressed adequately in our region and Saudi Arabia still lacks any health/professional organizations or public agencies that focus on this issue. Although spouses/caregivers and the patients themselves are a good source of information on their diabetes management, the best information on a driver's prescribed diabetes management comes from health care professionals. However, few studies have been conducted to assess the physicians' awareness and knowledge about diabetes and driving. Although these studies have reported that physicians have suboptimal knowledge regarding diabetes and driving, none of these studies were published recently or locally.¹⁴⁻¹⁶ A recent review concerning the management of diabetes and driving in the Gulf Council Countries (GCC) proposed recommendations to help drivers with diabetes as well as provided guidance to healthcare providers to manage these patients.¹³ An assessment of healthcare providers' awareness and knowledge of the issues surrounding diabetes and driving is necessary in order to implement such recommendations and guidance. Therefore, this research is intended to determine the awareness and knowledge of healthcare providers in Saudi Arabia surrounding the recommendations for drivers with insulin-treated diabetes.

Methods. The design of the present study is cross-sectional. A self-administered questionnaire was completed by healthcare providers at 4 tertiary hospitals in Riyadh, Saudi Arabia. Ethical approval was obtained from the Institutional Review Board, College of Medicine, King Saud University (No. E-16-1815). All participants provided informed consent before the completion of the questionnaires.

A group of healthcare providers in 4 tertiary hospitals in Riyadh, Saudi Arabia was approached between April and December 2016. These providers work in areas that

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allow them to deal directly with diabetic patients, such as internal medicine, family medicine, endocrinology, diabetology, and diabetes education. All healthcare providers present at the time of data collection were included. They were presented with a paper copy of the questionnaire during their routine educational activities. Before seeing the questionnaire, they were asked to complete an anonymous self-report questionnaire in English to access their basic background knowledge of diabetes. Participants were excluded if they had no experience treating patients with diabetes.

An extensive review of published studies on diabetes and driving has been conducted to develop a survey instrument; there is no valid and reliable questionnaire to address this issue. Therefore, 3 investigators developed a draft questionnaire based on the evaluation of expert recommendations, and international diabetes guidelines.^{8,13,16,17} The questionnaire consists of 2 main sections. The first section includes participants' demographics information (age, gender, nationality, specialty, job title, duration of practice, frequency, and percentage of patients with diabetes seen by the provider compared to other patients), their awareness of the recommendations regarding diabetes and driving, and whether they had a patient who has experienced a driving mishap resulting from diabetes. Section 2 was developed to assess the provider's knowledge toward diabetes and driving specifically, by asking multiple-choice questions (Appendix 1).

Content validity was evaluated by a panel of 2 family physicians and 2 diabetologists who were familiar with the diabetes guidelines and survey development. They assessed the questionnaire's appropriateness, accuracy, and relevance. Minor changes were made based on their recommendations. To test reliability and consistency of answers, a pilot study was conducted involving 20 physicians from different specialties at King Khalid University Hospital. They completed the questionnaire at 2 time points (baseline, and one month later). Good test-retest consistency was found ($\kappa=0.88$, $p<0.001$). Baseline questionnaires from the pilot study were excluded from the main study, and were not subject to any further analyses.

We calculated the sample size based on the results of the pilot study. Based on a confidence interval of 95%, 5% margin of error, and 76% awareness of healthcare providers toward diabetes and driving, the appropriate sample size was calculated to be 280. Taking into account the non-response rate of 15%, the survey questionnaire was distributed among 322 participants.

Statistical analysis. The Statistical Package for the Social Sciences (SPSS) software version 21 was used

for the data analysis.¹⁸ Descriptive statistics such as the mean, standard deviation, frequency distribution, and percentages were used. Eleven questions assessed health care providers' knowledge toward diabetes and driving. For each question, a correct answer was scored as 1 point, while an incorrect answer was given a score of 0. The percentage of mean knowledge score was computed by adding the correct answers to all 11 questions multiplying by 100 and dividing by 11; possible total mean scores ranged from 0 to 100. Moreover, methods of inferential statistics such as an independent t-test and one-way ANOVA test were used to compare the mean knowledge percentage scores with different levels of categorical variables. The linear relationship between healthcare providers' knowledge percentage scores and other continuous variables was assessed using a correlation coefficient. Significance was defined at a 2-tailed *p*-value of 5% for all analyses.

Results. A total of 322 surveys were distributed to healthcare providers, and 285 completed the survey (response rate 88.5%). Of the 285 participants, 170 (59.6%) were males. With 168, family physicians represent the highest proportion of the respondents (58.9%), followed by 71 internists (24.9%), 25 endocrinologists/diabetologists (8.8%), and 21 diabetes educators (7.4%). Among them, 113 (39.6%) were residents, 79 (27.7%) were consultants, 72 (25.3%) were registrars, and 21 (7.4%) were diabetes educators. The mean years of practice was 10.6 ± 8.8 years, while the mean number of patients with diabetes in an outpatient setting seen in one week was 30 ± 28 patients. Approximately one-third of the participants (36.1%) had 30% to 50% diabetes patients among all patients that they have seen. A summary of participants' demographic characteristics is presented in Table 1.

Two hundred (70.2%) were aware to the recommendations for drivers with insulin-treated diabetes and safe driving, and 128 (44.9%) had a patient who experienced driving mishaps resulting from diabetes. Knowledge about drivers with insulin-treated diabetes and safe driving 241 participants (84.6%) knew that their patients required evaluation for their ability to drive, and 251 (88.4%) knew that drivers should stop and treat themselves as soon as hypoglycemia and/or impaired driving is suspected. Approximately 201 (70.5%) correctly identified the type of diabetes associated with higher incidence of driving mishaps. However, the need for patients with diabetes to check their blood glucose levels before driving was underestimated by 86 participants (30.2%), and in 112 (39.3%), the

Table 1 - Healthcare providers' demographics

| Categorical variables | n (%) |
|---|------------|
| Gender | |
| Male | 170 (59.6) |
| Female | 115 (40.4) |
| Nationality | |
| Saudi | 198 (69.5) |
| Non-Saudi | 87 (30.5) |
| Specialty | |
| Family physicians | 168 (58.9) |
| Internist | 71 (24.9) |
| Endocrinologist/ diabetologist | 25 (8.8) |
| Diabetes Educator | 21 (7.4) |
| Job title | |
| Consultant | 79 (27.7) |
| Registrar | 72 (25.3) |
| Resident | 113 (39.6) |
| Diabetes Educator | 21 (7.4) |
| Proportion of patients with diabetes among all patients seen | |
| <10% | 20 (7.0) |
| 10-30% | 94 (33.0) |
| 30-50% | 103 (36.1) |
| >50% | 68 (23.9) |
| Awareness to the recommendations for insulin treated patients with diabetes and safe driving | |
| Aware | 200 (70.2) |
| Unaware | 85 (29.8) |
| Had a patient who experiences driving mishaps due to his diabetes | |
| Yes | 128 (44.9) |
| No | 157 (55.1) |
| Continuous variables mean±SD | |
| Age | 36.7±10 |
| Years of practice | 10.6±8.8 |
| Total number of patients with diabetes in outpatient setting seen in a week | 30±28 |

importance of not driving after effective treatment of mild to moderate hypoglycemia was underestimated. The need to carry fast-acting carbohydrates while driving (87.4%), to carry glucose meters while driving (82.8%), and to carry identification that indicates that the patient has diabetes (93.7%) were correctly identified. However, only 70 (24.6%) were able to identify the correct level of blood glucose at which it is safe for the patient to drive, 81 (28.4%) were able to identify the recommended time at which to check blood glucose levels before driving, and 90 (31.6%) knew the recommended time at which to recheck blood glucose levels during a long trip (Table 2).

The level of knowledge in relation to different demographic characteristics. There was no significance difference between the mean knowledge score of males (66.5±17.7) and females (64.4±22.9; $p=0.382$). However, the Saudi nationality record score was, on

Table 2 - Proportions of healthcare providers' knowledge regarding insulin treated patients with diabetes and safe driving.

| Question | n (%) |
|--|------------|
| Correctly answered that insulin-treated patients with diabetes require evaluation for their ability to drive | 241 (84.6) |
| Correctly answered that Insulin-treated patients with diabetes need to check their blood glucose before driving | 199 (69.8) |
| Correctly answered the level of blood glucose which is safe for the patient to drive | 70 (24.6) |
| Correctly answered the recommended time for checking blood glucose before driving | 81 (28.4) |
| Correctly answered persons with diabetes should not drive after effective treatment of mild to moderate hypoglycemia | 173 (60.7) |
| Correctly answered the recommended time for rechecking blood glucose during long-time trip | 90 (31.6) |
| Correctly answered the type of diabetes associated with higher incidence of driving mishaps | 201 (70.5) |
| Correctly answered drivers should stop and treat themselves as soon as hypoglycemia and/or impaired driving is suspected | 252 (88.4) |
| Correctly answered that insulin-treated patients who have diabetes need to carry fast acting carbs during driving | 249 (87.4) |
| Correctly answered that insulin-treated patients who have diabetes need to carry their glucose meters during driving | 236 (82.8) |
| Correctly answered that insulin-treated patients who have diabetes need to carry ID that says they have diabetes | 267 (93.7) |

average, 63.2 ± 19.0, which was significantly lower than non-Saudi scores (71.3±20.9; $p=0.002$). Participants who were aware of the recommendations for drivers with insulin-treated diabetes and safe driving had significantly higher average score (68.8 ± 18.6) than those who were not aware (58.8±21.1; $p<0.001$; Table 3).

A one-way ANOVA test showed that there was a significant difference among the levels of medical specialties ($p=0.002$) and among the job's levels ($p<0.001$). However, Dunnett's T3 one-way ANOVA post hoc multiple comparison test showed that the average knowledge score was higher among endocrinologists/diabetologists (74.6±14.4) and diabetes educators (75.3±11.6) compared with family physicians (65.4±20.3) and internists (60.3±20.8; Dunnett's T3, $p<0.05$). Additionally, residents had the lowest average knowledge score (58.4 ± 18.8) compared to other job categories (Dunnett's T3 $p<0.05$; Table 4).

A regression model with participants' age, years in practice, and the number of diabetic patients they treated in one week as predictor variables fit the knowledge score data well, $F(4, 280) = 18.39$, $p<0.001$, $R_2 = 0.21$. Years in practice added significantly to the

Table 3 - Comparing the average mean knowledge percentage scores for variables with 2 levels.

| Variable | N | Mean | SD | 95% confidence interval of the difference | |
|---|-----|------|------|---|--------|
| | | | | Lower | Upper |
| <i>Gender</i> | | | | -2.643 | 6.837 |
| Male | 170 | 66.5 | 17.7 | | |
| Female | 115 | 64.4 | 22.8 | | |
| <i>Nationality</i> | | | | -13.001 | -3.073 |
| Saudi | 198 | 63.2 | 19 | | |
| Non-Saudi | 87 | 71.2 | 20.9 | | |
| <i>Awareness to the recommendations for insulin treated patients with diabetes and safe driving</i> | | | | 5.434 | 15.320 |
| Yes | 200 | 68.7 | 18.6 | | |
| No | 85 | 58.3 | 21.1 | | |
| <i>Had a patient who experiences driving mishaps due to his diabetes</i> | | | | -0.497 | 8.815 |
| Yes | 128 | 67.9 | 17.4 | | |
| No | 157 | 63.8 | 21.6 | | |

Table 4 - Comparing the average mean knowledge percentage scores for variables with more than 2 levels.

| Variable | Sample size | Mean | SD | ANOVA p-value | 95% confidence interval for mean | |
|---|-------------|------|------|---------------|----------------------------------|-------|
| | | | | | Lower | Upper |
| <i>Specialty</i> | | | | 0.002 | | |
| Family physician | 168 | 65.4 | 20.3 | | 62.3 | 68.5 |
| Internist | 71 | 60.3 | 20.8 | | 55.3 | 65.2 |
| Endocrinologist/ Diabetologist | 25 | 74.5 | 14.3 | | 68.6 | 80.4 |
| Diabetes Educator | 21 | 75.3 | 11.5 | | 70.1 | 80.5 |
| <i>Job title</i> | | | | 0<.001 | | |
| Consultant | 79 | 72.8 | 19.9 | | 68.3 | 77.3 |
| Registrar | 72 | 66.5 | 19.7 | | 61.9 | 71.1 |
| Resident | 113 | 58.4 | 18.8 | | 54.9 | 61.9 |
| Diabetes educator | 21 | 74.8 | 11.4 | | 69.6 | 80.1 |
| <i>Proportion of patients with diabetes among all patients seen</i> | | | | 0.27 | | |
| <10% | 20 | 60 | 27.7 | | 47 | 72.9 |
| 10-30% | 94 | 66.8 | 18.7 | | 62.9 | 70.6 |
| 30-50% | 103 | 63.9 | 18.6 | | 60.3 | 67.6 |
| >50% | 68 | 68.3 | 20.5 | | 63.3 | 73.2 |

prediction ($p=0.02$), while age and number of patients treated did not ($p=0.52$, $p=0.47$).

Discussion. This is a formal survey of healthcare providers' knowledge regarding diabetes and safe driving in Saudi Arabia. While most participants identified the importance of evaluating their patients for their ability to drive, and two-thirds were aware of the recommendations for drivers with insulin-treated diabetes and safe driving, we found some important knowledge gaps. Participants were generally able to clinically advise drivers that they should stop and treat themselves as soon as hypoglycemia and/or impaired driving is suspected. However, 24.6% were able to

identify the correct blood glucose level at which it is safe for the patient to drive and 28.4% were able to identify the recommended time at which blood glucose levels should be checked before driving. In addition, less than one-third knew the recommended time at which to recheck blood glucose levels during a long trip. Knowledge of the need to check blood glucose levels before driving and the importance of not driving after effective treatment of mild to moderate hypoglycemia was also suboptimal; these are important factors when assessing safe driving in patients with diabetes.

A number of health conditions can lead to increased risk of motor vehicle crashes (MVCs).¹⁹ One meta-analysis demonstrates that diabetic drivers are 12%

more likely than healthy controls to be involved in MVCs,²⁰ although a more recent meta-analysis suggests that there is only an increased risk for insulin-dependent patients.²¹ However, patients with diabetes often receive little to no advice on how to ensure safety on the road.⁵ Approximately one-third of the participants in our study were unaware of the recommendations for drivers with insulin-treated diabetes and safe driving. Other surveys have reported that more than half of the primary care physicians in Saudi Arabia did not consider diabetes to be a fitness-to-drive risk.²² Our healthcare providers who are aware of the recommendations for diabetes and driving have a higher mean knowledge score than unaware participants; therefore, healthcare providers who are unfamiliar with the diabetes and driving recommendations will be more likely to inappropriately educate patients with diabetes on safe driving. Further efforts are needed to conduct extensive educational programs for healthcare providers to increase their awareness and knowledge, and then determine the effect of such an intervention on the detection and management of high risk drivers with diabetes.

The risk of clinically significant hypoglycemia occurring while driving is a major concern for diabetic drivers in the GCC countries.¹³ Hypoglycemia-induced traffic accidents can be prevented by checking the blood glucose level in insulin-treated patients with diabetes before driving and after 2 hours of driving.² However, in our survey the need to check blood glucose levels before driving was underestimated by almost one-third (30.2%) of the participants, and 39.3% underestimated the importance of not driving after effective treatment of mild to moderate hypoglycemia, and only 24.6% were able to identify the correct level of blood glucose at which it is safe for the patient to drive. This is consistent with a Scottish study which showed that 13% of health care professionals thought it safe to drive with blood glucose <72 mg/dL (4 mmol/L).²³ Our findings indicate that the majority of healthcare providers had poor knowledge regarding diabetes and driving, and that they underestimated the risk of hypoglycemia while driving in patients with diabetes.

Many patients with diabetes think that it is safe to drive within the hypoglycemic range.²⁴ Therefore, it is important that healthcare providers inform their patients with diabetes of the precautions they need to take to minimize their risk on the road and ensure safe driving. They should also inform them of any legal requirement to report their diabetic status to the licensing authorities. There is, unfortunately, no such legal requirement in any of the GCC countries.¹³ It is worth noting, however, that despite receiving education

on driving with insulin-dependent diabetes, patients often fail to absorb the information they receive and put it into practice.²⁴ This may highlight increased regulation as a favored approach to increased education.

Study limitations. The study has some limitations, which are mostly related to the survey design whereby the results showed associations and not necessarily causal relationships. These data were collected from tertiary medical centers in Riyadh. Healthcare providers from other local hospitals or clinics and other regions were not included in the survey. Therefore, the actual awareness and knowledge may be lower than the reported data in this study. Variation in the number of participants from different specialties and the lack of a well-structured survey are considered to be limitations of this study. To minimize the latter limitation, the survey was validated by a panel of experts and the reliability of the survey was measured using the test re-test reliability method.

In conclusions, patients' medical fitness to drive is often neglected in clinical practice as well as in local research that assessed traffic violations as a cause of MVCs.²⁵ Lack of country-specific rules and guidelines may contribute to the lack of healthcare providers' knowledge regarding diabetes and driving in the present survey. Healthcare providers, legislators, administrators of traffic licensing, and patients with diabetes all have a responsibility to ensure safety on the road. Professional intervention to improve healthcare providers' awareness and knowledge regarding diabetes and driving is the first step in improving detection. Reporting high-risk drivers with diabetes will also reduce future driving mishaps. Our data can be used as a benchmark to formulate effective awareness and educational programs. It is also timely to include discussions on safe driving with diabetes at local and regional medical meetings to prepare for a dialogue with licensing authorities on how best to incorporate assessment of medical fitness in licensing these drivers.

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Appendix 1 - Assessment of health care providers' awareness, and knowledge to the recommendations of diabetes and safe driving

I would like to participate in this study by filling this Questionnaire.

I wouldn't like to participate in this study.

Section 1: Physician demographics.

Please answer each of the following questions by entering some information or ticking the appropriate choice:

1. Age Years: _____
2. Gender Male
 Female
3. Specialty: Family medicine
 Internal medicine
 Endocrinology/diabetologist
 Diabetes educator
4. Nationality: Saudi
 Non-Saudi
5. Job title: Consultant
 Registrar
 Resident
 Diabetic educator
6. How many years have you been in practice since completing your medical college:
 _____ # of years
7. Approximately how many diabetic patients in outpatient setting do you see in a week?
 _____ # of total diabetic patients/week
8. Approximately what is the proportion of diabetes patients among all patients seen?
 a. <10%
 b. 10-30%
 c. 30-50%
 d. >50%
9. Are you aware to the recommendations for insulin treated patients with diabetes and safe driving?
 Yes
 No
10. Have you ever had a patient who experiences driving mishaps due to his diabetes?
 Yes
 No

Section 2: The following questions and statements are specific to diabetes and safe driving. Please respond to the best of your knowledge, and if you are unsure on any question, select "don't know".

11. Insulin-treated patients with diabetes require evaluation for their ability to drive?
 a. Yes
 b. No
 c. Don't know
12. Insulin-treated patients with diabetes need to check their blood glucose before driving?
 a. Yes
 b. No
 c. Don't know
13. The level of blood glucose which is safe for the patient to drive is?
 a. >4mmol/l
 b. >5mmol/l
 c. >6mmol/l
 d. >7mmol/l
 e. Don't know
14. The recommended time for checking blood glucose before driving is?
 a. Just before driving
 b. 30 minutes before
 c. 60 minutes before
 d. 90 minutes before
 e. Don't know
15. Persons with diabetes should not drive after effective treatment of mild to moderate hypoglycemia until at least minutes?
 a. 5 to10 min
 b. 15 to 20 min
 c. 30 to 45 min
 d. Don't know

Appendix 1 - Assessment of health care providers' awareness, and knowledge to the recommendations of diabetes and safe driving (Continued).

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16. During long-time trip, the recommended time for rechecking blood glucose is?
- Every hour
 - Every two hours
 - Every three hours
 - Every four hours
 - Don't know
17. Which type of diabetes associated with higher incidence of driving mishaps?
- Type 1
 - Type 2
 - Don't know
18. Drivers should stop and treat themselves as soon as hypoglycemia and/or impaired driving is suspected?
- Yes
 - No
 - Don't know
19. Do you think that insulin-treated patients with diabetes shouldn't drive?
- Yes
 - No
 - Don't know
20. Insulin-treated patients who have diabetes need to carry fast acting carbs during driving?
- Yes
 - No
 - Don't know
21. Insulin-treated patients who have diabetes need to carry their glucose meters during driving?
- Yes
 - No
 - Don't know
22. Insulin-treated patients who have diabetes need to carry ID that says they have diabetes?
- Yes
 - No
 - Don't know
-

Case Reports

Case reports will only be considered for unusual topics that add something new to the literature. All Case Reports should include at least one figure. Written informed consent for publication must accompany any photograph in which the subject can be identified. Figures should be submitted with a 300 dpi resolution when submitting electronically. The abstract should be unstructured, and the introductory section should always include the objective and reason why the author is presenting this particular case. References should be up to date, preferably not exceeding 15.